VDI Technologiezentrum

Social Changes 2030

Volume 1 of results from the search phase of BMBF Foresight Cycle II

Axel Zweck, Dirk Holtmannspötter, Matthias Braun,
Michael Hirt, Simone Kimpeler, Philine Warnke

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1 OVERVIEW OF THE FORESIGHT PROCESS

Foresight is an instrument that provides a long-term perspective so that orientational knowledge for strategic decisions can be generated at an early stage. Since 2007, the German Federal Ministry of Education and Research (BMBF) has adopted a cyclical method for its Foresight processes. The last completed BMBF Foresight process (Cycle I, 2007-2009) centred on a technology-oriented approach. For Cycle II (2012-2014), the emphasis is on future social trends and challenges. With the completion of the search phase of the second cycle of the BMBF Foresight process, exciting results concerning future social and technological developments with a time horizon of 2030 are now available. The process addresses possible upheavals in the fields of health, research and innovation, education, business, politics and work. This Foresight process was conducted on a subcontractor basis by VDI Technologiezentrum GmbH in conjunction with the Fraunhofer Institute for Systems and Innovation Research (ISI), as the *Foresight Office* (Büro Foresight).

Cycle II: social challenges in focus

Time horizon 2030

Foresight provides BMBF with orientational knowledge concerning possible future social and technological trends, so that emerging challenges can be identified at an early stage and, if necessary, addressed via research and/or innovation policy measures. From the point of view of the *Foresight Office*, it is not claimed that the identified trends and challenges are entirely new to BMBF. Instead the intention is to provide the ministry with a full and complete basis for discussion, and to highlight implications for research and innovation policy.

Orientational knowledge for BMBF

Meanwhile, the findings of the Foresight process are of interest not only for research and innovation activities, as businesses can also use the findings to identify challenges and prospects for the future in their business areas.

Orientational knowledge for businesses

A method consisting of three work stages was chosen for the Foresight process (see figure 1).As the first stage (A), social trends and challenges with a time horizon of 2030 were identified. The key results from the first work stage have been compiled in this volume as sixty trend profiles on social developments, and seven topic areas involving social challenges.

Work stage A: 60 trend profiles and 7 topic areas with challenges for society

The BMBF Foresight process comprises three steps

1. Identify social trends and challenges

2. Compile research and technology perspectives

3. Work out innovation seeds

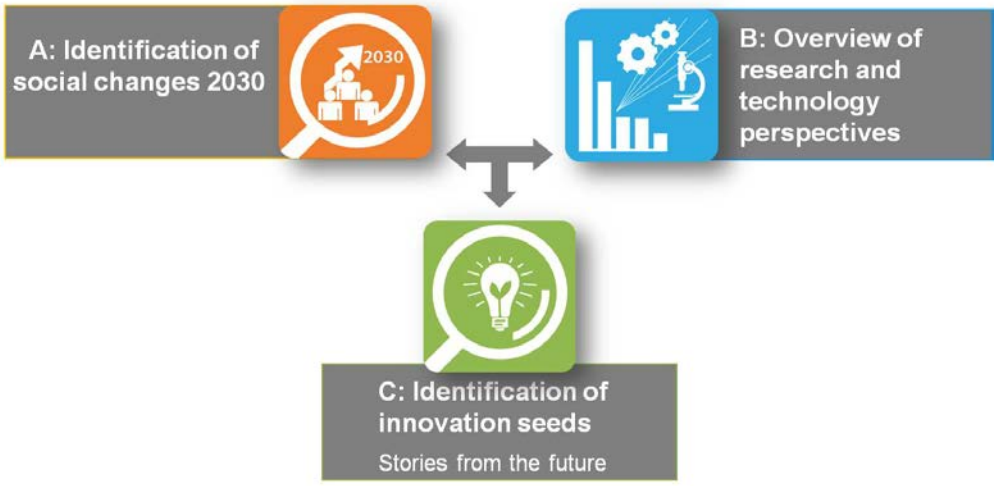

Figure 1: Three work stages for the search phase of BMBF Foresight Cycle II

Work stage B: 11 fields with research and technology perspectives (vol. 101)

In the second work stage (B), research and technology perspectives with particular application potential were identified. The most important results from eleven research and technology fields have been compiled in volume 101 (only available in German).

Work stage C: Stories from the future about 9 innovation seeds (vol. 104):

The task in the third work stage (C) was to identify new challenges at the interfaces between society and technology, in the form of innovation seeds. Innovation seeds form a basis for new potential missions in research and innovation policy. To identify the innovation seeds, the social challenges that were identified (A) were linked with the research and technology perspectives (B). To illustrate the future significance of the final nine innovation seeds, example visions of the future (Stories from the future, volume 104) were formulated for the innovation seeds, and central challenges and opportunities outlined.

The following sections describe the method and the results from the first work stage, “Identification of social changes”.

2 FORESIGHT AT THE BMBF

Foresight is a strategic instrument that provides a long-term perspective and is used globally in business and politics to generate orientational knowledge and management information for strategic decisions at an early stage. To this end, suitable knowledge banks are accessed, combined and prepared in appropriate ways. While Foresight for business (Corporate Foresight) in many cases concentrates on a particular market or industry environment, foresight for the political administration covers a broader spectrum, taking in both the social and the technological perspective.

BMBF has used Foresight for many years

The German Federal Ministry of Education and Research (BMBF) has used Foresight for many years as an anticipatory and interdisciplinary instrument to obtain systematic orientational knowledge and current information for strategic decisions in the research and innovation environment. BMBF's Foresight processes have been organised in defined cycles since 2007. As figure 2 shows, each cycle consists of a search and analysis phase, a transfer of the results into the spheres of business, science, society and politics, and preparation for the next cycle. So far this cycle has been completely worked through once (Cycle I).

Since 2007, Foresight has been implemented in defined cycles.

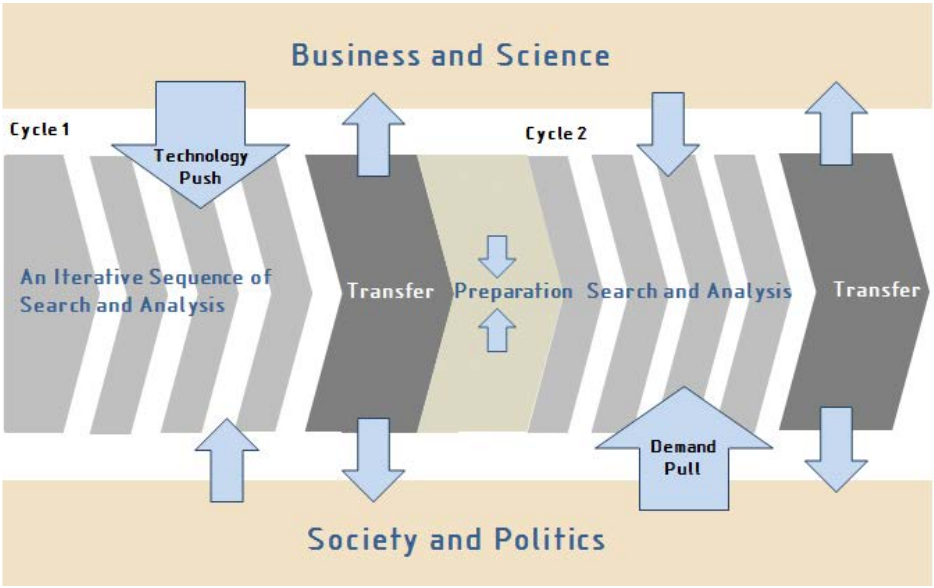

Figure 2: Sequence and phases of BMBF Foresight processes since 2007

BMBF Foresight Cycle I (2007-2009)

For the completed Foresight Cycle I (2007-2009), the BMBF chose an approach based on research and technology (technology push). Foresight Cycle I was conducted from 2007 to 2009. It highlighted research fields with future relevance that may become relevant to the research agenda with a time horizon of 10 to 15 years. Technology trends were identified that either develop out of established research and technology fields (referred to as "Established Future Fields"), or which either lie beyond

existing subject and programme definitions or are found at the intersections between existing disciplines (referred to as “New Future Fields”).

BMBF Foresight Cycle II (2012-2014) is complementary to Cycle I and focuses on changed needs resulting e.g. from social transformation. The overriding aim of BMBF Foresight Cycle II is to identify social challenges at the interfaces between society and technology in the form of innovation seeds. As emphasised in the High-Tech Strategy 2020, the main innovation drivers are considered to be “new technologies, services, and new social developments or changes, but also global challenges to which solutions and responses need to be found”[1]. In light of this, the current BMBF Foresight Cycle II (2012-2014) identifies future global social challenges relating to Germany that will be relevant between now and 2030.

Apart from the original task of Foresight – to identify new trends and topics – the current challenges of Foresight processes lie in filtering a glut of multimedia information on a project-related basis, i.e. in deciding which of the many developments that are publicised around the world are particularly relevant to the ministry. Therefore, in addition to the departments’ Foresight activities[2], BMBF Foresight Cycle II has concentrated on determining possible fields of action for overarching global social challenges.

1 BMBF (ed.) (2010): Ideen. Innovation. Wachstum. Hightech-Strategie 2020 für Deutschland. Bonn, Berlin.

2 Cf. ITA - Die Innovations- und Technikanalyse, at: http://www.innovations- und technikanalysen.de. Accessed on 28 January 2014

3 METHOD FOR IDENTIFYING SOCIAL CHANGES BY 2030

In the first work stage (A), social trends and challenges relevant to research and innovation with a time horizon to 2030 were identified (see figure 1). Analysis was carried out in two steps:

Two sub-steps: social trends (A1) and social challenges (A2)

- A1 Identify social trends
- A2 Derive challenges for society

Social trends were identified (A1) with the aid of defined search criteria (cf. section 3.1) and various search strategies. Trends – following the general dictionary definition – were here understood to be development tendencies that can be observed over a certain period of time. Building on this, social trends were defined as new developments or changes in political and social processes[3] and in their structures and actors[4] with far-reaching potentials, which in turn may produce and/or change a social need. In BMBF Foresight Cycle II, the focus was on social trends that may become relevant or are still relevant by 2030. To detect different trends in different manifestations, three search strategies were developed.

Identification via specific search criteria and various search strategies

To identify the challenges for society (A2), the social trends identified in step A1 were analysed further (cf. section 3.2). "Challenges for society" is understood to mean the specific organisational tasks lying behind the social trends that large communities face, and which arise or change as a result of the transformation of society and/or technologies. To highlight the challenges, interdependency analyses were carried out, in which social trends were grouped together and common topic areas identified.

Identifying social challenges

3 Political and social processes take place in communication, cultural rules and conventions, routines of action and forms of collectivisation, cf. also Fuchs-Heinritz, W. et al. (eds.) (2007): Lexikon zur Soziologie. Wiesbaden, Westdeutscher Verlag.

4 „Actors" means individuals, groups, organisations and institutions. The structures of social coexistence can be described in terms of roles, institutions, markets and networks.

3.1 Identifying social trends

Extensive source material was evaluated

To identify social trends, a very extensive range of sources was sifted through, representing the full spectrum of relevant topics and formats that are relevant for social trends to the year 2030. These ranged from national and international specialist literature on futurology and social change, to strategy papers by research institutes, to blogs. Particular emphasis was placed on the quality of sources. Figures, dates and facts were as far as possible taken from institutions that are respected in the specialist field. It was possible to increase the reliability of results by triangulation, meaning that several different sources support a statement. In addition, care was taken to achieve balance between sources: between research results and theories from the specialised disciplines and futurology on the one hand, and contributions from practice from research and innovation, politics, business and the public on the other.

Interdisciplinary researcher teams and a wide range of methods to avoid "blind spots"

To validate the results and reduce "blind spots" while researching social trends, a combination of interdisciplinary researcher teams and a wide range of methods were used as part of specific search strategies[5]. These included analyses of actors, topics and needs, systematic analyses of sources, surveys of marginal actors, web monitoring, and the validation and differentiation of results by means of expert interviews and workshops. Additionally, in interviews and workshops, the knowledge of external national and international experts in research, science, administration and associations was taken into account. For example, an international "sounding board" comprising five renowned foresight experts is accompanying the process to critically reflect on the methods used and the process results, and to contribute suggestions for improvement where necessary.

International "sounding board" accompanied the process

The methodical procedure for identifying social trends in work step A1 is outlined below. First the standardised search criteria – what to look for? – are briefly presented, then three specific search strategies used to identify open, hidden and normative trends – where and how to look? – are described in more detail. Finally an account is given of how the results of these three search avenues were integrated.

5 Cf. also Gerhold, L. (2012): Methodenkombination in der sozialwissenschaftlichen Zukunftsforschung. In: Popp, R. (ed.): Zukunft und Wissenschaft. Wege und Irrwege der Zukunftsforschung. Berlin/Heidelberg, Springer Verlag, pp. 159-183, here: pp. 164ff.

Search criteria

Social trends were defined as new developments or changes in political and social processes and in their structures and actors with far-reaching potentials, which in turn may produce and/or change a social need (cf. preceding section). In line with the objectives of BMBF Foresight, these developments should be relevant to research and innovation between now and 2030. With this in mind, the following four search criteria were derived:

Four search criteria

1. Social relevance

The importance of a trend is determined by significant social and/or economic and in some cases also disruptive impacts in Germany.

2. Time dimension

Impacts of the trend are relevant in a period of time extending from now until 2030.

3. Relationship to research and innovation (R&I)

The trend as a whole or in some aspects should clearly relate to research and innovation.

4. Degree of "newness" of a social trend

The social trend is wholly or partly new for the German research and innovation system, or, in the opinion of the authors and experts involved, has received too little attention to date.

Search strategies

With respect to the objectives of BMBF Foresight Cycle II, social trends can be said to have three different manifestations: open, hidden and normative. These categories are described briefly below, before the appropriate specific search strategies are explained.

Three manifestations of trends – three search strategies

Open trends are already discussed as trends, e.g. in public discourse in the fields of politics, business and science. Open social trends are not infrequently also an expression of the zeitgeist, and are therefore central points of reference for individual and social reflection. In addition to these open trends, there are other trends that are less obvious. Referred to as hidden trends, these can only be perceived if existing perceptual filters are eliminated or at least minimised.

Normative social trends are defined as social developments, desires or changes which are predominantly shaped by ethical standards and values shared either by sections of society or by society as a whole[6].In this case, social practice and patterns of behaviour are closely linked with values, visions and ethical aims (e.g. veganism). Protagonists of normative social trends aspire for their postulated concepts to become established in the long term as generally accepted, mandatory, and even sanctionable values, norms and regulations[7].

Manifestations of social trends

Table 1 summarises the features of the three trend manifestations:

Manifestation	Features
Open social trends	Social developments or changes that are already discussed as trends by various actors in social systems such as science, business, politics and media, and are linked to predictions for the future, an increasing number of people affected, and social organisational tasks
Hidden social trends	Social developments whose impacts have so far gone almost unnoticed by research and innovation policy and/or which have not yet become a focus of interest in public discourse in the context of social trends (signals hidden by perceptual filters)
Normative social trends	Social developments that are predominantly motivated by values, desires, visions and/or ethical standards

Table 1: Manifestations of social trends

6 Cf. Micic, P. (2007): Das Zukunfts-Radar. Die wichtigsten Trends, Technologien und Themen für die Zukunft. Munich, pp. 330ff.

7 Cf. concerning values as a subject of research: Schüll, E. (2009): Zur Forschungslogik explorativer und normativer Zukunftsforschung. In: Zukunftsforschung und Zukunftsgestaltung. Beiträge aus Wissenschaft und Praxis. Pp. 223-234, here: p. 230.

For the three manifestations – hidden, open and normative social trends – specific search strategies were developed (see figure 3), which are described below.

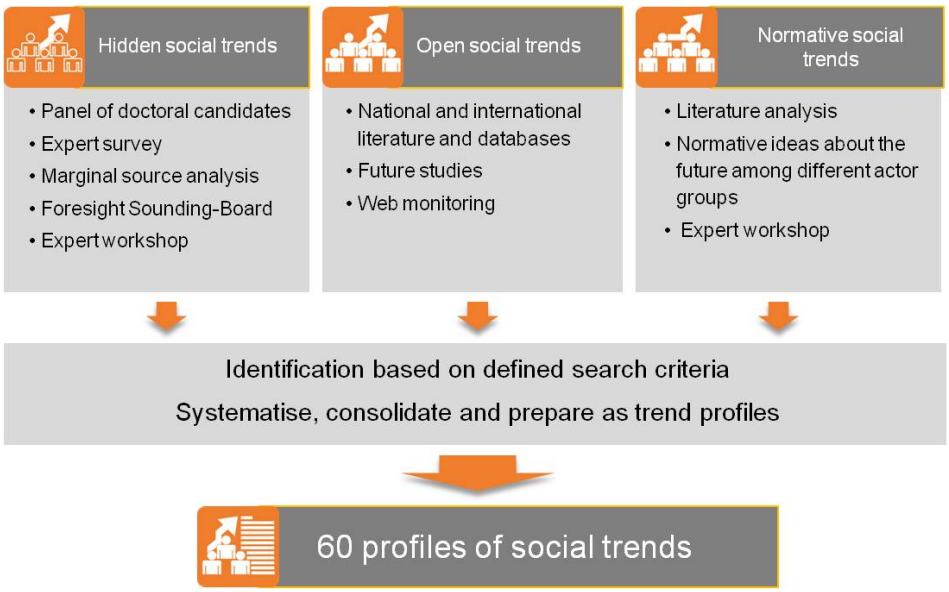

Figure 3: Three specific search strategies for identifying open, hidden and normative trends

Search strategy for open social trends

Search strategy for open social trends

The search process for indications of open social trends comprised the following steps:

Step 1: Analyse actors and thematic areas

The particular characteristic of an open social trend is that it is adopted by a substantial number of relevant actors, such as social functionaries and multipliers, and enters their repertoire of arguments. Only in this case does it develop enough influence and definitional power to play a role in the future development of society in Germany between now and 2030. Therefore the analysis of actors and thematic areas looked for indications of open social trends, particularly at the heart of public discourse in politics, business, science and the media.

Step 2: Select relevant sources on open social trends

To complement the analysis of actors and thematic areas, in particular sources from central threads of discourse in politics, business, science and the media were selected and analysed. Examples of sources that were used here include:

- Secondary literature on open social trends: e.g. national and international future and trend studies, foresight reports, reviews of new publications in this research field, research reports and strategy papers on future research funding, periodicals for futurology such as *Technological Forecasting and Social Change*, *Futures, Foresight* as well as *World Future Review*, *The Futurist*, *swissfuture* and Pro ZUKUNFT.
- Databases: To determine the impact of trends in the social sciences and humanities, a search was performed using generic search terms[8] in the citation databases *Social Science Citation Index (SSCI)* and *Arts and Humanities Citation Index (AHCI)*[9].
- Research institutions: In addition to this database research, the presence of open social trends in social science and economic disciplines, research areas and research facilities was assessed by analysing sources consisting of key publications by research institutions such as reports, memoranda, position papers etc. This process began with a top-down search – starting with documents from the umbrella organisation *International Social Science Council (ISSC),* via the leading international associations in social science disciplines such as sociology, economics and psychology, and the regional networks of research associations such as the *European Federation of Psychologists' Associations*, to the national professional associations in specific disciplines such as the German Psychologists' Professional Organisation (Berufsverband Deutscher Psychologinnen und Psychologen, BDP). This step was complemented by a bottom-up process: the most active subjects/subdisciplines in the social science disciplines in Germany, such as the *German Society for Health Economy (Deutsche Gesellschaft für Gesundheitsökonomie, DGGÖ)* as a subsection of the economic sciences, were screened with regard to the search criteria for social trends. Then a search was conducted among the international umbrella organisations for the respective subject areas (such as the *International Health Economics Association*).

8 A generic search is a search for general keywords. Generic terms can be derived by combining common features and characteristics of many different terms and their similarities. In this case, signal terms in the discourse such as foresight, 2030, 21st century, revolution, vision and so on were used, as well as key specialist terms relating to wide trends, e.g. inclusion and digitalisation.

9 The SSCI covers 4,500 social science journals from approx. 50 disciplines or research fields. The AHCI includes approx. 1,100 periodicals in the fields of the arts and humanities.

- Particularly close attention was given to publications by international organisations such as specialised programmes at the United Nations (UN), Organisation for Economic Co-operation and Development (OECD), World Health Organization (WHO), and Food and Agriculture Organization of the United Nations (FAO), as they have a global distribution and hence influence in the definition of political and economic trend constellations.

Step 3: Specification of search criteria for open social trends

Based on the four search criteria for social trends, further features and keywords characterising open trends were derived. Thus open trends are often based on agenda-setting processes which can be characterised by keywords without any further level of differentiation. The focus here needed to be on the new implications that emerge from changed social contexts. Because these trends are often picked out as a central theme and discussed in detail in public discourse, in some cases they can be identified via direct, descriptive search terms such as trend, development, 2030, revolution, upheaval, expectations, and so forth.

Step 4: Source analysis for open social trends

The sources that were identified were analysed based on the general search criteria for social trends and according to the specific features of open trends mentioned above. As part of this source analysis, it was possible to follow up numerous references to further sources, with the result that the volume of reviewed sources continuously increased. This process resulted in around 200 indications of open social trends with a time horizon to 2030.

Step 5: Involve external experts

To validate the results, experts were called in for individual themes, both from the specialist departments at BMBF as well as external experts from the scientific community. They offered qualitative assessments of individual social trends, as well as recommendations for the grouping of results.

Step 6: Consolidation of indications of open social trends

The approximately 200 indications of open social trends to 2030 resulting from step 4 were consolidated into approximately 80 trends, in part based on the experts' advice. This consolidation was carried out in internal workshops with the researchers of the social trends. The key consideration was fulfilment of the search criteria. Subsequently, the 80 open social trends were compiled together with the results of the searches for hidden and normative social trends into a long list with short descriptions of each trend, which was then evaluated.

Search strategy for hidden social trends

Early detection of (still) hidden social trends is impeded by perceptual filters that are specific to the observer[10]. These filters result from perception being focused in day-to-day routines on central developments that are relevant to action, and they serve to reduce cognitive dissonance in the observer. As a result, areas at the margins are hidden from view, yet may very well be triggers for social trends. Therefore, in the search process for hidden social trends, measures were developed to systematically overcome some of these perceptual filters and recognise new social trends which, from the point of view of the Foresight process, had previously been hidden.

Overview of measures to reduce perceptual filters

The BMBF Foresight Cycle II process addresses the following perceptual filters: limited resources lead to a curtailment of observation *(surveillance filters)*, routines shape decision-making structures in organisations *(power filters)*, and thought patterns and experiences of decision-makers *(mentality filters)* affect the selection and evaluation of observations. Furthermore, typical mechanisms favour a misjudgement of observations: the search for confirmation of one's own suppositions *(confirming trends bias)*, a preference for positive trends *(overconfidence)* and overestimation of predictability *(overprediction)*[11]. To mitigate the effects of perceptual filters, the measures listed in table 2 were taken in the search for hidden trends:

Measures	**Implementation**
Reflection on how to deal with possible perceptual filters	Desk research, individual needs as a starting point, selection of marginal sources to overcome typical filters, definition of knowledge holders for changing needs (lead users, pioneers, antennas)
Extension of the scope of consideration beyond observation of the established environment	Marginal source analysis (monitoring), web monitoring, identification of knowledge holders and experts in marginal needs

10 Cf. Ansoff, H. I. (1979): Strategic Management. London, Macmillan; Ilmola, L.; Kuusi, O. (2006): Filters of weak signals hinder foresight: Monitoring weak signals efficiently in corporate decision making. In: Futures, vol. 38 / no. 8, pp. 908-924.

11 Schoemaker, P. J. H. (2003): Organizational Renewal: Overcoming Mental Blindspots. In: Goldsmith, M. et al. (ed.): The Many Facets of Leadership. New Jersey, Financial Times-Prentice Hall http://www.oecd.org/std/47917288.pdf. Accessed on 28 January 2013.

Also take into account trends that are felt to be negative	In-depth analysis of selected areas of need
Search for countertrends to open trends	Creative workshop with knowledge holders (see above), doctoral candidate panel
Inclusion of knowledge holders outside of established structures	Expert interviews and creative workshop
Involvement of persons from different organisational structures	Doctoral candidate panel, foresight experts (sounding board), actors from politics and interest groups/associations
Involvement of persons with different background experience	Expert interviews and creative workshop
Use of discursive evaluation processes	Doctoral candidate panel, creative workshop, sounding board

Table 2: Measures and implementations for reducing the effects of perceptual filters

Step 1: Analysis of perceptual filters and screening of needs for hidden social trends

New social trends emerge in interaction with needs. From needs, requirements for solutions to satisfy those needs can be derived. For the widest possible coverage of the search spaces for – from the point of view of innovation policy – hidden social trends, therefore, relevant basic needs should be covered. To achieve this, first of all a survey of relevant areas of need was conducted, based on scientific approaches from philosophy[12], psychology[13], consumer research, and economics[14], comprising the following areas: movement, nutrition, clothing/self-presentation, health, quality of the environment, housing, personal safety, social relationships, communication, happiness, self-fulfilment, meaning, and curiosity/learning. For each area of need, an analysis was conducted of potential needs, trends and sources that will be gaining in importance in the future.

12 Lenk, H. (2010): Das flexible Vielfachwesen. Weilerswist, Velbrück Wissenschaft, pp. 87-120.

13 Maslow, A. H. (1954): Motivation and Personality. New York, Harper.

14 Organisation for Economic Co-operation and Development (OECD) (2012a)

Step 2: Identification and survey of relevant marginal actors for hidden social trends

Marginal actors

A bell-shaped diffusion curve is assumed in theory for the spread of innovations. In the case of trends which are still very weak today, but which nevertheless will be of great importance to society in the year 2030 (high point on the bell-shaped curve), it is hard to identify the relevant actors since their innovation activities are currently to be found at the lowest starting point of diffusion or even before that, and are not part of the innovation mainstream. However, such marginal actors are important knowledge holders for the identification of hidden trends. We distinguish three groups of marginal actors, each of which is identified and included in the process via different methods. The first group consists of persons who have new or extreme needs for the innovation system, which although they are still marginal phenomena at the moment, could be relevant to a large part of the population by 2030, for example because of a recognised demographic trend or changing attitudes in society. Actors who belong to this group are henceforth called "need pioneers". The second group consists of persons with new or extreme needs, who – going beyond the pioneer status – also possess particular object or use knowledge about resulting needs and possible solutions, which they are already helping to develop. They correspond to the description of "lead users" in innovation research. To the third group, having crucial knowledge about future needs, belong people who – for example as artists, therapists or educators – have an external view of newly emerging social needs. These people are referred to as "need antennas".

Need pioneers

Lead users

Need antennas

For each area of need, marginal actors such as these were identified as knowledge holders, and integrated into the search process via 35 expert interviews and an expert workshop. In the interviews, current developments in the respective area of need were explored in greater depth and used as a basis for trend profiles. Furthermore, selected interview partners were invited to a workshop, at which relevant hidden trends in the areas of need were examined in detail. Information from the analysis of marginal sources (see below) and the interviews was further expanded via a discursive process, which increased the quality of findings. During the workshop, 15 draft trend profiles were developed by the participants themselves. Of these, a number of ideas were included directly as trends in the trend profile collection, while others fed into existing trend profiles.

Step 3: Marginal source analysis

The aim of the marginal source analysis was to analyse a set of sources which, generally speaking, the innovation system only rarely takes any notice of – such as from the feature pages of newspapers and youth culture.

Findings concerning new social trends or changes with a potential influence on areas of need were recorded and, following a review, were transferred into trend profiles where appropriate.

Step 4: Panel of doctoral candidates

The panel of doctoral candidates was formed as a counterweight to the researcher teams of the project implementers VDI TZ and Fraunhofer ISI, as a way of further weakening the perceptual filters. Young researchers from various disciplines who work on themes in any of the areas of need were invited to sit on the panel. During a two-day workshop, the panel developed a series of ideas for trend profiles, which if suitable were transferred into new or existing trend profiles.

Step 5: Consolidation of indications of hidden social trends

The results of the individual search approaches were analysed and consolidated based on possible cross-references in their content. This consolidation was carried out in internal workshops with the researchers of the social trends. The key consideration in the consolidation process was the fulfilment of the search criteria. The end product of this work step was 110 social trends, which were subsequently compiled together with the results of the searches for open and normative social trends into a long list with short descriptions of each trend, which was then evaluated.

Search strategy for normative social trends

Step 1: Analysis of actors and thematic areas for normative social trends

Search strategy for normative social trends

Numerous interest groups in civil society formulate normative goals for the social and technological development of society, and for the socially sustainable design of innovations. Their visions, utopias and goals represent a source for the search for normative social trends. The analysis of actors and thematic areas for normative trends showed that these trends essentially extend to all social topic areas. However, they are particularly pronounced in areas concerned with togetherness and the integration of society. Five social topics with a time horizon to 2030 were identified as being particularly relevant: multiculturalism, governance and statehood, social prosperity and sustainability, social cohesion, and virtualisation. The high relevance of these themes was apparent from an analysis of current publications by major non-governmental organisations.

Step 2: Selection of sources for the search for normative trends

To systematically record normative trends, four key actor types were chosen. These were corporations, international organisations, the German federal government, and social research institutes[15]. From the documents and other contributions of these actors to discourses, a correspondingly diverse range of sources was selected.

Step 3: Specification of search criteria for normative social trends

Apart from the four general search criteria for a social trend, the following additional specific features are applicable to normative social trends:

- normative trends are frequently the subject of public discourse,
- normative trends raise social questions that cut across topic areas, such as the theme of sustainability,
- in discourse concerning normative trends, there is strong disagreement on values and a great need for understanding, communication and compromise,
- normative trends imply an urgent appeal for action to policymakers.

15 Documents of corporate representation and knowledge generation by interest groups such as associations, foundations, think tanks and research institutions were taken as an indicator that these groups have the potential to introduce their values and principles into the public debate, and therefore gain influence over the social trend. Publications that were evaluated in this context included those from world-leading think tanks and foundations – measured by the results of the annual ranking "The Global Go-To Think Tanks". Various organisations and initiatives have also become established at the international level and in some cases gained state recognition, which aggregate the visions and guiding principles of global sustainable development to form integrated goal catalogues and sets of criteria. Their works include internationally recognised normative frameworks such as the UN declarations and the UN Global Compact, the Millennium Development Goals, Local Agenda 21, the OECD "Better Life Initiative" and various initiatives of the G8/G20, and goal catalogues and strategies of the German federal government and European Union for socially relevant policy areas such as social policy, sustainability, the future of energy, and health. Furthermore, studies and statistics from empirical social research (surveys and panels) and from market, opinion, trend and lifestyle research at the German, European and global level were assessed to determine the presence of social trends among the general public. These sources are relevant because they provide a picture of public opinion without any filtering, amplifying or distorting effect of media reporting.

Step 4: Analysis of sources for normative social trends

In line with the general search criteria for innovative social trends to 2030 mentioned above, and the additional specific features, the sources were searched through and analysed for corresponding indications.

Step 5: Bring in external expertise via a Foresight workshop on normative social trends

It is often difficult to assess the progress and pace of normative social trends, since their claim to validity may depend both on internal developments in a social group and on external events (e.g. natural disasters, technology-related accidents). Additional influences arise from constellations of themes relating to political and social events. To make any kind of forecast, it is therefore of great importance to consider the nature of a normative trend from different angles, and to reflect on possible development tendencies individually and seen together with neighbouring trends. In this context, new perspectives and angles provided by external experts served to validate and enhance the results.

External expertise was organised in the form of a workshop on normative social trends. The workshop results were taken into account on two levels when compiling the trend profiles:

- Supplementing the profiles: further information, differentiations and new examples were included and indicated with footnotes[16]. In a number of trend profiles, the arguments were refined.
- Check ideas for additional trends for newness: finally the suggestions for new trend profiles, such as “inclusion/exclusion” and “diversity in old age” were checked for newness in comparison with the 60 trend profiles that had already been developed.

16 This happened in the following profiles: Working group 1 Multiculturalism 2030: social cohesion, migration in the post-ethnic age; Working group 2 Governance 2030: click to protest – more activities through organisation in the internet? New architectures of government: the ability of policymakers to act in post-democracy; Working group 3 Sustainability 2030: the global urban middle class – pioneer or disaster for sustainable development? New paradigms of economic growth and social prosperity, rebound effect: underestimated paradox of sustainability policy; Working group 4 Social cohesion: social cohesion – the cement of 21st-century societies?, Social disparities – fault lines of global development, New senior citizens are shaping protest culture; Working group 5 Virtualisation: consequences of hypertransparency and hyperpuritanism, Digital competency pressure as a social organisational task, Human-machine development between autonomy and control.

Step 6: Consolidation of indications of normative social trends

The research conducted by the Foresight Office and the expert workshop produced around 100 indications of normative social trends to the year 2030. These were consolidated in internal workshops with the researchers, taking the experts' recommendations into account, to approximately 40 trends. The key consideration in the consolidation process was the fulfilment of the search criteria. Subsequently, the approximately 40 normative social trends were compiled together with the results of the searches for hidden and open social trends into a long list with short descriptions of each trend, which was then evaluated.

Integration of results

The trends identified in the three specified search strategies for open, hidden and normative social trends were first of all brought together in the form of a short description of the social trend in a common list, and consolidated in several stages.

Owing to overlapping themes in the partial results of the parallel search avenues, duplicate themes were merged and similar themes were clustered so that the trends had similar levels of aggregation. This step resulted in a long list with approximately 150 identified social trends.

Integration of the results of all search strategies produced 60 social trends

In the next step, the long list was discussed extensively and in detail by the core team at the Foresight Office, who prioritised the individual trends based on the four search criteria "social relevance", "relationship to research and innovation", "degree of newness of a social trend" and "relevance between now and the year 2030"[17]. The result was a short list of 60 trend themes. Further extensive research and expert discussions were conducted so that key statements could be made concerning the trend profiles.

These 60 trend themes were developed into trend profiles, which are presented in section 4 in the form of standardised trend profiles.

17 As preparation for this internal discussion to weigh up the suitability of the themes for development into a trend profile, at VDI TZ IBB (formerly ZTC) and Fraunhofer ISI, internal trend profiles were also evaluated to make the coordination process for the long list as efficient as possible.

3.2 Identifying social challenges

In work step A1, social trends were identified and reviewed to form 60 trend profiles. The subsequent work step A2 "identifying social challenges" builds on the results from A1 and comprises the following steps:

- Identify overarching topic areas
- Highlight initial challenges in the topic areas

Identification of overarching topic areas:

To identify social challenges, seven overarching topic areas were formulated.

So that the most important aspects for German innovation policy could be pinpointed among the large number of individual trends, the pool of 60 trend profiles was consolidated further. An interdependency analysis was carried out for this purpose in two internal workshops. In each case, the participants were in-house experts of the *Foresight Office* with specialisms in various subject areas.

The results of the two workshops, which were held independently of each other, showed a high degree of concordance, and were subsequently integrated by the core team of the *Foresight Office*. This step resulted in 7 topic areas in which multiple social trends were grouped together (see figure 4).

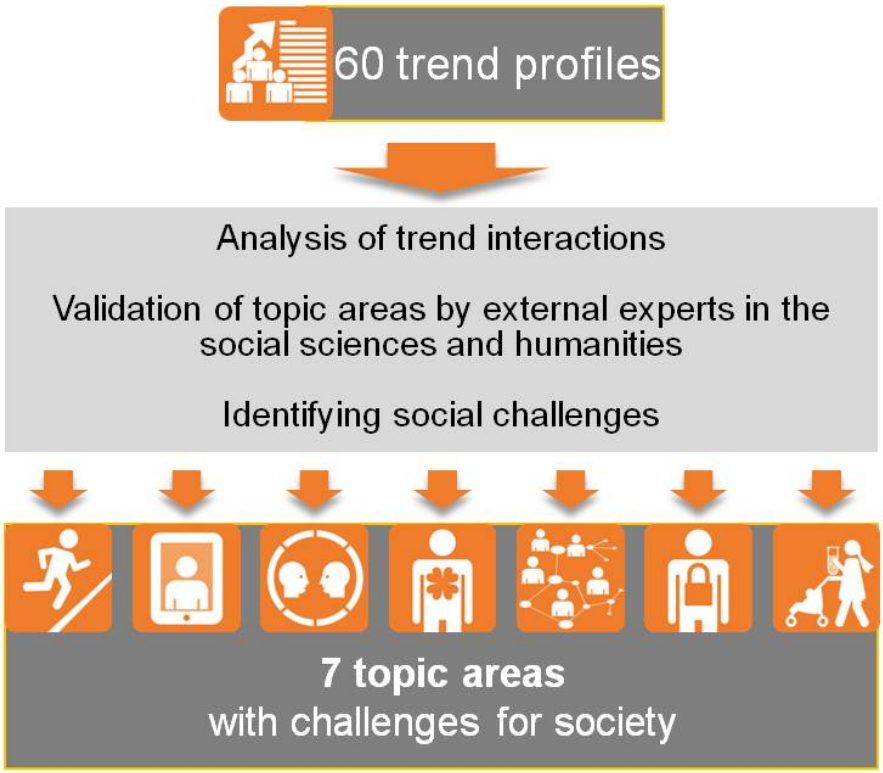

Figure 4: Identifying social challenges in the seven topic areas

Highlighting initial challenges in the 7 topic areas

Development paths, opportunities and risks for society, as well as challenges for innovation policy were worked out for each topic area.

In the next step, the topic areas were analysed in depth. To do this, the sources that were used before were evaluated again with regard to statements concerning the topic areas. Furthermore, additional literature was reviewed and further expert opinions specifically on the overarching aspects were sought and used in the formulation. Indications of possible development paths and their implications for society and the innovation landscape were identified and brought together. In this way, various possible development paths, opportunities and risks for society, as well as challenges for innovation policy, were worked out for each topic area.

As with the trend profiles, the topic areas were summarised in the form of short profiles with a common structure consisting of the following three sections:

- Short description
- Possible development paths
- Opportunities and risks for society – challenges for research and innovation policy.

Before these topic areas were finalised, they were validated via telephone interviews with external experts in the social sciences and humanities.

The seven resulting topic areas are presented in section 5. They outline, in standardised form, social challenges that are potentially highly relevant to research and innovation policy in Germany.

4 IDENTIFIED SOCIAL TRENDS (60 TREND PROFILES)

A standardised trend profile format was designed for the presentation of the identified social trends. Under fixed headings, the degree of newness of a social trend and its relevance to society and to research and innovation between now and 2030 are presented in a clear and concise form, and supported with relevant sources.

The headings structure the information as follows:

Trend profile headings for a standardised presentation of the social trends

- The title and short description of the trend serve to name the basic direction of development of a social trend, and also include – as far as possible in a heading – for normative trends, the discrepancy between the current state of society and new claims to validity.
- The section on drivers and dynamics shows the development of the driving forces and dynamics of the social and/or economic impacts of the trend. This provides the basis for saying why and to what extent a trend is considered to be a relevant development between now and 2030.
- Relationship to research and innovation: This explains the approaches via which research and innovation can supply responses to social trends, and which new opportunities might open up as a result.
- Relationship to the knowledge society: The influence that the social trend could have on the future of the knowledge society is mentioned in this optional section.
- Assessment: This section summarises the key implications of a trend from the point of view of the *Foresight Office.*

The footnotes reference sources that support the core findings. As far as possible, the main sources and especially initial primary sources are cited where a trend is mentioned for the first time and/or which offer a particularly apt description of a trend.

In their present form, the main purpose of the trend profiles is to provide new insights and stimulate discussion. As part of Foresight Cycle II, specific new social challenges will be derived from the trend profiles presented here, for research and innovation to address. The “relationship to research and innovation” section provides the starting point for this task.

The trend profiles are arranged in three categories

To provide an overview of subjects, the 60 trend profiles are arranged in three categories:

A) Society / culture / quality of life

B) Business

C) Politics and governance

This categorisation is based on the central archive classification scheme of GESIS – Leibniz-Institute for the Social Sciences18. The keywords within the classification scheme were used to group together thematically related trend profiles. The following list provides an overview of the identified trends.

Society / culture / quality of life

1. Digital competency pressure as a social organisational task
2. Citizen science – new challenges for science and society
3. Open access – knowledge freely available and free of charge for all
4. Globalisation and virtualisation of higher education
5. Transformation of academic culture through university knowledge transfer
6. More attention being given to social innovations
7. Women as pioneers of global transformations
8. Time sovereignty
9. Families in the multi-option society
10. Youth as a future marginal group?
11. A European Islamic culture is emerging
12. Villages as pioneers in shaping the post-growth society
13. The social function of friendship is gaining importance
14. Human-animal connection
15. Noise: the ignored environmental and health problem
16. Rebound effect: underestimated paradox of sustainability policy

18 Cf. GESIS central archive classification scheme, at: http://www.gesis.org/unser-angebot/recherchieren/thesauri-und-klassifikationen/zentralarchiv-klassifikationsschema-za-klassifikation/.
Accessed on 21 December 2012.

17. New requirements for material flows for consumer goods have a delayed impact on the environment and disposal systems
18. The battle against obesity is intensifying
19. Self-optimisation of people
20. The culture of dying: between suppression and self-determination
21. Growing need for concepts for our digital legacy
22. Trust in the internet age
23. Increasing demands for the right to use digital goods for free
24. Post-privacy versus privacy protection
25. Human-machine: development between autonomy and control
26. Amateur drones are pervading everyday life
27. Gamification – persuasive games in ever more areas of life

Business

28. Information technologies are replacing even currently well-paid jobs
29. Reindustrialisation
30. Do-it-yourself 2.0
31. A new culture of exchange is becoming established
32. Personal footprint – more responsible consumption
33. Slow consumption as a countertrend to fast fashion
34. Crowdfunding is becoming established as an alternative financing model
35. Ethical and value-based financial services
36. Impatient investors – the drying-up of long-term capital
37. Development scenarios for the global financial system
38. The usefulness of patent law is running up against limits
39. New paradigms of economic growth and social prosperity
40. Public finances: from voluntary commitment to paralysis?
41. Rediscovery of the commons
42. African innovations point to new paths for innovations

43. Frugal innovations complement high-tech innovation models
44. Economic activity in extreme climatic regions is being stepped up
45. Growing importance of enterprises in emerging economies
46. The global urban middle class – tipping the scales of sustainable urban development?
47. Social disparities – fault lines of global development
48. The new global innovation landscape
49. The growing importance of the region in the global economy

Politics and governance

50. Urban governance – solving global challenges locally in cities
51. New architectures of government: the ability of policymakers to act in post-democracy
52. Future European integration scenarios
53. Click to protest – more activities through organisation in the internet?
54. New senior citizens are shaping protest culture
55. Erosion of the sense of progress
56. Younger people’s values are shifting towards global empathy
57. Reconquering the public space
58. Consequences of hypertransparency and hyperpuritanism
59. Social cohesion – the cement of 21st-century societies?
60. Post-ethnic culture as a result of migration

4.1 Category: Society / culture / quality of life

Much discussed megatrends in the category "society / culture / quality of life" which have been found to be relevant between now and 2030 are presented below. Their impacts on the identified social trends are mentioned in the trend profiles.

Megatrends included in the "society / culture / quality of life" category

Global population growth

The world's population will continue to grow rapidly. It is expected to rise from 7 billion people today to 8.3 billion[19] people in 2030. This population growth of around 19 percent is concentrated in the world's less developed countries. While population figures will fall slightly in Europe, the strongest growth is predicted in Asia and Africa.

Demographic change in Germany

Germany's population will decrease sharply. It is anticipated that only 77 million people will live in Germany in the year 2030. For comparison, the population stood at 82 million in 2012. This decline in the overall population will be particularly pronounced in the under-20 age group. According to forecasts, there will only be around 12.9 million under-20-year-olds by 2030. Assuming this to be the case, an increasing skills shortage can be expected, which may trigger a general skills shortage in the economy in 2030[20].

By contrast, there will be a sharp increase in the 65-plus age group by 2030, to more than 22 million people[21]. At the same time, it is expected that life expectancy at birth will rise continuously, reaching around 81 years for boys and 86 years for girls in the year 2030[22].

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19 United Nations, Department of Economic and Social Affairs, Population Division (2011): World Population Prospects 2010, New York. Data cited from: German Federal Agency for Civic Education (Bundeszentrale für politische Bildung): http://www.bpb.de/nachschlagen/zahlen-und-fakten/globalisierung/52699/bevoelkerungsentwicklung. Accessed on 26 January 2013.

20 Helmrich, R. et al. (2012): Geändertes Bildungs- und Erwerbsverhalten mildert Fachkräftemangel. In: BIBB REPORT, vol. 6, no. 18.

21 German Federal Statistical Office and the statistical offices of the Länder (Statistische Ämter des Bundes und der Länder) (2011): Demografischer Wandel in Deutschland, vol. 1. Wiesbaden, Statistische Ämter des Bundes und der Länder.

22 German Federal Statistical Office (*Statistisches Bundesamt*) (2009): Bevölkerung Deutschlands bis 2060. Wiesbaden, Statistisches Bundesamt.

Against this trend, Germany's population has grown over the past two years due to immigration[23]. It is unclear, however, whether this is a long-term trend reversal or just a temporary phenomenon. If this is actually a reversal of the trend, the scenario outlined above will not occur to this extent.

Rising global burden of disease

By the year 2030, deaths from non-infectious and non-communicable diseases will account for more than 75 percent of the forecast 67 million deaths annually. The annual number of deaths from cancer globally will rise from 7.4 million in 2004 to 11.8 million in 2030, an increase of around 60 percent. Deaths from cardiovascular disease are expected to increase from 17.1 to 23.4 million over the same period[24].

It is anticipated that in 2030, the following three diseases will be the most common causes of death:

1. Coronary heart diseases
2. Cerebrovascular diseases
3. Chronic obstructive pulmonary disease (COPD)

COPD is mainly attributed to the projected increase in tobacco consumption[25].

For comparison, fatal road accidents will be the fifth most common cause of death in 2030. The worldwide number of road-traffic fatalities is forecast at 2.4 million in 2030. This is an increase of around 85 percent from 1.3 million in 2004. The main reason cited for this is the increasing number and use of vehicles associated with economic growth in low and middle-income countries[26].

Increasing urbanisation

The proportion of the world's population living in cities will grow from 52 percent in 2011 to 60 percent in 2030. The number of people living in urban regions in less developed countries will rise from 2.67 billion in 2011 to 3.92 billion in 2030[27].

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23 Destatis (2013): https://www.destatis.de/DE/PresseService/Presse/Pressemitteilungen/2013/01/PD13_013_12411.html. Accessed on 29 January 2013.

24 World Health Organization (2008): World health statistics 2008. Geneva, WHO, p. 29

25 World Health Organization (2008): World health statistics 2008. Geneva, WHO, p. 30

26 World Health Organization (2008): World health statistics 2008. Geneva, WHO, p. 29

Thus nearly the entire growth in the world population of an estimated 1.3 billion people will be concentrated in these areas.

Declining household size in Germany

Ever more people will live in cities in the future. And city life will continue to change. It is anticipated that the proportion of single-person households in Germany will rise from 40 percent in 2009 to 43 percent in 2030. Two-person households will follow a similar trend. They will make up an estimated 38 percent of all households in 2030. The proportion of families – the main group of households with three or more persons – will fall below ten percent in 2030[28]. This will impact on urban planning and urban management.

Climate change

Annual carbon dioxide emissions have risen by 40 percent since 1990. For this reason, ocean acidification will occur, and – together with other anthropogenic greenhouse gases – the world's climate will become progressively warmer[29]. Climate projections[30] show the following impacts on Germany for the "near future", the period from 2021 to 2050: the annual mean air temperature will increase by 0.5°C, and precipitation in summer will decrease by around 15 percent, while in winter it is likely to increase by up to 10 percent.

A further increase in carbon dioxide emissions will be triggered by the rising global energy demand, which without specific counter-measures is set to increase 36 percent by the year 2035[31].

Human intervention in the biosphere is leading to a loss of biological diversity. The current rate of species extinction is already hundreds or thousands of times the natural rate. Twenty-two percent of mammals, 14 percent of bird species, and 31 percent of amphibians are now at risk or already extinct[32].

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27 United Nations, Department of Economic and Social Affairs/Population Division (2012): World Urbanization Prospects: The 2011 Revision. New York, UN.

28 German Federal Statistical Office and the statistical offices of the Länder (Statistische Ämter des Bundes und der Länder) (2011): Demografischer Wandel in Deutschland, vol. 1. Wiesbaden, Statistische Ämter des Bundes und der Länder.

29 WBGU (2011): Globale Megatrends. Factsheet no. 3/2011.

30 BMU (2012): Aktionsplan Anpassung der Deutschen Anpassungsstrategie an den Klimawandel, annex H.1. Berlin, BMU.

31 WBGU (2011): Globale Megatrends. Factsheet no. 3/2011.

32 Ibid.

Feeding the world's population is becoming increasingly problematic

In view of the expected global population growth and against a background of climate change and a decrease in available agricultural land due to soil degradation and the expansion of settlement areas, global food security is regarded as being a difficult global challenge. As a consequence, more than 500 million people in less developed countries will suffer from malnutrition in 2030[33].

Increasing water scarcity

Around 1.1 billion people lack access to clean drinking water, and some 2.6 billion people lack access to basic sanitation[34]. In 2030, almost half of the world's population will live in water-scarce regions[35].

Increasing importance of the global knowledge society

The world is moving towards a global knowledge society. This view is supported by new key data on people who work in research and development (R&D) around the world, on global R&D expenditure, and on new forms of global collaboration[36].

Drivers of this trend are considered to be the widespread use of information and communication technologies and the associated digitalisation of information and information processing, as well as the global expansion of education.

33 Alexandratos, N.; Bruinsma, J. (2012): World agriculture towards 2030/2050: The 2012 revision. ESA working paper no. 12-03. Rome.

34 WBGU (2011): Globale Megatrends. Factsheet no. 3/2011.

35 United Nations (2013): http://www.un.org/waterforlifedecade/scarcity.shtml. Accessed on 5 March 2013.

36 National Science Board (2012): Science and Engineering Indicators 2012. National Science Foundation. Arlington; see section on "Major Global Science and Technology Trends".

The global educational landscape has been undergoing far-reaching change for some time now. This is mainly being driven by two change processes. The first change process consists of the continuing boom in the knowledge economy. This boom is motivating people to enhance their skills through education, and furthermore creates incentives for individual countries to help their population achieve this goal. The second change process is the explosive expansion of higher education around the world. This enables an increasing number of people to work towards new education opportunities, with the result that the global supply of highly qualified people may increase significantly. [37]

37 OECD (2012): Education at a Glance 2012, OECD Indicators. OECD Publishing, p. 13.

1 DIGITAL COMPETENCY PRESSURE AS A SOCIAL ORGANISATIONAL TASK

Short description of the trend

The integration of digital technologies into every area of life is a source of anxiety for many citizens. Apart from an intensifying digital competency pressure – meaning the pressure to acquire new media and technology skills at an ever faster rate – the impacts of computer usage on personal and social development are being more widely discussed[38].

Drivers and dynamics

Both the transfer and the acquisition of knowledge have fundamentally changed as a result of the continuously increasing use of computers and the internet. In information and knowledge societies, knowledge and information are available almost everywhere, in the form of large data volumes, as a result of digitalisation. Knowledge that decades ago people had to learn and retain for themselves can today be saved in digital form and accessed quickly as needed from almost any location. Many learning processes have changed as a result. Some have become almost superfluous – one such example is the active learning and memorising of telephone numbers. Outsourcing thinking to machines exposes citizens to an increased digital competency pressure. In addition, society is unsettled by controversial and at times heated debates over the impacts this outsourcing might have on human development. For instance, there is the extreme view that human intellectual capacity is decreasing because of the increased use of digital media, accompanied by the call to limit media consumption to a necessary minimum[39]. Opponents of this position, especially in the field of media didactics, criticise this view as being too simplistic, anti-technology, and unrealistic[40]. They say that media usage stimulates creativity, encourages thinking for oneself, and moreover also has positive neurological effects[41]. The fact is that in our present times, it is no longer possible to sever the link between the learning and living environment and digital media[42]. From increasing digitalisation and changing social frameworks – such as key demographic data, the growing skills shortage, and the declining half-life of specialised knowledge – there emerges a social organisational task: How should we design a future canon of education and competencies, if knowledge that used to be necessary to learn can now be easily researched in the internet?

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38 This trend profile resulted from the expert workshop on normative trends that was held on 16 November 2012 in Berlin.

39 Spitzer, M. (2012): Digitale Demenz: Wie wir uns und unsere Kinder um den Verstand bringen. Munich, Droemer.

40 Likusa, A.: http://www1.wdr.de/themen/digital/digitaledemenz100.html. Accessed on 31 October 2012.

41 Kühn, S. et al. (2011): The neural basis of video gaming. In: Translational Psychiatry, 15 November 2011.

42 Dürhager, R.; Heuer, T. (2009): http://www.dnadigital.de/networks/wiki/index.manifesto. Accessed on 31 October 2012.

How can the growing demand for media and technology skills be covered in the decades ahead?

Relationship to research and innovation

As a result of the advancing use of technical innovations and the increasingly digital character of culture, media skills are becoming ever more important for unrestricted social participation and employability. Service innovations could also play a role in promoting this participation. On the technology side, further innovations for the more intuitive use of devices and services could help to mitigate the digital competency pressure.

Relationship to the knowledge society

Lifelong learning is a fundamental condition for the information and knowledge society. Digital media offer effective possibilities in this respect, but they require more in-depth examination on the part of cognitive neuroscience and educational science with regard to their potential negative impact on humans. In particular, possible disparities in access to information and in the use of available information should be discussed.

Assessment

Against a background of accelerating developments in the areas of new technologies and media, and their impacts on life and learning processes, the topic is highly relevant to the future and requires further research activities.

2 CITIZEN SCIENCE – NEW CHALLENGES FOR SCIENCE AND SOCIETY

Short description of the trend

In addition to public participation and consultation in the formulation of research agendas[43,44], citizens are increasingly conducting research on their own initiative and are more frequently involved directly in scientific research projects[45]. Focuses of citizen science include not only weather research, biology, health, nature conservation and environmental protection, but also archaeology, cryptology, information science, amateur drones and space research. The decentralisation of knowledge production represents a challenge for society and the science and research system: while citizen science holds great potential for tackling the tasks faced by society – such as preserving biodiversity or understanding protein folding – it also presents new risks, such as biohacking products falling into citizens' hands, i.e. genetic manipulations by amateurs. The United States and the United Kingdom are pioneers in citizen science.

Drivers and dynamics

Citizens usually do research out of curiosity, and often also out of a need to do something meaningful and participate in society. Citizen science is developing as a result of ever more powerful information and communication technology, open access, low-cost laboratory equipment, and new measuring instruments or apps for smartphones. Other drivers of the increase in citizen science are crowdfunding, the maker culture[46,47], especially also as a result of the increase in privately owned 3D printers, and research activities by civil society organisations. Governments and businesses also support citizen science in some cases to raise the legitimacy and acceptance of research and innovation. The alignment of research programmes to the major challenges in society – the *grand challenges* – which began selectively a few years ago at EU level and in some member countries, and the increasing opening-up of internal innovation processes in enterprises, are strengthening citizen science. Citizen science does have its limits, however: these are due to the complexity of the science and research system, and the often highly charged relationship between established researchers and citizen scientists.

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43 BUND (2012): Nachhaltige Wissenschaft. Plädoyer für eine Wissenschaft für und mit der Gesellschaft. Berlin, BUND.

44 E.g. the advisory board of the Institute for Health Care Business GmbH, Essen: http://www.hcb-institute.com. Accessed on 17 January 2013.

45 E.g. the collection of data on animal and plant populations, or the "fold.it" computer game for researching molecular structures: http://fold.it/portal/info/about. Accessed on 17 January 2013.

46 Cf. trend profiles 34. Crowdfunding is becoming established as an alternative financing model, and 30. Do-it-yourself 2.0.

47 European Commission (2012): http://ec.europa.eu/research/science-society/index.cfm?- fuse-action=public.topic&id=1226. Accessed on 28 January 2013.

Relationship to research and innovation

German research institutions increasingly have to deal with new participation requirements, especially at EU level[48]. However, there is currently a lack of processes and routines for legitimate and effective integration of citizens into research practice. There are some specific dangers associated with citizen science becoming independent outside of the established science and research system: for instance, biohacking or genetic manipulation carried out by amateurs could easily lead to the uncontrolled release of genetically modified organisms into the environment, or to a more rapid spread of harmful pathogens.

Relationship to the knowledge society

The blurring boundary between non-scientifically qualified citizens with research ambitions and scientists is referred to as the "scientification of society" and "democratisation of science". The need for learning from each other on the part of society and research is increasingly recognised, but this has not been implemented yet. In synthetic biology, for example, the iGEM[49] initiative with its competitors is a pioneer in the initiation and implementation of citizen science.

Assessment

Citizen science presents complex and new social challenges. The contract between science and society is changing, requiring entirely new research policy concepts to utilise the opportunities of citizen science and manage its risks. This trend is closely linked to the crowdfunding and maker-culture trends[50].

48 European Commission (2012): http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=1226. Accessed on 28 January 2013.

49 International Genetically Engineered Machine (iGEM) Foundation (2012) http://igem.org/Main_Page. Accessed on 30 November 2012.

50 Cf. trend profiles 34. Crowdfunding is becoming established as an alternative financing model, and 30. Do-it-yourself 2.0.

3 OPEN ACCESS – KNOWLEDGE FREELY AVAILABLE AND FREE OF CHARGE FOR ALL

Short description of the trend

An excellent research environment includes easy and low-cost access to scientific findings. However, the current practice of having research work published by private publishers places a heavy financial burden on (young) scientists. Libraries at universities and research institutes are suffering under the cost burden of periodical subscriptions. Society too increasingly wants free-of-charge access to – taxpayer-funded – knowledge. *Open access,* i.e. free-of-charge access to scientific findings such as primary data and scientific literature, could be a solution.

Drivers and dynamics

In 2003, nineteen German and international research organisations issued the *Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities*[51], which has now been signed by a total of 363 national and international research institutions. The initiators argue that publicly financed scientific work should be published free of charge, instead of having it published exclusively by publishing houses. In the declaration, they call for a complete revision of existing publication structures. This is intended to change the existing situation whereby knowledge that is funded by public money then has to be financed again by the public sector, as publications are bought (back) from publishers. The declaration envisages that all citizens should be able to use scientific publications via the internet in any conceivable lawful way[52]. This contrasts with the signatories of the *Heidelberg Appeal*[53], who see the prescribed open access method of publishing as being a far-reaching interference in the freedom of the press and freedom of publication, as well as in the author's freedoms. The subject has already been taken up at the level of the European Union. As part of the European Commission's *HORIZON 2020*[54] research and innovation funding programme, *open access* will be implemented in stages from 2014 onwards. By 2016, 60% of the scientific results funded by the European Union or by the state are to be freely accessible to all citizens. However, there is still an urgent need for clarification regarding the design of the implementation of *open access.* Questions need to be answered concerning how authors' copyright is dealt with, the technical implementation possibilities, the necessary quality assurance and the possible publication and financing structures.

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51 Max-Plank-Gesellschaft (2006): http://oa.mpg.de/files/2010/04/Berliner_Erklaerung_dt_Version_07-2006.pdf. Accessed on 30 October 2012

52 Mruck, K. et al. (2004): Open Access: Wissenschaft als Öffentliches Gut. In: Forum Qualitative Sozialforschung, vol. 5 / no. 2.

53 Institut für Textkritik: http://www.textkritik.de/urheberrecht/. Accessed on 30 October 2012

54 European Commission (2012): http://europa.eu/rapid/press-release_IP-12-790_de.htm?locale=en. Accessed on 30 October 2012

In particular, the different financing models require closer, and also scientific consideration, as they affect in equal measure the authors, scientific institutions and scientific publishers currently involved in the publication process, and could therefore have a significant impact.

It is particularly important to investigate not only the opportunities but also the risks associated with the publication models.

Relationship to research and innovation

Fast, easy and low-cost access (especially) to the latest scientific publications is essential for all research and innovation efforts. Improving access to knowledge in the areas of education, science, culture and media would therefore have a positive impact on the innovative strength of Germany and the EU[55].

Relationship to the knowledge society

Collective knowledge is an important basis for economic and social interaction. A large part of public research work is financed by society. Therefore, many actors think it is reasonable that there should be free-of-charge and prompt access to research results that were funded in this way.

Assessment

In the future, the topic of open access will become increasingly relevant given rising costs of scientific publications, falling university budgets and increased pressure from society[56].

55 Deutsche UNESCO-Kommission e.V. (2008): Open Access. Chancen und Herausforderungen -Ein Handbuch. Bonn, UNESCO

56 Cf. trend profile 2. Citizen science – new challenges for science and society.

4 GLOBALISATION AND VIRTUALISATION OF HIGHER EDUCATION

Short description of the trend

Good university education in the United States is expensive: it is quite common for a bachelor's degree at a state university to cost more than US$ 30,000 in fees[57]. Tuition fees for courses at a research university are now often beyond the means of many families[58]. Consequently there is a large unmet need for higher education in the United States. This situation is currently boosting the development of online universities as a growth market in the United States. Many and particularly commercial actors are repositioning themselves to serve this market. This trend may also have impacts in Germany.

Drivers and dynamics

Start-up enterprises such as Coursera and Udacity, which offer online lectures, are attracting attention because they have managed to acquire substantial venture capital and enter into partnerships with major universities[59]. They can point to more than 100,000 online students for individual lectures[60]. Bertelsmann is also currently investing a double-digit million euro sum in a virtual university[61,62].Because of the reach of the new online courses, the higher education landscape could change significantly globally, and hence in Germany as well. In Germany, the cost of access to higher education is much lower than in the United States. But such courses could become attractive here if they are able to fulfil the widespread desire among German students to learn via distance learning from the best in the world, such as Nobel prize winners or successful businesses[63]. Furthermore, admission requirements for higher education could change fundamentally as a result of virtualisation. Another driver of this globalisation of education is the establishment of overseas branches of universities[64]. The disruptive potential of online universities could develop further, because students are already discussing and archiving questions and answers in social networks online.

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57 Schmidt, M. (2012): Bertelsmann steigt in Discount-Universität ein. In: Financial Times Deutschland, 21 June 2012.

58 National Research Council (2012): Research Universities and the Future of America. Washington, D.C., National Academies Press.

59 Friedman, T. L. (2012): http://www.nytimes.com/2012/05/16/opinion/friedman-come-the-revolution.html. Accessed on 20 October 2012.

60 Ibid.

61 Schmidt, M. (2012): Bertelsmann steigt in Discount-Universität ein. In: Financial Times Deutschland, 21 June 2012.

62 Grafemeyer, A. (2012): http://www.bertelsmann.de/News/9362154/Bertelsmann-steigt-%FCber-Education_Fonds-bei-US_Bildungsanbieter-UniversityNow-ein. Accessed on 20 February 2013.

63 Hasso-Plattner-Institut (2012): Wissen als Geschenk: Hasso Plattner mit offenen Informatik-Kursen im Web. Press release, 3 September 2012.

64 Wildavsky B. (2010): The Great Brain Race: How Global Universities Are Reshaping the World. Princeton, Princeton University Press.

Possible barriers to implementation, however, include the risk of cheating in exercises and examinations, and giving adequate consideration to study credits[65].

Relationship to research and innovation

Universities are part of the innovation system. If stronger online development actually occurs in this area, this would have far-reaching consequences for innovation and research policy. The traditional model of research and teaching at universities, which is already undergoing considerable changes, could change even more as a result.

Relationship to the knowledge society

Because universities are a central element in the knowledge society, a profound change in higher education would have wide implications for the knowledge society as well. New, simplified forms of access and reduced costs as a result of online universities or other forms of digitalisation in education could increase participation in the knowledge society globally. In Germany too, interest may develop in new approaches offering easier access to higher education and improved course quality.

Assessment

Because of new drivers in the globalisation of higher education, the dynamics of a known subject are changing. Hence there appears to be a need for an in-depth analysis and evaluation of the aspects of university education that will change globally as a result of online universities, and what implications might result from this for Germany in the long term.

65 Friedman, T. L. (2012): http://www.nytimes.com/2012/05/16/opinion/friedman-come-the-revoluti-on.html. Accessed on 20 October 2012.

5 TRANSFORMATION OF ACADEMIC CULTURE THROUGH UNIVERSITY KNOWLEDGE TRANSFER

Short description of the trend

The transfer of knowledge and insights makes scientific research contributions accessible to business, and helps define the direction of scientific research[66]. The need to promote this knowledge transfer is largely undisputed. Intense efforts to enhance knowledge transfer have been made not only in Germany but also in Japan[67], the United States[68] and in the rest of Europe[69]. Countries such as China, Taiwan, India, Singapore and South Korea are following this route too[70]. The main focus of these efforts is to facilitate the use of knowledge generated in universities for the achievement of social goals. Recently there have been signs that the academic culture is changing in some respects in certain sectors in the higher education landscape where knowledge transfer is successful.

Drivers and dynamics

Because of increasing transfer activities at universities, a transformation in university researchers' role identity can be observed: alongside their core academic identity, a secondary commercial identity can now be found in individual cases[71]. Accordingly, in the United States, there has been a long ongoing debate about how to deal with possible conflicts of interest[72] in research, particularly in the field of medical research[73]. In recent times, this debate has increasingly taken place in Germany too[74].

On the other hand, there is evidence that the need by businesses to use academic knowledge as a source is leading businesses to conduct their own scientific research and publish the results in the academic discourse[75].

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66 EFI (2013): Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands (Report on research, innovation and technological performance in Germany). Berlin, EFI.

67 Woolgar, L. (2007): New Institutional Policies for University-Industry Links in Japan. In: Research Policy, vol. 36 /no. 8.

68 National Research Council (2012): Research Universities and the Future of America. Washington, D.C., National Academies Press.

69 Stercx, S. (2011): Patenting and Licensing of University Research: Promoting Innovation or Undermining Academic Values? In: Science and Engineering Ethics, vol. 17 / no. 1.

70 Posadas, D. (2007): Rice and Chips: Technopreneurship and Innovation in Asia. Singapore, Pearson Education South Asia.

71 Jain, S. et al. (2009): Academics or entrepreneurs? Investigating role identity modification of university scientists involved in commercialization activity. In: Research Policy, vol. 38.

72 Loewenstein, G. (2012): The Unintended Consequences of Conflict of Interest Disclosure. In: JAMA, vol. 307 / no. 7.

73 Lo, B.; Field, M. J. (eds.) (2009): Conflict of Interest in Medical Research, Education, and Practice. Washington, D.C., National Academies Press.

74 Lieb, K. et al. (eds.) (2011): Interessenkonflikte in der Medizin. Berlin, Springer.

75 Simetha, M.; Raffo, J. (2011): What makes companies pursue an Open Science strategy? Ecole polytechnique föderale de Lausanne, working paper.

According to the findings of various studies, scientists who are supported by industry publish just as frequently, or even more frequently, than other scientists; available studies are also in relative agreement that academic inventors publish more and better scientific articles than their non-patented colleagues; furthermore, cooperation projects often generate new, academically valuable insights and ideas, even if the projects are highly application-oriented and do not lead directly to publishable results[76].

Relationship to research and innovation

Promoting the transfer of scientific findings is one of the core concerns of innovation policy. Free discourse and sharing results are key elements of research and science. The cited publications suggest that an increase in knowledge transfer can change the nature and scope of scientific exchange, and hence even change the academic culture in institutions that have a high proportion of external funding. What relevance, magnitude and impacts this effect ultimately has on particular fields of research and innovation is viewed as an open question[77].

Assessment

Efforts to transfer scientific findings into socially desirable applications underline the importance of sufficient public core funding for free basic research. A dominant dependency on external funding could in the long term lead to a change in the academic culture at the institutes concerned, which could even impact on their knowledge production itself, and is not yet fully understood.

76 Perkmann, M. et al. (2012): Academic engagement and commercialisation: A review of the literature on university industry relations. In: Research Policy, vol. 42 / no. 2

77 Hong, W.; Walsh, J. (2009): For Money or Glory? Commercialization, Competition, and Secrecy in the Entrepreneurial University. In: Sociological Quarterly, vol. 50.

6 MORE ATTENTION BEING GIVEN TO SOCIAL INNOVATIONS

Short description of the trend

Social innovations are socially consequential arrangements, activities and methods that depart from the familiar scheme, and which help to solve social problems more effectively, efficiently or sustainably than conventional approaches[78,79,80]. Social innovations are increasingly regarded by citizens, civil society organisations and policymakers as helping to enhance quality of life and deal with structural challenges[81,82]. Accordingly, new concepts, models and types of social innovations are currently being analysed in innovation research, so that their potentials can be more systematically exploited[83]. Examples of innovations that have significant consequences for society and social structures, and are therefore social innovations, include, at the private level, environmental movements or the emergence of new forms of cohabitation, at the economic level production line work or fast food chains, and at the political level social insurance[84].

Drivers and dynamics

The trend towards more attention being given to social innovations is accompanied by an increasing political orientation to social needs. At the same time, the task spectrum of civil society organisations is becoming broader, while social work and counselling are become more knowledge-based and professionalised[85]. The integration of community values into businesses[86], and philanthropic projects, are also gaining significance. Civil society organisations such as the German Red Cross[87] and social institutions[88] are increasingly expressing the need to optimise their processes in a scientifically supported way. From an innovation policy perspective, social innovations are a key to addressing social needs[89].

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78 Gillwald, K. (2000): Konzepte sozialer Innovationen. WZB Discussion Paper P00-519. Berlin, WZB.

79 Phills Jr. et al. (2008): http://www.ssireview.org/articles/entry/rediscovering_social_innovation. Accessed on 27 January 2013.

80 Zapf, W. (1989): "Über soziale Innovationen". In: Soziale Welt, vol. 40 / no. 1-2.

81 Franz, H.-W. (2012): http://politik-digital.de/auch-die-politik-braucht-soziale-innovation/. Accessed on 29 January 2013.

82 Expert interview with Dominik Rüede (EBS European Business School) on 6 September 2012.

83 Cf. focus topic at ITA-Forum 2013: http://www.itaforum.info. Accessed on 05 March 2013.

84 Gillwald, K. (2000): Konzepte sozialer Innovationen. WZB Discussion Paper P00-519. Berlin, WZB.

85 Expert interview with Dominik Rüede (EBS European Business School) on 6 September 2012.

86 Porter, M. E.; Kramer, M. R. (2011): Creating Shared Value. In: Harvard Business Review, January 2011.http://hbr.org/2011/01/the-big-idea-creating-shared-value. Accessed on 29/01/2013.

87 Rüede, D.; Lurtz, K. (2012): Mapping the various meanings of social innovation: towards a differentiated understanding of an emerging concept. Wiesbaden, EBS Business School Research Paper Series 12-03.

88 Expert interview with Bernd Stahl (Manchester Business School) on 20 August 2012.

89 Goldsmith, S. et al. (2010): The Power of Social Innovation: How Civic Entrepreneurs Ignite Community Networks for Good. San Francisco, CA, Jossey-Bass.

Apart from the inertia of routine action, obstacles to social innovations include the diversity of social practices and a lack of awareness of innovation potentials[90,91]. Since there is currently no uniform understanding of social innovations or their conditions and consequences, their dynamic forces are still relatively unclear.

Relationship to research and innovation

Close interlinking between social and technical innovations increases the potential for solutions to challenges faced by society as a whole, as well as their diffusion into other areas of society, as they can mutually reinforce each other. It will not be possible to manage future problems such as mass unemployment, the erosion of social security systems and the intensification of ecological risks without implementing social innovations[92]. Little is known as yet about the differences between social as opposed to technical innovations, or the benefits and costs of their implementation and necessary adaptations in the environment.

Relationship to the knowledge society

The integration of social innovations requires additional competences such as a holistic understanding of individual and collective needs, and the actual and potential practices for their fulfilment, as well as creativity, willingness to learn, and trust[93].

Assessment

The systematic analysis and targeted enhancement of social innovation potentials shows promise. Social innovations can complement, trigger or even replace technical innovations.

90 Rüede, D.; Lurtz, K. (2012): Mapping the various meanings of social innovation: towards a differentiated understanding of an emerging concept. Wiesbaden, EBS Business School Research Paper Series 12-03.

91 Expert interview with Bernd Stahl (Manchester Business School) on 20 August 2012.

92 Gillwald, K. (2000): Konzepte sozialer Innovationen. WZB Discussion Paper P00-519. Berlin, WZB.

93 Expert interview with Dominik Rüede (EBS European Business School) on 6 September 2012.

7 WOMEN AS PIONEERS OF GLOBAL TRANSFORMATIONS

Short description of the trend

Disadvantageous treatment of and discrimination against women are still very much in evidence in large parts of the world. They find expression in generally poorer educational opportunities, difficult access to certain fields of employment, and high barriers to holding political offices and mandates. Despite this, current studies show that women's life chances are starting to improve significantly in many areas of life, especially in developing and emerging countries, and, accordingly, that relationships between the sexes in these countries are undergoing rapid and distinct transformation. For example, in developing countries, 38% of all small businesses are run by women. Women in developing countries today make up 17% of the industrial workforce and 24% of employees in the service sector. Globally, women currently represent 40% of employees, 43% of agricultural workers and – for the first time in history – more than half of all students[94]. The number of women attending tertiary education has increased by more than seven times since 1970. In 45 developing countries, more girls than boys now attend secondary school[95].

Because women – especially in developing countries – are increasingly fighting for personal and economic freedoms, they often act as drivers of fundamental positive changes in policy areas such as education, poverty reduction, agriculture and urban development[96]. However, the importance of this transformation in gender relations for the world society of the future has been less researched and is less present in the public mind than for example technological or economic trend shifts. Consequently, the expert debate is missing an important factor and lever, e.g. for achieving the United Nations Millennium Development Goals[97].

Drivers and dynamics

The World Development Report 2012 states that women in developing and emerging countries have benefited disproportionately, compared to men, from reduced trade barriers and technological change resulting from globalisation[98].

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94 World Bank (2012): World Development Report 2012. Gender Equality and Development. Washington, D.C., World Bank.

95 World Economic Forum (2011): The Global Gender Gap Report 2011. Geneva, World Economic Forum.

96 UNDP (2012): Powerful Synergies. Gender Equality, Development and Sustainability. New York, United Nations Development Programme.

97 OECD (2010): http://oecdinsights.org/2010/09/21/investing-in-women-and-girls-the-breakthrough-strategy-for-achieving-the-mdgs/. Accessed on 31/10/2012.

98 Cooray, A. et al. (2012): Globalization and Female Labor Force Participation in Developing Countries: An Empirical (Re)Assessment. In: Courant Research Centre 'Poverty, Equity and Growth' – Discussion Papers, no. 129.

As a result, women can increasingly cultivate their own farmland[99], for example, or migrate to urban centres far from their place of birth to work in export-oriented businesses. Working conditions and pay are often poor, but for women this employment nevertheless means financial independence, autonomy, being better informed and better educated, and an expansion of their networks beyond kindred ties. The combination of an increase of women in gainful employment in agriculture and industry, and these women's desire for freedom, is producing significant social cascade effects[100]: women make greater use of advancement opportunities through education than the average for the population as a whole, and they pass this mindset on to their children; they pay more attention to health, family planning and environmental protection initiatives because their capacity for work depends on it; they push for legislation, e.g. by advocating gender-neutral property rights or land reforms, which in turn reduces the risks of house-building or making agricultural investments; they take out microloans and reinvest savings in small businesses; they use information and communication technologies such as mobile phones to extend their social radius beyond patriarchal control; they join together to form networks and cooperatives or invest in their communities to create an economically, socially and environmentally sustainable foundation for their progress.

Relationship to research and innovation

Taking these new developments into consideration in research and innovation may unleash great potential for shaping society in the future. It is beginning to become apparent how societies in developing and emerging countries react to women's new status, and how this emancipation interacts with other global technological, economic and cultural trends, and this can therefore be researched more systematically and used for innovations.

Assessment

Reflections about the future in 2030 have so far neglected a key megatrend: women as accelerators (change agents) and pioneers of transformation in key areas of services of general interest.

99 FAO (2011): Women in Agriculture. The 2010-11 State of Food and Agriculture Report.

100 OECD (2012): Social Institutions and Gender Index 2012. Understanding the Drivers of Gender Inequality. Paris, OECD.

8 TIME SOVEREIGNTY

Short description of the trend

Today, any reduction in working hours – as called for by trade unions and employee associations – is often only implemented because of economic crisis situations. Many employees are finding this practice increasingly contrary to their interests. The desire for more time sovereignty, i.e. for individual self-determination over the use of one's time, is growing. Reasons for this include the intensification of work, the difficulty of reconciling family and work, and low pay increases[101].

Drivers and dynamics

Particularly the need for opportunities to balance family, leisure time and work is driving the desire for more time sovereignty. For 69% of the population and 78% of parents, improving the balance between family and work is an area for urgent policy action[102]. Starting a family is an event that particularly influences the employment behaviour of employees. The main statistically relevant factors here include a high proportion of mothers who significantly restrict their ability to work up to the age of 30, and do not achieve their highest labour force participation rate[103] until the age of around 49, whereas childless women – or women who enter the active family phase later on – have the highest labour force participation rate in the earlier years of their lives[104]. Yet among men too there is an increasing desire to devote more time to their families in early phases of their working lives[105]. In general, there is an increasingly great interest in the values of family and time[106]. Aside from family demands, everyday life and individual lifestyles are promoting the desire of many employees for more efficient and more flexible working time and working lifetime arrangements. This wish is met in particular by the deregulation and flexibilisation of working hours, e.g. by working less during the family phase, more flexible and later retirement, and educational opportunities late in life – such as studying for a degree. As a result of rising competitive pressure, but also because of the fact that measures to balance work and private life are an investment in a company's workforce, an increasing desire can be seen among employers for greater flexibility in the use of labour and for deregulation of working time[107].

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101 Bohulskyy, Y. (2011): http://www.iaq.uni-due.de/iaq-report/2011/report2011-03.pdf. Accessed on 23 February 2013.

102 BMFSFJ (2012): Familienreport 2011. Leistungen, Wirkungen, Trends. Berlin, BMFSFJ.

103 According to the International Labour Organization (ILO) definition, employment refers to persons of working age who in any one-week reporting period have worked for at least one hour for pay or in the context of self-employment or as a family worker.

104 Rübenach, S. P. et al. (2010): Mikrozensus 2009. Vereinbarkeit von Familie und Beruf. Wiesbaden, Destatis.

105 Holzinger, H. (2010): Zur Zukunft der Arbeit. Befunde und Ausblicke. Salzburg/Vienna, Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW).

106 BMFSFJ (2005): Work Life Balance. Motor für wirtschaftliches Wachstum und gesellschaftliche Stabilität. Analyse der volkswirtschaftlichen Effekte – Zusammenfassung und Ergebnisse. Berlin.

107 BMFSFJ (2012): Familienreport 2011. Leistungen, Wirkungen, Trends. Berlin, BMFSFJ.

Existing working-time models and regulations, such as the German Part-time Work Act (Teilzeitgesetz) need to be adapted to the constantly changing world of work. The threatening skills shortage and the impacts of demographic change also require consideration with respect to future working-time models. Therefore, in addition to business needs, a reliable framework that enables flexibility to the benefit of both employers and employees should be discussed at both the social and enterprise level.

Relationship to research and innovation

New working-time models are required that consider the social, economic and ecological consequences of new requirements for employees and employers, and therefore both business and individual requirements. This simultaneously takes account of the need for opportunities to shape the life-phase-oriented employment biography. This trend may increase demand for technologies that support the flexibilisation of working time – as for example developments in mobile terminal devices, faster internet connections and cloud computing are already increasing location independence and hence the time sovereignty of work today.

Relationship to the knowledge society

Education, for instance in a late phase of life, may promote the hiring of employees even after the statutory retirement age, and hence soften the effects of demographic change. Lifelong learning is more easily possible, however, if employees are able to individually shape their employment biography.

Assessment

The topic of time sovereignty is increasingly applicable to both the economy and to every individual citizen. In the context of constantly changing life circumstances, this topic has a high relevance for the future.

9 FAMILIES IN THE MULTI-OPTION SOCIETY

Short description of the trend

The classical nuclear family, consisting of father, mother and one or more children, will continue to decline in importance in the future. This model is increasingly being replaced by alternative, often more complex, but also less stable ways of life. Alongside the traditional family, for example, there is cohabitation with children, or single parents. At the same time, new family-like ways of life are increasingly shaping society[108]. This trend extends beyond the already-familiar patchwork family. Ways of life such as cohabitation outside of marriage, childless marriages, partnerships with separate households, multi-generation households, same-sex couples with children, and non-exclusive relationships are becoming more prevalent[109]. The impacts of this increasing pluralisation of ways of life offers opportunities but will also create major challenges for society over the coming decades. Above all, it is necessary to determine how social infrastructures should be adapted for these new ways of life, and what suitable legal frameworks can be created for children living in these partnerships.

Drivers and dynamics

The nuclear family is currently still the commonest form of living together in Germany, but the proportion of alternative forms of family is growing[110]. Changed conditions in modern society, such as the equalisation of educational opportunities for men and women, reforms to family law and pensions, but also the change in social values, increasing individualisation and growing economic uncertainties are facilitating and promoting the emergence of alternative living concepts. One in every four children now lives with only one parent or in a stepfamily[111]. For several years, same-sex partners have been able to legally register a civil partnership, which has a status equivalent to conventional marriage in a number of areas. It is also possible to adopt a child in this situation. The recording of the consequences and functions of all the listed new family models is still surprisingly incomplete, even in industrialised countries. In its study “The Future of Families to 2030”, the OECD fears that this transformation constitutes a considerable poverty risk for industrialised and developing countries alike.[112]

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108 German Federal Statistical Office (Destatis); Wissenschaftszentrum Berlin für Sozialforschung (WZB) (eds.) (2011): Datenreport 2011. Ein Sozialbericht für die Bundesrepublik Deutschland. Vol. 1. Bonn, German Federal Agency for Civic Education (Bundeszentrale für politische Bildung).

109 Peuckert, R. (2008): Familienformen im sozialen Wandel. Wiesbaden, VS Verlag für Sozialwissenschaften.

110 Haberkern, K. (2012): Vielfalt der Familie: Problem, Herausforderung, Chance. In: Spektrum der Wissenschaft, October 2012.

111 Peuckert, R. (2008): Familienformen im sozialen Wandel. Wiesbaden, VS Verlag für Sozialwissenschaften.

112 OECD (2012): The Future of Families to 2030. Paris, Organisation for Economic Co-operation and Development.

New research results, especially from the neurosciences, genetics and evolutionary biology, may further accelerate the trend. New biotechnology processes or methods of reproductive medicine may relativise the smallest unit of existing family forms, the mother-child unit[113].

Relationship to research and innovation

The growing trend for the development of new forms of families results in numerous requirements and needs, particularly in relation to infrastructure. Innovations are required in respect of both technical and social infrastructure to adequately meet changed requirements.

Relationship to the knowledge society

The high degree of mobility and flexibility in the private sphere and in working life that is demanded by today's knowledge society is difficult for families with children to achieve. The rising proportion of working mothers additionally reinforces this effect. Especially in working life, people living alone and childless couples benefit above all from their time independence. Working from home and modern information and communication technologies, but also good childcare services, can reduce the burden on parents in this respect.

Assessment

Differentiation into new forms of living together is a clear trend. It affects nearly all areas of society. A detailed examination of potential consequences is required, particularly for the adaptation of social infrastructure and legal frameworks.

113 Burkart, G. (ed.) (2009): Zukunft der Familie. Prognosen und Szenarien. Opladen, Budrich.

10 YOUTH AS A FUTURE MARGINAL GROUP?

Short description of the trend

Demographic change towards an ageing society puts the prevailing cultural youth paradigm to the social test. International surveys show that a majority of the population – at all ages – shares the opinion that society is excessively permeated by the youth craze[114]. It could be replaced by ideals and values that are more in line with the self-image of best-agers (people in their best age over 50) or the silver generation (over 60).

Drivers and dynamics

According to market research, Germany and most industrialised countries will see the development of a demographic structure in which children and young people are not only in a minority in terms of numbers, but also, compared with wealthier and higher-spending older consumer groups, they will lose so much purchasing power, market power and attention e.g. in the media, that their relevance to society's self-image will decline[115]. It is suspected that advertising and marketing will then be aimed more at best-agers, and will stylise this target group as a new consumer "élite". Youth will still represent an important value for best-agers. But they will combine it with their own ideas such as life experience, comfort, enjoyment, an appreciation of quality, "timeless" design, stability/security and depth of experience, and also with an interest in civic commitment, to form new paradigms of "active un-retirement"[116]. Market researchers can tell from best-ager data that this group is already shaping consumer trends in areas such as health and wellness, body care and cosmetics, travel and recreation, and food and restaurants. They have long set the tone in sectors such as household furniture, watches and jewellery, women's clothing, pharmaceuticals, and mobility. These trends are still weak in Africa, the Arab countries, and Latin America[117]. In East Asia, Central Europe and Russia, however, the ageing of the population will accelerate in a way similar to Western Europe by 2030, and will probably result in a similar shift in values[118].

114 Havas Worldwide (2012): Aging: Moving Beyond Youth Culture. Prosumer Report vol. 14. Paris, Havas.

115 SCHUFA (2012): SCHUFA Kredit-Kompass. Finanzverhalten der Generation 60+. Wiesbaden, Schufa Holding AG.

116 Borgstedt, S. (2010): Sinus-Milieus 50plus Deutschland. Die Lebenswelten der Generation 50plus. Heidelberg, Sinus-Institut.

117 UNPFA (2012): Ageing in the 21st Century. United Nations Population Fund / HelpAge International. New York/London, UNPFA.

118 CSIS/Everest Capital (2011): Global Ageing and the Future of Emerging Markets. Washington, D.C. / Miami, FL, Center for Strategic and International Studies / Everest Capital.

Relationship to research and innovation

The impact of demographic change on youth has hardly been researched to date[119]. What happens if youth fades as a lifestyle paradigm? Will the youth phase decline in significance as a "moratorium in the life story", because society exerts more pressure to adapt and "dictates of form" on young people[120]? Or will youth become a long-term biographical grey area, because it is becoming more difficult to enter the employment market ("internship generation")? The important question for the innovation system is whether an ageing population will have a greater tendency to meet innovations with serenity, or with scepticism. Plus there is the uncertainty of whether best-agers will adopt sustainable lifestyles, or tend to opt for catch-up luxury consumption, with problematic environmental consequences. Young and old will need to exchange experiences with each other to a greater extent in the future: Germany's innovative capacity will be maintained if all generations are successfully integrated in the employment market and there is a successful exchange of knowledge and experience in the workplace in a dialogue that spans different age groups. At the same time, the question of the future development of the vocational training system represents another requirement for research and innovation. The answers to these questions will have a decisive impact on future innovation patterns.

Relationship to the knowledge society

Newly emerging senior social environments will present significantly changed requirements for the education and work system – for example as a result of workforces with a high average age. Employees will be active in working life for far longer than is currently the case. Likewise, highly qualified retirees will want to keep working as senior experts. At the same time, the knowledge society will be characterised by a growing demand and need for lifelong learning.

Assessment

In the historical perspective, youth as an independent life phase is a very recent phenomenon; it did not start to appear until after 1900. A "teenager" culture as a consumer milieu and model for youth and the youth craze first appeared, relatively abruptly, in the 1950s[121]. The ageing of society may lead to a similarly disruptive social and economic paradigm shift, which may have consequences for many areas of society that are difficult to predict.

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119 Hoffmann, D. et al. (2008): Jungsein in einer alternden Gesellschaft. Weinheim, Juventa.

120 Picot, S., Willert, M. (2010): Jugend unter Druck?, In: Shell Deutschland (ed.): Jugend 2010. Frankfurt am Main, Fischer.

121 Hurrelmann, K.; Quenzel, G. (2012): Lebensphase Jugend. Weinheim/Basel, Beltz Juventa.

11 A EUROPEAN ISLAMIC CULTURE IS EMERGING

Short description of the trend

More than four million Muslims of different geographic origins live in Germany, and their share of the population will continue to increase[122]. Their growing involvement in social, cultural and political life here in Germany is contributing to a stronger link between European and Islamic values, and hence also to a new understanding of Islam[123,124].

Drivers and dynamics

Islam is the world's second-largest and fastest-growing monotheistic religion[125]. It is based on values and traditions that have their roots in Muslims' different countries of origin[126]. The proportion of Muslims in the German population is increasing. Around half hold German citizenship. They are increasingly involved in shaping everyday cultural, social and political life in Germany[127]. For example, more than half of all Muslims, especially younger age groups, are members of German clubs and associations[128]. This will further reinforce the positive relationship with Germany that today already applies to the majority of Muslims[129]. Contact in everyday life is a key variable influencing the openness of the majority society towards Muslims[130]. Although contact with the majority society in Germany is currently still significantly below the level of other European countries[131], it will continue to grow as a result of Muslims' increasing involvement in German society, and hence increase openness towards social integration and new cultural links with Islam in the future.

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122 Baumgarten, R. (2011): http://www.kulturrat.de/islam/islam-1.pdf. Accessed on 27 January 2013.

123 piegel Online: http://www.spiegel.de/politik/deutschland/engagement-von-migranten-in-zivilgesellschaft-waechst-a-860225.html. Accessed on 24 October 2012.

124 Baumgarten, R. (2011): http://www.kulturrat.de/islam/islam-1.pdf. Accessed on 27 January 2013.

125 Ibid.

126 Ibid.

127 Spiegel Online: http://www.spiegel.de/politik/deutschland/engagement-von-migranten-in-zivilgesellschaft-waechst-a-860225.html. Accessed on 24 October 2012.

128 Haug, S. (2011): http://www.kulturrat.de/islam/islam-1.pdf. Accessed on 27 January 2013.

129 BMI (2011): http://www.bmi.bund.de/SharedDocs/Downloads/DE/Broschueren/2012/junge_muslime.pdf?_blob=publicationFile. Accessed on 24 January 2013.

130 van Melis, V. (2010): http://www.uni-muenster.de/Religion-und-Politik/aktuelles/2010/dez/PM_Studie_Religioese_Vielfalt_in_Europa.html. Accessed on 24 January 2013.

131 Pollack, D. (2011): http://www.kulturrat.de/islam/islam-1.pdf. Accessed on 27 January 2013.

Relationship to research and innovation

The increasing participation of Muslim intellectuals and members of the public in political debates[132] and policy processes in Germany opens up new prospects for social innovations and addresses the interests of a growing section of the population in Europe as a whole[133]. Furthermore, newly established centres for Islamic studies and Islamic sciences may provide the basis for greater academic dialogue, and a setting for reflection on the respective traditions of values. Here too, the process of renewal for Islam in Europe, which many Islamic intellectuals regard as being necessary, can be decisively influenced by the experiences of German Muslims[134].

Relationship to the knowledge society

In a number of major cities in Germany, more than half of under-6-year-olds now have a migration background – in the majority of cases Muslim[135]. They will significantly shape our community in the medium term. Islamic religious education in schools, new faculties of Islamic theology at German universities and the training of theologians, teachers and imams[136] that this has initiated are further milestones of a modern Islam which promotes integration and is partly shaped by German culture, and which unites different cultural and religious lifestyles with a common foundation of values.

Assessment

This topic is highly relevant to the future society in Germany, as the development of a specifically European Islamic culture will in the long term make it easier for Muslims to integrate and identify with the values of society in Germany. It is still open as to what form a specifically German Islamic culture may take, and this can still be shaped.

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132 Ibid.

133 See http://www.gazelle-magazin.de/, http://www.soukmagazine.de/ or http://de.qantara.de/. Accessed on 28 January 2013.

134 Amirpur, K. (2011): http://www.kulturrat.de/islam/islam-1.pdf. Accessed on 27 January 2013.

135 German Federal Statistical Office (Statistisches Bundesamt) (2012): https://www.destatis.de/DE/PresseService/Presse/Pressekonferenzen/2012/kindertagesbetreuung/begleitmaterial_PDF.pdf?_blob=publicationFile. Accessed on 05 March 2013.

136 Khorchide, M.; Karimi, M. (2013): http://www.kulturrat.de/dokumente/islam/islam-7.pdf. Accessed on 27 January 2013.

12 VILLAGES AS PIONEERS IN SHAPING THE POST-GROWTH SOCIETY

Short description of the trend

Stagnating or declining population figures in numerous European countries are being reinforced in rural areas by the loss of importance of agriculture and forestry, and migration to urban centres. The existence of many German villages is under threat[137], and many will gradually disappear from the map by 2030, as is already happening in eastern Germany[138] and in remote areas such as the Hunsrück[139]. Depopulation causes reduced tax income for municipalities, and, at the same time, rising per-head costs for public services. These conditions may become a reality for ever more and larger regions[140]. As supply services such as water and health are difficult to finance for an ever decreasing number of people, villages are becoming test cases for designing the post-growth society[141].

Drivers and dynamics

The main driver of the existential threat to many German villages is the declining economic significance of agriculture and forestry, in conjunction with demographic factors. In "dying" villages there is often a vicious circle of an ageing population, falling attractiveness (e.g. cutbacks in public services such as mobility) – which then triggers migration to the cities (which are more attractive because of education, jobs, lifestyle etc.) – and a lack of younger people moving in. Factors determining the future continued existence of individual villages include the geographical and scenic location, access to infrastructures within a short travelling time, sufficient numbers of younger inhabitants, vacancy visibility, initiatives by citizens and local government, but also real estate ownership patterns and earlier infrastructure investment decisions. Smaller villages on the whole are at greater risk than larger villages[142].

Future prospects are offered by connection to high-performance IT infrastructure and the transformation of Germany's energy supply system ("Energiewende")[143]. High-performance IT networks are set to create new opportunities for education, work and more modern lifestyles and as a result – in addition to rural advantages such as quiet and proximity to nature – increase the attractiveness of villages compared to towns and cities[144].

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137 Kröhnert, S. et al. (2011): Die Zukunft der Dörfer: Zwischen Stabilität und demographischem Niedergang. Berlin, Berlin-Institut für Bevölkerung und Entwicklung.

138 Interview with Werner Frohwitter (Energiequelle AG, Feldheim) on 28 September 2012 as part of the BMBF Foresight Cycle II process.

139 Deutscher Städte- und Gemeindebund (ed.) (2012): Ländlicher Raum. Für eine Politik der Chancen und der Zukunft ländlicher Räume! Berlin, Deutscher Städte- und Gemeindebund.

140 Regional planning forecast 2030 by the German Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) (2013): http://www.bbsr.bund.de. Accessed on 24 January 2013.

141 Interview with Werner Frohwitter (Energiequelle AG, Feldheim) on 28 September 2012 as part of the BMBF Foresight Cycle II process.

142 Ibid.

143 Kröhnert, S. et al. (2011): Die Zukunft der Dörfer: Zwischen Stabilität und demographischem Niedergang. Berlin, Berlin-Institut für Bevölkerung und Entwicklung.

144 Cf. trend profiles nos. 8 Time sovereignty, 4. Globalisation and virtualisation of higher education.

Germany's Energiewende, promoting biomass utilisation, wind power and photovoltaics, is mainly being implemented in rural areas. New job opportunities (e.g. system installation, maintenance and repair) are being created[145,146].

Relationship to research and innovation

So far villages or rather the urban/rural fabric have not been the focus of much research and innovation activity[147]. With restrictions imposed by a declining population and the difficulty of funding public expenditure, conditions are found in villages that are also of critical importance to the post-growth society. Villages are therefore coming to the fore as pilot sites, e.g. for low-cost, decentralised wastewater systems, small schools with new forms of learning, a mix of mobile and central health services, and care with the support of civil society.

Relationship to the knowledge society

With the decline of villages, knowledge about everyday life in rural areas is disappearing. Possibly this is also changing the relationship between people and the cultural landscape and nature. Villages as pilot sites for the post-growth society require dialogues with citizens about new forms of community.

Assessment

In Germany too, the future of villages is overshadowed by the concerns of cities[148]. Yet villages have the potential to come to the fore as pilot cases for designing the post-growth society.

145 Kröhnert, S. et al. (2011): Die Zukunft der Dörfer: Zwischen Stabilität und demographischem Niedergang. Berlin, Berlin-Institut für Bevölkerung und Entwicklung.

146 SWR Fernsehen RP: http://programm.ard.de/Programm/Jetzt-im-TV/im-gruenen---das-natur--und-umweltmagazin/eid_282317059562374?list=themenschwerpunkt. Accessed on 29 November 2012.

147 Meng, R. (2012): Verborgener Wandel: Innovationsdynamik in ländlichen Räumen Deutschlands – Theorie und Empirie. Dissertation at the University of Mannheim. Online: https://ub-madoc.bib.uni-mannheim.de/32550. Accessed on 12 March 2013.

148 Kröhnert, S. et al. (2011): Die Zukunft der Dörfer: Zwischen Stabilität und demographischem Niedergang. Berlin, Berlin-Institut für Bevölkerung und Entwicklung.

13 THE SOCIAL FUNCTION OF FRIENDSHIP IS GAINING IMPORTANCE

Short description of the trend

Lasting friendships – whether real or virtual – are gaining importance both for individuals and for society[149]. Building and maintaining friendships is not just a way to feel subjectively more satisfied, able to cope with the demands of life, and anchored in social life. There is also growing scientific evidence that people who find support in friendships live longer and healthier lives, and are more resistant to stress, more self-confident, and more trusting[150]. People are more likely to fall back on advice from friends, and they no longer regard friends as lower-ranking social contacts compared with relatives, but rather see them as the centre of everyday life[151,152].

Drivers and dynamics

In our individualised society (single-person households[153], discontinuous employment biographies, high mobility requirements[154] etc.), friendships are to an ever increasing extent occupying the space that was previously filled by the family, through organically developed life contexts and biological relationships[155]. Given that partners and employers change frequently, having a family of one's own is no longer taken for granted, and ever fewer people find comfort in religion, friendships are becoming one of the "central relay stations of social cohesion" (Heinz Bude)[156]. In addition, there is ever stronger evidence of the close link between good friendships, health, life expectancy and demographic development[157]. Thus people who have close social bonds enjoy a far better state of health than people without social support. In the Netherlands, for example, friendship programmes have recently been introduced to protect elderly women from loneliness[158].

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149 Steinberger, P. (2012): Ein Leben lang. Freundschaft. In: Süddeutsche Zeitung, weekend supplement, 26 January 2013.

150 Roseneil, S.; Budgeon, S. (2004): Beyond the Conventional Family: Intimacy, Care and Community in the 21st Century. In: Current Sociology, vol. 52 / no. 2.

151 Steinberger, P. (2012): Ein Leben lang. Freundschaft. In: Süddeutsche Zeitung, weekend supplement, 26 January 2013.

152 Various aspects of the increasing importance of social relationships in the virtualised world was brought up several times during the marginal actors creative workshop on 20 October 2012 in Berlin, and by the doctoral candidate panel on hidden social trends on 27/28 September 2012 in Karlsruhe.

153 Roseneil, S.; Budgeon, S. (2004): Beyond the Conventional Family: Intimacy, Care and Community in the 21st Century. In: Current Sociology, vol. 52 / no. 2.

154 Steinberger, P. (2012): Ein Leben lang. Freundschaft. In: Süddeutsche Zeitung, weekend supplement, 26 January 2013.

155 Ibid.

156 Die Zeit-Online Wissen: http://www.zeit.de/zeit-wissen/2011/01/Freundschaft. Accessed on 28 November 2012.

157 Lucas, B. P. et al. (2011): Cardiac ventricular repolarization and global cognitive performance in a community population: a cross-sectional study. In: American Journal of Cardiology, vol. 106, no. 8; Kruger, D. J. et al. (2007): Neighborhood social conditions mediate the association between physical deterioration and mental health. In: American Journal of Community Psychology, vol. 40, no. 3-4.

158 Ibid.

Web 2.0 and new media facilitating visual and virtual communication are functioning as drivers of this trend. Increasing mobility and the constant availability of virtual social networks lead to friendships that are lived mainly in the virtual realm. This means that key aspects of friendship (e.g. closeness, security, trust or time spent together) in some cases need to be renegotiated, while hitherto proven behaviours may lead to conflicts.

Relationship to research and innovation

The trend for upward revaluation of friendships is relevant to numerous research and innovation fields. The first of these fields to mention are the health sciences, biomedicine and brain research, which deal with the positive psychosomatic effects of friendship. Innovations in the field of architecture and housing that attempt to address the growing importance of friendships can be expected in the future. It can further be assumed that developments in the field of information and communication technology (ICT) and new media will support virtual friendships and the nurturing of friendships as they become more and more important. This trend may also reinforce trend 6. More attention being given to social innovations.

Relationship to the knowledge society

A comparison of OECD countries showed that for example in the United States, where people maintain particularly extensive contact with their friends, there is a more positive prevailing mood among the population – measured by feelings of self-worth – than in countries such as Hungary and Japan, where people spend less time with their friends. Germany lies somewhere in the middle[159]. A strengthening of the trend may have a positive impact on perceived quality of life and people's sense of security.

Assessment

Friendships can possibly be regarded as being the social relationships that counteract the disintegration tendencies of modern and future work-oriented and knowledge societies, provide stability and binding forces, and not least make experienceable that which is eroding in many areas of contemporary society: trust and responsibility.

159 Die Zeit-Online Wissen: http://www.zeit.de/zeit-wissen/2011/01/Freundschaft. Accessed on 28 November 2012.

14 HUMAN-ANIMAL CONNECTION

Short description of the trend

The relationship between humans and animals is undergoing a transformation. In many cultures, animals are no longer regarded and understood as objects, but are increasingly viewed as being closely related to humans, intelligent and capable of suffering up to a certain degree, and generally as being our fellow creatures[160,161]. This results in further questions concerning the treatment of animals by humans[162].

Drivers and dynamics

Current natural sciences research[163] in biology and in behavioural, cognitive and brain science shows that animals – and this applies not only to primates but also to birds and reptiles – have numerous cognitive and social abilities which had not previously been attributed to them to such an extent. Market research and social research illustrate that in diverse social milieus around the world, pets are becoming a centre of people's lives, and this is accompanied by a strong humanisation of animals[164]. When cultural values are surveyed in attitude and opinion research studies, animal rights and animal welfare rank very highly[165]. Climate policy as well as environmental and agricultural research also exert argumentative pressure on animal husbandry and meat production. Agricultural experts doubt that the meat industry will continue to be sustainable in its current form in the future, in view of current environmental and demographic challenges[166]. Vegetarian, vegan and animal welfare movements are becoming professionalised, and are therefore increasingly making their voices heard in cultural and ethical discourse and in the media. Leading philosophers such as Derrida[167], Haraway[168], Latour[169] and for example artists[170] at Documenta 2012 address the social construction of the human-animal relationship.

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160 Lurz, R. W. (ed.) (2009): The Philosophy of Animal Minds. Cambridge, MA, Cambridge University Press.

161 Hurley, S.; Nudds, M. (eds.) (2006): Rational Animals? Oxford, Oxford University Press.

162 Verein Philosophicum Lech (2012): http://www.philosophicum.com/editorial-zum-16-philosophicum-2012-tiere-der-mensch-und-seine-natur.html. Accessed on 24 October 2012.

163 Osvath, M. (2012): http://www.svenska-djurparksforeningen.nu/Santino.pdf. Accessed on 24 October 2012.

164 Greg Miller, G. (2011): A Road Map for Animal Rights. In: Science, vol. 332.

165 Crettaz von Roten, F. (2012): Public Perceptions of animal experimentations across Europe. In: Public Understanding of Science, 15 February 2012.

166 Sachverständigenrat für Umweltfragen (2012): http://www.umweltrat.de/DE/Publikationen/Umweltgutachten/umweltgutachten node.html. Accessed on 25 October 2012.

167 Derrida, J. (2010): Das Tier, das ich also bin. Vienna, Passagen-Verlag.

168 Haraway, D. J. (2007): When Species Meet. Minneapolis, University of Minnesota Press.

169 Latour, B. (2009): Will Non-Humans be Saved? An Argument on Ecotheology. In: Journal of the Royal Anthropological Institute, vol. 15.

170 Christov-Bacargiev, C. (2012): Hunde sind die neuen Frauen. In: Süddeutsche Zeitung, 31 May 2012.

Relationship to research and innovation

The subject of the animal-human connection is a new inter- and transdisciplinary research field, which is suitable for a social dialogue process in which research should play a key role as an authority providing balance. There is also a relationship with research into substitute solutions for the use of animals in agriculture and food, such as in-vitro meat or the cultivation in closed reactors of micro-organisms to be used as animal feed or nutritional supplements. It is conceivable that new discourse alliances could change the direction of bioeconomics and agricultural research, or lead to tighter controls on animal experiments in medicine and behaviour research[171]. It is also obvious that products for animals, animal welfare, animal health and human-animal relationship building are developing into new demand factors[172] for technological and service innovations.

Assessment

New natural science findings are combining with other cultural and social trends to form a secular and possibly disruptive social trend. The human-animal connection is a charismatic topic and therefore apt to be the subject of campaigning[173].

171 van Vliet, E. (2011): http://altweb.jhsph.edu/altex/28_1/altex_2011_1_017_044_Vliet.pdf. Accessed on 30 October 2012.

172 IVH Industrieverband Heimtiermarkt e.V. (2011): http://www.ivh-online.de/fileadmin/user_upload/Der_Deutsche_Heimtiermarkt_2011.pdf. Accessed on 30 October 2012.

173 Christov-Bacargiev, C. (2012): Hunde sind die neuen Frauen. In: Süddeutsche Zeitung, 31 May 2012.

15 NOISE: THE IGNORED ENVIRONMENTAL AND HEALTH PROBLEM

Short description of the trend

Surveys confirm that large sections of the German population feel bothered not only by road and aircraft noise, but also by industrial and neighbourhood noise[174]. Citizens' initiatives against noise are gaining support, while complaints against private individuals or against municipalities and businesses are piling up and gaining media attention[175]. There is growing scientific evidence of the harmful effects of noise on health[176]. Accordingly, public calls for policy measures to reduce noise nuisance are becoming increasingly vocal[177]. Politicians are paying more attention to noise as an environmental problem, not least in response to rising expectations from the population[178]. That noise perception has both objective and subjective components can be seen from the years-long public discussions and legal wranglings on the subject of "noisy children", which led in May 2011 to a change in the German Federal Immission Control Act (Bundes-Immissionsschutzgesetz, BImSchG)[179].

Drivers and dynamics

From a medical viewpoint, it is undisputed that noise causes considerable health problems and may increase the risk of numerous diseases, including cardiovascular diseases, tinnitus, cognitive development problems in children, and depression[180,181]. According to the WHO/Europe, every year more than one million healthy years of life are lost as a result of noise in Western Europe alone[182]. In addition, there is evidence that (industrial) noise has harmful impacts on animals[183,184], as well as indications that noise has indirect negative impacts on plants[185]. Increasing numbers of citizens' initiatives are being formed in protest against noise; aircraft noise in particular receives a lot of media attention.

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174 Umweltbundesamt (2011): www.umweltbundesamt-daten-zur-umwelt.de/umweltdaten/public/theme.do?nodeIdent=2451. Accessed on 24 October 2012.

175 Schmidt, L. (2012): Auswirkungen von Lärm - Warum tun wir uns das an? In: Frankfurter Allgemeine Zeitung, 24 August 2012.

176 WHO/Europe (2011): Burden of disease from environmental noise. Copenhagen.

177 Schmidt, L. (2012): Auswirkungen von Lärm - Warum tun wir uns das an? In: Frankfurter Allgemeine Zeitung, 24 August 2012.

178 WHO/Europe (2011): Burden of disease from environmental noise. Copenhagen.

179 Deutscher Bundestag (2011): www.bundestag.de/dokumente/textarchiv/2011/34547505_kw21_de_kinderlaerm/index.html. Accessed on 29 November 2012.

180 Schmidt, L. (2012): Auswirkungen von Lärm - Warum tun wir uns das an? In: Frankfurter Allgemeine Zeitung, 24 August 2012.

181 WHO/Europe (2011): Burden of disease from environmental noise. Copenhagen.

182 Ibid.

183 Spiegel-Online (2012): www.spiegel.de/wissenschaft/natur/3000-delfine-an-der-kueste-von-peru-verendet-a-825784.html. Accessed on 4 April 2012.

184 Hodge, A. M.: http://www.ecology.com/2012/01/26/noise-pollution-biodiversity/. Accessed on 26 January 2012.

185 EC / DG Environment News Alert Service (2012): http://ec.europa.eu/environment/integration/research/newsalert/pdf/286na4.pdf. Accessed on 24 October 2012.

But complaints against noise from municipal facilities and events, such as sports grounds and fairs, are also increasing[186,187]. The drivers of this globally increasing noise pollution are largely known: growing urbanisation along with road, air and rail traffic are making civilisation increasingly noisy[188]. However, the stress caused by noise does have a subjective component: whether a sound is perceived to be noise depends on personal and economic interests as well as the individual's attitude towards the source of the sound. So far, the question of what people's personal contribution to reducing the noise load in everyday life should be – e.g. by taking a possible noise nuisance into account when purchasing a product – remains an open one[189].

Relationship to research and innovation

From the medical perspective, there are research gaps concerning the dose-effect relationship of noise in increasingly common disorders such as tinnitus[190]. There are also important research questions of a socio-cultural nature: How can individual expectations in relation to consumption, mobility and productivity be reconciled with reducing noise? What contributions can policymakers, legislators, and individuals make?

Other relevant areas of research and innovation include engineering measures to reduce industrial and traffic noise. Noise pollution is developing into a global challenge, with the result that a global demand for innovative noise reduction solutions can be expected.

Relationship to the knowledge society

Exposure to noise has negative impacts on humans' cognitive abilities. More recent studies show a relationship between noise exposure and learning and memory impairment in children[191].

Assessment

In view of the scientific evidence that noise harms health, and the fact that it can be so socially disruptive, noise as an environmental and health problem requires further attention.

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186 Schmidt, L. (2012): Auswirkungen von Lärm - Warum tun wir uns das an? In: Frankfurter Allgemeine Zeitung, 24 August 2012.

187 WHO/Europe (2011): Burden of disease from environmental noise. Copenhagen.

188 Ibid.

189 Schmidt, L. (2012): Auswirkungen von Lärm - Warum tun wir uns das an? In: Frankfurter Allgemeine Zeitung, 24 August 2012.

190 WHO/Europe (2011): Burden of disease from environmental noise. Copenhagen.

191 Ibid.

16 REBOUND EFFECT: UNDERESTIMATED PARADOX[192] OF SUSTAINABILITY POLICY

Short description of the trend

The rebound effect refers to a phenomenon whereby technological measures to improve energy and resource efficiency can have the unintended effect of increasing their usage, and so actually lead to an increase in energy and resource consumption, instead of a saving. Sustainability efforts could therefore be undermined by a rebound effect[193]. This effect can be seen at various different levels: as a result of technological measures to increase efficiency, the demand for products and services may increase, because they are now cheaper (direct rebound effect), or because freed-up resources stimulate demand (indirect rebound effect). Efficiency improvements can also lead to an increase in aggregate demand (aggregate rebound effect)[194].

Drivers and dynamics

Although rebound effects have been known for some time[195,196], their definition, their drivers, and above all their extent are scientifically disputed[197]. "There are only estimates of the level of the rebound effect, which differ greatly in some cases. Between approx. 30 percent and more than 100 percent of the expected savings resulting from efficiency gains may not be realised because of rebound effects,"[198] reports the German Parliamentary Advisory Council on Sustainable Development (*Parlamentarischer Beirat für nachhaltige Entwicklung*). It is notable that according to empirical estimates, the extent of the total rebound, which is relevant to sustainability policy, has steadily increased in recent years. Nevertheless, rebound effects are still largely unconsidered in research and (energy) policy[199].

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192 Endres, A. (2012): http://www.zeit.de/wirtschaft/2012-04/rebound-effekt-energieeffizienz. Accessed on 26 October 2012.

193 Parlamentarischer Beirat für nachhaltige Entwicklung (2012): http://www.bundestag.de/bundestag/gremien/nachhaltigkeit/berichte/natuerlicheressourcen.pdf. Accessed on 26 October 2012.

194 Peters, A. et al. (2012): Rebound-Effekte aus sozialwissenschaftlicher Perspektive. Fraunhofer ISI. Working paper S 5/12.

195 Parlamentarischer Beirat für nachhaltige Entwicklung (2012): http://www.bundestag.de/bundestag/gremien/nachhaltigkeit/berichte/natuerlicheressourcen.pdf. Accessed on 26 October 2012.

196 Madlener, R.; Alcott, B. (2011): http://www.bundestag.de/bundestag/gremien/enquete/wachstum/gutachten/m17-26-13.pdf. Accessed on 26 October 2012.

197 Peters, A. et al. (2012): Rebound-Effekte aus sozialwissenschaftlicher Perspektive. Fraunhofer ISI. Working paper S 5/12.

198 Parlamentarischer Beirat für nachhaltige Entwicklung (2012): http://www.bundestag.de/bundestag/gremien/nachhaltigkeit/berichte/natuerlicheressourcen.pdf. Accessed on 26 October 2012.

199 Madlener, R.; Alcott, B. (2011): http://www.bundestag.de/bundestag/gremien/enquete/wachstum/gutachten/m17-26-13.pdf. Accessed on 26 October 2012.

There is a particular need for more research on the drivers of rebound effects: in addition to the factor of increased demand due to falling costs, there are indications of sociological and psychological influencing factors – including individual beliefs, desires, and social expectations of consumer behaviour[200,201].

Relationship to research and innovation

Rebound effects are complex phenomena that may thwart the intentions of innovations in sustainability. There is a need for further research efforts to gain a better understanding of rebound effects and to find strategies for preventing them. For example, the interdependencies between resource consumption and efficiency, and the rebound effects of new technologies and applications should be investigated. In this context, innovative approaches to break the link between growth and the consumption of energy and resources are of great interest[202].

Assessment

Efficiency gains in energy and resource consumption are often targets for technological funding programmes, which in addition to developing new markets are also expected to achieve sustainability and environmental targets. It is possible that efficiency gains will be accompanied by rebound effects, and could therefore counteract sustainability targets. Thus it is necessary to develop a better understanding of the interdependencies between efficiency, lower prices, and consumption, so that possible unwanted rebound effects can be systematically taken into consideration and prevented.

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200 Ibid.

201 During the expert workshop on normative social trends on 16 November 2012 in Berlin, it was pointed out that currently there is above all a lack of information and transparency regarding the social causes of rebound effects. If these could be better understood and tracked, awareness of the psychological and social factors that cause rebound effects would increase.

202 Madlener, R.; Alcott, B. (2011): http://www.bundestag.de/bundestag/gremien/enquete/wachstum/gutachten/m17-26-13.pdf. Accessed on 26 October 2012.

17 NEW REQUIREMENTS FOR MATERIAL FLOWS FOR CONSUMER GOODS HAVE A DELAYED IMPACT ON THE ENVIRONMENT AND DISPOSAL SYSTEMS

Short description of the trend

Because of their associated material flows, changing consumption patterns have a critical impact on future waste disposal and potential environmental problems between now and 2030. For example, consumer goods such as clothing, automobiles and insulating materials for residential buildings are characterised by an ever greater diversity of materials and complex composite materials. Yet current waste disposal systems are geared to other, less complex materials[203]. Through corrosion and wear, installed materials (e.g. in buildings, systems, transformers, pipes and wiring) or open applications (e.g. munitions in the sea[204], pharmaceutical agents, heavy metals such as nanosilver[205]) gradually release harmful substances into the environment. There is only scant knowledge about the location, distribution, character and dynamics of such environmental effects.

Drivers and dynamics

Consumption patterns are changing as a result of complex interactions, especially between market participants, technological change, and governance. They reflect the preferences of their time, e.g. for mobile communication or reducing the energy requirements of residential buildings[206]. Meanwhile the useful life of infrastructures, products and materials ranges from hundreds of years (e.g. bridges) to one or two decades (e.g. automobiles), down to a few days (e.g. food packaging)[207]. The main drivers of changed requirements for future waste disposal are therefore past, present and future consumption patterns, the changing material composition of goods, and anticipated future environmental problems and raw material requirements[208]. For example, current car-shredders are designed for old types of cars that are largely made of steel. Present-day cars, however, which will require disposal around about 2030 if not before, increasingly consist of plastics, light metals and electronics, which cannot be satisfactorily recycled using conventional shredder technology[209]. The main drivers of the delayed environmental impacts resulting from consumption patterns and behaviours often lie in the past; but they can be put in place in the present or future, and therefore create future environmental pollution.

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203 Erdmann, L. et al. (2011): Kritische Rohstoffe für Deutschland. Frankfurt am Main, KfW Bankengruppe.

204 NDR: http://www.ndr.de/fernsehen/sendungen/panorama_3/alle_sendungen/munition117.html. Accessed on 29 November 2012.

205 ZDF: http://stream-tv.de/sendung/1291448/abenteuer-wissen-tote-werra. Accessed on 29 November 2012.

206 Röpke, I. et al. (2010): Information and communication technologies – A new round of household electrification. In: Research Policy, vol. 38. / no. 4.

207 Murakami, S. et al. (2010): Lifespan of Commodities, Part I: The Creation of a Database and Its Review. In: Journal of Industrial Ecology, vol. 14 / no. 4.

208 Angerer, G. et al. (2009): Rohstoffe für Zukunftstechnologien. Stuttgart, Fraunhofer IRB Verlag.

209 Erdmann, L. et al. (2011): Kritische Rohstoffe für Deutschland. Frankfurt am Main, KfW Bankengruppe.

Relationship to research and innovation

Some selective information is available concerning the effects of past, present and future consumption patterns on future waste disposal and on the future input of harmful substances into the environment, but the future consequences for waste disposal and the environment have not received sufficient attention from the research and innovation system, particularly with regard to the aspect of material dynamics. A growing need will emerge to “defuse” these consumption “time-bombs”.

Relationship to the knowledge society

Knowledge about material issues related to consumption, their dynamics over time, and their environmental relevance is likely to gain importance in a densely populated country that lacks natural resources, such as Germany (which has committed itself to sustainable development).

Assessment

Present and future consumer goods should be taken into consideration more systematically in research and development for waste disposal systems of the future. Development times for systems which, for example, take the changing material composition of cars into account in future waste disposal, are in the order of magnitude of one decade. Identifying the time-delayed effects requires considerable research and development efforts.

18 THE BATTLE AGAINST OBESITY IS INTENSIFYING

Short description of the trend

The increase in people's average weight in many Western countries has led the World Health Organization (WHO) to declare a global "obesity epidemic"[210]. This has resulted in a variety of efforts at all kinds of levels of control. All have the aim of getting citizens to lead a weight-reducing lifestyle. As a result, increasing numbers of people are becoming the implied targets of a discourse which classifies them into risk groups and urges them to participate in the battle against obesity.

Drivers and dynamics

Since the 1990s, a continuing increase in people's average weight has been observed in prosperous countries like Germany[211]. Accompanying this, extensive concerns are expressed about the health consequences and long-term economic costs of this trend. Even though the equating of weight reduction with a health benefit is scientifically disputed, this assumption has led to numerous campaigns and media reports urging citizens to lose weight or take steps to prevent weight gain. Driven by (bio)medicine, food science, health policy, mass media and the fitness and beauty industry, there has been a strengthening of cultural norms and conceptions about slim bodies being healthy, on the one hand, and about fat bodies being a risk to health and tending to be a deviation from the norm, on the other. The propagated "normal weight" combines with culturally embedded aesthetic and moral notions that slim bodies are more desirable, whereas fat bodies are frequently interpreted as being unaesthetic and the expression of a person's failure of self-discipline. Health campaigns designed to have popular appeal combine developments in which the body becomes an object of consumption and symbol of performance. Consequently, stigmatisation of and discrimination against fat people are reinforced ("fitocracists" versus "fat activists"), which also plays a role in a growing number of psychological problems in relation to food, activity and sport. Social engagement with the "obesity epidemic" provokes ever more active partisanship, ranging from refusal to participate in the debate, to aggression against other people[212,213].

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210 World Health Organization (2007): http://www.euro.who.int/de/what-we-publish/abstracts/challenge-of-obesity-in-the-who-european-region-and-the-strategies-for-response-the.-summary., Accessed on 28 November 2012; BMBF (2013): http://www.gesundheitsforschung-bmbf.de/de/ 2042.php. Accessed on 28 November 2012.

211 Robert Koch Institut (2012): http://www.rki.de/DE/Content/Gesundheitsmonitoring/Studien/Degs/degs_w1/Symposium/degs_uebergewicht_adipositas.pdf?_blob=publicationFile. Accessed on 28 November 2012.

212 Miersch, M.: http://www.welt.de/wissenschaft/article4833493/Dick-und-doof-oder-rundum-gluecklich.html Accessed on 28 November 2012.

213 Doctoral candidate panel on hidden social trends on 27/28 September 2012 in Karlsruhe.

Relationship to research and innovation

Whereas research is being conducted into medical, surgical and pharmacological solutions to the obesity problem, and also solutions aiming at nutrition and exercise, so far there has been a lack of implementation of ethical, legal and social aspects (ELSA)[214]. In addition to media products that offer (computer) game-like intervention opportunities (exergames), research and innovation activities should also include technology and media-based capabilities for self-monitoring, self-measurement and self-discipline. Furthermore, concepts are conceivable which combine questions of urban planning, mobility and transportation engineering with the challenge of physical exercise. If there is an increase in conflicts of this kind, the overall pressure on research and innovation rises.

Relationship to the knowledge society

This trend negatively affects career opportunities and lifestyles of those affected by obesity[215]. Revitalising food and exercise competence is part of the task of health education and moderating the trend. In addition, psychology, therapies and multimedia education formats are increasingly providing differentiated offerings for groups of people affected in different ways.

Assessment

The battle against obesity can be seen as a litmus test for how individualisation in the knowledge society is reconcilable with biopolitical tolerance, and its impacts will continue to be seen between now and 2030.

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214 Ibid.

215 N24.de: http://www.n24.de/news/newsitem_8164499.html. Accessed on 28 November 2012.

19 SELF-OPTIMISATION OF PEOPLE

Short description of the trend

In the modern society, beauty and youth are increasingly becoming an obligation[216]. Physical fitness and intellectual capacity, an attractive appearance and an engaging manner are becoming ever more relevant for social recognition and professional success. For example, attractive people get paid higher salaries than less attractive people[217]. Increasing numbers of people frequently feel under pressure to meet society's expectations and are starting to mould themselves physically and mentally.

Drivers and dynamics

Ability to work under pressure, flexibility, motivation, creativity and self-confidence are just some of the requirements that are explicitly demanded in present-day job adverts[218]. Not everybody can live up to these expectations and the actual demands of real working life. The latest findings in medical research, as well as progress in the neurosciences and in information and communication technologies, are increasingly expanding the spectrum of possible measures to improve physical and mental health[219]. Doctors in various medical fields currently offer services that go beyond curative medicine[220]. These are aimed not so much at health, but rather at increasing performance and attractiveness. Cosmetic surgery continues to be a booming market. There is a rising trend particularly among men for anti-wrinkle treatments in the form of injections and fillers[221]. In addition, enhancing mental performance is now also becoming increasingly relevant[222]. The palette of possibilities for temporarily increasing cognitive abilities, and also influencing emotional states, ranges from consuming so-called "brain foods", to taking freely available stimulants, to using prescription psychotropic drugs. Yet knowledge and in some cases also education about long-term psychological and physical side-effects is often still insufficient.

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216 Pany, T. (2012): http://www.heise.de/tp/artikel/36/36360/Lhtml. Accessed on 14 January 2013.

217 Hamermesh, D. S. (2011): Beauty Pays: Why Attractive People Are More Successful. Princeton, University Press.

218 Sailer, M. (2009): Anforderungsprofile und akademischer Arbeitsmarkt: Die Stellenanzeigenanalyse als Methode der empirischen Bildungs- und Qualifikationsforschung. Münster, Waxmann.

219 One example is individualised medicine, i.e. medicine that is more closely tailored to patients' individual needs and circumstances (cf. BMBF (2012): http://www.bmbf.de/de/16162.php. Accessed on 14 January 2013).

220 Borkenhagen, A.; Brähler, E. (eds.) (2012): Die Selbstverbesserung des Menschen. Wunschmedizin und Enhancement aus medizinpsychologischer Sicht. Gießen, Psychosozial-Verlag.

221 Hibbeler, B.; Siegmund-Schultze, N. (2011): Ästhetisch-kosmetische Medizin: Schönheit hat ihren Preis. In: Dtsch Arztebl, vol. 108 / no. 26.

222 Galert, T. et al. (2009): Neuro-Enhancement. Das optimierte Gehirn; Memorandum. In: Gehirn & Geist, no. 11.

In addition to these rising but known developments, new trends are emerging in psychological self-conditioning[223].Thus, based on new scientific findings, there are increasing attempts to use classical methods, such as meditation, in a targeted way for self-optimisation. Furthermore, various self-monitoring technologies are being increasingly used, such as mobile health (m-health) applications. The data collected in this way is also made accessible via social networks.

Relationship to research and innovation

The trend for self-optimisation is being driven in part by new research findings, and may entail positive as well as negative effects. Optimising mental performance may produce better results at work, but could also cause health problems. Questions of preventive health and safety are of great importance in this context. The consequential effects of new research findings – both medical and social – should be observed so that any negative impacts can be counteracted at an early stage.

Relationship to the knowledge society

The knowledge society – especially some sections of it – places very high demands on its members. Not all people can fulfil these requirements with their natural resources. Ever more people feel forced to seek help from artificial measures so that they can keep up with the competition.

Assessment

Self-optimisation has the potential to be highly socially disruptive. As well as ethical and moral aspects, for example, issues of distributive justice and possible medical consequences, such as the risk of addiction, should be considered.

223 Sieben, A. et al. (eds.) (2012): Menschen machen. Die hellen und die dunklen Seiten humanwissenschaftlicher Optimierungsprogramme. Bielefeld, transcript.

20 THE CULTURE OF DYING: BETWEEN SUPPRESSION AND SELF-DETERMINATION

Short description of the trend

The way that our society deals with dying and death is ambivalent. On the one hand, dying and death are suppressed in everyday life[224,225]. On the other hand, a recent survey[226] shows that one in every two people in Germany has already given though to their own death. In contrast to death, it is dying in particular that triggers fears and anxieties in people. Thus a majority of people wish for a sudden, unexpected and painless death in a familiar environment, surrounded by family members[227,228,229].This is a wish that is seldom granted, since most people today die in institutions, such as care homes or hospitals[230,231,232]. To continue to ensure a "culture of dying with dignity" is a social challenge that needs to be addressed not only by care homes and hospitals.

Drivers and dynamics

Dying is to a large extent determined by cultural, religious and social conditions. In particular, dying is influenced by demographic change, the longevity of society, but also developments in intensive care medicine. At the same time, the goal of modern medicine – to prevent dying and prolong life – seems to be in contradiction to pain-relieving, "more acceptable" palliative care[233]. There are increasing demands for more consideration to be given to the patient's wishes and for more self-determination. Thus increasing numbers of citizens in Germany are writing a living will, mainly due to fears of medical overtreatment[234].

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224 ARD.de: www.ard.de/themenwoche2008/gesundheit/sterben-in-deutschland/-/id=742958/nid=74295/did=767940/rozgyz/index.html. Accessed on 06 November 2012.

225 Göckenjan, G.: www.bpb.de/apuz/31448/sterben-in-unserer-gesellschaft-ideale-und-wirklichkeiten?p=all. Accessed on 31 October 2012.

226 Deutscher Hospiz- und Palliativ Verband (2012): Sterben und Tod kein Tabu mehr. Berlin, DHPV.

227 Ibid.

228 Hoffmann, M. (2011): "Sterben? Am liebsten plötzlich und unerwartet." Die Angst vor dem "sozialen Sterben". Wiesbaden, VS Verlag. Wiesbaden, VS Verlag.

229 von Bredow, R. et al.: www.spiegel.de/spiegel/print/d-85913063.html. Accessed on 6 November 2012.

230 Deutscher Hospiz- und Palliativ Verband (2012): Sterben und Tod kein Tabu mehr. Berlin, DHPV.

231 3sat (2012): http://www.3sat.de/pageVsourceUscobel/166462/index.html. Accessed on 10 March 2013.

232 Jaspers B.; Schindler T. (2005): Stand der Palliativmedizin und Hospizarbeit in Deutschland und im Vergleich zu ausgewählten Staaten. Report commissioned by the Bundestag Study Commission on "Ethics and Law of Modern Medicine". Berlin, Deutscher Bundestag.

233 Pawlik, M.(2010): www.faz.net/aktuell/feuilleton/buecher/rezensionen/sachbuch/michael-de-ridder-wie-wollen-wir-sterben-kraefteverfall-partnerverlust-mangelernaehrung-1971849.html. Accessed on 6 November 2012.

234 Ibid.

The number of people planning to make such provisions is also steadily rising[235]. Discussions about active and passive euthanasia gain new force against this background[236].

Relationship to research and innovation

This trend raises not only ethical but also social questions: How can the risk of medical over- or undertreatment at the end of life be addressed? Will "the pressure of 'self-disposal' and 'renouncing life'"[237] for economic reasons grow in the future, as the ethicist Reimer Gronemeyer fears[238]? Should alternative concepts for the dying process be implemented, e.g. from palliative medicine or even active and passive euthanasia? And how should health and care structures be modified to meet people's common desire to die humanely in their own home?

Assessment

The enormous response to a themed week on ARD about "living with death" (17-23 November 2012) confirms the topicality and social relevance of the subject. An in-depth scientific examination of all aspects of the culture of dying would help to find answers to questions relating to the end of life, which people in Germany are concerning themselves with to an ever greater extent.

235 Deutscher Hospiz- und Palliativ Verband (2012): Sterben und Tod kein Tabu mehr. Berlin, DHPV.

236 ARD.de: www.ard.de/themenwoche2008/gesundheit/sterben-in-deutschland//id=742958/nid=742958/did=767940/rozgyz/index.html. Accessed on 06 November 2012.

237 Ibid.

238 Ibid.

21 GROWING NEED FOR CONCEPTS FOR OUR DIGITAL LEGACY

Short description of the trend

Around the world, increasing uncertainty is developing over how to deal with digital data, i.e. a person's digital property, after their death. In Germany, the (basic) right to informational self-determination and the general personal rights based on Article 2 of the German Basic Law (*Grundgesetz*) form the basis for settling digital property rights after the death of the person[239]. It is in this context that the first conflicts between heirs and providers of internet platforms have already occurred. Surviving family members demanded access to the digital data of those who had died, but were refused because they didn't have the login details[240]. It is anticipated that the concept of property in general will change as society becomes increasingly digitalised.

Drivers and dynamics

When it comes to making arrangements for one's digital legacy, a distinction should be made between private property and business property. Private property includes, for example, photos, emails, video and audio data, and online network profiles. Business data consists of e.g. customer data. Data of this kind increasingly has sentimental and material value, including after death. Access to electronic accounts and insurance policies can have existential implications for family members. And yet, around the world, there are very few firm rules concerning the treatment of a person's digital legacy after their death. For example, the right to close a digital account after a person's death is dealt with in different ways by different operators. In many cases, contracts with service providers terminate automatically in the event of the death of the contracting party, e.g. in the case of Apple iTunes. The first comprehensive service offerings for managing people's digital legacy are now being developed as business models and reviewed from the legal point of view[241].

Possible relationship to research and innovation

The lack of rules or provisions on digital legacies may prove to be a barrier to innovation, if for example after a person's death, refusal of access by a platform operator means that heirs are no longer able to use data that is available there, and therefore knowledge transfer is restricted. On the other hand, new legislation and regulations influence innovations. In this light, digital asset management services are gaining importance. New services will need to include digital legacy arrangements. As a result of the increasing use of digital identities, other similar conflicts are likely in relation to the handling of data and traces left by the dead in the internet.

239 Martini, M. (2012): Der digitale Nachlass und die Herausforderung postmortalen Persönlichkeitsschutzes im Internet. In: Juristen-Zeitung, vol. 23.

240 Cahn, N. (2011): Postmortem Life On-line. In: Probate & Property, vol. 25 / no. 4.

241 Semno is one example of a business that offers digital legacy related services: http://www.semno.de. Accessed on 23 October 2012.

Issues concerning the long-term storage of and access to data, which have been known about for some time, in part from large-scale facilities research, and in some cases are still unresolved, could increasingly affect the data of private persons.

Relationship to the knowledge society

What happens to digital data when a user dies? The industry association Bitkom advises its members to give careful consideration to digital legacies, just as they would to paper documents, as they may contain important information for surviving family members[242]. Possibly a new culture of knowledge retention is developing, which also encompasses new forms of remembrance and mourning – perhaps a kind of digital mourning culture[243].

Assessment

This topic entails a series of new, future challenges, that are highly important: What digital data does the legacy actually include? How can this data be safeguarded? How can one make a virtual bequest? How can privacy and data protection in the virtual realm be guaranteed, e.g. for surviving family members? How long are the relevant time periods here? How can I gain access in my lifetime to personal data, such as data concerning my consumption patterns, in order to destroy it, if it is stored on foreign servers? How can German companies use customer data stored on servers in the United States, and at what cost? These unanswered questions show that a digital society needs to make a more conscious effort to address the topic of personal legacies, also in the long term. At the same time, there is a need not only to transfer previously valid rules, values and norms to the digital world, but also where necessary to adopt new requirements from the digital world. The task of shaping the future society will also include making the relevant bodies ready to meet the new challenges. It is a matter of anticipating the future development of the concept of property in a digital society.

242 Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e.V. (BITKOM) (2012): http://www.bitkom.org/de/themen/50792_63078.aspx. Accessed on 22 October 2012.

243 E.g. as professional grief counselling online and offline: http://www.fachberatung-trauerfeier.de. Accessed on 22 October 2012.

22 TRUST IN THE INTERNET AGE

Short description of the trend

Trust is essential for social systems to function[244]. A significant change in the culture of trust can be observed in the internet. In a world of variable user identities, we see new forms in which people, products and services gain and lose trust and reputations. Recommendations from both commercial and private actors, such as curators or bloggers, are used in and sometimes even initiated by business marketing and sales departments. It will therefore be more difficult in the future to allay suspicions that recommendations have been paid for[245]. Thus, on the internet, there is a general suspicion of commercial marketing attaching not only to products and services, but increasingly also to opinions. It is important to realise that the internet here is merely providing the technological framework for society's increasing demand for detailed information about products and people. New kinds of internet services, such as Klout[246], promise to measure a person's online reputation, i.e. how they are regarded in digital media, and transform this into a set of comparable variables.

Drivers and dynamics

Nearly one billion people around the world now use the social network Facebook to present themselves, their interests and activities in the internet. Networks specialising in professional profiles, such as a LinkedIn and XING, also have several hundred million members, who in some cases also provide information about their leisure activities. This disclosure of personal interests and desires has already produced the everyday phenomenon of "googling" people to get a first impression about them. This transparency can bring to light highly personal details about a person, but it can also create trust. Web 2.0 usage concepts are just some of the drivers of this social trend. New services such as PeerIndex calculate an internet user's influence based on their web activities, as a score on a defined scale. Ultimately, therefore, a simple number can serve as a universal indicator for the reputation of individuals, businesses, products or services in the real world. The methods and variables chosen to calculate such reputation indicators are still the subject of much debate, but there are now reports that internet reputations are being taken into account as a basis for both private and professional decisions.

244 Schneider, B. (2012): "Liars and outliers: enabling the trust that society needs to thrive." Indianapolis, John Wiley & Sons.

245 Alvares de Souza Soares, P. (2012): http://www.zeit.de/digital/internet/2012-08/twitter-follower-facebook-fans-gekauft. Accessed on 2 November 2012.

246 Vielmeier, J. (2012): http://www.basicthinking.de/blog/2012/04/26/die-schufa-furs-web-klout-misst-euren-sozialen-wert/. Accessed on 2 November 2012.

Wired magazine reports on cases[247] such as job candidates who were turned down because their Klout score was too low, and an American hotel chain that only decides whether to give guests a free room upgrade after checking their Klout score.

Relationship to research and innovation

Little research on online reputations has been carried out in Germany to date. However, there is a need in research and innovation to look into the question of the extent to which a "virtual reputation" is applicable to everyday life outside of the internet, and what consequences – negative as well as positive – such a change is likely to have. This may become more important for researchers too, and create new challenges for them.

Assessment

A recent survey of internet users by the industry association BITKOM revealed that almost 80% of respondents find it more difficult to judge whether people or businesses are trustworthy based on their internet presence as opposed to direct encounters[248]. A new "unit of measure" for measuring trust in the internet in the future would appear useful, and this may turn into a challenge in the long-term with regard to the highly dynamic drivers mentioned above.

247 Stevenson, S. (2012): http://www.wired.com/business/2012/04/ff_klout/all/1. Accessed on 2 November 2012.

248 BITKOM (2012): http://www.bitkom.org/files/documents/BITKOM_Praesentation_Managing_Trust_Prof_Kempf_05_03_2012.pdf. Accessed on 1 November 2012.

23 INCREASING DEMANDS FOR THE RIGHT TO USE DIGITAL GOODS FOR FREE

Short description of the trend

The digitisation of copyrighted content in conjunction with the possibility for mass distribution of this content via the internet is creating a new challenge for the protection of intellectual property. Firstly, current rights owners are attempting to protect their content in the traditional way, e.g. by using copy-protection technologies to prevent unlawful distribution. Secondly, an increasing number of initiatives are making public calls for a new copyright[249,250]. All things considered, even if this is legally resolved by 2030, the general understanding of original and copy will change dramatically. Today, internet users already and increasingly want to use the wide variety of digital cultural goods in creative and inventive ways. The high relevance to future developments results from the growing awareness of the innovation potential of open data.

Drivers and dynamics

The digitisation and distribution of copyrighted material via the internet makes it easier to save content, copy it, modify it for other purposes, and redistribute it. Although licenses already exist which explicitly permit such use, e.g. Creative Commons licenses[251], none of the approaches currently has the potential to become a widely accepted solution; knowledge of such solutions is too limited among large sections of the population, and opposition from creative industry lobbies is too strong. Intense usage of digital technologies among the population will increase, and with it so will the demand for "creative" use of digital content of all kinds – whether scientific texts, images, music or videos[252]. One consequence is that in pop culture, pieces which are known or more specifically have proven popular with the public are rehashed ever more frequently[253]. Copyright to intellectual property is increasingly infringed, for example when parts of a piece of music are used in a film production. Here the interests of rights holders are opposed to those of initiatives which assert that copyright is no longer fit for the times, and call for a new rights-and-usage model that is right for the digital age[254].

249 Beckedahl, M. (2012): https://netzpolitik.org/2012/mitmachen-fordert-eine-richtige-bundestagsdebatte-uber-das-leistungsschutzrecht/. Accessed on 30 December 2012.

250 Deutschlandradio Wissen: http://wissen.dradio.de/netaudio-remix-ohne-grenzen.40.de.html?dram:article_id=3473. Accessed on 30 November 2012.

251 For Creative Commons initiatives in Germany, see: http://de.creativecommons.org/was-ist-cc/. Accessed on 30 November 2012.

252 Von Gehlen, D. (2011): Mash-up: Lob der Kopie. Frankfurt am Main, Suhrkamp.

253 Reynolds, S.; Wilpert, C. (2012): Retromania: Warum Pop nicht von seiner Vergangenheit lassen kann. Mainz, Ventil Verlag.

254 Beckedahl, M. (2012): https://netzpolitik.org/2012/meine-rede-gegen-acta/. Accessed on 30 November 2012.

As the use of digital media should be viewed in the global context, adapting national copyright is just one element of the picture.

Relationship to research and innovation

If creatively combining existing content into something new is regarded as being potentially innovative, then rigid copyright rules may prove to be barriers to innovation. Accordingly, calls for a redefinition of the relationship between copy and original are gaining significance[255].Furthermore, science and research are affected directly when it comes to the subsequent use of research findings, as is called for e.g. by the open access and open data movements[256]. On the other hand, a critical view of the digitisation and archiving of popular cultural goods sees the remix culture as having effects that hinder innovation, if it results in "artistic originality standing still"[257].

Relationship to the knowledge society

In a world (of work) in which information and knowledge are resources, people increasingly depend on being able to access and use content. To be able to easily integrate and utilise such content in one's own work is essential if existing knowledge is to be used, developed and ultimately passed on in the best possible way.

Assessment

The trend should be regarded as highly relevant. This trend will become even more important with the increasing spread and use of the internet among all sections of the population and in pop culture.

255 Von Gehlen, D. (2011): Mash-up: Lob der Kopie. Frankfurt am Main, Suhrkamp.

256 See e. g. http://www.soros.org/openaccess/boai-10-translations/german-translation. Accessed on 30 November 2012; cf. also trend profile 3. Open access – knowledge freely available and free of charge for all.

257 Reynolds, S.; Wilpert, C. (2012): Retromania: Warum Pop nicht von seiner Vergangenheit lassen kann. Mainz, Ventil Verlag.

24 POST-PRIVACY VERSUS PRIVACY PROTECTION

Short description of the trend

Digitalisation and networking are increasingly characterising our society. Internet users apparently accept far-reaching intrusions into their privacy so that they can use new technologies and capabilities. Is our society approaching a state in which there is no longer any personal privacy or data privacy? Or is the reverse scenario possible, in which internet users increasingly reject new technologies and withdraw from the internet?

Drivers and dynamics

Around 74 percent of all internet users in Germany are registered on at least one social network[258]. There are just under 25 million Facebook members[259] in Germany who voluntarily give away their personal data and profiles. Given that data protection scandals are an almost daily occurrence, these are impressive figures. Even though ever greater amounts of personal data are being hacked or stolen, this is not something which internet users seem too concerned about. Although a change in user behaviour would be expected, there are currently no signs of this happening. In fact the opposite is the case: most of society wants to use the versatile new capabilities, and people are consciously or unconsciously accepting a partial loss of control over their private data. New services and technical capabilities are gratefully accepted and apparently used without reservation. Cloud computing, social commerce and online banking, despite the risks to data protection and privacy, are now part of everyday life in our society[260].

In light of the above, under the keyword “post-privacy”, a current of thought is emerging which regards data protection and privacy as being relics from the pre-digital age[261]. For the counter-current, i.e. for advocates of extensive data protection, this attitude is short-sighted. Data protectionists believe that post-privacy adherents attach too little importance to the decision-making powers of internet users, and that they declare new technological developments to be inevitable and unchangeable.

In reality, however, the bulk of internet users have not lost sight of privacy and data protection:

258 Budde, L. et al. (2011): Soziale Netzwerke. Eine repräsentative Untersuchung zur Nutzung sozialer Netzwerke im Internet. Berlin, Bitkom.

259 Roth, P. (2012): http://allfacebook.de/zahlen_fakten/deutschland-oktober-2012/. Accessed on 31 October 2012.

260 Ström, P. (2005): Die Überwachungsmafia. Das gute Geschäft mit unseren Daten. Munich, Hanser Verlag.

261 Heller, C. (2011): Post Privacy: Prima leben ohne Privatsphäre. Munich, C.H. Beck.

for example, an overwhelming majority – around 86 percent – of social network users have given consideration to the privacy settings for the respective network, and have modified or changed these settings where possible[262]. Further data protection scandals could in future result in users increasingly withdrawing from commercial offerings in the internet, or even rejecting new technologies and developments. The economic consequences would be dramatic.

Relationship to research and innovation

Digital networking, dialogue and discussion are important drivers for research and innovation. Changes in the behaviour of internet users may have far-reaching consequences for the innovation and research field. Continuous efforts and innovations are required in the area of IT security to protect privacy.

Relationship to the knowledge society

New technologies and networking provide the basis for a knowledge society and are essential for its operation. Changes and curtailments in user behaviour could have considerable consequences.

Assessment

Privacy and data protection are subjects which concern all citizens in their everyday environment. In light of rapid developments in the field of new technologies, new media and the internet, this topic requires further consideration and investigation.

262 Budde, L. et al. (2011): Soziale Netzwerke. Eine repräsentative Untersuchung zur Nutzung sozialer Netzwerke im Internet. Berlin, Bitkom.

25 HUMAN-MACHINE: DEVELOPMENT BETWEEN AUTONOMY AND CONTROL

Short description of the trend

In ever more areas and aspects of our everyday activities, people interact with software-intensive system networks which are becoming increasingly complex and opaque. The increasing autonomy of these automated systems is the result of a delegation of decision-making power to machines. Since the systems offer only a limited range of options for action, there is a tendency towards a stereotyping of action and behaviour in everyday life. On the other hand, efforts are being made to increase the adaptivity of these systems to the point that they allow users more flexible action[263]. This trend's main challenge for society consists not only in optimally adapting the machines themselves to users' needs, but also in granting people the freedom of choice in society, e.g. the degree of mechanisation and delegation they choose in old age[264].

Drivers and dynamics

One driver is the development of (partially) autonomous, open, socio-technical networked systems, e.g. by means of cyber-physical systems (CPS)[265]. These are set to make an appearance in many different areas of life, for instance in industrial manufacturing, in health care, in the energy supply, and in road transport[266]. Other drivers of this trend include business criteria (e.g. production capacity utilisation, efficiency enhancement, personnel cost reduction) as well as changed lifestyle habits and conditions (e.g. longer life expectancy, a greater number of single instead of multiple-person households). A (self-referential) momentum of technological development and of respectively current research efforts can also be assumed. If, for example, systems developed for industrial production are used in private homes, this produces a wide variety of follow-on dependencies (skills, manners of use, compatibility, infrastructure, etc.) Private applications require different framework conditions than industrial applications.

263 Trend profile from the doctoral candidate panel on hidden social trends on 27/28 September 2012 in Karlsruhe, also an interdisciplinary topic at the marginal actors creative workshop on 20 October 2012 in Berlin.

264 In this connection, the themes of autonomy and self-determination with regard to support by robots in old age were also ranked highly during the expert workshop at VDI Technologiezentrum on 16 November 2012 in Berlin.

265 Geisberger, E.; Broy, M. (eds.) (2012): agendaCPS. Integrierte Forschungsagenda Cyber Physical Systems. S.l., acatech.

266 Ibid.

Relationship to research and innovation

Not only does the spread of new types of networked systems of this kind make new developments necessary in the field of (software and hardware) engineering, but at the same time, particularly systemic perspectives on "practical usability" and the "manageable complexity" of machines gain new and high empirical relevance[267].Consequently it will be necessary to ascertain which individual and/or social need structures – oscillating between autonomy and control – we are (or will be) dealing with here, and how future human-machine teams and for example "automated innovation"[268] can be successfully managed, while also acknowledging, not least, that significant ethical and legal challenges can be expected. New forms of stereotypical user models may constitute a barrier to innovation, and they conflict with the trend for increasing personalisation of products and services.

Relationship to the knowledge society

The availability, choice and dissemination of data, information and knowledge will be strongly influenced by the new systems - whether via "intelligent", semantic, ubiquitous systems, medical monitoring and emergency services (active and assisted living, AAL), or new forms of participation in educational offerings (e.g. virtual universities).

Assessment

There are currently various positions in the debate: warnings about the dangers of adapting our thinking to fit in with machine logic[269] contrast with techno-optimist (transhumanist) expectations of salvation as machine intelligence far exceeds human capabilities (technological singularity). Apart from these poles, the special relevance of the continued collective development of "human-machine teams" is regarded as a central challenge between now and 2030.

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267 Sifakis, J. (2011): A vision for computer science - the system perspective. In: Central European Journal of Computer Science, vol. 1 / no. 1.

268 Leitner et al. (2011): http://www.innovation-futures.org/sites/default/files/INFU%20Policy%20Report%20D6%201%20Final%20March%202012_2.pdf

269 Auerbach, D. (2012): http://nplusonemag.com/the-stupidity-of-computers. Accessed on 30 November 2012.

26 AMATEUR DRONES ARE PERVADING EVERYDAY LIFE

Short description of the trend

Unmanned, uninhabited or unpiloted aerial vehicles (UAVs), or recently unmanned aircraft systems (UASs), are all types of what are commonly called "drones". They can be equipped with various devices, such as film and video cameras, infrared sensors, measuring devices and radar systems. UAVs are remotely controlled via various control devices, or alternatively via preprogrammed algorithms. So far, UAVs have been used mainly for military purposes, but they have recently found civilian applications such as in disaster control and for facility inspection. Drones such as these are now becoming ever cheaper and easier to build and operate. As a result, they are increasingly being used by "amateurs" in the private segment[270,271].

Drivers and dynamics

The same trend that once helped Commodore achieve a breakthrough with their C64 home computer is now driving the ascent of drones: miniaturisation, tumbling prices, and a large, creative hobbyist scene. A new amateur movement now exists in the United States. Such "amateur drones" are controlled by computers, radios and mobile phones. Communities are forming to swap self-build instructions[272]. Current limitations include flying regulations and battery life. Business models for drone-based services, such as delivery services, are also already being discussed[273]. Since June 2012, unmanned flying objects weighing less than five kilograms can receive a time-limited permit for operation up to 100 metres "above ground", but they are not permitted to fly over gatherings of people or sites of police and security force operations[274].

Relationship to research and innovation

If drones actually take over functions in social relationships, then they will represent – like the personal computer (PC) – a platform for future innovations. Addressing the challenges at an early stage is sure to influence the course of this innovation path. Questions arise with regard to control and the protection of privacy. The German Federal Ministry of the Interior (Bundesinnenministerium, BMI) has issued a statement calling for access to drone technology to be "organised in such a way that abuse such as attacks and invasion of privacy are prevented[275]."

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270 Anderson, C. (2012): http://www.wired.com/dangerroom/2012/06/ff_drones/all/ Accessed on 30 November 2012.

271 ZDF Bauerfeind (2012): http://www.3sat.de/page/7sourceUnano/gesellschaft/151380/index.html Accessed on 30 November 2012.

272 http://diydrones.com/ or http://www.buildyourowndrone.co.uk/. Accessed on 30 November 2012

273 Vascellaro, J.E. (2012): http://online.wsj.com/article/SB10001424052702303299604577326301981308414.html Accessed on 28 January 2013.

274 Spiegel Online: http://www.spiegel.de/spiegel/print/d-88754329.html. Accessed on 27 March 2013.

275 Ibid.

Relationship to the knowledge society

Apart from a possible negative impact on social concepts of mutual trust and discretion with regard to privacy, the mass use of private drones may lead to changes in narrative structures and forms in public communication. Media and journalism are also being increasingly influenced by the use of drones[276]. One possible consequence of drones in journalism and in private photography is a new visual vocabulary shaped by the "view from above".

Assessment

Between now and 2030, this trend will produce long-term challenges for society which go beyond the medium-term need for statutory regulation, e.g. with regard to changing social relationships as a result of the use of UAVs, and impacts on innovation processes. It is also worth keeping in mind that other high-tech products could undergo similar amateurisation.

276 http://www.dronejournalismlab.org/ Accessed on 28 January 2013.

27 GAMIFICATION – PERSUASIVE GAMES IN EVER MORE AREAS OF LIFE

Short description of the trend

Intense playing of computer and video games is having an increasing impact on social behaviour in society. Recently, this has led to experiments with new ideas that could develop into social innovations. Firstly, persuasive games are being developed and used with the goal of practising positive behaviours and shaping values. They use the human play instinct to increase intrinsic motivation. Secondly, it can be seen that game mechanisms are used in communication in ever more areas of life to attract a high level of attention and participation (gamification). Persuasive games have particular potential for application in general education and health education, but also in employee motivation, increasing customer loyalty, and in innovation processes[277]. Examples include the Chromaroma game on the London transport system[278], and motivation-boosting online games such as EpicWin[279].

Drivers and dynamics

This trend is being driven firstly by the great willingness of broad sections of the population to play online games. This is reflected in a rapidly increasing number of users of computer and online games in all age groups. Secondly, findings from cognition research demonstrating the positive effects of gaming on promoting desired behaviours and motivation are increasingly being integrated into education concepts. Thirdly, the international market for computer and online games is the fastest-growing segment of the software market. Computer games are becoming more complex, and virtual gaming worlds are increasingly converging with the real environment, for example in conjunction with gamers' location data[280]. This leads to elements of typical online games being tested and used in other areas of everyday life, e.g. to boost motivation or for behavioural training.

Relationship to research and innovation

All in all, gaming mechanisms will permeate ever more areas of society, and are therefore gaining importance for all innovation fields. As a mass phenomenon, online games have effects on the actions and decision-making behaviour of an entire generation, e.g. in connection with problem-solving, intuitive action, collaboration, experimentation and risk-taking, and they therefore increase innovativeness and associated skills.

277 Stampfl, N. S. (2012): Die verspielte Gesellschaft. Gamification oder Leben im Zeitalter des Computerspiels. Hanover, Heise Verlag.

278 Chromaroma is an online game involving the London transport system, see: http://www.chromaroma.com/ Accessed on 28/01/2013.

279 EpicWin is a game produced by Supermono Studios, see: http://www.rexbox.co.uk/epicwin/ Accessed on 28 January 2013.

280 Localised services from mobile providers based on users' location data.

New approaches involving creative learning methods and also "serious games" simultaneously offer the opportunity to create flexible instruments that enable lifelong learning in the fast-changing world of work. Furthermore, science benefits from creative contributions of large "gamer masses"[281,282,283,284,285]. The intrinsic motivation mentioned above is often used in science to motivate test subjects, and may therefore also reinforce the citizen science trend.

Relationship to the knowledge society

Utilising gaming mechanisms to increase motivation and condition behaviour raises ethical questions. It also goes beyond current educational approaches, especially the open, self-directed learning paradigm in school education, further education and training. A society in which a generation has been shaped by global and cooperative strategy, simulation and problem-solving games from the nursery until well into their working life will develop a new understanding of problem-solving, decision-making, cooperation, communication and complexity skills[286,287].

Assessment

Game development often takes place in close cooperation with users, with the result that the demand perspective is strongly taken into consideration. Game-like training for problem-solving strategies and decision-making behaviour as an element of everyday private and professional life is highly relevant to innovation and research. In light of currently discussed possible risks of addiction or an increased propensity for violence as a result of excessive playing of certain games, this trend deserves particular attention.

281 Nussbaum, B. (2013): http://www.fastcodesign.com/1671971/how-serious-play-leads-to-breakthrough-innovation. Accessed on 12 March 2013.

282 One example is the EteRNA "game" in which participants design virtual RNA molecules so as to develop completely new proteins, e.g. for medicines, vaccines or antitoxins, see: http://eterna.cmu.edu/web/. Accessed on 12 February 2013.

283 Asendorpf, D. (2011): http://www.zeit.de/2011/05/T-Computerspiel-Foldit. Accessed on 26 October 2012.

284 Groß, M. (2012): http://www.spektrum.de/alias/bioinformatik/proteinfaltung-als-computerspiel/1044209. Accessed on 26 October 2012.

285 Küchemann, F. (2012): http://www.faz.net/aktuell/feuilleton/medien/computerspiele-mit-mission-wer-redet-hier-von-zeitverschwendung-11856884.html. Accessed on 19 March 2013

286 Asendorpf, D. (2011): http://www.zeit.de/2011/05/T-Computerspiel-Foldit. Accessed on 26 October 2012.

287 Groß, M. (2012): http://www.spektrum.de/alias/bioinformatik/proteinfaltung-als-computerspiel/1044209. Accessed on 26 October 2012.

4.2 Category: Business

Megatrends included in the "business" category

Much discussed megatrends in the category "business" which have been found to be relevant between now and 2030 are presented below. Their impacts on the social trends identified and presented in this report are mentioned in the trend profiles.

Advancing economic globalisation

Economic globalisation is leading to the formation of a multipolar global economy whose centre of gravity will no longer be in the West, but in Asia.

Conditions which are considered to favour economic globalisation include political decisions to liberalise world trade, but particularly also a comparatively sharp fall in transportation and communication costs[288].

Increase in global trade

Annual growth in international trade in the period from 1850 to 2007 was always higher than population growth[289]. Globally, the foreign trade ratio rose from 19.7 percent in 1970 to 48.4 percent in 2010. Germany alone exported goods worth € 1,060 billion in 2011, and imported goods to the value of € 902 billion[290]. According to estimates, global trade will continue to increase in the future.

Emergence and growth of a global middle class

With global economic growth, it is expected that a new global middle class will emerge, representing an important group of new consumers.

Citizens in the global middle class spend between US$ 10 and US$ 100 per person per day on housing, health care, education and provision for old age. Most enjoy good working conditions and a sufficient income for extensive consumption and leisure activities. By 2025, the global middle class will comprise around one billion people in urban regions[291].

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288 German Federal Agency for Civic Education (Bundeszentrale für politische Bildung): http://www.bpb.de/nachschlagen/zahlen-und-fakten/globalisierung. Accessed on 29 January 2013.

289 World Trade Organization (2008): World Trade Report 2008. WTO, Geneva, table 1, p. 15.

290 German Federal Agency for Civic Education (Bundeszentrale für politische Bildung) (2012): http://www.bpb.de/nachschlagen/zahlen-und-fakten/globalisierung/52842/aussenhandel. Accessed on 06 March 2013.

291 Silverstein, M. J. et al. (2012): The $10 Trillion Prize: Captivating the Newly Affluent in China and India. Boston, MA, Harvard Business Review Press.

Increase in global capital flows

In 2011, capital totalling around US$ 24 trillion was transferred around the world in the form of direct investments[292]. An increase in global capital flows can be expected. The annual rate of increase will be around 8 percent until the year 2020[293].

Rising national debt in industrialised countries

In 2007, the national debt of the G8 countries[294], excluding Russia[295], ranged from 43 percent of their respective gross domestic product (GDP) for the United Kingdom, to 63 percent of GDP for Germany, and 196 percent of GDP for Japan[296]. The indebtedness of the G8 countries, excluding Russia, rose sharply by 2011. In 2011, the figures ranged from 82 percent of GDP in Germany to 230 percent of GDP in Japan[297]. If this increase continues unchanged, it will lead to higher expenditure on debt servicing. This would place a severe strain on government budgets and limit resources for core tasks.

Increasing mobility

Traffic forecasts for the years 2025/2030 assume an overall increase in mobility in Germany. As yet there is no scientific consensus concerning the long-term trend in passenger traffic. Some scenarios predict stagnation, others slight growth, while further scenarios indicate that a decline is more likely. On the other hand, experts are in agreement that freight traffic will increase. An increase of more than 25 percent is expected by 2025 compared to 2011[298].

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292 International Monetary Fund (2013): http://cdis.imf.org/.Table 4 Accessed on 06 March 2013.

293 McKinsey & Company (ed.) (2009): Made in Germany, Zukunftsperspektiven für die Produktion in Deutschland. Düsseldorf, McKinsey.

294 The G8 countries are: Germany, France, the United Kingdom, Italy, Japan, Canada, Russia, and the United States.

295 Russia's national debt stood at 9.5 percent of GDP in 2007, and 9.6 percent of GDP in 2011.

296 World Economic Forum (2008): Global Competitiveness Report 2008-2009, World Economic Forum. Geneva, p. 398.

297 World Economic Forum (2012): Global Competitiveness Report 2012-2013, World Economic Forum. Geneva, p. 425.

298 InnoZ booklet (2012): Trends 203 – Mobilität und Logistik, 2012 innovation workshop for Deutsche Bahn AG on 14/15 June 2012 at InnoZ, Berlin.

Goods traffic will grow in all areas – road, rail, air, sea and inland waterways - at different rates, depending on the scenario. In the case of ground transportation, it is forecast that the high proportion of goods traffic of around 75 percent will either remain constant or even increase further by 2030. One reason for this is the significant rise in transit traffic on Germany's long-distance transport network. Owing to growing trade with Asia, a rise in sea and air traffic is expected[299].

Furthermore, it is anticipated that mobility costs will increase. The drivers here are rising fuel prices, as well as regulatory, environmental and transport policy measures[300].

Rising energy prices

One driver of globally rising energy prices is the oil price. The current price of Brent Crude oil is around US$ 110 per barrel[301], which is equivalent to 159 litres. Experts expect the price of crude oil to rise continuously. The price is estimated to reach around US$ 200 in 2018[302]. Rising prices for other energy sources such as electricity and gas can be expected in the years ahead. It is not yet possible to produce a clear assessment of the extent to which renewable energies are liable to mitigate this trend.

Rising energy consumption

The global energy landscape will change significantly in the future, with far-reaching impacts on energy markets and energy trading. Taking into account changing energy policy frameworks, it is predicted that global energy consumption will increase by more than 33 percent by 2035. The biggest increase is expected in China and India, while energy consumption in the OECD countries will rise only marginally[303].

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299 Institut für Mobilitätsforschung (2010): Zukunft der Mobilität - Szenarien für das Jahr 2030. Munich, Institut für Mobilitätsforschung, p. 50.

300 InnoZ booklet (2012): Trends 203 – Mobilität und Logistik, 2012 innovation workshop for Deutsche Bahn AG on 14/15 June 2012 at InnoZ, Berlin.

301 Finanzen.net (2013): Http://www.finanzen.net/rohstoffe/oelpreis@brent Accessed on 3 March 2013.

302 Innovationszentrum für Mobilität und gesellschaftlichen Wandel (2009): InnoZ-Bausteine Nr. 4. Megatrends und Verkehrsmarkt. Langfristige Auswirkungen auf den Personenverkehr, Berlin, p. 16.

303 International Energy Agency (2012): World Energy Outlook, Zusammenfassung, German Translation. Paris, p. 1.

Various measures to manage energy efficiency and change patterns of behaviour towards more economical energy consumption could weaken this trend.

Rise in digital data traffic

Internet data traffic is increasing rapidly. By 2015, the volume of data sent across the internet will be ten times higher than in 2010. By 2020, it will be 100 times higher[304].

So that as many people possible can benefit from this trend, the installation and operation of high-quality broadband telecommunications infrastructure is being prioritised globally.

Changes in the nature of work

Impacts of the knowledge and information society on the economy include changes in the nature of work towards an increasingly important service sector and a significant increase in knowledge work.

A decline in the working population is predicted because of demographic change. This is accompanied by an increasingly urgent need to modify workplace design for the changed age structure of the workforce.

Growth of the global health market

Growing numbers of people are spending increasing amounts of money on their health: in nearly all OECD countries, spending on health has risen faster than gross domestic product (GDP). Thus an ever greater proportion of GDP is spent on the health market. In 2009, public and private health expenditure in OECD countries amounted to 9.6 percent of their GDP. Germany actually spends 11.6 percent of its GDP on health. Private expenditure on health in the OECD countries has risen particularly sharply: it increased by almost 60 percent between 1980 and 2009305. This trend appears to be continuing.

304 Institute of Electrical and Electronics Engineers (IEEE) (2012): IEEE 802.3™ Industry Connections Ethernet Bandwidth Assessment. S.l., IEEE, p. 1.

305 OECD (2012): “Gesundheitsausgaben”. In: Die OECD in Zahlen und Fakten 2011-2012: Wirtschaft, Umwelt, Gesellschaft. S.l., OECD Publishing.

28 INFORMATION TECHNOLOGIES ARE REPLACING EVEN CURRENTLY WELL-PAID JOBS

Short description of the trend

A number of professional fields in which comparatively high incomes are earned – such as medicine and law – involve many routine tasks which in the future may be performed by information technologies. It is expected that as a result, many jobs will be eliminated or change significantly by 2030. If this social trend continues for other occupational fields in the knowledge society, then it will create far-reaching challenges for the middle class. Above all, this implies a need for society to be adequately prepared for changing job requirements in the digitalised knowledge society.

Drivers and dynamics

The history of industrialisation shows how new technologies triggered social and economic revolutions, and how traditional jobs were replaced or changed by the use of machines. In the market for industrial robots[306], which is experiencing double-digit growth, Germany occupies a world-leading position with regard to robot density in manufacturing. This trend is now continuing for highly qualified professions: electronic medical expert systems in hospitals are already making diagnoses in hospitals, while on the world's high-frequency exchanges, autonomous computer algorithms trade in millisecond cycles. Modern text-synthesis algorithms could very soon write news articles on sports events or compile financial news into reports that are barely distinguishable from texts by human authors.

Relationship to research and innovation

These developments hold immense innovation potentials for reducing costs and enhancing efficiency in the professional fields mentioned, and possibly even in research and development as well.

At the same time, far-reaching consequences will result for the occupational fields concerned, which are not entirely clear at the present time. To compensate for possible negative effects arising through the elimination of well-paid jobs, it is important to identify needs and utilise potentials resulting from the changes systematically.

306 Schreier, J. (2012): http://www.maschinenmarkt.vogel.de/themenkanaele/automatisierung/fertigungsautomatisierung_prozessautomatisierung/articles/376635/index2.html Accessed on 29 October 2012.

Relationship to the knowledge society

The elimination of low-skilled assembly-line jobs as a result of rationalisation could be followed in the future by the elimination of supposedly skilled knowledge-worker jobs[307, 308]. This emerging trend is accompanied by a critical discourse regarding the extent to which striving for (profit) optimisation is ethically justifiable when using automation to raise productivity. Hence it is necessary to ask what consequences such a development will have for the working world and society in the future, and how Germany will position itself in the international field of "algorithm providers"[309].

Assessment

Within just a few decades, information technology and its associated technological requirements have become the catalyst for a highly industrialised society. Developments in microelectronics are progressing at exponential speed, which will also have far-reaching social consequences for vocational fields outside of the information and communication technologies. This transformation of jobs in the knowledge society and among the middle class is producing significant challenges for society: How should society deal with the elimination of further jobs through rationalisation? What can be done to ensure that the current young generation is adequately prepared for digital competency pressure[310] and changing job profiles?

307 Brynjolfsson, E.; McAfee, A. (2011): Race Against the Machine: How the Digital Revolution is Accelerating Innovation, Driving Productivity, and Irreversibly Transforming Employment and the Economy. Lexington (MA), Digital Frontier Press.

308 Rifkin, J. (1997): Das Ende der Arbeit und ihre Zukunft: Neue Konzepte für das 21. Jahrhundert. New York, Campus.

309 Ford, M. (2009): The Lights in the Tunnel: Automation, Accelerating Technology and the Economy of the Future. S.l., CreateSpace Independent Publishing Platform.

310 On this point, see also trend profile 1. Digital competency pressure as a social organisational task.

29 REINDUSTRIALISATION

Short description of the trend

The economic and financial crisis of recent years has led to a reorientation of economic policy in the established industrialised countries: industry and its potentials are being "rediscovered" as a result of newly emerging technological developments, and reindustrialisation – i.e. the return and/or expansion of industry – is being promoted. The United States[311] and the United Kingdom[312] are already focusing on this strategy. The European Commission is similarly pursuing this goal with its "Europe 2020" strategy, and is aiming to increase industry's share of European economic output from just under 16% at present to 20% by the year 2020[313].

Drivers and dynamics

In recent decades, the established industrialised countries have developed into service-based economies. In the course of this process of sectoral shifting, the service sector's share of macroeconomic gross value added has risen over the last 20 years. Conversely, the technology-driven industrial sector has steadily declined. For example, industry as a share of GDP in the U.S. and UK fell from around 16% and 17% respectively in 2000 to 13.3% and 12.3% respectively in 2008[314]. The associated job losses were partially absorbed by the service sector. However, only a few jobs migrated into the knowledge-intensive service sector, such as the finance, insurance and corporate sector, which achieves productivity levels similar to the manufacturing sector. Most employees work in the human resources and social services sector, which has the lowest productivity in the economy as a whole. Economic development therefore depends to an ever greater extent on the less productive service sector. As a result, annual productivity growth in the U.S. and UK, for example, is around 0.3 and 0.5 percentage points lower respectively[315].

311 President's Council of Advisors on Science and Technology (2012): Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing. Washington, D.C., President's Council of Advisors on Science and Technology.

312 Government Office for Science (2010): Technology and Innovation Futures: UK Growth Opportunities for the 2020s. London, Government Office for Science.

313 EU (2013): http://ec.europa.eu/enterprise/magazine/articles/industrial-policy/article_11059_de.htm. Accessed on 20 March 2013

314 BMWi (2010): Im Fokus: Industrieland Deutschland. Stärken ausbauen - Schwächen beseitigen - Zukunft sichern. Berlin, BMWi.

315 Rodrik, D. (2011): The Manufacturing Imperative. Cambridge, Project Syndicate.

As a response to these developments, the United States and the United Kingdom in particular are turning to an active industrial policy which favours knowledge and technology-intensive industrial sectors[316,317].

The situation in Germany is different. Here the reindustrialisation trend does not exist to the same extent as in other industrialised countries, because despite tertiarisation, Germany has always placed an emphasis on industry, especially the high-tech sector (e.g. automotive, mechanical engineering). For example, industry's share of gross value added was 23.1% in 2008, which is significantly higher than in the U.S. or UK[318].

Technological developments in industrial production may support reindustrialisation, since countries are finding a new approach to industry through their technological expertise. Advancing digitalisation and the intelligent linking of systems ("Internet of Things") are leading to the fourth industrial revolution. Cyber-physical production systems (CPPSs) are prominent in this context. Instead of mass production, CPPSs enable the production of individualised products (mass customisation)[319].

Another driver in the development of industry is the stronger convergence of production and services, referred to as hybrid value creation. The goal is to develop products and services together.

Relationship to research and innovation

Germany is in a good starting position in the areas of technological developments and hybrid value creation. On the one hand, the reindustrialisation of other industrialised countries may lead to more competition, while on the other hand it may offer enormous opportunities, especially in mechanical and plant engineering. Reindustrialisation may bring an intensification of international research and innovation activities.

Assessment

There is sufficient empirical evidence of the positive effects of the expansion of the industrial sector on economic growth. Industrial policy is therefore a current focus for many nations. In this context, it is important to include other policy strategies, such as climate and energy policy, and also education policy. This is the only way to ensure that the strategies complement rather than contradict each other.

316 President's Council of Advisors on Science and Technology (2012): Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing. Washington, D.C., President's Council of Advisors on Science and Technology.

317 Government Office for Science (2010): Technology and Innovation Futures: UK Growth Opportunities for the 2020s. London, Government Office for Science.

318 BMWi (2010): Im Fokus: Industrieland Deutschland. Stärken ausbauen - Schwächen beseitigen - Zukunft sichern. Berlin, BMWi.

319 BMWi (2012): AUTONOMIK für Industrie 4.0. Produktion, Produkte, Dienste im multidimensionalen Internet der Zukunft. Berlin, BMWi.

30 DO-IT-YOURSELF 2.0

Short description of the trend

In Germany and around the world, increasing numbers of people are starting once again to make and offer products and services themselves or in groups, instead of buying them[320]. This trend applies to many kinds of goods – from clothing and bicycles, to software and electronic control devices, to energy. The interaction of various social trends with new technical capabilities represents a dynamic force that could substantially change value creation between now and 2030.

Drivers and dynamics

Various current developments are converging and will reinforce each other:

- the increasing emphasis on individual creativity for identity formation and value creation in the knowledge society, which has led to an ever stronger personalisation of products with a growing personal input by users (co-creation)321,
- a movement towards non-commercial, collaborative ways of satisfying needs (peer production) as an alternative to a consumer society that is perceived to be unsustainable322,
- the emergence of a highly technology-based scene of amateur electronics hardware makers (maker movement)323 and the expansion of the open source movement to other fields (open design),
- a revival of local craft traditions as a movement complementary to globalisation,
- self-help phenomena in current crisis situations such as in Greece and Spain.

320 One example of numerous similar articles in the daily press: Die Welt: http://www.welt.de/lifestyle/article6117372/Selbermachen-die-kreative-Zeitverschwendung.html. Accessed on 17 January 2013.

321 Baldwin, C; von Hippel, E. (2011): Modeling a Paradigm Shift: From Producer Innovation to User and Collaborative Innovation. In: Organization Science, vol. 22 / no. 6.

322 At the marginal actors creative workshop on 16 October 2012 in Berlin, a group was represented which makes cargo bikes for social organisations: http://www.werkstattlastenrad.de/index.php?title=Worum_gehts#Peer-Production. This trend was rated as highly relevant at the workshop.

323 Albat, D. (2012): http://www.ftd.de/panorama/kultur/:amateur-hardware-drueckerkolonne/70104678.html. Accessed on 29 November 2012.

The do-it-yourself movement is flanked by technical enablers such as open-source electronics components[324], open-source software, open-design concepts, mobile workshops ("Fab Labs"), generative production processes (3D printing) and internet platforms for sharing concepts and selling products. A number of scientists and actors see in this interaction signs of a paradigm shift towards highly decentralised forms of value creation[325,326,327].

Relationship to research and innovation

Value creation patterns with a high proportion of DIY require different innovation models and roles for actors in the innovation system. The conditions for addressing social challenges are also changing, as the decentralised structure requires and enables other forms of governance.

Relationship to the knowledge society

Do-it-yourself actors are calling for creative and craft skills to be strengthened in nurseries and school. Projects such as Fab Lab workshops can make technology accessible to children and encourage the uptake of STEM subjects (science, technology, maths and engineering)[328]. The boundaries between knowledge work, creative work and craft activities could blur and bring about different forms of education.

Assessment

Currently it is not foreseeable whether DIY will expand to become a paradigm shift, or turn out to be a "hype" that fits into current value creation paradigms. However, since the former case would produce significant opportunities and challenges for the innovation system, it is worth keeping an eye on this trend.

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324 Siefkes, C. (2007): From Exchange to Contributions: Generalizing Peer Production into the Physical World. Berlin, Edition C. Siefkes.

325 Benkler, Y. (2006): The wealth of networks. How social production transforms markets and freedom. New Haven, Connecticut, Yale University Press.

326 Friebe, H.; Ramge, T. (2008): Marke Eigenbau: der Aufstand der Massen gegen die Massenproduktion. Frankfurt/New York, Campus-Verlag.

327 Siefkes, C. (2007): From Exchange to Contributions: Generalizing Peer Production into the Physical World. Berlin, Edition C. Siefkes.

328 Cf. the offering of the Open Workshops Association (Verbund Offener Werkstätten): http://www.offene-werkstaetten.org/seite/offene-werkstaetten. Accessed on 04 June 2013.

31 A NEW CULTURE OF EXCHANGE IS BECOMING ESTABLISHED

Short description of the trend

Firstly, the exchanging or swapping of clothes, shoes, furniture and other consumer goods, and also the establishment of social department stores, are becoming increasingly common in times of crisis, especially for the needy. Secondly, increasing numbers of people who are not in need are using professionally organised swap meets and exchange platforms, private swap parties, and online exchange events[329]. Swap boxes and bookcases are installed in public spaces in many cities. While private initiatives are primarily about exchanging items for free, newly emerging commercial offerings frequently combine free swaps with a commercial trade in used objects.

Drivers and dynamics

The exchanging trend is being driven by a variety of factors. One important driver is falling standards of living, for example in regions affected by economic crisis, where people swap clothing and everyday items out of necessity. For example, the number of exchange-type events and platforms in Greece rose rapidly in 2012[330]. In less crisis-ridden European countries, some people feel overburdened by the constant flood of newly bought objects, and so try to cut back on their new purchases. Other people see exchanging goods as a strategy for responsible and sustainable consumption. A factor that is frequently mentioned is the formation of neighbourhood structures in connection with exchange projects. Finally, the exchange culture is supported by the internet and especially by the communication culture of Web 2.0. Thus, for example, alternative digital currencies and reputation mechanisms make it possible to organise exchange activities beyond the immediate environment.

Relationship to research and innovation

Addressing needs through organised exchanges is a social innovation. Its spread is interpreted by a number of observers as heralding a new type of economy, in which needs are increasingly met without classical market mediation through direct cooperation between the actors involved (barter economy)[331]. This particularly applies in connection with other approaches such as sharing and collective use. There are indications that the swapping principle is expanding to cover many areas of need. This creates new requirements for products and services, for example in relation to mobile usability by different actors, or the lifetime of products. Technical and social innovations are combining in new ways. Ultimately, a swapping culture may generate new sustainable business models in the spirit of the green economy.

329 Klatt, P. (2012): Klamottentausch macht Mode. Beim “Swapping” wechselt hochwertige gebrauchte Kleidung die Besitzerin / Intelligenter Konsum statt Verzicht. In: Der Sonntag, 20 May 2012.

330 Das Erste: http://www.daserste.de/plusminus/beitrag_dyn~uid,7deb4y0irpuymmxi~cm.asp. Accessed on 30 November 2012.

331 Benkler, Y. (2006): The wealth of networks. How social production transforms markets and freedom. New Haven, Connecticut, Yale University Press.

Relationship to the knowledge society

As everyday life and the economy become digitalised, and with the increasing use of social media, the necessary infrastructures are being created around the world to develop new markets based on swapping principles[332]. Here the information process can be virtual, while the actual implementation takes place communally and locally in the immediate usage environment. This trend therefore addresses both local and global needs. In a society with increasing migration and high cultural diversity, there is an increased need for alternatives to existing market forms that integrate different cultural requirements pertaining to ownership, acquisition and usage.

Assessment

The wide range of possible applications for the swapping culture shows that this trend has the potential to mature into a new hybrid market form by the year 2030. The fact that the swapping culture flourishes in crises indicates that it will become more relevant in the future[333]. In this sense, the formation of swapping infrastructures may be understood as part of a social resilience strategy.

332 Potts, J. (2011): Creative Industries and Economic Evolution. London, Edward Elgar.

333 The Economist: http://www.economist.com/news/leaders/21573104-internet-everything-hire-rise-sharing-econmmy. Accessed on 13 March 2013.

32 PERSONAL FOOTPRINT - MORE RESPONSIBLE CONSUMPTION

Short description of the trend

As the consequences of mass consumption have become a problematic issue in Western industrialised countries, pioneers of sustainable consumption are questioning the ecological and increasingly also the social "footprint" of their activities. For example, they calculate the CO2 emissions or water consumption involved in manufacturing their clothing, which would influence their "ecological footprint". The "social footprint" is determined in a similar way, for example by considering the average labour time worked per item of clothing in conditions that violate human rights. In each case, the figures are calculated by analysing process chains across the product lifecycle[334]. Free online tools are now available for both calculations, which work out the footprint based on the user's data.[335] Aware consumption as a result of knowing one's personal footprint addresses needs such as a cleaner environment, meaningfulness, social commitment and health.

Drivers and dynamics

Possible drivers of the spread and general establishment of the personal footprint indicator for sustainable consumption could be the consequences of global change such as global warming. For example, according to a representative survey conducted by the German Environment Agency (Umweltbundesamt) in 2011, 88% of the German population said that they could make a significant contribution to climate protection through environmentally aware everyday behaviour. The main reasons for the increasing awareness of the global ecological and social consequences of individual consumption are greater media coverage of global interdependencies, and an improvement in the underlying body of scientific facts[336]. Measuring and surveying individual personal footprints causes changes in consumption patterns to an extent which is, on the whole, unknown, and whose ecological and social effects are in turn measured and may result in further changes in behaviour. In the future, citizens may face increasing pressure to measure, record and even publish their personal footprint. At the same time, social pressure to minimise this footprint could arise, i.e. to reduce one's personal contribution to climate change. Another driver is a stronger awareness among the population of the global ecological and social consequences of individual consumption.

334 URL: http://www.ghgprotocol.org/. Accessed on 30 November 2012.

335 E.g. various CO2 calculation services in the internet, or "slavery footprint": http://slaveryfootprint.org/. Accessed on 30 November 2012.

336 Expert interview with lead user Martin Stengl (inhabitant of the Sieben Linden ecovillage), 24 October 2012.

Relationship to research and innovation

The extent in terms of society as a whole of changes in individual consumption as a result of measuring and recording the personal footprint and its possible ecological and social consequences remain unknown at present. The indirect effects of changed consumption patterns on innovation activity are likely to have disruptive potential. Key innovations here include customer interaction with purchasing assistance systems[337] and the provision of the data basis necessary for measuring ecological and social footprints[338].

Relationship to the knowledge society

The personal footprint has an awareness-raising effect, and it increases pressure for sustainable production and consumption. It is also a key element for sustainable consumption in the knowledge society.

Assessment

The personal footprint can also be used in marketing, for example as an automatic transfer of data from the product to the customer's personal decision-making assistant. Then, to fulfil their needs, the customer buys a product (e.g. organic and/or fair-trade coffee instead of a conventional coffee), which is more advantageous with regard to the ecological and/or social footprint[339]. In conjunction with the increasing use of mobile devices, new possibilities are emerging for a simple implementation of this idea, with the result that a trend may develop which is significant for society as a whole.

337 According to a current study by GFK, 70% of retail purchase decisions are made at the point of sale.

338 Presented during the workshop on the potentials of living labs for sustainable development. Fraunhofer-inHaus-Zentrum, Duisburg, 20 April 2012.

339 Expert interview with lead user Martin Stengl (inhabitant of the Sieben Linden ecovillage), 24 October 2012.

33 SLOW CONSUMPTION AS A COUNTERTREND TO FAST FASHION

Short description of the trend

Cheap fashion today is primarily fast fashion. The global success of companies such as H&M, Primark and Zara is based in particular on these fashion chains' ability to produce clothing in the shortest space of time, which is trendy for a few weeks, and can be sold so cheaply that many customers subsequently dispose of it straight away and buy new clothes. A significant shortening of product life and product lifecycles can be observed, as is the case with many other products. This contrasts with a new trend that promotes buying high-quality, long-life goods as a form of sustainable consumption[340].

Drivers and dynamics

The fashion chains mentioned above have shaped the shopping behaviour of an entire generation with their concept: products with a short life span that are so cheap that anyone can afford them. In the United States, people on average buy 64 articles of clothing each per year, many of which are consigned to the bin after a few weeks[341]. This behaviour is by no means a form of extreme shopping, but rather a widespread consumer behaviour. This conflicts with the trend that increasing numbers of people, partly through ecological awareness, partly also as the expression of a slower lifestyle, are demanding services and products that have longer production times and useful lives[342]. Sustainability-oriented providers of regional products and traditional manufacturers of high-quality products such as clothing and luxury items are fulfilling this wish. The French leather goods manufacturer Hermès, for example, offers its customers a repair service for older bags. Automobile manufacturers such as Volvo are considering how to create a car that can be upgraded when new technology becomes available, extending the life of the body while simultaneously using technical innovations[343].

340 Tuck, A. (2012): http://www.monocle.com/monocolumn/2012/quality-not-quantity/ Accessed on 28 January 2013.

341 Cline, E. (2012): Overdressed: The Shockingly High Cost of Cheap Fashion. S.l., Penguin Portfolio.

342 Cf. platforms such as www.heldenmarkt.de, www.karmakonsum.de, , and results of the sustainable consumption creative workshop held by the German Council for Sustainable Development (Rat für Nachhaltige Entwicklung): http://www.nachhaltigkeitsrat.de/dokumente/dokumente/termine/2009/ergebnisbericht-13-10-2009/?blstr=0. Accessed on 24 October 2012.

343 Tuck, A. (2012): http://www.monocle.com/monocolumn/2012/quality-not-quantity Accessed on 28 January 2013.

Relationship to research and innovation

In view of the fast-fashion buying behaviour which can currently be observed, the increasingly discussed call to break the link between economic growth and the production of waste, instead of living in a throwaway society, is especially relevant to future demand for consumer goods such as clothing[344]. As well as rethinking the development, manufacturing and distribution processes, innovations are required in the whole infrastructure, not least to allow upgrading. While the use of upgrades is already widespread in some technological fields, e.g. software, it remains a central question whether such concepts are transferable to other fields of application with high resource-saving potential. A stronger focus on durability in consumer behaviour may transfer to other areas of society, e.g. science and research ("slow science").

Assessment

At the moment, demand for "slow consumption" is still a marginal phenomenon. However, a further shift in values[345], increasing resource scarcity and crises could reinforce the trend and make it more relevant even before 2030, including for our understanding of innovation.

344 Linz, M. (2012): Weder Mangel noch Übermaß - Warum Suffizienz unentbehrlich ist. Munich, Oekom Verlag.

345 E.g. in the manner described in trend profile 32. Personal footprint – more responsible consumption.

34 CROWDFUNDING IS BECOMING ESTABLISHED AS AN ALTERNATIVE FINANCING MODEL

Short description of the trend

The crowdfunding concept is related to crowdsourcing. In crowdsourcing, work and creative processes are outsourced to a large number of individuals. For example, complex tasks can be broken down into smaller tasks, which are then performed by various different people, making the job manageable. Crowdfunding uses exactly this principle to raise money for a project or business via special crowdfunding platforms, in the form of multiple smaller investments from a large number of investors. In Germany, for example, the crowdfunding platform Seedmatch[346] allows young businesses to raise funding of up to € 100,000. Selected start-ups are presented to a crowd of potential micro-investors, each of whom can then take a stake in the company in a straightforward way by providing at least € 250. In the long term, investors can benefit from the company's growth by receiving a pro-rata payout as a profit based on the increase in value after a minimum shareholding period, in addition to their stake in the company.

Drivers and dynamics

As a financing model for start-ups and social innovations, crowdfunding is still in its early days of development, but the demand for it on the part of founders and activists is at least as high as people's willingness to invest privately in crowdfunding projects. Two factors are essential drivers for the increasing spread of crowdfunding: Web 2.0 provides the technological basis, since it enables worldwide participatory processes, and the second factor is advances in online and micro-payment models. Assuming that micro-investments are motivated either by a general interest in the person, business or idea being supported, or also by the desire to be part of a community of like-minded people, then there are great potentials both for the implementation of further crowdfunding platforms and for increasing the sums of funding involved[347].

Relationship to research and innovation

Positive impacts of crowdfunding are anticipated especially for social innovations[348] and new services, which in turn are regarded as being drivers of innovations in other sectors. The development of crowdfunding for financing innovative small businesses not only supports direct innovations but also indirectly impacts on the innovation system, as the success or failure of crowdfunding projects for investors and venture capital (VC) providers can supply important information about the market (proof of concept)[349].

346 Seedmatch. URL: https://www.seedmatch.de. Accessed on 23 October 2012.

347 Cf. trend profile 6. More attention being given to social innovations.

348 Ibid.

349 The Economist: http://www.economist.com/node/21556973. Accessed on 24 October 2012.

Crowdfunding often creates a link between customer and manufacturer while circumventing banks and retailers, which may be an indicator of a new industrial regime[350]. Crowdfunding is therefore also a challenge to the conventional financial system, whose actors fear competition from the world of IT[351]. For this reason, the financial sector is now starting to offer its first crowdfunding services[352].

Relationship to the knowledge society

Crowdfunding can also be transferred to science, as shown by the Sciencestarter crowdfunding platform created by Wissenschaft im Dialog (WiD) – an initiative of Germany's scientific community – which was launched with support from the donors' association for the promotion of humanities and sciences in Germany (Stifterverband für die Deutsche Wissenschaft) in November 2012[353]. Crowdfunding could also be used to successfully answer and resolve scientific questions and problems via the open science model, which opens scientific processes to participants outside of the professional scientific field[354,355].

Assessment

Crowdfunding has so far been used mainly by internet-based start-ups and small creative companies. One year after its launch, Seedmatch had financed 20 projects with total invested capital of nearly two million euros. Seedmatch therefore successfully filled a gap in the area of risk financing of sums up to € 100,000. The great potential of this principle can be seen if one considers the dimensions of the U.S. market: to date, seven projects on Kickstarter[356], one of the best-known crowdfunding portals, have exceeded a sum of one million U.S. dollars.

350 This is particularly true in conjunction with the phenomenon described in trend profile 30. Do-it yourself 2.0.

351 The Wall Street Journal: http://online.wsj.com/article/SB10001424127887323628004578458892382014094.html. Accessed on 4 June 2013.

352 http://www.netzpiloten.de/neues-crowdfunding-modell-fur-die-finanzbranche/, Accessed on 4 June 2013.

353 Sciencestarter: http://www.sciencestarter.de/Ueber-uns/ueber-sciencestarter.html. Accessed on 12 March 2013.

354 Nielsen, M. (2012): Reinventing Discovery. The new era of networked science. Princeton, Princeton University Press.

355 Gowers, T. (2009): http://gowers.wordpress.com/2009/01/27/is-massively-collaborative-mathematics-possible. Accessed on 24 October 2012.

356 Kickstarter. URL: http://www.dronejournalismlab.org/. Accessed on 25 October 2012.

35 ETHICAL AND VALUE-BASED FINANCIAL SERVICES

Short description of the trend

Currently, in the financial sector, trends and forms of financing can be seen in which traditional yield-driven investment criteria are weakened, added to, or complemented with non-financial considerations. Banks often play only a peripheral role in such transactions. Financial services of this kind include:

- Micro-finance / micro-insurance – lending small sums or providing insurance cover to poor and rural small-scale entrepreneurs, who otherwise would not be able to receive any capital because of a lack of infrastructure or creditworthiness[357].
- Concepts for the financial inclusion of poor sections of society (banking the unbanked), not only in poor countries but also in industrialised countries, where a growing number of people on low incomes and with personal debts but without bank accounts or credit cards are falling out of the formal financial system[358].
- Financial services that are compatible with Islamic law, which prohibits certain types of financial transactions[359].
- Mobile banking – in developing countries this is primarily offered by network operators and telecommunications companies, mostly by using simple IT such as text messaging in unconventional ways. Low-earning consumers but also small retailers are therefore able to conduct money transactions over the phone[360].
- Mission or impact investing – a generic term for investments that apart from the yield also consider ethical, religious, social and ecological dimensions, especially the portfolio's climate/emissions impact.

Drivers and dynamics

Value-based financial services are driven firstly by the realisation that lack of access to capital and a rigid concept of creditworthiness based on Western standards is a high barrier to development. Secondly, the increased self-confidence of religious groups is leading them to seek investment opportunities that relate to their religion. Thirdly, communication technologies provide new customer groups or service providers with access to the financial market, or more precisely they enable a coupling between previously separate financial value-creation segments.

357 World Bank (ed.) (2008): Finance for All. Policies and Pitfalls in Expanding Access. Washington, D.C., International Bank for Reconstruction and Development / World Bank.

358 World Economic Forum and Boston Consulting Group (WEF/BCG) (2012): Redefining the Emerging Market Opportunity. Driving Growth through Financial Services Innovation. Geneva, WEF/BCG.

359 Economist Intelligence Unit (2012): The Sharia-Conscious Consumer. London, Driving Demand.

360 Davidson, N.; Penicaud, C. (2012): State of the Industry: Results from the 2011 Global Mobile Money Adoption Survey. London, GSMA.

Fourthly, even before the financial crisis, a loss of trust in banks among consumers and businesses could be seen. This fuelled the search for new forms of financing.

Relationship to research and innovation

The developments mentioned above can be regarded as experimental arrangements. Attempts are being made to bring economic, value-based and cultural investing criteria into a new "order of justification"[361]. Based on these efforts, it is possible to research the extent to which new models of sustainable business can succeed in market economies, and enable corresponding innovations, e.g. for disadvantaged segments of the population.

Relationship to the knowledge society

If the importance of the banks declines, then money decisions for citizens become more fragmentary, faster, of greater consequence, but often also more tangible, for instance if a small-scale farmer is given a microloan. To ensure that citizens and especially groups such as school students have better financial skills is an important orientation task for the knowledge society.

Assessment

For the time being, value-based financial services have only small market shares in global capital flows. Nevertheless, the concurrence of a large number of initiatives, reform pressure on the financial system, and the emergence of mass markets in Africa, the Arab world and Asia could lead to fundamentally new financial innovations.

361 Nessel, S. (2012): Ethisches Investment, Islamic Finance und politische Fonds. In: Kraemer, K.; Nessel, S. (eds.): Entfesselte Finanzmärkte. Soziologische Analysen des modernen Kapitalismus. Frankfurt am Main, Campus.

36 IMPATIENT INVESTORS - THE DRYING-UP OF LONG-TERM CAPITAL

Short description of the trend

Society's provision for the future is increasingly reliant on the availability of long-term capital. Strategic investments, e.g. in building infrastructure such as roads and public transport, innovation financing, climate protection and the modification of energy and agricultural systems worldwide require a long-term view and cannot be shouldered solely by the state. The global infrastructure investment requirement alone is estimated at three trillion U.S. dollars annually – so private (co)investment is needed. Private and institutional investors need to be suitably patient. Investments in energy systems promise steady returns, for example, but these only materialise over longer periods of time.

On the global financial markets, however, the opposite trend can be seen[362]. Capital owners such as asset managers, insurers, reinsurers and their corporations, pension funds, sovereign wealth funds, wealthy individuals and managers of large family fortunes are focusing increasingly often on minimising risks and achieving short-term returns. Studies of these globally managed assets estimate that less than one quarter of capital owners and managers around the world are currently considering long-term investment strategies. The result is paradoxical: globally, inordinate amounts of capital are looking for investment opportunities. Yet key areas of general-interest services, such as infrastructure and innovation financing, are suffering from a lack of capital[363]. Thus there is a wide discrepancy between investment needs and the capital markets' allocation propositions.

Drivers and dynamics

The financial crisis led financial service providers to use stricter methods in their risk management instruments for estimating performance as well as market, credit and liquidity risks, and they now apply these consistently to all asset classes. In this perspective, the uncertainties of complex long-term investments, with all their technological, political, regulatory and systemic risks, become highly conspicuous. By contrast, the strengths of long-term investments, namely long payback periods and, on the whole, opportunities for above-average profits, become less important, as they are less measurable, assessable or guaranteeable. As a result, investors increasingly prefer less volatile and liquid asset classes that can be priced immediately, including money market and commodity transactions with the highest possible return, which allow a quick restructuring of investments[364].

362 World Economic Forum (2011): The Future of Long-term Investing. Geneva, World Economic Forum.

363 Frankfurt School – UNEP Collaborating Centre for Climate & Sustainable Energy Finance (2012): Global Trends in Renewable Energy Investment 2012. Frankfurt, Frankfurt School of Finance & Management.

364 Funke, C. et al. (2011): Globale Risiken und ihre Auswirkungen auf das Risikomanagement institutioneller Anleger. Eine Analyse der neuen Herausforderungen für das Risikomanagement. Frankfurt am Main, Union Investment Institutional.

Analysts talk about "defuturisation"[365] when investment goals no longer extend beyond a radius of a few years[366].

State regulation, for example capital requirements (e.g. Basel II/III and Solvency), or approval and mediation procedures, may indirectly and unintentionally intensify this risk aversion.

Relationship to research and innovation

Global policymakers face a number of investment-intensive generational tasks – such as guaranteeing the food supply for 8.3 billion people in 2030, and demographic change. How can these be accomplished if the financial system and its instruments for measuring profitability are becoming increasingly short-sighted? It is particularly important to investigate whether long-horizon institutional investors such as pension funds, sovereign wealth funds and foundations can escape the trend of "defuturisation"[367] on the capital markets, and what role policy, incentives and dialogues can play in mitigating the trend. This may become an increasingly important field for research and innovation, as the new challenges are also producing a paradigm shift in economics.

Relationship to the knowledge society

Education and science are long, open-ended processes, and are in any case risky from an investor's point of view. The hope of private funding for educational facilities will suffer from the drying-up of long-term capital.

Assessment

Would it be possible today to finance visionary infrastructures such as the American rail network at the end of the 19th century? Is the innovation system losing a key partner because the financial sector is "giving up on the future"[368]? Counteracting this trend will require in-depth research.

365 Esposito, E. (2010): Die Zukunft der Futures. Die Zeit des Geldes in Finanzwelt und Gesellschaft. Heidelberg, Carl-Auer-Verlag.

366 Ibid.

367 Ibid.

368 Ibid.

37 DEVELOPMENT SCENARIOS FOR THE GLOBAL FINANCIAL SYSTEM

Short description of the trend

In its "World Risk Report 2012", the World Economic Forum cited chronic imbalances in the financial system as the biggest risk factor for the world. Studies show that economists are essentially unable reliably to assess the consequences of the financial crisis[369], not least because they anticipate "fundamental transformations"[370] in the banking sector in terms of business models and corporate culture. Forecasts are further complicated by the fact that while banks from emerging countries are rapidly gaining importance in the global economy, the formal financial system in key regions such as Africa and South Asia is only just starting to develop[371]. As a result, very different long-term scenarios are plausible, such as the following:

- Nation states take a not very coordinated, ultimately fragmented approach to financial supervision, based on the Basel III regulatory accord and possibly on fiscal stimulus measures[372].
- Stronger macroprudential supervision of the global financial system via internationally coordinated initiatives to contain the destabilising impact of the bond markets in particular, for example through pro-cyclical provisions, debt limits, and the separation of investment and commercial banking[373].
- Further development of regional alliances (e.g. ASEAN, Arab League) that agree on internal regulations to control the financial sector and negotiate with other regional alliances.
- "G2 global financial management", in which the United States and China either agree to coordinate their goals, or pursue conflicting goals to protect their domestic markets[374].
- Multipolar integration and supranational regulation of the financial markets would lead to the establishment of a kind of World Financial Authority comprising financial supervisory authorities, central banks and finance ministry representatives, and equipped with extensive powers, including against nation states.

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369 World Economic Forum (2009): The Future of the Global Financial System. A Near-Term Outlook and Long-Term Scenarios. Geneva, WEF.

370 McKinsey (2012): The triple transformation. 2nd McKinsey Annual Review on the banking industry. New York, McKinsey.

371 World Bank / International Bank for Reconstruction and Development (2012): The Little Data Book on Financial Inclusion. Washington, D.C., World Bank.

372 Forum for the Future (2011): Sustainable economy in 2040: A roadmap for capital markets. London, Forum for the Future.

373 Wharton School / Ernst & Young (2012): Global Banking 2020: Foresight & Insights. S.l., Ernst & Young.

374 GlobeScan / Center for Responsible Business (2011): The Future of Finance. Berkeley, CA, GLOBALSCAN.

- The worst-case scenarios include a long stagnation phase in the global economy which does lasting damage to the reputation of the market economy and globalisation, induces nation states to pursue counter-cyclical economic policies or even impose protectionist measures, and at worst ends with countries closing off their markets[375].

Drivers and dynamics

Scenarios for the future of the financial system are influenced by key factors: for example, the frequency and international convergence of regulatory initiatives; the behaviour of lenders of last resort such as the central banks; economic growth and the shifting of capital and production to emerging countries; the concentration of a small number of actors in the banking sector; a renewed strengthening of financial institutions that provide bank-like services, without being subject to banking supervision; increasing sovereign debt crises; speculation bubbles in commodity markets; improved standards for risk management, transparency and pay; standardisation and automation of financial market transactions; and the development of a climate of trust in the financial system.

Relationship to research and innovation

The divergence between the scenarios shows that there is considerable uncertainty concerning the future of the financial world, and hence this is a challenge of the first order for research and innovation. It is controversially discussed whether the feedback effects from financial instruments such as complex derivatives or high-frequency trading are so uncalculable for financial and commodity markets that it is necessary to regulate financial innovations.

Relationship to the knowledge society

The financial crisis has produced much-noted comments in the cultural sciences[376] and initiated an interdisciplinary discourse between economists, social scientists and also natural scientists. This dialogue is central to self-reflection and determining our society's positioning with regard to prosperity goals.

Assessment

The relevance of this topic to the global economy and the national and global innovation system is evident in the section on drivers and dynamics. Hence there is a need for research in the economic, social and cultural sciences.

375 Vogl, J. (2010): Das Gespenst des Kapitals. Zurich, Diaphanes Verlag.

376 Ibid.

38 THE USEFULNESS OF PATENT LAW IS RUNNING UP AGAINST LIMITS

Short description of the trend

Ever more frequently, companies are ignoring existing patents when they develop new products[377]. The main reason for this trend is the overall costs of patent searches, which rise disproportionately as the number of existing patents and active innovators grows, with the result that patent searches ultimately become prohibitively expensive[378]. This calls into question a basic premiss of patent law, which assumes that all participants are in principle able to respect the patent rights of other actors[379]. The field of software patents is highlighted as being particularly problematic in this regard[380].

Companies that find themselves faced with patent thickets are less successfully innovative, partly because it is difficult even to enter the market[381,382]. At present, thousands of patents protect innovative products such as smartphones[383]. Such patent thickets are often held by numerous parties, with partially overlapping patent claims. It generally becomes difficult, if not simply impossible, to judge whose rights are infringed by one's own product developments, and what licenses should or can be obtained[384]. This raises questions of principle regarding the usefulness of the patent system.

Drivers and dynamics

The global number of patents applied for each year has risen from around one million in 1985 to almost 2 million in 2010[385]. The disproportionate growth of patent applications in computer and telecommunication technology is a main driver of the increase in patent thickets[386]. Open technology standards, cross-licensing or patent pools are regarded as being among the possible solutions to patent thicket problems, but they require participants to take a cooperative approach[387,388].

377 Lemley, M. A. (2008): Ignoring Patents. In: Michigan State Law Review, vol. 19.

378 Mulligan, C.; Lee, T. B. (2012): Scaling the Patent System. Appears in: N.Y.U. Annual Survey of American Law.

379 Ibid.

380 Ibid.

381 Schwiebacher, F. (2012): Complementary Assets, Patent Thickets and Hold-up Threats – Do Transaction Costs Undermine Investments in Innovation? In: ZEW Discussion Paper no. 12-015.

382 Hargreaves, I. (2011): DigitalOpportunity - A Review of Intellectual Property and Growth. S.l.

383 ZEW (2012): www.zew.de/de/presse/2117#. Accessed on 30 November 2012.

384 Hargreaves, I. (2011): DigitalOpportunity - A Review of Intellectual Property and Growth. S.l.

385 WIPO (2011): World Intellectual Property Indicators – 2011 Edition. Geneva, WIPO.

386 Hargreaves, I. (2011): DigitalOpportunity - A Review of Intellectual Property and Growth. S.l.

387 Ibid.

388 German Federal Ministry for Economic Affairs and Technology (BMWi) (2013): Gutachten vom Januar 2007 bis November 2011. Vol. 18 of the report / The academic advisory board at the German Federal Ministry for Economic Affairs and Technology. Stuttgart, Lucius.

However, an increase in patent litigation has been observed, with a large rise in the number of cases since it became easier to obtain software patents in the United States, for example[389]. There is anecdotal evidence that in 2011, for the first time, Google and Apple spent more money on patent disputes and buying patents than on research and development[390]. Another driver of the described trend is the rising complexity of technology in general and of information and communication technologies (ICT) in particular. Problems with patent law in the field of ICT, which is a central key technology, could therefore indirectly affect other technology fields as well, such as mechanical and automotive engineering, which are increasingly permeated by ICT.

Relationship to research and innovation

The integrity of the patent system may play a key role in innovation activity in patent-intensive technologies such as ICT. Patent law has the task of encouraging innovations. Yet a number of observers[391,392] are now questioning whether this still applies to the patent system in its current state. It can be expected that the debate surrounding the usefulness of the patent system as an instrument for promoting innovation will intensify significantly in the long term.

Assessment

Even back in 2007, a future study[393] by the European Patent Office raised the question, looking forward to 2025, of whether the patent system might become overwhelmed by its constantly increasing volume. Indications of research costs getting out of hand and the increase in patent thickets that were mentioned above could be specific factors that contribute in the long term to a possible collapse of the patent system.

389 Bessen, J.; Meurer, M. J. (2008): Patent Failure. Princeton, Princeton University Press.

390 Duhigg, C.; Lohr, S. (2012): The Patent, Used as a Sword. In: New York Times, 7 October 2012.

391 Mulligan, C.; Lee, T. B. (2012): Scaling the Patent System. Appears in: N.Y.U. Annual Survey of American Law.

392 Hargreaves, I. (2011): Digital Opportunity – A Review of Intellectual Property and Growth. S.l.

393 European Patent Office (2007): Scenarios for the future: How might IP regimes evolve by 2025? Munich, EPO.

39 NEW PARADIGMS OF ECONOMIC GROWTH AND SOCIAL PROSPERITY

Short description of the trend

Quality of life, quality growth and sustainable prosperity are globally the most important normative trends in civil society and science. In the measurement and mapping of economic and social performance, and in the environmental conditions for progress as well as its limits and consequences, far-reaching paradigm shifts are imminent. It is a matter of breaking the link between prosperity and the consumption of resources, enabling a fair share of prosperity nationally and globally, and treating a society's human, social, natural and health capital as assets worth protecting, in addition to its economic capital[394]. Especially in view of the debate in science and social philosophy about the limits of economic growth, and high sensitivity to environmental and climate issues among the population, alternatives are being developed to gross domestic product (GDP) as the exclusive indicator of social progress, and these are being integrated into social reporting. In Germany, discourse has been advanced in particular by the Bundestag Study Commission on "Growth, Wellbeing and Quality of Life – Paths to Sustainable Economic Activity and Social Progress in the Social Market Economy" since it was set up in 2010[395].

Drivers and dynamics

Around the world, the extent to which prosperity is possible without economic growth is the subject of passionate debate in science, civil society, economics and ethics. Uncertainty over the future development of social cohesion, national economies and public finances worries people, as do continuing climate change and the loss of biodiversity. As a result of the financial crisis, there is currently extensive participation by social movements, political institutions and business representatives in the debate over solutions. The discussion covers a spectrum ranging from pragmatic initiatives e.g. to operationalise quality of life and sustainability indices as governance criteria, to fundamental and in some cases radical criticism of the system aiming at a reform or normative taming of capitalism (the Occupy movement). On the whole, however, an attitude of constructive criticism predominates in civil society, via which new forms of integration and coordination of societies are sought.

394 United Nations Environment Programme / United Nations University International Human Dimensions Programme on Global Environmental Change (2012): Inclusive Wealth Report 2012. Measuring progress toward sustainability. Cambridge, UNEP/IHDP.

395 It examines key questions concerning e.g. sustainable lifestyles. On this point, see: Deutscher Bundestag (2013): Berichtsentwurf Projektgruppe 5 - Arbeitswelt, Konsumverhalten und Lebensstile. Kommissiondrucksache 17(26)100.

Relationship to research and innovation

So far, various different threads of discussion in politics, economics, philosophy and civil society exist alongside each other, but they are still largely unconnected. Meanwhile the discourse which is just beginning does not yet offer any fully developed control possibilities that are compatible with democratic standards for imposing limits on growth[396].The work of the Bundestag Study Commission on "Growth, Wellbeing and Quality of Life – Paths to Sustainable Economic Activity and Social Progress in the Social Market Economy"[397] can be regarded as an important contribution to this discussion, and could be built on in the future. Given the social importance of the debate, but also in view of its rather incohesive nature and possible radicalisation tendencies, the development of science and research-based answers to the questions mentioned would represent an important contribution to the national provision of general-interest services.

Assessment

Given the growing global challenges presented by environmental problems and economic disparities between and within nations, the discourse on alternatives to growth will continue to gain importance. As a result of the financial crisis, this discourse is being driven by strong dynamics across society as a whole, which is an indication of future disruption potentials.

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396 Working group 3 at the expert workshop on normative social trends on 16 November 2012 in Berlin emphasised that the preservation and development of social, natural and economic capital should stand at the centre of a new prosperity and development model. The participants found it important to note that this is not a utopia, but instead – for example in view of the trend for the shared use of products – is already a tangible trend that could soon enter the social mainstream. The group held an instructive discussion about the question of how the overabundance of information resulting from new media can be made accessible and transparent as guidance and as a decision-making basis for citizens, but also how it can be compressed, validated and prepared as action knowledge.

397 It examines key questions concerning e.g. sustainable lifestyles. On this point, see: Deutscher Bundestag (2013): Berichtsentwurf Projektgruppe 5 - Arbeitswelt, Konsumverhalten und Lebensstile. Kommissiondrucksache 17(26)100.

40 PUBLIC FINANCES: FROM VOLUNTARY COMMITMENT TO PARALYSIS?

Short description of the trend

The global financial and economic crisis has affected public finances around the world. The national debt of Western industrialised nations has grown from an average of 72% of gross domestic product (GDP) in 2000 to nearly 95% today. In the United Kingdom, United States and Japan, the debt ratio has risen significantly over the last ten years (in Japan from 120% to almost 200% of GDP). Without any emphatic fiscal policy adjustments, the national debt of industrialised countries could rise from around 100% of GDP to 133% in 2020. Studies show that national debt definitely starts to dampen economic growth at levels of 90% of GDP and higher. Germany currently has a debt ratio of around 80%, placing it in the middle range of OECD countries. However, a rise to more than 200% of GDP is conceivable in a "business-as-usual" scenario[398].

Drivers and dynamics

When it comes to managing their debt, countries essentially have four options, all of which involve risks[399]. To stop servicing the debt and negotiate a waiver of payment with creditors can be successful in individual cases, but on a broad front it would destabilise the global economy. A policy of inflation, on the other hand, would cause the value of assets and real incomes to fall. Therefore a reduction in government spending and an improvement in the revenue situation through tax increases are discussed. Both solutions – redistribution measures and cuts in social policy – are hard to implement, and run the risk of having a dampening effect on economic growth. However, as they are relatively dosable risks, these two options are the main focus of recommendations for budget consolidation. Other possible measures to lower government spending include reducing social benefits, making savings in the public sector, structural cuts in the pension system, increased efficiency and privatisation in the health system, charging for education e.g. through tuition fees, widening the income tax and value-added tax (VAT) base, cutting subsidies and imposing environmental levies such as CO2 taxes. In addition, policymakers have made self-limitation arrangements, for example spending ceilings, requirements to balance the budget, rules for a structural budget balance, and legally binding spending cuts. These measures generate predictability and fiscal stability. But it is unclear whether they have a consolidating or inhibiting effect on macroeconomic variables such as private investment and consumption[400].

398 OECD (2012): Fiscal consolidation: How much, how fast and by what means? Paris, Organisation for Economic Co-operation and Development.

399 Hagemann, R. (2012): Fiscal Consolidation: Part 6. What Are the Best Policy Instruments for Fiscal Consolidation? OECD Economics Department working papers, no. 937.

400 Molnar, M. (2012): Fiscal Consolidation: Part 5. What Factors Determine the Success of Consolidation Efforts? OECD Economics Department working papers, no. 936.

If a rising proportion of public budgets is taken up by health, care and pension spending – which are rising considerably for demographic reasons – and is tied by self-commitment rules, then the freedom for policymakers to act is limited at precisely the moment when the financial crisis demands a clear political framework, when fundamental investments such as the transformation of the energy supply system are required, and when the debate over justice and the future of democracy is reaching new heights.

Relationship to research and innovation

Fiscal restrictions – as is seen in current budget policy developments in the United States – may have a significant medium-term impact on future-oriented investments such as education, research and infrastructures, which face tough competition from urgent policy areas in day-to-day politics. These developments may accelerate the shift in global R&D budgets towards aspiring agenda-setting powers.

Assessment

National debt is undoubtedly “ruthless exploitation of the future” – but debt reduction can lead to restrictions on the future that are democratically questionable. The debate about this restricted scope should be conducted aggressively.

41 REDISCOVERY OF THE COMMONS

Short description of the trend

A common good is a collective or public good whose use is restricted and regulated. It therefore belongs jointly to a group of persons, but is distinct from a public good because of its restricted access. In contrast to a club good, a common good is "rivalrous", i.e. it is consumed through use[401]. As collective forms of use spread in the internet, the approach is gaining significance in many fields, and it is being discussed as a sustainable economic system[402,403].

Drivers and dynamics

Elinor Ostrom, winner of the Nobel Prize in Economics, has shown by means of many examples that in certain cases, self-regulated collective management of scarce, rivalrous goods by users is superior to both privatisation and nationalisation[404]. The concept of homo oeconomicus, who necessarily destroys common property ("tragedy of the commons")[405], is therefore called into question. People act in the common interest if a suitable framework for this exists. However, certain conditions have to be satisfied for the commons to function, such as jointly developed controls and sanctions which members bow to out of conviction, transparency in the principles of operation, and effective conflict resolution mechanisms. The state can play an accompanying role, for example as a trustee. The commons principle is currently attracting a lot of attention in science and society[406,407]. The primary driver is the drastic fall in the costs of collaboration because of the internet, which has enabled a considerable expansion of the commons principle. Prominent examples include the "free" software system Linux[408] and the internet encyclopaedia Wikipedia, which are jointly developed and used according to strict rules. In a similar way, other knowledge goods such as recipes, maps, instructions and sewing patterns are managed collectively via the internet. While the classical commons relates to "rival goods", which are consumed through use, with these "knowledge commons" the quality of the goods increases with the number of active users, with the result that the strict economic definition of a common good does not apply.

401 Summer Academy of the Swiss Study Foundation (2010): http://oekonomie-sozialwiss.blogspot.co.at/2010/07/offentliche-guter.html. Accessed on 24 January 2013.

402 Deutschlandfunk (2012): Jenseits von Markt und Staat – Begegnungen in der Allmende. Dagmar Scholle. Programme on 4 September 2012.

403 Helfrich, S.; Heinrich-Böll-Stiftung (eds.) (2012): Commons – Für eine neue Politik jenseits von Markt und Staat. Bielefeld, transcript.

404 Ostrom, E. (1999): Die Verfassung der Allmende: Jenseits von Staat und Markt. Tübingen, Mohr Siebeck (English original 1990).

405 Hardin, G. (1968): The Tragedy of the Commons. In: Science, 13 December 1968.

406 Deutschlandfunk (2012): Jenseits von Markt und Staat – Begegnungen in der Allmende. Dagmar Scholle. Programme on 4 September 2012.

407 Helfrich, S.; Heinrich-Böll-Stiftung (eds.) (2012): Commons – Für eine neue Politik jenseits von Markt und Staat. Bielefeld, transcript.

408 Grassmuck, V. (2004): Freie Software. Zwischen Privat- und Gemeineigentum. Bonn, BPB.

In parallel, however, modern varieties of the classical commons are emerging, for example in the form of collectively managed green spaces such as the "Allmende-Kontor" in Berlin, which has garnered much attention[409]. Finally, following on from Ostrom's work and in view of the rapid destruction of many ecosystems under conventional forms of ownership, the commons principle is being discussed as a possible form of management for certain global goods such as oceans, the atmosphere and the electromagnetic spectrum. The so-called "enclosure" of the commons is criticised, i.e. sealing-off in the course of privatisation or nationalisation, which is said to lead to unrestrained overuse and often destruction, but which could also result in underuse that would hamper innovation (gridlock economy)[410].

Relationship to research and innovation

The commons principle means a paradigm shift in the logic of innovation. Instead of price, the focus is on value. Instead of a shortage of goods, there is free usage of common property. The spread of this principle, e.g. in the form of open design, is therefore a challenge for all actors in the market economy. Knowledge commons are an important basis for many innovations. There are consequences for technology development, too: collective forms of use place particular requirements for example on mobility or energy concepts. Furthermore, the commons can possibly form one element of economic sustainability.

Assessment

For the reasons mentioned above, the development of commons research seems profoundly relevant to the future. There is a particular need for research to ascertain under what conditions and in which areas the concept can be usefully applied, and what an appropriate commons-sensitive policy (also: governance of the commons) could look like. Finally, particular attention should be paid to innovation and knowledge commons, whose upkeep has a direct impact on innovative ability.

409 Tempelhofer Freiheit: http://www.tempelhoferfreiheit.de/mitgestalten/pionierprojekte/allmende-kontor/. Accessed on 17 January 2013.

410 Heller, M. (2008): The Gridlock Economy: How Too Much Ownership Wrecks Markets, Stops Innovation and Costs Lives. New York, Basic Books.

42 AFRICAN INNOVATIONS POINT TO NEW PATHS FOR INNOVATIONS

Short description of the trend

The importance of African countries as locations for innovative solutions is growing. Innovative products and services from the African continent are increasingly being presented in Western media, and there is rising interest in their potentials for markets here[411]. These kinds of innovations – intelligent, creative solutions for local social needs under severe resource limitations, also known as *frugal innovations*[412] – could become relevant for developed countries in crisis situations. For example, a text message based system to check whether medications are genuine, which was developed in Africa, has rapidly spread around the world[413]. Investors are already specifically seeking promising ideas and developers of frugal innovations[414]. This trend is accompanied by accelerated economic growth in parts of Africa[415,416].

Drivers and dynamics

Due to a lack of infrastructure and hardware, extraordinarily many people in African countries use mobile phones for communication and as a method of payment, with the result that mobile platforms form the basis for many African innovations. Fast-moving social dynamics and the strong informal sector raise the potential for social innovations. A number of completely new concepts from Africa have spread globally, such as the web platform of the non-profit organisation Ushahidi, which enables collective visualisation of information[417]. It is possible that the knowledge commons approach, i.e. the collective use of knowledge, has a particularly high potential for Africa[418]. Another basis for African innovation is the highly developed local craft tradition[419]. Finally, specific location factors in a number of fields provide a good framework for production innovation. Thus an aspiring shoe industry is emerging in Ethiopia[420].

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411 The Guardian/The Observer: http://www.guardian.co.uk/world/series/new-africa. Accessed on 29 October 2012.

412 On this point, see also trend profile no. 43. Frugal innovations.

413 The Guardian / The Observer: http://www.guardian.co.uk/technology/2012/aug/26/new-africa-ghanaian-tech-innovator. Accessed on 17 January 2013.

414 Koutonin, M.R.: http://www.siliconafrica.com. Accessed on 05 November 2012.

415 The Economist (2011): The lion kings? Africa is now one of the world's fastest-growing regions. In: The Economist, 6 January 2011.

416 The Economist (2012): Consumer goods in Africa. A continent goes shopping. Africa's fast-growing middle class has money to spend. In: The Economist, 18 August 2012.

417 The Guardian / The Observer: http://www.guardian.co.uk/technology/2012/aug/26/new-africa-kenya-activist-internet. Accessed on 17 January 2013.

418 Cf. the Open AIR research project, which was co-financed by Germany: http://www.openair. org.za. Accessed on 24 January 2013.

419 The Economist (2012): Ethiopian shoes on the march. Footwear may be Ethiopia's commercial future. In: The Economist, 09 June 2012.

420 Ernst &Young (2011): It's time for Africa. Ernst &Young's 2011 Africa Attractiveness Survey. S.l., Ernst & Young South Africa.

A number of analysts anticipate that Africa will develop into a globally important manufacturing location[421].

It is also predicted that by 2015, seven out of ten of the fastest-growing countries will be in Africa, and that countries in Africa will grow faster than Asian countries in the long term[422]. Furthermore, per-capita income in Africa has steadily risen since 2000. This is being driven by massive investments from China, rising raw material prices and strategic investments by a number of African governments. Kenya, for example, is explicitly promoting innovation and is regarded as an innovation location. However, it is unclear whether such predictions underestimate Africa's complexity, since individual regions in Africa are developing in very different ways[423].

Relationship to research and innovation

The African model of innovation, i.e. being creative with limited resources, could point the way to innovations that address challenges for society, without progress being reduced by rebound effects. Especially the combination of social and technical innovation involving the informal sector would appear to point the way to the future in this regard[424]. A new innovation pattern could emerge here, which may gain importance in Germany too. African innovations could make a considerable contribution to reducing poverty and hunger by addressing typical problems that poor countries face, such as in agriculture and the health sector. German innovations that help to utilise this potential could make a key contribution to tackling global challenges.

Assessment

Of particular interest to Germany and Europe is the interplay of various innovation types, in view of global scarcities. The question is whether and how new innovation sources can be tapped in Europe. The interplay between developments, with emerging countries as innovators, production locations and sales markets, may both accelerate the pace of innovation and lead to tensions.

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421 The Guardian / The Observer: http://www.guardian.co.uk/technology/2012/aug/26/new-africaghanaian-tech-innovator. Accessed on 17 January 2013.

422 The Economist (2011): The lion kings? Africa is now one of the world's fastest-growing regions. In: The Economist, 6 January 2011.

423 Dowden, R. (2012): http://www.guardian.co.uk/world/blog/2012/oct/02/africa-liberia-guardianafrica-network. Accessed on 30 October 2012.

424 There is a connection with trend 7. Women as pioneers of global transformations, as specific cultural characteristics, national democratisation and equality aspects as social innovations are relevant here too.

43 FRUGAL INNOVATIONS COMPLEMENT HIGH-TECH INNOVATION MODELS

Short description of the trend

Problems such as raw material shortages, debts and an ageing population are leading international high-tech companies to rethink their innovation model[425]. Products cannot continue to be provided, cost-intensively, with ever new functions and technological refinements. One model for this is "frugal innovation", whose success is based on a limited use of resources, so that technically simple, cheap and robust products are created[426]. For the time being, examples of frugal innovations are found mainly in the BRIICS countries, Asia and Africa[427], where products more frequently need to be adapted to local demand and a lack of infrastructure. The products are cheaper to manufacture and sell, and simpler to use. Frugal innovations are a strategic and organisational challenge for industrialised nations.

Drivers and dynamics

In times of economic crisis, there is stronger pressure on businesses to act in a resource-efficient and solution-oriented way. A lack of resources and capital is no longer seen as being a barrier to innovation, but instead as a driver of needs-based and therefore marketable solutions[428]. This effect benefits not only businesses in developing and emerging countries, but increasingly also foreign companies that operate there, who can learn from frugal innovations and achieve competitive advantages[429,430]. Technology groups, such as Siemens, are therefore choosing to open up to frugal innovations in partnership with local providers (frugal engineering)[431,432]. This is not about developing cheap versions of high-tech products, but rather of developing completely new products[433,434].

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425 Hohensee, M. (2013): http://www.wiwo.de/technologie/umwelt/interview-innovationsforscher-radjou-mangel-macht-erfinderisch/7105078.html. Accessed on 29 January 2013.

426 Radjou, N. et al. (2012): Jugaad Innovation. San Francisco, Jossey Bass.

427 For examples from African countries, see trend profile 42. African innovations point to new paths for innovations, in which, for example, frugal innovations are also gaining importance in healthcare provision.

428 Radjou, N. et al. (2012): Jugaad Innovation. San Francisco, Jossey Bass.

429 Hohensee, M. (2013): http://www.wiwo.de/technologie/umwelt/interview-innovationsforscher-radjou-mangel-macht-erfinderisch/7105078.html. Accessed on 29 January 2013.

430 Radjou, N. et al. (2012): Jugaad Innovation. San Francisco, Jossey Bass.

431 Hohensee, M. (2013): http://www.wiwo.de/technologie/umwelt/interview-innovationsforscherradjou-mangel-macht-erfinderisch/7105078.html. Accessed on 29 January 2013.

432 AW Solution GmbH (2012): http://www.aw-solution.com/media/blog-1/frugalengineeringausindien. Accessed on 29 January 2013.

433 Radjou, N. et al. (2012): Jugaad Innovation. San Francisco, Jossey Bass.

434 Pick, D. et al. (2011); http://www.global-innovation.net/press/2011/AsienKurier_2011_03.pdf. Accessed on 29 January 2013.

Another driver of frugal innovations is a policy of "inclusive growth" in countries such as India, so that in economically emerging countries, the market is opened to poorer sections of the population as well with "jugaad innovations" (imaginative innovations)[435,436].

Relationship to research and innovation

The concept of frugal innovations is based on necessity being the mother of invention, and has impacts on all levels of the innovation system as the entire innovation process needs to be reconsidered[437,438]. Addressing social needs is a key element of frugal innovations, as shown by the example of Toyota's car for the Indian market[439]. Case studies show that an intermeshing of frugal with technical and social innovations[440] and an intensification of R&D partnerships (Open Global Innovation Networks, OGINs)[441] are critical for innovation systems that are fit for the future[442]. The "art of leaving things out"[443] is a big challenge for the business models and organisational structures of Western companies[444].

Assessment

The combination of high-tech and frugal innovations may help to align product development more closely with social needs, and therefore help to solve problems faced by society as a whole[445]. There is particular potential in the health sector. It seems rather unlikely that providers from emerging countries will capture markets here with frugal innovations[446].

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435 Ibid.

436 Cf. trend profile 6. More attention being given to social innovations.

437 Herstatt, C.; Tiwari, R. (2012): Frugal Innovation: A Global Networks' Perspective. In: Die Unternehmung, vol. 66 / no. 3; the same authors (2012): URL:http://www.globalinnovation.net/publications/PDF/Working_Paper_72.pdf. Accessed on 29 January 2013.

438 Zeschky, M. et al. (2011): Frugal Innovation in Emerging Markets. In: Research Technology Management, vol. 54 / no. 4.

439 Kölling, M.(2011): http://heise.de/-1278993. Accessed on 29 January 2013.

440 Zeschky, M. et al. (2011): Frugal Innovation in Emerging Markets. In: Research Technology Management, vol. 54 / no. 4.

441 Herstatt, C.; Tiwari, R. (2012): Frugal Innovation: A Global Networks' Perspective. In: Die Unternehmung, vol. 66 / no. 3; the same authors (2012): http://www.global-innovation.net/publications/PDF/Working_Paper_72.pdf. Accessed on 29 January 2013.

442 AW Solution GmbH (2012): http://www.aw-solution.com/media/blog-1/frugalengineeringausindien. Accessed on 29 January 2013.

443 Kölling, M.(2011): http://heise.de/-1278993. Accessed on 29 January 2013.

444 Zeschky, M. et al. (2011): Frugal Innovation in Emerging Markets. In: Research Technology Management, vol. 54 / no. 4.

445 Cf. trend profile 6. More attention being given to social innovations.

446 Cornelius Herstatt interviewed by Asien Kurier (2011): http://www.globalinnovation.net/press/2011/AsienKurier_2011_03.pdf. Accessed on 29 January 2013.

44 ECONOMIC ACTIVITY IN EXTREME CLIMATIC REGIONS IS BEING STEPPED UP

Short description of the trend

Economic activity in (sub-)tropical regions will assume unknown dimensions by 2025[447]. Of the six BRIICS countries (Brazil, Russia, India, Indonesia, China, South Africa) and the *next eleven* countries which could experience a similar economic boom, seven countries are situated mainly in the tropics, and six in the sub-tropics. Humans are utilising more extreme economic regions ever more intensively, including the ocean floor and polar regions. By 2030, a large part of global activity will take place in extreme climatic regions (particularly the tropics and sub-tropics), and no longer in temperate latitudes as is currently the case[448].

Drivers and dynamics

This shift in economic activities to extreme climatic regions is being driven partly by the aspirations of numerous countries situated in the (sub-)tropics, but on the other hand the shift of economic activities to extreme climatic regions is what enables these countries to develop economically in the first place. The spread of low-cost air-conditioning units makes it easier to work in offices and facilities under extreme climatic conditions. Furthermore, favoured regions for human economic activity have already been largely developed. Thus the development of extreme climatic regions such as the polar areas[449], the deep sea and the tropics reflects the increasing scarcity of raw material deposits in temperate latitudes. Moreover, the tropical belt is expanding towards the poles[450] as a result of climate change, while polar areas are free of ice for ever longer periods of time (the Arctic may be ice-free by 2030) and are therefore easier to exploit economically[451].

Especially in tropical regions, tropical health and disease issues, the enormous amount of energy used for air-conditioning, corrosion-related loss of value and environmental pollution will all become dramatically more important[452].

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447 World Bank (ed.) (2011): Global Development Horizons – Multipolarity: The New Global Economy. Washington, D.C., World Bank Publications.

448 OECD (2012): Looking to 2060: A Global Vision of Long-Term Growth. OECD Economics Department Policy Notes, No. 15, November 2012; climate map produced by the Institute for Veterinary Public Health: http://koeppen-geiger.vu-wien.ac.at/. Accessed on 1 March 2013.

449 Smith, L. C. (2011): Die Welt im Jahr 2050: Die Zukunft unserer Zivilisation. Munich, Deutsche Verlags-Anstalt.

450 Umweltdialog: http://www.umweltdialog.de/umweltdialog/klima/2012-06-01_Tropen_ziehen_zum_Nord-und_Suedpol.php. Accessed on 29 November 2012.

451 Schrader, C. (2012): Bald eisfrei? In: Süddeutsche Zeitung, 20 September 2012.

452 AFP/Reuters/lw: http://www.welt.de/wirtschaft/energie/article109466262/Oelmulti-warnt-vorDesaster-bei-Arktis-Ausbeutung.html. Accessed on 29 November 2012.

In climatic regions with low biotic activity, such as the Arctic[453], some ocean regions and the ocean floor, questions arise concerning the persistence and accumulation of materials and substances introduced by humans (e.g. plastic, oil)[454].

Relationship to research and innovation

In research and innovation, climate change and its consequences play a dominant role. Yet very little light has been shed on the effects of global socio-economic changes in respect of health, material and environmental issues. To deal with material requirements for structures in extreme climatic regions, the first climate chambers have been developed. These simulate different requirements for materials, and allow the material composition to be modified for specific climate zones[455].

Relationship to the knowledge society

Business travel and work stays in extreme climatic regions are likely to require a new degree of preventive health measures, monitoring and follow-up care. The global use of material goods may become linked to product information systems (e.g. status sensors, location) for the management of wear and disposal.

Assessment

The increase in economic activity in extreme climatic zones is taking place gradually. The phenomenon is not necessarily new, but the underlying dynamics could suddenly increase the scale of challenges, requiring new, large-scale solutions in certain areas (occupational medicine and travel medicine, public health, materials, recycling).

453 Weisman, A. (2009): Die Welt ohne uns. Reise über eine unbevölkerte Erde. Munich, Piper Verlag.

454 AFP/Reuters/lw: http://www.welt.de/wirtschaft/energie/article109466262/Oelmulti-warnt-vorDesaster-bei-Arktis-Ausbeutung.html. Accessed on 29 November 2012.

455 Austria Presse Agentur (2012): Baumit eröffnet Innovationszentrum in Wopfing. Vienna, APA Zukunftswissen.

45 GROWING IMPORTANCE OF ENTERPRISES IN EMERGING ECONOMIES

Short description of the trend

According to the scenario that the World Bank[456] considers to be most likely (World Bank baseline scenario), by 2025 the six most important *emerging economies* – Brazil, China, India, Indonesia, South Korea and Russia – will together account for more than half of total global growth. These countries are therefore important centres of global growth. Consequently, it is expected that enterprises in these emerging economies will evolve into *agents of change* in the global industrial and financial landscape. Foreign direct investment figures support this expectation: between 1997 and 2003, companies in emerging economies accounted for 4% of cross-border mergers and acquisitions (measured by the value of the respective deals). For the period between 2004 and 2010, this figure had risen to 17%, measured against the total global sum[457]. More than one-third of foreign direct investment in emerging economies now comes from other emerging economies. It is anticipated that the annual value of cross-border mergers and acquisitions by companies from emerging countries will double by 2025, and the number of transactions will triple[458].

Drivers and dynamics

Other indicators also provide evidence of strong dynamics. In 2012, the Fortune 500 list included 202 companies from developing countries, whereas only 19 such companies were featured in 1990[459]. As the global economy grows, it is expected that a new global middle class will emerge, representing an important group of new consumers[460]. Actors from the countries in which this new middle class is emerging could have competitive advantages since they have better knowledge of cultural characteristics and preferences in the respective countries[461]. In addition, as compared to companies from developed countries, companies from emerging countries often have the advantage that they are better able to deal with the political conditions in those countries because they have experience of similar conditions in their home countries[462].

456 World Bank (2011): Global Development Horizons 2011 – Multipolarity: The New Global Economy. Washington, D.C., World Bank.

457 Ibid.

458 Ibid.

459 World Economic Forum (2012): http://www.weforum.org/content/global-agenda-councilemerging-multinationals-2012. Accessed on 30 November 2012.

460 McKinsey & Company (2012): Winning the $30 trillion decathlon: Going for gold in emerging markets. S.l., McKinsey.

461 Boston Consulting Group (2013): Allies and Adversaries – 2013 BCG Global Challengers. Boston, Boston Consulting Group.

462 World Bank (2011): Global Development Horizons 2011 – Multipolarity: The New Global Economy. Washington, D.C., World Bank.

Relationship to research and innovation

Companies from emerging countries are increasingly investing in research and development: between 2004 and 2009, they doubled in number on the list of the 1,000 companies with the highest research and development spending in the world, to 114[463]. They are also stepping up direct cooperation, for example in global production networks[464]. For German companies and for other companies from developed countries that wish to target innovations at newly emerging markets in developing countries, a wide variety of new competitors, but also possible new cooperation partners, are appearing[465].

Assessment

As the global economy's centre of gravity shifts to today's emerging countries, companies from these countries will increasingly come into focus. There are still a number of uncertainties: To what extent do these new companies actually operate multinationally or globally[466]? Which companies are growing fastest globally and are therefore of particular interest[467]? At any rate, the configuration of actors is certainly becoming more complex. This creates new challenges and opportunities for German companies in the international competitive environment, and for the German innovation system as a whole.

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463 Ibid.

464 UNCTAD (2012): Technology and Innovation Report 2012 – Innovation, Technology and South-South Collaboration. New York, UNCTAD.

465 McKinsey & Company (2012): Winning the $30 trillion decathlon: Going for gold in emerging markets. S.l., McKinsey.

466 Shambough, D. (2012): Are China's multinational corporations really multinational? In: East Asia Forum Quarterly, April-June 2012.

467 Boston Consulting Group (2013): Allies and Adversaries – 2013 BCG Global Challengers. Boston, Boston Consulting Group.

46 THE GLOBAL URBAN MIDDLE CLASS – TIPPING THE SCALES OF SUSTAINABLE URBAN DEVELOPMENT?

Short description of the trend

Citizens of the world's middle class spend between US$ 10 and US$ 100 per person per day on housing, health care, education and pensions. Most enjoy good working conditions and a sufficient income for consumption and leisure activities. By 2025, the global middle class will comprise around one billion people in urban regions[468]. According to market studies, a large part of global economic growth (47%) and resource consumption will then be concentrated in cities in developing and emerging countries[469]. What consulting firms see as being the most promising market segment in the decades ahead[470] is a source of concern especially for environmental policy, but also of hope. The preferences of the new urban middle class will come to more closely resemble the habits of large Western cities. As a result, it can be assumed that environmental pollution and CO2 emissions will increase. On the other hand, market research shows that sustainability issues are increasingly important to consumers in the growing urban middle class in developing and emerging countries, because they are directly exposed to pressures such as noise, air and water pollution, traffic problems, and economic fluctuations. Accordingly, the new global urban middle class is developing a growing interest in quality of life, but also in environmentally sound technologies and products, and it has the financial flexibility for sustainable patterns of consumption[471].

Drivers and dynamics

According to an OECD study[472], cities are seen as being engines of economic growth, job creation and innovation – but also as causers of global warming and environmental pollution. Their large populations have potential for testing green technologies and for a market for ecological products. The urban middle classes are therefore regarded as being central to a transformation towards a green economy, even though they are not homogeneous. A sustainable trend from Latin America, for example, is bus rapid transit (BRT), which is an innovative, municipal approach to reducing traffic and emissions that can be implemented flexibly and cost-efficiently.

468 Silverstein, M. J. et al. (2012): The $10 Trillion Prize: Captivating the Newly Affluent in China and India. Boston, MA, HBR.

469 McKinsey Global Institute (2011): Urban world: Mapping the economic power of cities. Washington, D.C., McKinsey.

470 Boston Consulting Group (2010): Winning in Emerging-Market Cities. A Guide to the World's Largest Growth Economies. Boston, MA.

471 McKinsey Global Institute (2012): Urban World: Cities and the Rise of the Consuming Class. Washington, D.C., McKinsey.

472 Silverstein, M. J. et al. (2012): The $10 Trillion Prize: Captivating the Newly Affluent in China and India. Boston, MA, HBR.

Based on positive experiences, BRT is now implemented around the world – e.g. in Seoul, Los Angeles and Santiago – enabling considerable reductions in emissions[473]. An urban mobility trend in industrialised countries is cost-saving and eco-friendly mobility by car-sharing. Numerous approaches to the shared use of private and commercial motor vehicles now exist[474,475]. With regard to health issues, members of the urban middle class especially in Asian megacities are increasingly interested in measures to improve air quality, specifically to reduce chronic respiratory diseases[476]. Moreover, it is notable that young people in Western cities are reducing their meat consumption[477].

Relationship to research and innovation

The consumer habits of the middle class, especially in developing and emerging countries, may play a groundbreaking role in the transformation to the green economy. As part of this process, with the support of research and innovation, old behaviour patterns could be replaced by new, sustainable and therefore more effective behaviours. Urban regions with a high population density offer easier access to markets and a good basis for learning processes as well as marketing strategies for sustainable products, services and behaviour patterns. In the areas of traffic, infrastructure, energy and the water supply, the development of sustainable technologies for cities offers great potential for conserving resources and a large sales potential on the world market.

Assessment

Sustainable development in urban regions can be promoted through targeted support for more resource-efficient patterns of consumption by the urban middle class. To encourage the transformation to the green economy and at the same time achieve global climate goals, research should be targeted accordingly.

473 Suzuki, H. et al. (2010): Eco² Cities. Ecological Cities as Economic Cities. Washington, D.C., World Bank.

474 Viehmann, S. (2012). URL: http://www.zeit.de/auto/2012-03/mikroautos-kleinstfahrzeuge. Accessed on 26 October 2012.

475 During the expert workshop on normative social trends on 16 November 2012 in Berlin, it was stated that the shared use of products in various major Western cities is evolving to become an essential part of an "urban lifestyle" and change in values.

476 Siemons, M. (2013): Der Himmel täuscht. In: Frankfurter Allgemeine Zeitung, 15 January 2013.

477 Cockrall-King, J. (2012): Food and the City. Urban Agriculture and the New Food Revolution. Amherst, Prometheus Books.

47 SOCIAL DISPARITIES – FAULT LINES OF GLOBAL DEVELOPMENT

Short description of the trend

Generally, *within* the individual national economies of the global economy, an increase in differences between incomes can be observed[478]. In the developed economies, income inequality has increased considerably in recent years; but the level of inequality is still far higher in emerging countries. In growth economies such as India and China too, there are rising concerns about an increasing divide between rich and poor, and fears of oligarchies forming. However, measuring inequalities in these countries is made more difficult by corruption, opaque informal employment arrangements, and significant urban/rural disparities. Incomes are most evenly distributed in the Scandinavian countries, although even here they are undergoing a slight scissor movement. One exception is Latin America, where disparities have decreased owing to various recessions[479,480].

Drivers and dynamics

It is still unclear how significant and stable over time these changes might be[481]. On average, inequalities between the developed countries of the North and formerly underdeveloped countries of the South have clearly been reduced. Historically, it is unmistakable that income disparities steadily grew in the 19th and 20th centuries, but began to shrink in the 1960s. Economic growth and social policies in the decades following the Second World War evidently led to a reversal in the trend of centuries[482]. It is not yet possible to tell whether the rising disparities of the last two decades[483] point to a new trend. At the aggregate macroeconomic level, a close relationship can be seen between a country's gross domestic product and unequal income distribution, which when represented as a graph takes the form of an upside-down "U". With a low GDP, incomes are relatively equal. Disparities increase as GDP grows, until they start to decrease with continued growth. This correlation has weakened over the past 20 years however, as unequal distribution has increased again above a certain income level. The upside-down "U" has become more like an italic "N"[484].

478 The Economist: http://www.economist.com/node/21564418, and analysis by the project management agency VDI/VDE IT; The World Bank (2012): Inequality in Focus.

479 OECD (2011): Divided We Stand. Why Inequality Keeps Rising. Paris, OECD.

480 Deviating from the trend, in the period 2005-2010 DIW found a decrease in income inequality, see DIW Wochenbericht (weekly report) no. 43 (2012): Einkommensentwicklung und Armutsrisiko, Berlin, DIW Berlin.

481 International Monetary Fund (2012): World Economic Outlook: Growth Resuming, Dangers Remain. Washington, D.C., IMF.

482 Bastagli, F. et al. (2012): Income Inequality and Fiscal Policy. Washington, D.C., IMF.

483 The Economist. URL: http://www.economist.com/node/21564418, and analysis by the project management agency VDI/VDE IT; The World Bank (2012): Inequality in Focus.

484 The Economist: http://www.economist.com/node/21564418, and analysis by the project management agency VDI/VDE IT; The World Bank (2012): Inequality in Focus

There is a need for empirical evidence to substantiate the strong correlation between a reduction in disparities and an increase in a society's level of education. Well educated and highly skilled citizens are less prone to the risk of social downward mobility. Moreover, disparity is clearly lessened by tax, income transfer, pension, care and health policies, as well as generally by functioning institutions in society such as a legal system that prevents cronyism and corruption[485].

Relationship to research and innovation

Research is not in agreement about what conclusions to draw from the observed disparities and how generalisable such conclusions are, for example regarding the question of the role played by globalisation and technological change. Currently, however, the debate tends to conclude that excessively large income differences may slow economic growth[486], and therefore should not simply be accepted, and so these disparities should be evened out in particular through education and skills initiatives. A positive aspect is that inequality leads to interdisciplinary discourses, for instance between economists, sociologists and historians. These could be developed further and should be encouraged[487].

Assessment

Whether income disparities in Germany have increased in recent years is a matter of debate among economists[488,489,490]. However, in affluent societies even small disparities are perceived by the public as being a crisis phenomenon, and from a normative perspective are seen as being a loss of legitimacy for political institutions. The fact that German citizens at least are not alone in this perception is shown by the recent "Global Risk 2013" poll of experts conducted by the *World Economic Forum.* Among 50 risk factors for the global economy, the theme of "severe income disparities" was rated as the risk with the highest likelihood of occurrence, and (in 8th place) as being more dangerous than e.g. terrorism or cyber attacks.

485 Salverda, W. et al. (eds.) (2009): The Oxford Handbook of Economic Inequality. Oxford, Oxford University Press.

486 Stiglitz, J. E. (2012): Der Preis der Ungleichheit. Wie die Spaltung der Gesellschaft unsere Zukunft bedroht. Munich, Siedler.

487 Acemoglu, D.; Robinson, J. (2012): Why Nations Fail. The Origins of Power, Prosperity and Poverty. Random House.

488 Deviating from the trend, in the period 2005-2010 DIW found a decrease in income inequality, see DIW Wochenbericht (weekly report) no. 43 (2012): Einkommensentwicklung und Armutsrisiko, Berlin, DIW Berlin.

489 Institut der deutschen Wirtschaft Köln (2012): Stabile Mitte. Press release, no. 33, 27 August 2012.

490 Goebel, J. et al. (2010): Polarisierung der Einkommen. Wochenbericht des Deutschen Instituts für Wirtschaftsforschung, no. 24.

48 THE NEW GLOBAL INNOVATION LANDSCAPE

Short description of the trend

Global centres of innovation are currently shifting with increasing speed, and lasting effect, to Asia. China and (to a lesser extent) India are driving this trend. Countries such as Korea, Malaysia, Thailand and Singapore are in quick pursuit. Emerging countries were until recently the workbenches of the global economy. Now they are becoming thought factories and innovation incubators of the future[491].

Drivers and dynamics

Emerging countries, led by China and India, have significantly increased their global share in the manufacturing and exportation of high-technology goods, as well as their global share of patents, research and development (R&D) financing, and the publication of scientific findings[492]. Continuing high growth rates are foreseeable, especially in business R&D spending, because technologically innovative companies are increasingly developing in emerging economies and establishing their own R&D departments[493]. Large companies from emerging countries – specifically in the IT, communication, software and raw materials sectors – are rising to become global market leaders. The upsurge in innovation is accelerating as a result of cooperation between Asian countries and the migration to China's neighbouring countries of production facilities that are no longer profitable. This outsourcing provides the recipient countries with access to know-how of medium R&D intensity, which serves as a basis for their own modernisation strategies[494].

Western companies are also increasingly setting up R&D departments in emerging countries. In addition to accessing rapidly growing export markets, this is also about access to highly skilled personnel and the function of emerging countries as lead markets that articulate the demand for sophisticated innovations, and in turn increasingly set standards for the global economy. Conversely, for the first time a technology transfer from emerging countries to industrialised countries is reported[495]. Companies particularly in the IT sector and automotive industry are investing not only in R&D labs but also in company acquisitions in industrialised countries.

Higher education can be identified as one driver of this shift in gravity. The emerging countries currently train far more natural scientists and engineers than the United States or Europe[496].

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491 OECD (2011): Science, Technology and Industry Scoreboard 2011. Innovation and Growth in Knowledge Economies. Paris, OECD.

492 Ibid.

493 Battelle (2012): 2013 Global R&D Funding Forecast. In: R&D Magazine, December 2012.

494 INSEAD/WIPO (2012): The Global Innovation Index 2012. Stronger Innovation Linkages for Global Growth. Fontainebleau, WIPO.

495 World Economic Forum (2012): The Global Competitiveness Report 2012-2013. Geneva, WEF.

496 National Research Council (2012): Rising to the Challenge: U.S. Innovation Policy for the Global Economy. Washington, D.C., NRC.

Furthermore, higher education is becoming a global market. In the United States, 40% of all new doctorates in the natural sciences and technological sciences are of foreign origin. In the engineering sciences this figure reaches 61%[497].

Relationship to research and innovation

In the U.S. and internationally, a debate has raged over how to respond to the "new geography of global innovation"[498]. Responses that are discussed include: investment in the education system to attract and keep foreign students; an active policy of encouraging skilled personnel to settle in the country; strategies for cooperation with emerging countries and for "global sourcing" of strategic knowledge; the increased use of social demand vectors such as cleantech / climate protection / energy or the ageing population for innovations; helping smaller businesses to develop supplier, partner and knowledge networks in emerging countries; making natural science / technological science degree courses more attractive; improved dialogue between technology firms and finance companies for innovation financing. The return of industrial policy arguments in the U.S. is striking. It is discussed whether manufacturing processes that were outsourced to Asia can be won back; whether infrastructure development should be given greater priority as an innovation-driving task of the state; and whether policymakers should think in terms of global value chains and strategically occupy particular segments[499].

Assessment

An Asian century of innovation can hardly be stopped. Germany is not badly equipped for this, because it attracts foreign investors and many industries are pursuing a targeted internationalisation strategy. However, there is a need to develop integrative concepts and political visions for the role that Germany wishes to play in this shifting innovation and cooperation ecosystem.

497 Ibid.

498 Gilman, D. (2010): The new geography of global innovation. New York, Goldman Sachs Global Markets Institute.

499 Department of Commerce/National Economic Council (2012): The Competitiveness and Innovative Capacity of the United States. Washington, D.C., Department of Commerce.

49 THE GROWING IMPORTANCE OF THE REGION IN THE GLOBAL ECONOMY

Short description of the trend

The concentration of humankind in urban and peri-urban regions represents a trend of epochal social change. It is estimated that the world population will grow from around 7 billion today to 8.3 billion in 2030. This growth is accompanied by a redistribution: people are increasingly migrating out of rural areas and into cities[500]. In 1975, only 38% of all people lived in cities. The year 2008 marked the first time that more than half lived in cities. By 2050 at the latest, two-thirds of the world population will live in urban regions, (large) cities and mega-urban corridors[501]. This regrouping and concentration of people makes it of paramount importance to study the social, economic and environmental significance of peri-urban regions in particular. Cultural and social scientists talk about a "rediscovery of space"[502].

Drivers and dynamics

Urbanisation of rural and peripheral regions is being driven by profound social, economic and psychological factors. To escape the confines of their village community, but also because of the rural poverty and serious environmental problems that exist in many of the world's countries, people increasingly feel the urge to migrate. Moreover, they follow the pull of the city, which attracts them with the promise of a more diverse, safer, and freer life[503]. Over the past decades, new information and communication technologies, and the development of transport infrastructures, have made it easier to overcome distances and dramatically increased the geographical independence and mobility of workers.

Contrary to the original intuition that localness would become meaningless and dissolve in globalisation, it is seen that regions and their spatial structure and organisation are still central to the economic strength of nation states[504]. The concentration of human capital, information and financial flows, and the geographical rooting of industry clusters not only accelerates economic growth through agglomeration advantages. More even than that, many innovations only become possible as a result of spatial compression[505]. Comparison, learning, copying and lateral thinking effects in urban areas accelerate the cross-fertilisation of hitherto disparate ideas, knowledge milieus and ethne.

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500 On this point see also trend profile 12. Villages as pioneers in shaping the post-growth society.

501 UN-DESA (2012): World Urbanization Prospects. United Nations Department of Economic and Social Affairs. New York, UN-DESA.

502 Döring, J.; Thielmann, T. (eds.) (2008): Spatial Turn: Das Raumparadigma in den Kultur- und Sozialwissenschaften. Bielefeld, Transcript.

503 Glaeser, E. (2011): Triumph of the City. New York, Penguin Press.

504 OECD (2009): Regions Matter. Economic Recovery, Innovation and Sustainable Growth Paris, OECD.

505 Nallari, R. et al. (2012): Geography of Growth. Spatial Economics and Competitiveness. Washington, D.C., World Bank.

This concentration of people generates "creative classes" – innovative hybrid social milieus comprising a mix of e.g. scientists, designers, artists/bohemians, consultants, advertisers and financiers, who value diversity and who not only google new ideas but also want to see, touch, try and discuss them[506]. Regions are therefore becoming innovation labs of the global economy[507]. Furthermore, urban regions have global significance because they are integrated into supraregional and global economic, social and environmental networks and interrelationships via flows of people, resources, goods and capital, as well as globally interlinked supply, export and value chains. "The hinterland of urban areas of today is the entire globe[508]."

Relationship to research and innovation

Urban milieus are globally mobile and volatile, but at least temporarily they can be bound into stimulating regions, environments, districts and urban scenes. How this can happen on a more permanent basis requires further clarification. A subject of controversial debate in current research is how urban innovation milieus can be fostered without at the same time excluding other social milieus and creating metropolarities[509] and regional peripheries.

Relationship to the knowledge society

The potentials of the knowledge society develop in particular through mutual exchange in associations and networks. Thus urban agglomerations facilitate synergies between various different knowledge milieus.

Assessment

The growing significance of the region in the global economy is an important future trend between now and 2030. Research should consider not only the innovation opportunities but also the complementary aspect of "spatial justice"[510] in regional and urban development.

506 Florida, R. (2012): The Rise of the Creative Class Revisited. 10th Anniversary Edition. New York, Basic Books.

507 World Bank (2009): Reshaping Economic Geography. World Development Report 2009. Washington, D.C., World Bank.

508 Hamm, B.; Muttagi, P. K. (eds.) (1999): Sustainable Development and the Future of Cities. London, ITDG Publishing.

509 Soja, E. W. (2010): Seeking Spatial Justice. Minneapolis, University of Minnesota Press.

510 Ibid

4.3 Category: Politics and governance

Megatrends included in the "politics and governance" category

Much discussed megatrends in the category "politics and governance" which have been found to be relevant between now and 2030 are presented below. Their impacts on the social trends identified and presented in this report are mentioned in the trend profiles.

Development of a new political order in a multipolar world

The shift in economic centres of gravity as a result of globalisation is also changing the structure of political power. For a long time, the three major economic regions were the United States, Europe and Japan. As former emerging countries grow economically stronger – such as China, India, Brazil and South Africa – the order of the international community of states is becoming increasingly multipolar. These emerging countries play a key role in shaping cooperation in their regions, and they also influence other regions of the world. As a result, they are involved to a greater degree than previously in international decision-making processes, and have more influence on international politics.

Increasing European integration (EU expansion)

Today the European Union (EU) has 27 Member States and a total population of more than 500 million. For its future expansion, the European Union has defined an accession process that enables other European countries, subject to certain conditions, to become a member of the EU. Croatia is one current "accession candidate". The country has successfully completed the accession process and will become the 28th Member State of the EU on 1 June 2013.

Other countries are in accession negotiations and have acquired the status of an "accession candidate". These include Iceland, Macedonia, Montenegro, Serbia and Turkey. Furthermore, there are countries which do not currently meet accession criteria, but which are classified as "potential accession candidates". These are Albania, Bosnia and Herzegovina, and Kosovo. Any future accession dates are decided depending on the accession negotiations and the implementation of European legislation[511]. Despite phases of interruption and stagnation in the accession processes, a trend towards a growing European Union can be expected to continue in the future.

511 European Union (2013): http://ec.europa.eu/enlargement/policy/conditionsmembership/index_en.htm. Accessed on 6 March 2013.

Increasing global migration

The number of migrants worldwide has increased over the last decade from 150 million to 214 million, and could almost triple by 2050 to 405 million[512]. Reasons for this include growing demographic differences, negative impacts of climate change, poverty and corruption, new global political and economic dynamics, technological developments, and migrants' social networks.

In 2007, around 35 percent of migrants in EU Member States came from other EU Member States. As well as inward migration there is also outward migration. For Germany, the migration figures for 2007 were as follows: 575,000 people born outside Germany immigrated to Germany, whereas 476,000 people emigrated[513].

Because of the rise in migration movements, global competition for workers will increase. This particularly applies to highly skilled workers, but is also relevant to semi-skilled and possibly even unskilled workers[514].

New threats and risks to global security

Global security is also heavily influenced by the consequences of globalisation. Risks and threats to individual countries or a region have arisen mainly through the collapse of states or dictatorial regimes and the associated upheavals, international terrorist activities, and criminal networks. Ecological and environmental disasters, and the scarcity of natural resources and raw materials add to the threats. In particular, water is an essential resource that is likely to trigger conflicts in the future. Other risk and threat factors include diseases and epidemics, potential threats to critical infrastructures, and migration trends[515].

512 International Organization for Migration (IOM) (2010): World Migration Report 2010. The Future of Migration: Building Capacities for Change. Geneva, IOM, p. xix.

513 Ibid.

514 OECD (2009): The Future of International Migration to OECD Countries. Paris. OECD Publishing, p. 13.

515 German Federal Ministry of Defence (BMVg) (2011): Verteidigungspolitische Richtlinien. BMVg, Berlin.

50 URBAN GOVERNANCE – SOLVING GLOBAL CHALLENGES LOCALLY IN CITIES

Short description of the trend

In 2030, 60% of all people will live in cities[516]. Although cities only take up 2% of the Earth's surface, they account for around 80% of global economic output, 75% of global energy consumption and roughly 70% of global greenhouse gas emissions[517]. Cities are therefore the stage on which many of the most important decisions relating to future trends will be played out, e.g. concerning the environment, sustainability and social cohesion. Social, economic and technical solution strategies that are implemented in urban areas have a far-reaching effect on the urban hinterland and its global supply and export chains. In this respect, large cities are the local cause of, but also a hope for the solution to global problems such as resource consumption and environmental degradation, or social quality of life. At the same time, international surveys of opinions among urban decision-makers and experts show that urban governance and governability are among the most urgent problems of urbanisation[518]. Urban planning and research supply a mass of knowledge from experience, but currently little in the way of generalisable formulas for urban management.

Urban management challenges usually include the following: the city develops faster and spatially differently than intended by its planners, with the result that laws and the development of infrastructures such as transport systems do not keep up with actual changes. Cities cannot sufficiently deal with environmental problems such as air pollution and its health consequences, noise, land consumption, falling water quality, waste and heat islands. Low social cohesion due to overcrowded, run-down residential districts, districts with high unemployment and social marginalisation, ethnic enclaves, and lawless zones with high crime and a distinct informal economy are some of the biggest urban governability problems worldwide[519].

Drivers and dynamics

Common drivers of governance challenges include520, 521:

- deficiencies in the legitimacy, transparency and accountability of governments and administrations,

516 UN-DESA (2012): World Urbanization Prospects. New York, UN-DESA.

517 UNEP (2011): Towards a Green Economy. Nairobi, UNEP.

518 UN-DESA (2012): World Urbanization Prospects. New York, UN-DESA.

519 SustainAbility; Globescan (2011): Survey on Urbanization and Megacities in Emerging Economies. Toronto, Washington, D.C., GLOBESCAN.

520 UN-DESA (2009): Planning Sustainable Cities. Global Report on Human Settlements 2009. Nairobi, UN-HABITAT.

521 OECD (2012): Urban Trends and Policies in OECD Countries. Paris, OECD.

- lack of experience regarding the effectiveness and the right mix of different forms of political management, such as planning processes, cooperation models and civic participation,
- gaps in the monitoring, analysis and evaluation of processes, such as immigration or traffic flows, from which effectiveness and efficiency criteria for urban management could be derived,
- normative urban development concepts, such as “compact city” or “new urbanism”, are not ready for practical implementation,
- slow development of civic engagement and neighbourliness in cities, which would help to manage large immigration flows and population fluctuations more effectively.

Numerous disparate research findings exist concerning these challenges, but they should be systematised to a far greater extent, and reviewed with regard to their transferability and generalisability[522].

Relationship to research and innovation

Economic and social innovations and trends can be created, tested and adapted in cities, and radiate outwards to the urban hinterland, national economies, and the world society. At the same time, environmental problems and social upheavals in the world economy are concentrated in cities. Successes in researching and regulating economic, social and environmental challenges in cities are therefore highly efficient.

Relationship to the knowledge society

Political decision-making processes can be experienced directly in cities. The knowledge society occupies an important position here, as it is what enables informed, knowledge-based decisions by social groups in cities in the first place. It therefore becomes an important design tool for citizens.

Assessment

German export successes include not only new technologies but also German urban planning, administrative modernisation, civic participation, architecture and environmental services. Effective methods of government in cities are a scarce resource which Germany can use for dialogue in international politics.

522 UN-Habitat; Siemens (2012): Urban Planning for City Leaders. Nairobi, UN-HABITAT.

51 NEW ARCHITECTURES OF GOVERNMENT: THE ABILITY OF POLICYMAKERS TO ACT IN POST-DEMOCRACY

Short description of the trend

The management of democratic political systems in the 21st century is increasingly taking place in complex polycentric and cross-border constellations of actors and systems of rules that entail the development of new forms of political decisions and a transformation of government responsibilities[523]. These processes are frequently interpreted as an erosion of democracy[524]. In view of current financial and budgetary risks, and the faltering management of global challenges such as climate change and migration, there is first of all a fear that democratic institutions are losing legitimacy. Secondly, experts suspect that new institutions and patterns of interest mediation are forming which could expand nation states' scope for action through new policy instruments such as cooperation networks[525].

Drivers and dynamics

Drivers and outcomes of the transformation of democratic statehood include, in particular[526,527]:

- the growing importance of supranational and transnational processes, organisations and movements in the economic sphere and civil society, which, on a cross-border basis, set new norms in e.g. environmental or fiscal policy, organise solidarity, create legal frameworks, and provide scientific expertise,
- growth in the multi-level integration of local, regional, national and supranational political systems and decision-making chains, which often enable synergies but can also lead to fragmentary and opaque decision-making processes that are protracted because of their greater complexity[528],

an increase in political interest groups and neo-corporatist arrangements for compromise packages e.g. in social and health policy, which often leads to distribution conflicts being dealt with in great detail while future tasks beyond the horizon of day-to-day or legislative politics are neglected,

523 Botzem, S. et al. (eds.) (2010): Governance als Prozess. Koordinationsformen im Wandel. Baden-Baden, Nomos.

524 Schmidt, M. G. (2011): Demokratietheorien. Teil IV. Wiesbaden, VS Verlag für Sozialwissenschaften.

525 Höffe, O. (2009): Ist die Demokratie zukunftsfähig? Über moderne Politik. Munich, C.H. Beck.

526 Brunkhorst, H. (ed.) (2009): Demokratie in der Weltgesellschaft. Baden-Baden, Nomos.

527 Benz, A.; Dose, N. (eds.) (2010): Governance – Regieren in komplexen Regelsystemen. Wiesbaden, VS Verlag für Sozialwissenschaften.

528 During the expert workshop on normative social trends on 16 November 2012 in Berlin, it was pointed out that globalisation and multi-level integration significantly reduce transparency and hence the trust basis for citizens.

- the advance of initiatives to decentralise and regionalise political powers, and also for greater civic participation and direct democracy[529]; participation and direct democracy may boost the legitimacy of political processes, but also increase their particularisation, complexity, and susceptibility to blocking;
- state-authorised private self-regulation of public services, for example in the transport and health sectors, whose effectiveness and legitimacy is often questioned by the public,
- new forms of the mediaisation of politics, e.g. via the internet, which open up new platforms for social discourse about politics, but also contribute to information overload and weaken the communicative power of print journalism in political life[530],
- an increase in policy consultation at the interface between the philanthropic sector, lobbying and science, which increases knowledge intensity but also the time requirements and need for coordination in political processes.

Relationship to research and innovation

When it comes to addressing social challenges, innovative approaches can continue to build on the new forms of governance. For example, new methods such as foresight transition management are already being used to coordinate transformative information. At the same time, the economic and social sciences in particular can provide valuable input for strategies to improve policymakers' capacity for action, decision-making ability, and legitimacy in complex and in some cases cross-border multi-level systems.

Assessment

In the age of globalisation and international policy agreements, democratic state structures are exposed to critical questions concerning limitations, functional problems and counter-tendencies to democratisation. The ability of democracies to deal with conflicts and manage integration in competition with more autocratic or oligarchic forms of government is the subject of intense discussion, and is without doubt a key trend in global social development between now and 2030[531].

529 During the expert workshop on normative social trends on 16 November 2012 in Berlin, it was pointed out that despite an apparent rise in political scepticism, demands for the openness and quality of democratic participation processes are increasing considerably in society.

530 During the expert workshop on normative social trends on 16 November 2012 in Berlin, the experts highlighted the commodification of the media as being a key factor in the loss of discourse arenas and hence in democratic debate and quality assurance.

531 Schmidt, M. G. (2011): Demokratietheorien. Teil IV. Wiesbaden, VS Verlag für Sozialwissenschaften.

52 FUTURE EUROPEAN INTEGRATION SCENARIOS

Short description of the trend

In view of political science discourse about democratic and legitimacy deficiencies in the European Union (EU)[532], and the fact that citizens often find its decision-making processes to be opaque, and given that such sentiment is increasing particularly in the context of the financial crisis, the future course of European integration is increasingly marked by uncertainties. Against this background, in a science-based foresight process, the European Commission formulated three scenarios[533] that sketch out prototypical development paths for the EU and their implications for key policy areas and the EU's geopolitical status up to the year 2050:

- **A fragmented Europe (*"EU under threat"*):** In this scenario, Europe is hit by a recessionary global economic trend, characterised by protectionist tendencies, radicalisation tendencies including within the governments and parties of democratic states, and high bureaucratic costs. EU Member States in this scenario are unable to implement harmonised research funding. Some Member States pull out of the EU. The different speeds of integration in the EU become consolidated and deepen the divide. Consequently, the EU is unable to develop any unified strategy for dealing with key global challenges such as climate change and the energy supply.
- **European integration at a standstill (*"nobody cares"*):** Europe in this scenario is only capable of fragmented, patchwork policy solutions, and does not come up with clear strategic visions for the future. Given an increasingly multipolar world and changed global (economic and military) power relationships, Europe's geopolitical and economic weight in world affairs diminishes. The European Commission states that in this scenario, the European Research Area (ERA) is only implemented in piecemeal fashion. Joint research and knowledge exchange does take place, but is blocked by different national institutions and laws. The EU's overall development remains far behind its potential and the leading economic nations – the United States and China.
- **European integration (*"EU renaissance"*):** In this scenario, according to the European Commission, Europe is shaped by a positive global trend. In the context of a more secure world with good economic development and increasing democratisation, European integration deepens in political, fiscal and military respects and leads to the development of an integrated European research area.

532 Schmidt, M. G. (2011): Hat die Europäische Union ein Demokratiedefizit? In: Demokratietheorien. Wiesbaden, VS-Verlag.

533 European Commission, DG for Research and Innovation (2012): Global Europe 2050. Brussels, EC.

The EU shows itself capable of effectively addressing even complex political challenges at European and international level, and assumes a pioneering role in key policy areas in the international community, such as climate policy and European security policy.

Drivers and dynamics

These scenarios are each shaped by different developments in a series of influencing factors. The outcomes are determined in particular by assumptions about the future development of a strategic vision for the future of European integration, the development of efficient control mechanisms for the European institutions, the change in global military power relationships, the economic development of Europe and other world regions, the impacts of demographic change, and the ability of the public and the European Community to use the EU as a platform for pooling their political powers on important issues concerning the future[534].

Relationship to research and innovation

In view of the specific social and political challenges of the three scenarios described above, actors in the innovation system should anticipate and prepare themselves for possible developments. The science and research system could function as a driver of European integration in the future as well. The economic and social sciences in particular can provide valuable innovative impulses for strategies to increase the legitimacy of EU institutions. The scenarios also point to different implications for the EU research landscape, which are relevant to Germany not least because of the importance of EU research funding[535]. Furthermore, the question arises of the extent to which the availability of particular technologies supports or impedes individual scenarios, e.g. by having a socially integrating effect. Notable examples here include transport or communication infrastructures that make it possible to overcome spatial distances or language barriers.

Assessment

The scenarios portray three possible fundamental developments for the EU. Each of these developments has significant impacts on European and German research funding.

534 European Commission, DG for Research and Innovation (2012): Global Europe 2050. Brussels, EC.

535 BMBF (2008): Deutschlands Rolle in der globalen Wissensgesellschaft stärken – Strategie der Bundesregierung zur Internationalisierung von Wissenschaft und Forschung. Berlin, BMBF.

53 CLICK TO PROTEST – MORE ACTIVITIES THROUGH ORGANISATION IN THE INTERNET?

Short description of the trend

Social networks in the internet, such as Facebook and Twitter, make it possible for citizens to discuss political events with many people around the world. Protests can turn against political decisions – as was the case with the Stuttgart 21 urban development project – or even against political systems. Recent examples include the revolutions in North Africa and the Arab world, in which social networks served as organisational platforms[536]. The causes of this social trend are manifold. It is possible to differentiate between uprisings by oppressed peoples such as in Egypt, and citizens' initiatives which use the internet to call for more participation. If political activities in a democracy cannot sufficiently integrate citizens' concerns, as was the case e.g. when the Stuttgart 21 railway station project was planned, then the exchange of opinions increases via the internet as well[537]. What is new is the increasing systematisation in the use of the internet by protest movements, and the merging of activities in the real world with activities on the web[538,539]. The triggers – such as oppression or a lack of participation – come from the real world. Protest expressed in the internet is in turn picked up by the other media in the real world. In democratic societies, a growing social need to participate in decision-making and a considerable disruptive potential for political systems can be identified. What influence does (close to real-time) organisation via social networks have on the quality and quantity of protests?

Drivers and dynamics

One driver of this trend is the increasing availability of internet connections and mobile devices. With just one tweet (post) on Twitter, anyone can reach a broad mass of people from any location, call for demonstrations or start online petitions[540]. Text messages, videos and images can be shared and commented on almost in real-time. In just a few hours it is possible to gather together thousands of like-minded people in a group online, influence people's mood, and organise street protests at short notice.

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536 Stieler, W. (2011): http://www.heise.de/tr/artikel/Die-Opposition-war-immer-da-1349405.html. Accessed on 29 October 2012.

537 Reißmann, O. (2012): http://www.spiegel.de/netzwelt/web/mobiles-internet-echtzeit-protestgegen-den-castor-a-727610-druck.html. Accessed on 27 November 2012.

538 Xaidialoge; European University Viadrina (2012): http://www.internet-tsunamis.de/wp-content/ uploads/INTERNET-SUNAMIS__Politische_Massen_im_digitalen_Zeitalter__v1.2.pdf. Accessed on 28 January 2013.

539 This may also have a disruptive impact on the split in society between committed citizens and those who are turned off by politics, which was discussed during the expert workshop on normative trends on 16 November 2012 in Berlin.

540 Reißmann, O. (2012): http://www.spiegel.de/netzwelt/web/mobiles-internet-echtzeit-protestgegen-den-castor-a-727610-druck.html. Accessed on 27 November 2012.

Actors attempt to attract the attention of the press and TV – e.g. via the number of followers (subscribers/readers) – and use this as a lever to exert social pressure on policymakers. Studies of protest actors in the internet reveal various typologies. These range from "salon activists" who are reserved when offline, to "law-abiding" activists, to the "pugnacious type" who breaks laws online and offline[541]. Effects such as acceleration, increased transparency, and the professionalisation of protests in social networks are undisputed. While this leads to growing solidarity among citizens, as campaigns against far-right extremism show, it also means that the movements are competing for the ever-scarcer resource that is people's attention.

Relationship to research and innovation

New forms of citizen participation in governance developing outside of established structures are a key challenge for the future – especially for major innovations. Systematic research into new forms of communication that are developing in this way may provide fundamental insights into the future development of society.

Assessment

For society, the way in which protest movements organise themselves via the internet, and the successes that they have, are crucially important since this affects activists' self-image and their effect on the politically active public, as well as on the speed, quantity and quality of protests.

541 Ebner, U. (2012): http://oe1.orf.at/programm/301847. Accessed on 28 November 2012.

54 NEW SENIOR CITIZENS ARE SHAPING PROTEST CULTURE

Short description of the trend

A number of paradigms from public discourses are particularly revealing with regard to socially relevant trends. The term *Wutbürger* or "enraged citizen" – which was "word of the year" in 2010[542] – emerged for the first time[543] in light of protests against the Stuttgart 21 railway station project. Since then, the term has been much used in the media – e.g. in reporting about protests against night flights at Frankfurt airport or the building of a third runway at Munich airport[544]. The term *Wutbürger* is controversial and is perceived by those to whom it is applied as *defamation*[545,546,547]. Nevertheless, it signifies a new social phenomenon: the legitimation of protest has reached the centre of society and particularly the older sections of society[548]. Thus, in recent times, public protests have frequently originated from older yet still very active, often well-situated people[549]. Moreover, these new actors frequently already have experience of protesting, and are well-educated and wealthy[550,551,552]. This is a phenomenon that not only demonstrates the heterogeneity of age[553] – via factors such as education, state of health, and wealth – but which also, above all, raises the question of the future development of public protests as a result of the new inflow of e.g. older people.

Drivers and dynamics

This is new in as much as social movements or demonstrations in the modern age have frequently been uprisings by the younger generations[544].

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542 Gesellschaft für deutsche Sprache (2010): Wutbürger zum Wort des Jahres 2010 gewählt. Press release, 17 December 2010.

543 Kurbjuweit, D. (2010): Der Wutbürger. In: Der Spiegel, 41/2010.

544 Spiegel-Online (2012): http://www.focus.de/politik/deutschland/tid-26191/muenchen-waehltgegen-dritte-startbahn-wie-wutbuerger-den-wirtschaftsstandort-bayern-gefaehrden_aid_768852. html. Accessed on 18 June 2012.

545 Kelm, J.(2012): http://www.sueddeutsche.de/kultur/unwort-des-jahres-der-wutbuerger-der-keinersein-will-1.1040887. Accessed on 24 October 2012.

546 Ibid.

547 Goethe-Institut e.V.(2011): http://www.goethe.de/ges/pok/zdk/de7961459.htm. Accessed on 26 October 2012.

548 Central findings from the expert workshop on normative social trends on 16 November 2012 in Berlin.

549 Goethe-Institut e.V.(2011): http://www.goethe.de/ges/pok/zdk/de7961459.htm. Accessed on 26 October 2012.

550 Ibid.

551 Bebnowski, D. et al. (2011): Neue Dimensionen des Protests? Göttingen, Göttinger Institut für Demokratieforschung.

552 Becké, A. B. et al. (2011): Die Proteste gegen den Flughafen Berlin Brandenburg (BER/BBI). Göttingen, Göttinger Institut für Demokratieforschung.

553 During the expert workshop on normative social trends on 16 November 2012, it was pointed out that opportunities for senior citizens have a highly heterogeneous distribution.

554 Betz, S.; Krauß, I. (2012): http://www.br.de/radio/bayern2/sendungen/radiothema/wutbuergerdemokratie100.html. Accessed on 1 December 2011.

According to recent surveys, older protestors are dissatisfied with the practical design of the democratic system in Germany – while at the same time identifying to a high degree with fundamental democratic values. They feel that they are not sufficiently involved in important political decision-making processes[555,556]. Two developments suggest that this phenomenon could become even more relevant in the future: firstly there is increasing disgruntlement among the general population towards established political parties, and secondly the demographic shift in the age structure of German society towards the higher age groups, to which the citizens currently protesting often belong[557,558]. Since 1996, there has been a considerable increase in public petitions (*Bürgerbegehren*) and citizens' decisions (*Bürgerentscheide*)[559]. Calls for more direct democracy instruments reflect key needs of the majority in society[560]. Seen in the context of the "decline of conventional political participation"[561], the phenomenon of new protest actors raises important questions about participation in the political process and inclusion in a representative democracy[562]. Thus from the point of view of political scientists, it is problematic when decisions that have been legitimised by parliamentary votes are subject to legitimation again because of pressure from demonstrations[563].

Relationship to research and innovation

The new locus of the legitimation of protest and discourse on this subject show a deep gulf between sections of the population and their elected representatives. In view of the described developments, the humanities and social sciences in particular are faced with the challenge of investigating the socio-political causes and implications of these developments and proposing various innovative action approaches for policymakers and civil society so that the legitimation basis for decisions can be enlarged in society as a whole. One possible approach, for instance, would be to develop new formats for citizen and stakeholder participation.

Assessment

Because of the increasing social and political disruptiveness of the new social structure of protest actors, this trend requires further analysis, e.g. to shed light on the question of which factors are causing greater numbers of older people to join protest movements.

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555 Bebnowski, D. et al. (2011): Neue Dimensionen des Protests? Göttingen, Göttinger Institut für Demokratieforschung.

556 Becké, A. B. et al. (2011): Die Proteste gegen den Flughafen Berlin Brandenburg (BER/BBI). Göttingen, Göttinger Institut für Demokratieforschung.

557 Kurbjuweit, D. (2010): Der Wutbürger. In: Der Spiegel, 41/2010.

558 Friedrich-Ebert-Stiftung (2011): http://www.demokratie-deutschland-2011.de/partizipation -und-inklusion.php. Accessed on 24 October 2012.

559 Geitmann, R. et al. (2012): Bürgerbegehrensbericht 2012. Berlin, Mehr Demokratie e.V.

560 Vorländer, H. (2011): Spiel ohne Bürger. In: Frankfurter Allgemeine Zeitung, 11 July 2011.

561 Friedrich-Ebert-Stiftung (2011): http://www.demokratie-deutschland-2011.de/partizipation -und-inklusion.php. Accessed on 24 October 2012.

562 Ibid.

563 Geitmann, R. et al. (2012): Bürgerbegehrensbericht 2012. Berlin, Mehr Demokratie e.V.

55 EROSION OF THE SENSE OF PROGRESS

Short description of the trend

In industrialised societies, scepticism is increasingly expressed about whether quality of life is actually advancing[564]. Long-term studies show that in Germany too, a steadily growing number of people fear a loss of social status, and poverty[565]. Core beliefs – such as that hard work brings rightful rewards, or confidence that one is better off than one's parents and that one's own children in turn will be better off than oneself – are declining in Europe and many OECD countries, particularly also in higher income groups[566].

Drivers and dynamics

The possible causes of this loss of confidence are complex. Several studies confirm an increasing gap between the actual threat to status and the perceived insecurity[567,568,569]. This indicates that it is a matter of a "fundamental change in the modern attitude towards life in Western industrialised countries"[570], while the experience that regression is occurring despite all efforts and acceleration is becoming a typical experience of the *late modern age*[571]. Sociologists distinguish between a gradual process of losing confidence, and impulses resulting from signal events (e.g. the 9/11 attacks, the European financial crisis). They suspect that the cause of the continuous "sense of insecurity" is a shift in control from politics to capital. This has brought experiences including a loss of control, a lack of transparency, disempowerment and uncontrollability[572]. Another influencing factor may be the increasingly widespread view that many resources are nearing depletion ("peak everything") and that further growth cannot bring any further increase in quality of life[573].

564 Rosa, H. (2012): Das neue Lebensgefühl. In: Die Zeit, 16 August 2012. This feeling was also described by numerous participants during the expert workshop on hidden social trends.

565 Heitmeyer, W. (2012) (ed.): Deutsche Zustände, series 10. Berlin, Suhrkamp Verlag.

566 Pew Research Center (2012): Pervasive Gloom About the World Economy. Faith in Hard Work, Capitalism Falter, But Emerging Markets Upbeat. Washington, D.C., Pew Research Center.

567 Geißler, R. (2010): Die Sozialstruktur Deutschlands. Aktuelle Entwicklungen und theoretische Erklärungsmodelle. Wiesbaden, VS Verlag für Sozialwissenschaften.

568 Erlinghagen, M. (2010): Mehr Angst vor Arbeitsplatzverlust seit Hartz? Langfristige Entwicklung der Beschäftigungsunsicherheit in Deutschland. SOEP papers on Multidisciplinary Panel Data Research 279.

569 Lengfeld, H.; Hirschle, J. (2009): Die Angst der Mittelschicht vor dem sozialen Abstieg. Eine Längsschnittanalyse 1984-2007. In: Zeitschrift für Soziologie, vol. 38 / no. 5.

570 Rosa, H. (2012): Das neue Lebensgefühl. In: Die Zeit, 16 August 2012. This feeling was also described by numerous participants during the expert workshop on hidden social trends.

571 Ibid.

572 Heitmeyer, W. (2012) (ed.): Deutsche Zustände, series 10. Berlin, Suhrkamp Verlag.

573 Heinberg, R. (2007): Peak Everything: Waking Up to the Century of Declines. Gabriola Island, BC, New Society Publishers.

Relationship to research and innovation

Innovation and especially innovation concentration – i.e. an increase in the volume of scientific, technical, organisational and cultural innovations per unit of time – is closely linked to the idea of social progress. If the notion of social progress changes, this will also influence the role of innovation. It is possible that innovation will increasingly be regarded as an engine of social and economic transformation[574]. The reorientation of many OECD countries to mission-oriented innovation strategies may be viewed as a pointer in this direction. This also opens new opportunities, e.g. in the area of social innovation or services, with the result that new actors become relevant to the innovation system. However, a collapse of social cohesion and a loss of faith in society could considerably harm the innovation culture in Germany.

Assessment

This topic is highly relevant to the general environment for innovation and perceptions of what innovation is about.

574 Steward, F. (2008): Breaking the Boundaries. Transformative Innovation for the Global Good. London, NESTA.

56 YOUNGER PEOPLE'S VALUES ARE SHIFTING TOWARDS GLOBAL EMPATHY

Short description of the trend

Longitudinal studies of value systems indicate that the attitudes of younger people in many European countries are increasingly shifting towards global empathy[575,576,577]. Recent studies in Germany also show that rejection of other people or groups is least prevalent in the 16 to 21 and 22 to 34-year-old age groups[578]. Especially for younger people, empathy increasingly extends not only to the core family, closer social environment and fellow citizens, but potentially to all people (irrespective of their origin, capability, disability, religious or political views, etc.)[579]. As global communication and mobility become taken for granted, they will contribute, in conjunction with changes in the world view in German society, to an increasing prevalence of globally empathetic value systems by 2030.

Drivers and dynamics

Drivers of the spread of global empathy include relief and fund-raising campaigns such as Brot für die Welt and Misereor, and media reporting about such campaigns, English as a world language, global migration and tourism (facilitated in part by cheap long-distance travel), transnational families, and disengagement from nationally oriented meaning systems[580]. Other factors contributing to the dynamics of the trend and the speed of its spread include information and communication technologies, which in their current form already enable virtually instantaneous dialogue between people anywhere in the world, and therefore represent a social and cultural force that is conducive to global empathy. Global empathy has a self-reinforcing effect since, in turn, it stimulates the drivers listed above. However, a further increase in material inequality among the world population and real or perceived threats against people could inhibit the trend towards global empathy if ever more people find themselves in difficulties and therefore their own fate or more precisely that of their closest neighbours becomes more important than that of strangers.

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575 World Values Survey Association (ed.) (2009): World Values Survey 1981-2008. Official aggregate v.20090902. Aggregate File Producer: ASEP/JDS, Madrid. The wave of the survey for 2010-2012 is not yet available, see: www.worldvaluessurvey.org. Accessed on 18 January 2013.

576 de Vasconcelos, A. (ed.) (2012): Global Trends 2030. Citizens in an Interconnected and Polycentric World. Paris, Institute for Security Studies of the European Union.

577 Wired.com (2012): http://www.wired.co.uk/magazine/the-world-in-2013. Accessed on 24 January 2013.

578 Zick, A. et al. (2011): Die Abwertung der Anderen. Eine Europäische Zustandsbeschreibung zu Intoleranz, Vorurteilen und Diskriminierung. Berlin, Friedrich-Ebert-Stiftung.

579 Jonas, H. (2011): Die Sakralität der Person. Eine neue Genealogie der Menschenrechte. Berlin, Suhrkamp Verlag.

580 Rifkin, J. (2012): Die emphatische Zivilisation. Wege zu einem globalen Bewusstsein. Frankfurt am Main, Fischer TB Verlag.

Relationship to research and innovation

A potential change in values of this kind among the younger generation could require a paradigm shift in the understanding of innovation towards collaborative and needs-oriented innovation. New insights about affective aspects of human action, behaviour and experience which form the heart of global empathy could also change our understanding of innovation.

Relationship to the knowledge society

In the age of post-democracy[581], more space is given to the thought of the other. There may be an increasing desire that democratic values should no longer be based only on prescribed moral codices, but on sympathy for others, regardless of classifications and categories. In a globally expanding knowledge society, global empathy offers orientation – as it were as an inner compass that guides us to do the "right thing" when faced with a flood of information.

Assessment

A further spread of global empathy value systems in Germany could gradually and invisibly transform society in Germany. A better understanding of human empathy and what it is based on (e.g. mirror neurons, endocrinological research) may contribute to more effective objectives of political action in dealing with the major global challenges facing society ("grand challenges"). Global empathy offers orientations that could promote the effectiveness of globally oriented policy. Furthermore, global empathy may itself become a trigger of effective globally oriented action and political movements.

581 Crouch, C. (2008): Postdemokratie. Frankfurt am Main, Suhrkamp Verlag.

57 RECONQUERING THE PUBLIC SPACE

Short description of the trend

Features of public spaces include being freely accessible to all citizens, and that they are publicly managed and subject to public law. The high social and economic relevance of public spaces in cities is increasingly recognised[582]. Nevertheless, in particular the maintenance, upkeep and redevelopment of public spaces are suffering ever more frequently as a result of local authorities' need to save money[583]. At the same time, public spaces are increasingly being turned into private or semi-private spaces such as shopping malls or event centres, in which communication and social exchange are regulated and citizens are only provided for in particular roles, e.g. as consumers[584]. Furthermore, diversity among the actors operating in the public space is decreasing due to the decline of retail[585]. In parallel, new forms of the appropriation of public spaces by residents are becoming established, such as:

- urban hacking - the active redesign of public spaces e.g. by painting a zebra crossing or cycle paths,[586]
- new urban lifestyles / trend sports such as buildering (urban climbing) and urban parkour[587],
- occupations or also collaborative conversions of public spaces[588],
- "Stadtfinden" – opening up public spaces for collective physical activity in the neighbourhood589, artistic interventions and temporary uses of open spaces by avant-garde groups590

582 Kuklinski, O. (2003): Öffentlicher Raum – Ausgangslagen und Tendenzen in der kommunalen Praxis – Ausgewählte Ergebnisse des Forschungsprojektes "Städte als Standortfaktor: Öffentlicher Raum". In: Informationen zur Raumentwicklung, vol. 3/4.

583 Ibid.

584 Kunzru, H. (2012): http://moreintelligentlife.com/content/places/east-londons-moment?page=full. Accessed on 28 January 2013.

585 Siebel W. (2007): Vom Wandel des öffentlichen Raums. In: Wehrheim, J. (ed.): Shopping Malls. Interdisziplinäre Betrachtungen eines neuen Raumtyps. Wiesbaden, Springer VS.

586 Höffken, S. (2010): http://www.urbanophil.net/kunst/urban-hacking-die-umgestaltung-der-stadt/. Accessed on 23 October 2012.
See e.g. http://www.parkour.de/ or http://www.le-traceur.net/parkour.php. Accessed on 9 April 2013.

588 Kunzru, H. (2012): http://moreintelligentlife.com/content/places/east-londons-moment?page=full. Accessed on 28 January 2013.

589 See for example the Lurup adventure trails project: http://abenteuerwege-lurup.de/index.html. Accessed on 23 October 2012.

590 Kruse, S.; Steglich, A. (2006): Temporäre Nutzungen – Stadtgestalt zwischen Selbstorganisation und Steuerung. Lüneburg, University of Lüneburg.

Drivers and dynamics

A series of developments will further increase the relevance of the design of public spaces in the long term[591,592]. A decline in prosperity, and rising energy costs in particular, may cause a shrinkage in private living space and a reduction in private transport, and hence lead to greater use of public spaces in the neighbourhood. Growing awareness of sustainability and health issues is increasing the use of public green spaces for sports activities. In addition, because older people have a reduced sphere of activity, the importance of nearby parks and open spaces will increase as the predicted demographic change occurs. Similarly, a progressive virtualisation of living and working environments may increase the need for real social contacts, which are made and nurtured in public spaces[593]. The population decrease that is forecast for many towns and the associated shrinkage of many towns and municipalities will increasingly free up spaces[594]. It can be expected that the associated demands on public spaces in many towns and cities will lead to usage conflicts[595]. Cities and citizens will be required to maintain the quality and variety of uses of public spaces.

Relationship to research and innovation

Particularly in cities, public spaces are regarded as breeding grounds for creativity and communication, and hence as incubators for ideas and innovations. The transformation of public spaces should remain true to these functions. Central challenges addressed by the high-tech strategy such as health, sustainability, diet and demographic change are just as much linked to the future of public space as are major infrastructure innovations e.g. in the context of the "city of the future". Urban avant-garde groups with their new forms of appropriation could play a driving role as innovation pioneers.

Assessment

The drivers mentioned above will with a high degree of probability become stronger by 2030 and beyond. The trend is therefore highly significant for safeguarding quality of life, social cohesion and innovative capacity in Germany.

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591 Kuklinski, O. (2003): Öffentlicher Raum – Ausgangslagen und Tendenzen in der kommunalen Praxis – Ausgewählte Ergebnisse des Forschungsprojektes "Städte als Standortfaktor: Öffentlicher Raum". In: Informationen zur Raumentwicklung, vol. 3/4.

592 Kunzru, H. (2012): http://moreintelligentlife.com/content/places/ east-londons-moment?page=full Accessed on 28 January 2013.

593 Miegel, M. et al. (2012): Lebenswerte Städte unter Bedingungen sinkenden materiellen Wohlstands. Herausforderungen und Maßnahmen. Bonn, Denkwerk Zukunft.

594 Regional planning forecast 2030 by the German Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR) (2013): http://www.bbsr.bund.de. Accessed on 24 January 2013.

595 Kuklinski, O. (2003): Öffentlicher Raum – Ausgangslagen und Tendenzen in der kommunalen Praxis – Ausgewählte Ergebnisse des Forschungsprojektes "Städte als Standortfaktor: Öffentlicher Raum". In: Informationen zur Raumentwicklung, vol. 3/4.

58 CONSEQUENCES OF HYPERTRANSPARENCY AND HYPERPURITANISM

Short description of the trend

The demand for greater transparency in politics, business and society is increasingly making people accountable to themselves and others, and to an ever greater extent. Does this development make society freer and more democratic, or does it compromise political and economic structures by producing constraints and fuelling a general climate of mistrust and suspicion?

Drivers and dynamics

Hardly any topic is currently as prevalent in public discourse as transparency. Whether in politics, business or society, the call for ever more extensive disclosure of information is pervasive. Errors are disclosed, and so is information that was initially kept secret. Drivers of this trend include new technological capabilities and the associated networking within society. The internet has become part of many people's identity, leading to a change in values[596]: open information flows, transparency and participation in all kinds of discourses have been facilitated, intensified, and made faster by the medium of the internet[597]. Advocates of an ever more open society regard transparency as a democratising and stabilising driver that particularly strengthens trust in political and economic structures. When it comes to combatting corruption or defending human rights, such *hypertransparency* is uncontroversial and, accordingly, it is welcome. However, critics complain that efforts to achieve transparency no longer take place solely on moral or legal levels[598]. Instead, they say, transparency is increasingly manifested as a "systematic compulsion"[599] that encompasses the totality of social processes. As a result, the *transparency society* threatens to turn into a control society, in which the individual may be overburdened with a kind of hyperpuritanism, i.e. with unattainable moral goals.

Excessive transparency, where mutual trust is no longer required, could paralyse social, economic and political life as decision-making processes are slowed or blocked. Given the complexity of political, economic and social relationships, it is questionable whether *hypertransparency* is socially beneficial, or whether, instead, a balanced form of transparency is not a much more suitable alternative.

596 Frick, K. (2011): Das Zeitalter der Transparenz. Die Verdatung unseres Lebens ist eine Tatsache. Welche Chancen bietet sie? Zurich, Gottlieb Duttweiler Institute (GDI).

597 Ehrhart, C. (2011): Hypertransparenz als Herausforderung und Chance. In: Kommunikations Manager, no. 4.

598 Han, B. C. (2012): Transparenzgesellschaft. Berlin, Matthes & Seitz.

599 Ibid.

Both the impacts of and possible solution strategies for the development of transparency therefore require more detailed consideration.

Relationship to research and innovation

Transparency has long since ceased to be only a political or economic imperative. Disclosure of information is increasingly demanded in all areas of society. Areas of research and innovation – especially those that are publicly funded – are also required to give an ever more detailed account of their work and methods. Excessive transparency could slow or even block decision-making processes in this field too.

Relationship to the knowledge society

The communication and shared use of information and knowledge are just as much fundamental factors in a knowledge society as is a basic level of transparency. *Hypertransparency* and associated *hyperpuritanism* could have a lasting effect on social and economic life.

Assessment

The ever-increasing demand for transparency and free information not only affects large parts of the political and business world, it also has an impact on society and its citizens. The topic therefore requires further discussion.

59 SOCIAL COHESION – THE CEMENT OF 21ST-CENTURY SOCIETIES?

Short description of the trend

Social cohesion refers to a normative concept that is intended to make the quality and binding effect of social structures transparent, measurable and designable[600]. For this reason, it is increasingly becoming a catalyst for political debate on the future of social coexistence. *Social cohesion* is defined as a combination of social inclusion, social capital and social mobility[601]. Social inclusion means eliminating unequal treatment of migrants, people with disabilities, the elderly, children and young people with special challenges, etc. Social capital is the trust that citizens have in their fellow human beings and social institutions – from the mayor to the parliament. Social trust motivates people to engage in society. Social mobility describes a person's opportunity to gain esteem in society, acquire a higher social status, and pass this on to their children. Other indicators of social quality of life are often also included in social cohesion[602].

Drivers and dynamics

The development of the concept of social cohesion is being spurred on by political, scientific and civil society organisations to enable an integrated assessment of the performance of societies and stimulate self-reflection[603]. Discussions about social progress, about values – e.g. about inequality or justice – and political objectives can be conducted in more precise terms with the aid of this concept. In addition, it increases comparability between nations. A greater number of internationally comparative indices of social cohesion are currently being published[604,605].

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600 OECD (2011): Perspectives on Global Development 2012. Social Cohesion in a Shifting World. Paris, OECD.

601 The concept of cohesion could be further sharpened or extended in light of the current academic discussion which is not yet completed. For example, cohesion could also come about through exclusion, e.g. as a result of the marginalisation or spatial segregation of social groups. The model of respectful dialogue with marginalised social groups could form a counterweight to this (cf. discussion during the expert workshop on normative social trends on 16 November 2012 in Berlin).

602 Bertelsmann-Stiftung (2012): Kohäsionsradar: Zusammenhalt messen. Gesellschaftlicher Zusammenhalt in Deutschland. Gütersloh, Bertelsmann-Stiftung.

603 The Bundestag Study Commission on "Growth, Wellbeing and Quality of Life – Paths to Sustainable Economic Activity and Social Progress in the Social Market Economy" can be seen as one of the first offshoots of this trend in Germany. One of the tasks given to the commission in its 2010 appointment resolution is to investigate "the social distribution of wealth, social inclusion and cohesion", see: http://dipbt.bundestag.de/dip21/btd/17/038/1703853.pdf.Accessed on 19 March 2013. For the international perspective, cf. International Monetary Fund (IMF); International Labour Organization (ILO) (2012): The Challenges of Growth, Employment and Social Cohesion. Discussion Document. S.l., ILO/IMF.

604 Bertelsmann-Stiftung (2011): Social Justice in the OECD – How Do the Member States Compare? Gütersloh, Bertelsmann-Stiftung.

605 OECD (2011): Society at a Glance 2011. Paris, OECD.

The World Economic Forum, for example, in its new Global Competitiveness Report, uses social cohesion as an indicator of social sustainability[606].

Relationship to research and innovation

The international surge in popularity of the cohesion concept was initiated by the realisation that technological and economic progress needs to be accompanied by social innovations to strengthen social cohesion and form a stable middle class that understands prosperity to mean more than consumption.

Relationship to the knowledge society

Highly skilled migrants in particular will only settle in Germany if they can persuade themselves, based on clear indices, that in addition to freedom and opportunities for personal development, they will also be welcome in the heart of our society. In the international competition for top people (*"global war for talent"*), high values in cohesion comparisons can be cited as a reason to choose Germany.

Assessment

What drives people and social groups is the long-term goal of acquiring a well-earned and permanent place in a *good society*. In the future, nations will no longer attract and compete for new citizens and young people only with money, but also with social recognition and cohesion. Obstacles on the path to this long-term goal can be seen mainly in the threat of divisions in society e.g. as a result of economic marginalisation, the loss of security by social groups, or the erosion of social commitment. Lowered standards and access opportunities in education, the perceived dominance of economic elites in political discourse, and the loss of importance of mass and quality media as mediators of society-wide debates may also have negative impacts on social cohesion.

606 World Economic Forum (2012): The Global Competitiveness Report 2012-2013. Geneva,WEF

60 POST-ETHNIC CULTURE AS A RESULT OF MIGRATION

Short description of the trend

According to a 2012 survey, 13% of all adults worldwide (640 million people) were willing to leave their country on a long-term basis. Approximately 26 million people would like to emigrate to Germany[607]. According to other estimates, in the next 25 years the global economy could grow by 39 trillion U.S. dollars as a result of the extensive mobility of workers[608]. This is equivalent to roughly half of total global GDP in 2011[609]. Migration in the 21st century will be shaped both by willing migrants – driven by push factors such as poverty – and also increasingly by industrialised countries' demand for workers. Here there are pull factors at work in high-skilled job sectors such as IT and also e.g. in the care sector. By 2030, as a result of global migration processes, a transformation of ways of life and life structures can be expected, which can be described with terms such as cultural hybridisation or post-ethnic culture[610,611]. This includes the need for collective identities, which people choose for themselves. Identification categories include the global level of a world society, followed by nation, region and neighbourhood, and also subcultures defined by origin, milieu, age or interests.

Drivers and dynamics

The resulting social processes can no longer be sufficiently described by pairs of terms that were commonly used in the past such as integration/exclusion, native/immigrant, monoculture/multiculture etc. What can be expected is more of an aggregation of cultures and subcultures, in which people assemble their own multicultural identities, world views and biographies using various ethnic resources, and produce new cultural combinations as well as national realities. This is shaped by inclusions and exclusions in society[612]. Greater mobility and diverse communication possibilities relativise large distances and mean that it is possible to make and maintain social contacts even across different continents. Germany too is strongly influenced by migration: between 1991 and 2010, 18 million people moved to Germany from abroad, while almost 14 million left the country during this period.

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607 John Clifton, J. (2010): http://www.gallup.com/poll/153992/150-Million-Adults -Worldwide-Migrate.aspx. Accessed on 26 October 2012.

608 economist.com: http://www.economist.com/node/18741382. Accessed on 26 October 2012.

609 The Earth Policy Institute (2012): www.earth-policy.org/datacenter/xls/indicator2_2012_01.xls. Accessed on 26 January 2012.

610 International Organization for Migration (IOM) (2010): World Migration Report 2010. The Future of Migration: Building Capacities for Change. Genoa.

611 UNDP (2009): Human Development Report 2009. Overcoming barriers: Human mobility and development. New York, UNDP.

612 This profile was the subject of intense discussions during the expert workshop on normative social trends on 16 November 2012 in Berlin. The aspect of the simultaneity of excluding and including currents in society was added. It was said that currently, in assessing migrants, too much weight is given to their direct benefit to the jobs market.

The proportion of people with a migration background was nearly 20% in 2010[613].

Relationship to research and innovation

Because of the increasing formation and articulation of hybrid identities, the topic of migration more than ever requires a scientifically based reinterpretation of the concepts of *state, nation, culture, collective consciousness* etc., which goes beyond traditional categories like history, religion and language. Empirical data collected on immigration and emigration will no longer sufficiently capture this theme if values and customs of large sections of the population become increasingly differentiated. What is needed instead for an appropriate scientific analysis is a collaboration between the social science disciplines – for example economics, political science, sociology and social psychology. Diversity has always proven to be a catalyst for innovation in the science and research system, and in industry. The demand for skills in terms of qualified and interculturally experienced workers is rising not only in science and private enterprise, but also in government agencies and departments, schools, and hospitals. People with a migration background can use their resources effectively in this respect.

Assessment

A greater research-policy emphasis on the resources of immigrants could take the discussion to a more innovative level. For example, culturally enriched biographies (cultural hybridisation) could serve to better manage change and the increasing internationalisation of job profiles. Visionary migration governance is required that goes beyond short-term cost-benefit calculations.

613 German Federal Ministry of the Interior (BMI) (2012): Migrationsbericht des Bundesamtes für Migration und Flüchtlinge im Auftrag der Bundesregierung. Berlin, Bundesministerium des Innern.

5 DERIVED SOCIAL CHALLENGES (SEVEN TOPIC AREAS)

As with the trend profiles, the topic areas were summarised in the form of short profiles with a common structure consisting of the following three sections:

- a short description,
- possible development paths, and
- opportunities and risks for society – challenges for research and innovation policy.

The short description describes the content focus of the topic area, lists key drivers, points out connections with the content of the social trends, and so illustrates possible dimensions of the theme. Linking the content of selected social trends with topic areas reveals amplifying effects among and between the trends, and in some cases the linking produces new perspectives in relation to the content.

Possible directions of development in the topic area are in each case outlined in the form of development paths. Examples of paths are described which point to particularly interesting conceivable developments of the topic area.

In the final section, initial opportunities and risks for society and possible challenges for research and innovation policy are briefly mentioned. These comments are intended to draw attention to themes and initiate further discussions. Particularly in the description of the challenges, it is important to bear in mind that these are actor-specific.

5.1 Citizens as actors in the research and innovation system

Short description

Citizens with a more active role in research, innovation and production

An increasingly active role can be seen for citizens in research, innovation and production. Approaches to involve civil society in research and innovation (R&I) range from ad hoc involvement in agenda-setting via dialogue formats relating to ethical, legal and social aspects, to direct involvement in specific projects (e.g. crowdsourcing in innovation processes). Civil society actors are also increasingly initiating and designing their own projects in research (e.g. observation of ecosystems, measurement of physiological functions), in innovation (e.g. open workshops, social innovations such as local exchange trading systems) and in production (such as 3D printing of objects, self-built electronic devices). Citizens can express their individuality via their own creations, or help solve socially relevant problems via their specific perspectives and skills. This contribution may also be financially rewarded[614]. What these diverse activities have in common is that they mainly take place privately and outside of work, and that they can increase the legitimacy, acceptance and social relevance of R&I.

Drivers of this more active role include personal motivation, the availability of large volumes of data, and new technologies

Alongside individual motives such as curiosity and a desire for participation (inclusion), self-fulfilment and recognition, drivers of the increasingly active role for citizens in research, innovation and production also include the opening of access to data repositories and ever cheaper, more powerful and easier to use information, measurement, laboratory and production technology. In the future, information technology – including the merging of virtual worlds with the real world – will increase citizens' abilities and opportunities to participate actively in innovation in different phases of the innovation process.

In Germany, as in many other industrialised countries, new access to means of production and associated skills, as well as to extensive data and knowledge bases, is opening up to the population at large. Citizens are therefore increasingly able to perform functions in R&I that were previously the preserve of professional actors in the established R&I system[615].

614 For example via platforms such as Innocentive. URL: http://www. innocentive.com/ oder Sciencestarter: URL: http://www.sciencestarter.de. Accessed on 10 April 2014.

615 In the following, this includes production.

Possible development paths

A more active role for civil society may open new opportunities for acquiring skills, participation in the R&I system, and for productivity and personal development. It may also lead to decentralisation and fragmentation of the development and production of material and intangible goods.

Three possible development paths to 2030 are described below. They are not mutually exclusive – instead they partially occur and interact in parallel, and in the future may coexist in some parts of the R&I system. They differ in their focus on the areas of research, innovation and production, and in their dynamism and impact, while having an important influence on the negotiation and resolution of conflicts over (1) the quality and misuse of knowledge[616], (2) intellectual property rights and distribution aspects in new business models[617], and (3) the role of citizens and the legitimacy of demands in research, innovation and production[618].

Possible development paths are:

A
The integration of civil society into the innovation system remains a marginal phenomenon

Development path A – Effective participation by citizens in R&I only in niches

In this scenario, the established R&I system does not manage to make sufficient use of citizens' productive force to benefit the established innovation system. Only with difficulty can citizens' motives for becoming involved in research, innovation and production be combined with the interests of established actors in the R&I system, and participation remains limited to a small group of people.

An active role for citizens in research, innovation and production remains a marginal phenomenon through to 2030, which barely challenges the established R&I system or everyday life in society. Nevertheless, individual projects to involve citizens may in isolated cases produce major positive or negative effects, and therefore temporarily attract considerable public attention.

A few large citizens' organisations take part in agenda-setting processes and in dialogues on ethical, legal and social aspects of R&I, but smaller organisations and individual actors are left out.

616 As a result, the current institutional pillars of education and R&I will possibly be questioned.

617 Hence investment and revenue models face an uncertain future.

618 In the medium to long term, the contract between science, business and society will change.

Negotiation processes in the R&I system that are concluded in the future are accepted and only criticised on an isolated basis.

B
Integration of citizens' activities into the innovation system initiates an incremental change

Development path B – Incremental change in the innovation system as a result of constructive integration of citizens

The innovation system recognises activities by citizens as being an opportunity to expand its personnel base quantitatively by 2030, and to access qualitatively different modes of research, innovation and production (e.g. access to everyday life via ubiquitous measurement technology, reality laboratories, production and distribution of goods via 3D printing). It succeeds in forming appropriate alliances between the population at large and R&I actors to develop joint solutions to social challenges.

Citizens and civil society organisations therefore become recognised actors in the R&I system, and make a significant contribution to economic value creation and to the solution of problems in everyday life. At the same time, R&I extends far into the everyday life of citizens (i.e. even into the body and the living environment)[619].

Agenda-setting in R&I picks up the needs and concerns of the population in defined processes. As a result of their R&I expertise, citizens are able to articulate their position even in complex and ambivalent matters, and call for these to be addressed.

C
Citizens enjoy their new capabilities in research, innovation and production outside of established R&I structures

Development path C – Transformation of society through the active involvement of civil society in research, innovation and production

Despite the efforts of established R&I actors, they are unable to integrate the numerous diverse and effective activities by citizens to a sufficient extent. Outside of established R&I structures, citizens enjoy their new capabilities in research, innovation and production, initiate collaborative projects via social networks, develop new forms of social value creation, and mobilise capital for their projects. The existing R&I system including production does not find suitable responses within its rationale, and has to open up to the new developments in society.

619 Cf. the scenario of expert-supported ERA action for sustainability; Fraunhofer ISI (2013): Scenario Report. Forward Visions on the European Research Area. Karlsruhe; VERA Scenarios: URL: http://www.eravisions.eu. Accessed on 10 April 2014.

As a result of greater activity by citizens, the boundaries shift between science and society, and between business and society. By 2030, citizens acquire capabilities, skills and means of production that fundamentally change the previous patterns of cooperation and distribution of tasks in our society. The basic elements of the R&I system should no longer be thought of as a scheme of actors, but rather as a fluid scheme of roles, in which the actors can assume various roles depending on the situation. Citizens are no longer perceived only as being scientific laypeople, or as consumers.

In a decentralised, largely self-organised R&I landscape with blurred boundaries, even agenda-setting and the examination of ethical, legal and social aspects proceed in self-organised processes, while the central control capabilities of R&I institutions are limited and become less important compared with embedded forms of participation[620].

Opportunities and risks for society – challenges for research and innovation policy

The specific opportunities and risks for the three outlined development paths differ for the stakeholders involved (society, business, science, politics)[621]. The necessary negotiation processes can be actively shaped by R&I policy[622].

The focusing of R&I on social challenges, as addressed in the high-tech strategy, may benefit considerably from the more active involvement of citizens. **Opportunities** for the innovation system lie particularly in the local development, in real-life environments, of solutions to everyday problems (e.g. in living labs). Stronger integration of citizens into the R&I system in Germany through new forms of do-it-yourself ("maker culture") and a strengthening of social innovations may also help to stimulate production potential, develop problem-solving expertise, and support local, sustainable economic structures.

New actors could reduce the burden on the innovation system

620 Cf. open research platforms scenario; Fraunhofer ISI (2013): Modular Scenario Report. Research and Innovation Futures 2030. Karlsruhe. URL: www.isi.fraunhofer.de/isi-de/v/projekte/RIF.php. Accessed on 10 April 2014.

621 The full extent of opportunities and risks as well as challenges for R&I will only become apparent in an integrated socio-technical co-evolution perspective.

622 In the following, a distinction is made between R&I governance and R&I policy, where R&I governance also includes non-governmental regulation.

Even if the active role of citizens in research, innovation and production remains a marginal phenomenon between now and 2030, isolated transformative effects on the innovation system may occur. Citizens' involvement in solving the problems of societal challenges (e.g. understanding protein structures for cancer research) reduces the workload for established actors in the R&I system. Experiments are already being conducted with new business models in the form of a combination of classical and citizen-driven value creation623. In addition, playful and experimental access to applied research may increase the motivation and commitment of young people in STEM subjects and in product development. Knowledge stimulates innovation, whether it is knowledge gained through experience or traditional knowledge, and older people with suitable experience will continue to be integrated into value creation. A more active role for citizens in research, innovation and production may increase quality of life and well-being, and, as a collective practice, it may strengthen social cohesion and inclusion.

Quality of life and social cohesion could be improved as a result of citizens' activities

The associated decentralisation of research, innovation and production presents **risks** even in the event that citizens are constructively involved, in particular a possible deprofessionalisation in the production and use of material and intangible goods, and unclear responsibilities in distributed systems (such as the transfer of controlled and efficient production with clear responsibilities into citizens' hands, under uncertain production conditions). For R&I policy, decentralisation and fragmentation of the development and production of material and intangible goods may also mean that it is more difficult to accomplish the objectives of mission-oriented R&I policy due to self-organised and distributed R&I activities. There is also a need to identify and regulate the dangers resulting from the misuse of knowledge and capabilities (e.g. using 3D printing to make weapons, big data in citizens' hands). The various interests of the actors involved may lead to tensions in the innovation system, for example if commercial and ideal motivations clash in the context of crowdsourcing activities. Without suitable governance processes, there is a danger that new innovation paths will be blocked by a multitude of conflicting individual interests.

Decentralised, fragmented structures create new challenges for innovation and research policy

One important basis for R&I policy is a systematic inventory of the possible applications and uses of citizen science, innovation and production[624], and an analysis of the opportunities and risks.

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623 For example the Lego platform CuuSoo: URL: http://lego.cuusoo.com. Accessed on 10 April 2014; cf. also Reichwald, R.; Piller, F. (2009): Interaktive Wertschöpfung – Open Innovation, Individualisierung und neue Formen der Arbeitsteilung. Wiesbaden, Gabler Verlag.

624 Suitable topics for an inventory include e.g. how society deals with obesity, self-optimisation of people, human-machine interactions (research), social innovations, innovations to limit rebound effects of citizens' activities (innovation), home-grown food and knowledge production (production).

In this way it is possible to anticipate and promote the development of citizens' problem-solving abilities. Given the complexity and ambivalence of the more active role for citizens in research, innovation and production, it seems necessary to develop a prevention and resilience strategy for R&I governance that recognises the possibilities and limits of monitoring citizens' activities in research, innovation and production. At the same time, it would need to be determined how the relationship between citizens' activities and complementary activities in the established R&I system (including production) should be shaped in the future. Activities by citizens should therefore be understood as a horizontal field for research policy, in which R&I policy recognises and promotes the potentials of economic and social value creation by citizens in research, innovation and production.

An inventory can provide the basis for a discussion about citizen science, innovation and production

For society as a whole, it is necessary to clarify the goals that are associated with a more active role for citizens (including R&I support for civil society organisations, the opening of agenda-setting processes, citizen participation in projects, citizens as project funding applicants, possibly in partnership with conventional actors, citizen production as a new production sector, etc.) Corresponding models – supported by all actor groups involved, who codify new mechanisms, processes and structures of interactions – would facilitate the negotiation processes and at the same time show what a balance between old and new actors in the innovation system could look like. To achieve this, the entire R&I system should be considered, including entrepreneurship, brain circulation, intellectual property rights, standardisation, financing mechanisms and intermediaries. The multi-layered negotiation processes require suitable discourse arenas and professional mediating institutions.

Clear goals, roles, models and interaction mechanisms have yet to be established

In view of a possible radical decentralisation and fragmentation of innovation and the production of material and intangible goods, the current **R&I policy** management paradigm runs up against fundamental limits when it comes to mobilising R&I to address higher-level public interests, and coordinating and regulating the greater variety of actors. In respect of complexity management, governance structures and actually influencing R&I activities, R&I policy faces some major challenges.

The necessary understanding on the part of R&I policy of the framework conditions and functional conditions in complex social dynamics so that suitable approaches for control and/or adjustment can be recognised may be deepened in this early phase of transformation via systematic chartings, dialogue platforms, monitoring and opportunity/risk analyses, and via experimental project forms, from which practical recommendations and needs for regulation can be derived.

5.2 Learning and working in a smart world

Short description

Global changes in the learning and working environment could be revolutionary

There are signs of highly dynamic changes in the learning and working environment in the 21st century, with serious global social consequences similar to the industrial revolution. In education, new forms of using computer and online games[625] to increase motivation are emerging, and there are new online offerings for lectures which, because of their reach, could significantly change the higher education landscape globally by 2030, and hence in Germany too[626]. Data collected in connection with internet-assisted learning is being used in ever more extensive analyses. Via educational data mining (EDM) and using learning analytics methods, algorithms can increasingly take over the management and handling of learning processes. In the working environment, computers assist people and reduce their workload in a variety of ways. With increasing computing power and advanced memory technologies, they master the basics of autonomous machine learning[627]. Intelligent algorithms[628] are increasingly taking control, with the result that in many occupations, decisions are already routinely taken by software systems and not by people any more.

625 Trend profile 27. Gamification – persuasive games in ever more areas of life.

626 Trend profile 4. Globalisation and virtualisation of higher education.

627 Nötges, T. (2013): Von künstlicher Intelligenz und Büromaterial. URL: http://www.basicthinking.de/blog/2013/11/19/von-kuenstlicher-intelligenz-und-bueromaterial-googles-rechner-erkennen-papierschredder-angeblich-besser-als-jeder-mensch/. Accessed on 28 November 2013.

628 Steiner, C. (2012): Automate This: How Algorithms Came to Rule Our World. New York, Penguin.

According to estimates, up to 50 percent of the order volume in exchange trading in Germany is based on algorithms ("algo trading"). In the United States, this figure is thought to be as high as 70 percent[629]. Algorithms increasingly play a key role in credit decisions, too. Narrative Science is an American company that has developed a program which can independently summarise newspaper articles written in English[630]. Several U.S. media publications, for example, now have their sports articles written by intelligent narrative algorithms instead of journalists[631]. Another company[632] in the U.S. has developed software that evaluates essays by school and university students[633]. The supercomputer Watson is better at diagnosing cancer than doctors[634]. This list shows that computers not only influence human thought but can increasingly think for humans[635].This trend may have far-reaching consequences. Together with positive aspects such as making work easier, negative consequences are possible, such as a loss of control over technology, or job losses.

Algorithms are playing an important role in an increasing number of business areas

Possible development paths

Possible development paths depend on the degree of autonomy of computer systems and the extent to which humans lose control over these systems. The boundaries between conceivable scenarios are fluid. Below, together with the extreme scenarios of "extensive control" and "complete loss of control" by humans, a scenario with partial loss of control is outlined.

629 boerse.ARD.de (2012): Tempolimit für die Börse. URL: http://boerse.ard.de/aktien/hochfrequenzhandel-algotrading-tempolimit-schaeuble- hochleistungshandel-aktie100.html. Accessed on 17 October 2013.

630 Narrative Science Inc.: http://narrativescience.com/. Accessed on 11 April 2014.

631 Escher, T. (2013): Der elektronische Reporter. URL: http://www.zeit.de/digital/internet/2013-08/computergestuetzter-journalismus-usa. Accessed on 17 October 2013.

632 edX: www.edx.org. Accessed on 17 October 2013; joint project between Harvard University and Massachusetts Institute of Technology (MIT).

633 Endt, C. (2013): Eine Software verteilt Prüfungsnoten. URL: http://www.zeit.de/studium/uni-leben/2013-04/kuenstliche-intelligenz-korrektur-software. Accessed on 17 October 2013.

634 Steadman, I. (2013): IBM's Watson is better at diagnosing cancer than human doctors. URL: http://www.wired.co.uk/news/archive/2013-02/11/ibm-watson-medicaldoctor. Accessed on 4 December 2013.

635 Ford, M. (2009): The Lights in the Tunnel: Automation, Accelerating Technology and the Economy of the Future. Acculant Publishing.

Possible development paths are:

A
Decisions are in principle taken only by humans

A – Humans have extensive control over computer systems

This development path describes extensive control by humans over computer systems and their applications. The guiding principle for the development of software systems and applications is maximum transparency. System architectures have a modular structure wherever possible, and intermediate products are clearly defined. Users have operational control over systems that have an exclusively supporting function. For example, important decisions are prepared by computer systems, but the actual decision is always taken by a person following an evaluation and control step.

With this development path, there is less of an impact on many knowledge-based jobs since people retain decision-making powers and are therefore still decision-makers. Computers here have supporting functions for decision-making, and their interfaces in all areas of life and work are geared towards humans.

B – Computer systems decide independently in some cases

B
Routine decisions are left to computer systems, reducing the human workload

In 2030, personal digital assistants will know from personalised entries in the calendar when to buy a present for a party. Either the personal assistant will simply make suggestions, or possibly it will decide what flowers to order automatically as a gift for the host. In our working and private lives, we have become used to the idea that certain decisions cannot be questioned. The preselection of candidates by computer, automatic tariff changes for insurance policies, or computer-assisted requests for health insurance companies to pay medical bills are examples of processes in which computer systems make autonomous decisions. Many jobs, for example in the service and consultancy sector, may be carried out entirely by computers in this scenario.

C – Computer systems become independent

C
A massive spread of autonomous computer systems

IT specialists prevent system failure

Big data replaces human intuition

The third development path describes the massive spread of autonomous computer systems. Computers are used in ever more areas to make independent decisions that have direct or indirect consequences for humans. By 2030, these systems develop themselves independently, and IT specialists mainly have the job of ensuring that the systems do not fail. This development is driven by cost-efficiency and the increasing inability of humans to take into account a large number of complexly linked facts and parameters in decision-making. Big data replaces human intuition. Just how far humans can be pushed into the background by such developments is shown by the following example: intelligent algorithms produce stock market reports, which in turn are analysed by other algorithms.

The results of these analyses lead to algo trading, about which further reports are then written by intelligent algorithms[636]. This dramatic example shows that humans, in this case, are completely uninvolved.

Opportunities and risks for society – challenges for research and innovation policy

The increasing use of autonomous computer systems produces extensive impacts on the working environment, on education and training, and on economic and social systems. Humans become disconnected, as a gap emerges between reality and digitally mediated reality. At the same time, the impacts of this development are not limited to simple fields of activity. Even currently well-paid occupational groups are affected[637]. Even if the mechanism of automation[638] is not new, the sheer extent of possible impacts produces a high potential for disruption.

Opportunities lie in greater time sovereignty for individuals, and the promotion of inclusion

If computers assist people to a greater extent in knowledge-based work processes in the future, this results in numerous **opportunities.** This assistance could have a positive effect on the growing desire for time sovereignty[639]. However, if computers become more independent, this could mean that work processes and the people involved in them have to orientate themselves to technical systems[640]. Yet surely an orientation to human requirements is desirable here[641,642]. People who know how to use computers and intelligent algorithms optimally for their work will have the biggest opportunities in the job market. Furthermore, automation opens up a variety of new opportunities to promote inclusion in the working environment. Individual work steps that cause problems can be performed by automated systems, and as a result, humans can retain their position in the value chain.

In addition to making a number of existing jobs superfluous, the increased use of computer systems may also change many existing

636 Rieger, F. (2012): Roboter müssen unsere Rente sichern. URL: http://www.faz.net/aktuell/feuilleton/debatten/automatisierungsdividende-fuer-alle-roboter-muessenunsere-rente-sichern-11754772.html. Accessed on 22 October 2013.

637 Trend profile 28. Information technologies are replacing even currently well-paid jobs.

638 Automation as defined in DIN standard V 19233: equipping a facility so that it operates wholly or partially without human involvement.

639 Trend profile 8. Time sovereignty.

640 Trend profile 55. Erosion of the sense of progress.

641 Trend profile 25. Human-machine: development between autonomy and control.

642 Kurz, C.; Rieger, F. (2013): Arbeitsfrei – Eine Entdeckungsreise zu den Maschinen, die uns ersetzen. Munich, Riemann Verlag.

job profiles and contribute to the emergence of new job profiles. Demand for suitably qualified personnel may produce opportunities for the job market. Great challenges arise here for career guidance, for higher education course offerings, for the design of educational content and for the identification of future job market requirements. For classical universities, the question will arise of whether long-standing curricula are even still appropriate. Online universities may offer a flexible, modular system instead of fixed curricula[643]. It is possible that businesses will express their requirements in the form of specific teaching modules, and guarantee jobs for a certain number of graduates. As a result, assessment criteria and the reputation possibilities for universities may change fundamentally.

Many knowledge-based occupations and jobs could be at risk

However, if assistance in the workplace goes so far that humans can increasingly be replaced by computer systems, negative consequences can also be expected. For example, the existence of many knowledge-based occupations would be jeopardised. The **risks** of this development would be job losses and sharp falls in income. According to one estimate, in the "near future" in the United States, looking at the worst case, up to 50% of all jobs in the sales, office, transport and logistics sectors as well as administration and services could be eliminated as a result of computerisation and automation[644]. The education sector may also be affected by these developments. Firstly, for example, in the higher education sector, university lecturers in some departments and their attendance-based classes are being replaced by online lectures, and secondly, the courses and job training offered will need to continuously adapt, at an ever greater speed, to the job market.

As a result of digitalisation and networking, an ever-increasing amount of information and knowledge will be ubiquitously available. There is no longer any need to memorise facts, as they can be accessed immediately using mobile devices (smartphones etc.) The concept of general education will change, creating the **challenge** of reviewing learning content for schools, vocational training, and university study. However, because of the semantic arrangement of information, not only people but also computers are increasingly able to use and intelligently evaluate the internet as a knowledge pool in an automated manner. Ever greater volumes of data are available in machine-readable form – not least mass data (big data) from social networks that helps computers learn how people think and take decisions.

643 Trend profile 4. Globalisation and virtualisation of higher education.

644 Frey, C. B.; Osborne, M. A. (2013): The Future of Employment: How susceptible are jobs to computerisation? URL: http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf. Accessed on 28 November 2013.

The growing independence of software systems is accompanied by a continuous increase in technological complexity. Technical backgrounds and processes are ever less comprehensible to normal users because of their fast pace of development. Because of the large number of technical systems that surround humans, the vast majority of users are no longer expected to understand the underlying technology. Here humans are the direct driver of a loss of control which they tolerate. Even IT specialists usually only understand some portions of networked systems. The result of the interplay of complex feedback systems is becoming ever less comprehensible to individual people. Consequently, it is difficult to check whether decisions or solutions that are taken or calculated by computer systems are actually optimal.

Humans drive a loss of control which they tolerate

If human correction is eliminated, it is possible that autonomous decisions by computer systems will be "neutral" and "impartial", but on the other hand they could result in uncompromising harshness towards the people affected by them. When it comes to dealing with temporary payment difficulties on a home loan, for example, algorithmic decisions may have a different outcome than if the decision is taken by a bank clerk who is familiar with the borrower[645]. Moreover, undetected system errors may have serious consequences such as incorrect calculations and wrong decisions. This creates the **challenge** of preserving transparency and control capabilities for humans in the case of autonomous decisions by computer systems and their innovations. Here, as in other areas too, questions of standardisation need to be answered.

From the economic perspective, large companies in particular stand to benefit from efficiency increases brought about by automation. Their profits increase, but they are generated by ever fewer employees. The question is whether people whose jobs are eliminated will find other employment. In the past, many jobs were created in the service sector, but these could themselves be heavily affected in the future[646]. Critics fear that the digital revolution will fail to create enough new jobs, and that the concentration of wealth in the hands of the few will increase[647]. Others believe that technological progress will mean that ever fewer people are required in the value creation process[648].

Critics fear that not enough new jobs will be created

645 Trend profile 39. New paradigms of economic growth and social prosperity.

646 Frey, C. B.; Osborne, M. A. (2013): The Future of Employment: How susceptible are jobs to computerisation? URL: http://www.oxfordmartin.ox.ac.uk/downloads/academic/The_Future_of_Employment.pdf. Accessed on 28 November 2013.

647 Carr, N. (2009): Unsere Zukunft in der Matrix. URL: http://www.zeit.de/2009/46/Zukunft- Netz. Accessed on 22 October 2013.

The question arises as to the distribution of the "automation dividend"

The middle class could also be increasingly affected by these change processes due to loss of income or unemployment[649,650]. The question arises as to the distribution of the "automation dividend" and the design of future social systems. In 2030, robots could also play a role in securing the viability of pensions[651]. It would be helpful here to have a scientific discourse about guiding principles that describe a balanced relationship between human and digital labour.

If computers or robots will be able in the future to perform jobs currently done by humans, such as in the manufacture of mobile phones, in Asian low-wage countries, this would have a massive impact on global economic structures[652]. With intelligent manufacturing processes, the factories could return to the sales markets, creating enormous **opportunities** for Europe.

The impacts of a failure of networked technological systems could reach new dimensions

The discussion about the dependence of humans on technical systems is not new. However, from today's perspective, it is difficult to imagine the dimensions that a potential failure of networked technological systems might have in the future. It will be a key requirement in the future development of technology and innovations to consider the **risks** of technical failures or malfunctions. In this connection, there is also the question of liability if autonomous systems cause damage.

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648 McAfee, A.; Brynjolfsson, E. (2011): Race against the Machine Digital. Lexington (MA), Frontier Press.

649 Grötker, R. (2013): Computer machen die Arbeit. Was machen wir? URL: http://www.heise.de/tr/artikel/Computer-machen-die-Arbeit-Was-machen-wir1982495.html. Accessed on 3 December 2013.

650 Cowen, T. (2013): Average Is Over: Powering America Beyond the Age of the Great Stagnation. New York, Dutton.

651 Rieger, F. (2012): Roboter müssen unsere Rente sichern. URL: http://www.faz.net/aktuell/feuilleton/debatten/automatisierungsdividende-fuer-allerobot er-muessen-unsere-rente-sichern-11754772.html. Accessed on 22 October 2013.

652 Rethink Robotics: http://www.rethinkrobotics.com/. Accessed on 10 April 2013.

5.3 New drivers and actors in the global innovation environment

Short description

New actors in the international competitive environment

Global centres of innovation are currently shifting with increasing speed, and lasting effect, to Asia. China and to a lesser extent India are driving this trend. Countries such as Korea, Malaysia, Thailand and Singapore are in quick pursuit. Emerging countries – including some outside Asia – were until recently the workbenches of the global economy. Now they are developing into thought factories and innovation incubators of the future[653]. They include emerging African economies, which seem particularly promising because there are expectations that countries in Africa could see faster economic growth in the long term than those in Asia[654].

As centres of innovation shift geographically, the quality of innovations and innovation processes themselves could change. It is expected that enterprises in the fastest-growing emerging economies with their own corporate cultures could evolve into *agents of change* in the global industrial and financial landscape. Examples such as Huawei and Samsung show that companies in emerging countries can achieve top global positions within surprisingly short timeframes. As a result, the configuration of actors is becoming more complex, particularly because it is still uncertain which of these new large companies will actually operate multinationally or globally, how much the culture of these companies differs from that of multinationals in developed countries, and which companies are growing fastest globally[655]. It is also expected that qualitatively new forms of innovation and innovation cultures will emerge. Frugal innovations are particularly notable, for example. These innovations are a creative response to local and sometimes severe limitations on resource availability, and can therefore result in technically simple, cheap and robust products[656].

By 2025, around one billion people could be members of the global middle class

Many innovations only become possible as a result of spatial compression in urban areas, turning urban regions into innovation laboratories for the global economy[657].

653 Trend profile 48. The new global innovation landscape.

654 Trend profile 42. African innovations point to new paths for innovations.

655 Trend profile 45. Growing importance of enterprises in emerging economies.

656 Trend profile 43. Frugal innovations complement high-tech innovation models.

657 Trend profile 49. The growing importance of the region in the global economy.

It is anticipated that by 2025, in urban regions around the world, around one billion people will be members of the global middle class[658], which is emerging as an important group of future consumers and a basis for economic growth. At the same time, it is uncertain whether rising consumption will make existing global environmental problems worse, whether adopting a Western lifestyle will lead to a further spread of civilisation diseases, or whether the new middle class will use its financial flexibility and choose sustainable consumption together with a healthier lifestyle[659]. As the level of education rises, the new middle class is likely to include more women. As incomes rise, and with increasing economic freedoms, women may make more of an appearance as a demand group, and so play a role in shaping new markets. Women could have a greater influence in innovation processes[660].

The insight that an erosion of manufacturing expertise can result in an erosion of innovative capacity leads to greater appreciation of manufacturing industry

In a number of industrialised countries, change in the global innovation environment has led to a "rediscovery"[661] of manufacturing industry, following a period of years in which these countries – in contrast to Germany – had relied heavily on the service sector. There are signs that there is increasing interest in learning and profiting from experiences in Germany[662]. The rediscovery has been due, in part, to the realisation that manufacturing expertise is directly linked to the capacity to develop products and to implement process innovations, which means that any erosion of manufacturing expertise can also lead to an erosion of innovative capacity[663]. Many developed countries have to deal with structural tasks of the future such as demographic change, a growing skills shortage, and high national debt. In the long term, the middle classes in developed countries could come under new pressure because some professional fields in which comparatively high incomes have been earned up to now, such as medicine and law, involve many routine tasks which may be taken over by information technologies in the future[664]. This also applies to tasks in the innovation process.

658 Silverstein, M. J. et al. (2012): The $10 Trillion Prize: Captivating the Newly Affluent in China and India. Boston, MA, Harvard Business Review Press.

659 Trend profile 46. The global urban middle class – tipping the scales of sustainable urban development?

660 Trend profile 7. Women as pioneers of global transformations.

661 Trend profile 29. Reindustrialisation.

662 MIT Taskforce on Innovation and Production (2013): A Preview of the MIT Production in the Innovation Economy Report. Massachusetts Institute of Technology.

663 National Research Council et al. (eds.) (2012): Rising to the Challenge: U.S. Innovation Policy for the Global Economy. Washington, D.C., National Academies Press, p. 84.

664 Trend profile 28. Information technologies are replacing even currently well-paid jobs.

A global rise in international competitive pressure and the pressure to innovate will mean that potentials for useful outsourcing and for replacing well-paid jobs with information technologies will be systematically sought and exploited globally.

Possible development paths

A consideration of the relevant social trends reveals numerous possible development paths. As an example, three broad paths and their development to 2030 are outlined below. Other paths in addition to these three development paths are of course possible. Especially with regard to individual industries, countries and regions of the world, the new innovation dynamic may follow a very different course.

Possible development paths are:

The developments and influences may vary in degree, and occur both in parallel and in opposite directions.

A – Incremental change in the global innovation environment

A
Developed countries maintain their position. There are only incremental changes in the global competitive situation

Most German companies compete globally and are integrated into global value chains. As a result, these companies have a good knowledge basis that enables them to respond flexibly to changes in the respective local circumstances. They can identify new centres of growth at an early stage, and target them with specific strategies. Global cooperation is stepped up in science too. Taken as a whole, developed countries have such a big scientific, technological and economic lead, and their response capability is so strong, that only incremental changes occur in the global competitive situation. Developed countries can essentially maintain their position, and benefit from growth in emerging countries. Many top managers in companies in emerging economies have been educated in Western industrialised countries, with the result that the innovation culture in the new corporate actors has many similarities to that of Western firms. New competitors may be taken over by today's global players before they become serious competitors. Frugal innovations remain a niche phenomenon as emergency solutions. Cultural and local conditions in the various countries and world regions may impede or prevent market access in individual segments, but generally speaking, the export of Western lifestyles and consumption patterns continues. Global environmental and health problems intensify.

The export of Western lifestyles generally continues

B – Overtaken by the competition

B
Developed countries fall behind the international competition

The speed and pace of development in emerging countries surprises most actors in developed countries. Structural problems, ageing populations and debt overload reduce the response capabilities of many developed countries to such an extent that they fall behind the international competition. Market shares are lost at surprising speed; newly emerging markets are overlooked or cannot be sufficiently addressed, partly also through a lack of understanding of cultural differences and local circumstances. Because of continuing cost advantages and the mass of well-educated workers, the innovation dynamic in emerging countries increases so sharply that Western countries' technological lead becomes increasingly narrow, and they actually fall behind in individual technology segments. Attempts at reindustrialisation fail for this reason, among others. Consequently, there is an erosion of the middle classes in developed countries, in part also because of the outsourcing of information technology and lower-cost providers in emerging countries. In many developed countries, this makes economic development difficult and leads to rising social inequalities and an associated increase in social tensions.

Erosion of the middle classes in developed countries

C – New global division of labour and worldwide prosperity

C
A phase of global prosperity sets in as a result of an international division of labour and specialisation

The global expansion of education opens various potentials for the global division of labour in the economy, and for international cooperation to solve global challenges. Economic development and the accelerating pace of innovation in emerging economies bring rising prosperity with further increases in the level of education, which also contributes to the growing influence of women in emerging countries. The economic boom initially creates growing environmental and health problems, but these are swiftly recognised and addressed. Frugal innovations respond to the respective local resource limitations, and in the long term help to meet consumption needs in an environmentally sustainable way. The established industrialised nations are able to benefit from development in emerging countries, thereby partially compensating for job losses resulting from the increased use of information technologies. Various new forms of collaboration and competition in business and science become established. This new form of the global division of labour leads to further international specialisation and differentiation of national competence profiles. A phase of worldwide prosperity sets in.

Opportunities and risks for society – challenges for research and innovation policy

Change in the global innovation environment is a focus of innovation policy debate in the United States

Change in the global innovation environment was detected at a very early stage the United States[665], where it is a focal point of innovation policy debate. A very clear threat to their own competitiveness has been diagnosed, and great efforts are called for in all areas of innovation policy[666]. Even though the U.S. and Germany are not directly comparable in terms of their international competitive situation, this nevertheless provides food for thought as the United States is still regarded as a world leader in many scientific disciplines and future-oriented industries such as IT. The current situation for the United States can be interpreted as an example of the impacts that can result when a developed country's industrial base is neglected. All in all, it would appear that intense efforts to compensate for perceived shortcomings in the industrial base[667] can be expected, which presents Germany with **opportunities** – e.g. for mechanical and plant engineering – as well as **risks** from increased competition.

The United States and EU are increasingly backing knowledge and technology-intensive industry sectors

Thus it is clearly foreseeable that the United States – and also the EU[668] – will increasingly move towards an active industrial policy that favours knowledge and technology-intensive industrial sectors. Even in connection with the economic development of emerging countries, it is argued[669] that no country in the world can master the transition from low to high incomes without going through the process of industrialisation, and that markets alone typically are not good at bringing about and managing the associated structural transformations. Innovation policy is increasingly understood as being a modern form of industrial policy. In this context, various developing and emerging countries use supporting instruments such as sectoral technology funds, making public procurement innovation-friendly, and supporting company formation, specifically in the IT sector[670].

665 National Research Council, Members of the 2005 "Rising Above the Gathering Storm" Committee (2010): Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5. Washington, D.C., National Academies Press.

666 National Research Council, Committee on Prospering in the Global Economy of the 21st Century (2007): Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future. Washington, D.C., National Academies Press.

667 President's Council of Advisors on Science and Technology (2012): Report to the President on Capturing Domestic Competitive Advantage in Advanced Manufacturing. Washington.

668 European Commission (2013): Main EU funding opportunities for SMEs. URL: http://ec.europa.eu/enterprise/magazine/articles/industrial-policyarticle_11059_de.htm. Accessed on 20 March 2013.

669 Stiglitz, J. E. et al. (2013): The Rejuvenation of Industrial Policy. World Bank policy research working paper 6628.

670 OECD (2013): Perspectives on Global Development 2013: Industrial Policies in a Changing World. OECD Publishing.

At the same time, foreign direct investment is used to improve the quality level of innovation and industry through better links and technology transfer. Finally, it can be observed that developing countries, with the support of development banks, are making sustainable development and green innovation a priority. German research and innovation policy faces the challenge of developing forms of cooperation with the new partners, and adapting its own strategy to the changing innovation environment.

Frugal innovations are a newly emerging field for R&I policy

Frugal innovations are one of the newly emerging fields that could be shaped by R&I policy. Frugal products hold **opportunities** for new mass markets, as they target a numerically very large customer group. However, because German businesses currently have very little knowledge about customer needs in emerging countries, there is a **risk** that despite the growing importance of emerging countries as future sales markets, products may be developed and offered which are not what customers want[671]. The concept of frugal innovation – namely to create technologically simple, cheap and robust products under resource limitations – has impacts on all levels of the innovation system. As the entire innovation process has to be reconsidered with regard to new requirements and conditions, frugal products represent a real **challenge** to the business models and organisational structures of Western companies. It is precisely the integration of high-tech expertise into a frugal innovation model that could constitute a specific opportunity for German businesses, with potentially large leverage for dealing with global challenges.

The new global actors will have or aim to acquire particular content-related competences, and they will act in particular, possibly new organisational forms. This produces the **challenge** of designing the content-related and structural specialisation patterns that national policy could and should usefully aim for, of determining how assistance instruments should be developed and newly weighted, and deciding which strategies are suitable for boosting German actors. In this context, however, it is worth noting the theory that the industrial revolution which led to rapid productivity and income growth from the 1820s to the 1870s in Great Britain, the United States, France and Germany was ultimately based on a fundamental change in social values in these countries, which facilitated mass innovations, and which has been lost in recent decades[672].

671 Tauber, A. (2013): Mittelstand weiß zu wenig über Schwellenländer. URL: http://www.welt.de/121494347. Accessed on 6 November 2013.

672 Phelps, E. (2013): Mass Flourishing: How Grassroots Innovation Created Jobs, Challenge, and Change. Princeton, Princeton University Press.

According to this theory, it was ultimately values such as openness to change, personal initiative, a sense of responsibility and willingness to cooperate, but at the same time also the desire to compete with others, and a spirit of inventiveness and discovery, which were crucial to the advent of the industrial revolution[673]. From this perspective, the actual challenge is to revive these values and give them appropriate consideration e.g. in education and training.

5.4 New governance for global challenges – from the city as global laboratory to new forms of multilateral cooperation

Short description

Research and innovation are increasingly expected to help solve global challenges. For these contributions to be globally effective, the challenges and global governance structures need to be considered in context.

The management of democratic political systems in the 21st century will increasingly take place in complex polycentric and cross-border constellations of actors and systems of rules[674], with the result that the emergence of new governance structures is likely between now and 2030.

Polycentric, cross-border constellations of actors make new governance structures likely

This is shown particularly clearly by the example of the global financial and economic crisis, which brings together a large number of different government, business and civil society actors, responsibilities and interests[675]. Financial innovations have contributed to the emergence of new actors – e.g. the shadow banking system. The crisis profoundly affected public finances around the world, and caused the public debt of Western industrialised nations to grow[676]. It is also possible that the financial crisis will affect future European integration[677] and the common European currency. Hence it can be expected that governance issues in the financial sector will remain pressing for a long time to come, and may have a widespread impact on other policy areas, including research and innovation policy.

673 Ibid., p. 98.

674 Trend profile 51. New architectures of government: the ability of policymakers to act in post-democracy.

675 Trend profile 37. Development scenarios for the global financial system.

676 Trend profile 40. Public finances: from voluntary commitment to paralysis?

677 Trend profile 52. Future European integration scenarios.

One direct driver of the emergence of new governance structures is economic globalisation, because as economic centres shift, so too does the geopolitical power structure, and it is becoming increasingly multipolar.

Economic globalisation drives new governance structures

In addition, political decisions are no longer taken solely by states, because the production and distribution of public goods are increasingly often delegated to non-state actors and networks, cities and municipalities, or to private service providers (security, care of the elderly, utilities and waste disposal), and because non-state actors – such as private enterprises, non-governmental organisations and foundations – are pushing for participation in global decision-making processes[678].

Cities could become independent actors in climate, energy or social policy

Owing to increasing urbanisation, it is expected that in world politics – for example in the areas of climate, energy or social policy – cities will become independent actors and drivers of supraregional policy discourse and global change processes. Urban policy could become significantly more important in the multi-level political system of most countries. At the same time, urban governance and governability are among the most pressing issues for cities, as they need to keep pace with rapid urban changes that are difficult to plan, and the local impacts of global challenges[679]. Furthermore, cities are, and are increasingly becoming, centres of innovation and the locations where international cooperation and international competition mostly take place[680].

Rising demands on the political process and stronger pressure for direct democracy and new forms of public participation

In addition, it can be expected that new social groups and strata will become increasingly important in the political process. A new global, urban middle class in the emerging countries, which is expected to emerge in the wake of worldwide economic growth, could become a globally impactful driver in this regard[681]. This trend is supported by the global expansion of education. As a result, there are rising demands on the political process, and stronger pressure for direct democracy and new forms of public participation. At the same new time, new forms of politics are emerging through the internet[682]. A new quality is the increasing systematisation in the use of the internet by politically minded individuals and protest movements, and the close linking of activities in the real world with activities on the web.

678 European Union Institute for Security Studies (2012): Global Trends 2030: Citizens in an Interconnected and Polycentric World. EUISS, Paris.

679 Trend profile 50. Urban governance – solving global challenges locally in cities.

680 Trend profile 49. The growing importance of the region in the global economy.

681 Trend profile 46. The global urban middle class – tipping the scales of sustainable urban development?

682 Trend profile 53. Click to protest – more activities through organisation in the internet?

Social networks in the internet make it possible for citizens to discuss and influence political events with many people around the world. This may lead to a rise in global empathy[683] and also have a reinforcing effect on the global spread of political ideals with regard to democracy, human rights, and freedom of expression.

The internet represents cultural change in another respect too: open information flows, transparency and participation in all kinds of political discourses are increasingly expected and demanded[684]. Political actors are increasingly seen as being comprehensively accountable.

Possible development paths

It is very uncertain which new governance structures will emerge by 2030 or how existing structures will develop. The following two development paths particularly outline the possible geopolitical dimensions.

Possible development paths are:

A – New diversity of governance

With the economic and political rise of the emerging countries, the dominance of Europe and the United States comes to an end. A new world order arises, which is multipolar and politically diversified. Western democracy neither becomes the universal basic political form, nor is it replaced by any other dominant political model. Although Western forms of democracy slowly spread, other models – e.g. more autocratic forms of government such as currently prevail in China, Russia and some Gulf states – continue to exist for a long time to come. Future political transformation processes in North Africa also do not result in a transition to Western forms of democracy. Instead, they each produce particular models with various shades of political Islam. Consequently, by 2030, there will be a multitude of political powers, some of which are very influential, and each with their own ideas about what constitutes a modern, legitimate and just form of government. Individual newly rising powers that share Western values separate themselves from the U.S. and Europe, and fight with them for dominance. This redistribution of global power leads to a redistribution of international responsibilities.

A
A multipolar and politically diversified world order arises

A redistribution of global power leads to a redistribution of international responsibilities

683 Trend profile 56. Younger people's values are shifting towards global empathy.

684 Trend profile 58. Consequences of hypertransparency and hyperpuritanism.

Beliefs based on the idea that Western institutions can be exported to the entire world prove to be deficient, and in some cases become a source of ongoing international conflicts. In view of the political diversity, a new pragmatism will be required – particularly also in the future development of existing multilateral institutions[685]. Political processes will see an increase in particularisation, complexity and susceptibility to blocking. The growing influence of a wide variety of non-state actors and self-interests of cities contribute to this, and it is further aggravated by unpredictable and changeable opinion-forming processes in the internet, constantly increasing demands for transparency, and the spread of bad forms of direct democracy. Attempts to address global challenges run into ever greater difficulties.

Particularisation and changeable opinion-forming processes could mean that attempts to address global challenges run into difficulties

B
New ways are found to include rising powers and new actors

B – Global cooperation and new institutions of global governance

As the threat of major interstate wars slowly diminishes, a new phase of international cooperation begins, with the aim of creating a more just, safer, and more prosperous world[686]. At the same time, awareness grows of the dangers of global shocks, as a result of the growing insight into the increasing interdependence of international production and value chains, the rise in global mobility, and the growing concentration of people, assets and critical infrastructures in cities[687]. Together with the increasingly self-confident urban middle class and private enterprises, cities push for a systematic analysis of the resulting global challenges. Initially, the present structure prevails, in which the United States, with the support of the EU, will assume a leading role in order to create centres following the model of the G20 that respond to these challenges. But, step by step, new ways are found to include the rising powers and new actors, and develop a more stable and consensual system. This trend is supported by an increase in global empathy. Finally there is a growing willingness to fundamentally reform or establish new multilateral institutions, which are specifically tasked with global governance of the analysed global challenges. States turn their attention to shaping these new institutions, which create trust, legitimacy and acceptance by means of transparency, with the result that global challenges are increasingly better addressed globally.

There is growing willingness to fundamentally reform or establish new multilateral institutions

685 Kupchan, C. F. (2012): No One's World: The West, The Rising Rest, and the Coming Global Turn. Oxford, Oxford University Press.

686 European Union Institute for Security Studies, EUISS (2012): Global Trends 2030: Citizens in an Interconnected and Polycentric World. EUISS, Paris, 2012

687 OECD (2011): Future Global Shocks: Improving Risk Governance, OECD Reviews of Risk Management Policies. OECD Publishing.

Opportunities and risks for society – challenges for research and innovation policy

Global governance as a cross-cutting theme in connection with global challenges

To meet global challenges, the respective relevant actors need to cooperate globally. It is therefore essential that solutions from research and innovation to well-known and newly arising global challenges should consider the context of global governance structures. Global governance structures are thus a cross-cutting theme that concerns all areas of research and innovation relating to global challenges.

The financial sector – an example of the challenges of global governance

As an example, the global challenges of the financial sector reveal the following relationships: uncertainty concerning the future of the financial world is considerable, and hence this is also a **challenge** of the first order for research and innovation. For example, it is a controversial question whether financial innovations should be regulated, and, if so, how this could be implemented. Furthermore, scientific support is needed to answer the question of how to persuade institutional investors to make socially relevant long-term investments contrary to the trend in the capital markets for short-term returns[688], and how policy frameworks, incentives and dialogues can be shaped to achieve this. This is particularly relevant in view of high-investment generational tasks – such as guaranteeing the food supply for more than eight billion people in 2030, demographic change, and the transition to a sustainable energy supply. There is also the question of the effects that changes in and regulation of the financial sector will have on the financing of high-tech firms and on private sector investments in research and innovation, and what opportunities for influence the actors involved have.

In general, it can be observed that science and technology are increasingly significant in connection with governance. As many systems and circumstances increase in complexity, so too does the necessary knowledge base for the associated governance processes. This may create the **challenge** for research and innovation policy of ensuring that the science and research system can provide this knowledge base so that priority-setting processes in research and innovation with regard to global challenges can be designed, accompanied and supported[689].

688 Trend profile 36. Impatient investors – the drying-up of long-term capital.

689 OECD (2012): Meeting Global Challenges through Better Governance: International Co-operation in Science, Technology and Innovation. Paris, OECD Publishing.

Technological change increases the need for global governance

Furthermore, technological change itself continuously gives rise to issues that require new forms of governance[690]. Examples include the Earth's atmosphere (climate change as a result of industrialisation), the cyber world (cyber security), space (spread of space debris), and the deep sea, Arctic and Antarctic (where technological advances facilitate resource exploration). In addition, governance of new technologies is itself increasingly becoming a global **challenge.** Examples here include genetically modified organisms, synthetic biology, and drug development[691]. This is a matter of regulatory issues and the development of standards and platforms that businesses can participate in[692]. In these contexts, polycentric approaches to governance are increasingly considered, and their development encouraged[693,694].

Polycentric approaches to global governance

One **challenge** consists in developing horizontal linkages in addition to the existing hierarchy levels of governance. Via networks, projects and special initiatives, non-state actors such as non-governmental organisations, citizens' initiatives, and public and private sector service providers can be involved in different ways.

Science and technology are pioneers in international cooperation

Science and technology themselves are pioneers in international cooperation and globalisation[695]. The sciences frequently see themselves as being, and act as, global communities with systems of rules and sanctions that operate soundly even on a transnational basis, which means that the international scientific community has the **opportunity** to provide models for multilateral cooperation, and contribute to science diplomacy[696].

690 Stein, A. A. (2008): Incentive Compatibility and Global Governance: Existential Multilateralism, a Weakly Confederal World, and Hegemony. In: Alexandroff, A. S. (ed.): Can the World Be Governed? Possibilities for Effective Multilateralism. Wilfried Laurier University Press.

691 Institute of Medicine (2013): International Regulatory Harmonization Amid Globalization of Drug Development: Workshop Summary. Washington, D.C., National Academies Press.

692 Grevi, G. et al. (2013): Empowering Europe's Future: Governance, Power and Options for the EU in a Changing World. Chatham House, FRIDE, ESPAS.

693 Ostrom, E. (2009): A Polycentric Approach for Coping with Climate Change; World Bank policy research working paper 5095.

694 Shackelford, S. J. (2013): Governing the Final Frontier: A Polycentric Approach to Managing Space Weaponization and Orbital Debris. Yale Law & Policy Review.

695 National Research Council (ed.) (2011): U.S. and International Perspectives on Global Science Policy and Science Diplomacy: Report of a Workshop. Washington, D.C., National Academies Press.

696 Ibid.

New forms of citizen participation in governance that are developing outside of established structures are a key **challenge** for the future, especially in the case of major innovations. This particularly applies to the development of new formats of urban governance and public participation in cities, which in this respect could serve as global laboratories for social innovations. This means the establishment in politics and civil society of new and sometimes unconventional approaches to more effective, efficient or sustainable solutions to social **challenges** – regardless of whether they stem from public or indeed private initiatives[697,698]. In cities, social innovations and trends can be created, tested and adapted. Little is known as yet about the differences between social and technical innovations, about the benefits or costs of their implementation, or about necessary adaptations in the environment. Because of urbanisation, for example, noise pollution is also becoming a global **challenge**[699], with the result that a globally growing need for innovative solutions to reduce noise can be expected, which can be met by an interplay of technical and social innovations in the urban environment.

5.5 New dimensions of growth and balance between sustainability, prosperity and quality of life

Short description

In 2013, the Bundestag Study Commission spelled out a clear goal. The pressure of human activity on the planet needs to decrease so that the Earth's natural limits are taken into consideration when creating prosperity and security. At the same time, the Study Commission emphasises that high quality of life, quality growth, and sustainable prosperity are important social goals[700].

Quality of life, quality growth and sustainable prosperity are important social goals

697 Trend profile 6. More attention being given to social innovations.

698 Examples of social innovations in urban areas include car or bicycle-sharing systems, joint building ventures and projects for intergenerational living that pursue environmental, economic and social goals, or placemaking initiatives by citizens that improve quality of life in neighbourhoods, e.g. by developing plans for climate protection, encouraging new businesses to set up, making streets more attractive and repairing roads.

699 Trend profile 15. Noise: the ignored environmental and health problem.

700 Deutscher Bundestag (2013): Final report of the Study Commission on "Growth, Wellbeing and Quality of Life – Paths to Sustainable Economic Activity and Social Progress in the Social Market Economy".

In many industrialised countries[701], the question is debated of whether and how the link between human well-being and resource consumption can be broken, and how a fair distribution of wealth can be achieved to benefit the common good[702]. This discussion has moved away from its original focus on industrial raw material consumption[703].

Desires for time sovereignty and individual health capital reveal a change in values

A change in society's values can be seen, which gives the debate a new, powerful dynamism. Thus quality of life increasingly no longer depends on financial wealth and economic growth[704]. To an ever greater extent, intangible goods are coming to take the place of financial interests[705]. Examples here include more time sovereignty[706], and each person's individual health capital. Moreover, population explosion, the energy crisis, the economic crisis and the impacts of climate change are leading ever more people to conclude that limitless growth in a world of limited resources is not possible, and that we might be on the threshold of a post-growth society[707,708].

The first changes in consumption patterns can be seen. In a number of European countries, people increasingly feel overwhelmed by a constant flood of newly bought goods. Many citizens try to reduce their purchases of new items, or control their personal ecological footprint[709,710,711,712].

701 Bhagwati J. N.; Panagariya, A. (2013): Why Growth Matters: How Economic Growth in India Reduced Poverty and the Lessons for Other Developing Countries. New York, PublicAffairs.

702 Konrad-Adenauer-Stiftung e.V. (ed.) (2012): Denker für morgen. Freiburg, Verlag Herder.

703 Meadows, R. et al. (1972): Die Grenzen des Wachstums. Stuttgart, Deutsche Verlags-Anstalt.

704 Cf. e.g. OECD (2014): Better Life Index. URL: http://www.oecdbetterlifeindex. org/. Accessed on 11 April 2014.

705 Seidl, I.; Zahrnt, A. (eds.) (2010): Postwachstumsgesellschaft. Konzepte für die Zukunft. Marburg, Metropolis.

706 Trend profile 8. Time sovereignty.

707 BUND; Brot für die Welt (eds.) (2008): Zukunftsfähiges Deutschland in einer globalisierten Welt. Ein Anstoß zur gesellschaftlichen Debatte. Eine Studie des Wuppertal Instituts für Klima, Umwelt, Energie. Frankfurt am Main, Fischer.

708 Meadows, R. et al. (1972): Die Grenzen des Wachstums. Stuttgart, Deutsche Verlags-Anstalt.

709 Trend profile 31. A new culture of exchange is becoming established.

710 Trend profile 32. Personal footprint – more responsible consumption.

711 German Advisory Council on Global Change (2011): Welt im Wandel. Gesellschaftsvertrag für eine Große Transformation. Berlin.

712 Global Footprint Network (2012): Global Footprint Network 2012 Annual Report. URL: http://issuu.com/globalfootprintnetwork/docs/2012_annual_report_new_110613a. Accessed on 28 July 2014.

Furthermore, there is rising awareness among the population that individual consumption has far-reaching global, environmental and social consequences. Borrowing or sharing products instead of owning them[713], swapping instead of buying, and making and repairing products yourself[714,715] are increasingly recognised as being sustainable strategies, and could very well have a disruptive potential in the future. These forms of consumption are social innovations, whose spread can be interpreted as heralding a new type of economy. With financial services, it can be seen that traditional investment criteria such as the prospect of a high return are no longer the sole focus of interest, as they are expanded with ethical and value-based – i.e. non-financial – considerations[716,717]. Ethical investment, for example, means only financing projects that are in line with one's own values[718].

Borrowing, sharing, swapping, repairing and making your own products are regarded as sustainable strategies

Possible development paths

Especially the trend of swapping and borrowing instead of owning is closely linked to other trends that only reveal in interaction the direction in which, for example, the way society deals with property is changing, and which paradigms concerning society's feeling of well-being and quality of life will prevail in the future. Two possible development paths are described below. Their dynamism comes in particular from the development of consumer behaviour.

Possible development paths are

713 Leismann, K. et al. (2012): Nutzen statt Besitzen. Auf dem Weg zu einer ressourcenschonenden Konsumkultur. Berlin, Heinrich-Böll-Stiftung.

714 Trend profile 30. Do-it-yourself 2.0.

715 Kuhlmann, S. (2013): Reparieren statt wegwerfen. Repair-Cafes bieten Hilfe zur Selbsthilfe. URL: http://www.dradio.de/dlf/sendungen/umwelt/2030330/. Accessed on 18 October 2013.

716 German Advisory Council on Global Change (2011): Welt im Wandel. Gesellschaftsvertrag für eine Große Transformation. Berlin.

717 Trend profile 35. Ethical and value-based financial services.

718 Bassler, K. (2011): Ethisches Investment: Geht Geld vermehren auch anders. URL: https://www.brot-fuer-die-welt.de/shop/Kampagnen/Zukunft-fair-teilen/Broschuere--Darf-s-ein-bisschen-mehr-sein--.html. Accessed on 23 April 2014.

A – Niche existence for alternative consumption patterns and radical system criticism

A
A close link between prosperity and economic growth remains the prevailing model until 2030

Between now and 2030, the close link between prosperity and economic growth remains the prevailing model for society, business and politics. Economic growth continues to be regarded as a prerequisite for high quality of life and social stability. Although the common good, a fair distribution of wealth, and reduced resource consumption are aspired towards, they continue to be subordinate to economic growth. Economic prosperity remains a priority for the majority of citizens too. Working and the associated financial security that it brings continue to be valued more highly than, for example, more time sovereignty. Similarly, for the majority of consumers, sustainable consumption is not a focus of interest. However, individual persons and groups increasingly define their quality of life and their well-being in terms of non-financial values, and they attempt to promote alternative modes of consumption and lifestyles. In some cases they are organised in radical initiatives that are critical of the system – like the present-day Occupy movement – and emphatically call for a radical reform or normative regulation of capitalism. On an isolated basis, they cause polarisation between sections of society, business and politics. They succeed in changing the mainstream in individual areas of life and consumption sectors.

B – Transformative change in the understanding of prosperity, and a new consumer culture

B
Society, business and politics redefine the concept of prosperity

In light of growing global challenges resulting from environmental problems, social disparities and economic crises, discourse about alternatives to growth has intensified and is no longer limited solely to individual persons and groups. Society, business and politics redefine the concept of prosperity, and establish a nuanced way of measuring quality of life. In a similar way to the present National Welfare Index (Nationaler Wohlstandsindex, NWI) in Germany, the Human Development Index (HDI) or "enhanced GDP", the attempt is made to take a series of social factors into consideration[719,720,721]. State expenditure on health and education that promotes prosperity, and costs caused by crime or traffic accidents are taken into account along with economic factors when measuring quality of life.

719 Diefenbacher, H.; Zieschank, R. (2011): Woran sich Wohlstand wirklich messen lässt. Alternativen zum Bruttoinlandsprodukt. Munich, Oekom Verlag.

720 Deutscher Bundestag (2013): Final report of the Study Commission on "Growth, Wellbeing and Quality of Life – Paths to Sustainable Economic Activity and Social Progress in the Social Market Economy".

721 Cf. e.g. OECD (2014): Better Life Index. URL: http://www.oecdbetterlife index.org/. Accessed on 11 April 2014.

To increase quality of life, a greater emphasis is placed on intangible goods, and they are more actively promoted. Whereas politics today knows many instruments for stimulating economic growth, even in 2030 the search for democratic management options to promote the growth of prosperity, as newly understood, will still be a challenge for the future. As the concept of prosperity changes, so too does citizens' consumption behaviour. As a result, raw material consumption is significantly lowered, and the environmental burden reduced. Yet adjustment of the economy and of business models to new consumer behaviour is still ongoing in 2030.

Opportunities and risks for society – challenges for research and innovation policy

The Study Commission makes it clear that the process of separating economic growth from resource consumption will mean a far-reaching transformation of society, business and politics, and will therefore be a difficult challenge[722]. One **challenge** here is that the prevailing structures and institutions in our society today, including the economy, are designed in such a way that they build on and are dependent on economic growth[723]. To achieve the goal of sustainable prosperity, to counteract any growth limits, and to promote a possible paradigm shift, it is necessary to break free of these dependencies and develop suitable alternatives. A guiding principle of this paradigm shift could be to treat human, social, natural and health capital as assets in addition to economic capital. Thus the central **challenge** could consist in describing and characterising in more detail possible alternatives and limits to growth, in a scientifically sound way. Potential changes would need to be acceptable not only to business but also to a large majority of citizens.

Human, social, natural and health capital are assets along with economic capital

722 Deutscher Bundestag (2013): Final report of the Study Commission on "Growth, Wellbeing and Quality of Life – Paths to Sustainable Economic Activity and Social Progress in the Social Market Economy".

723 Seidl, I.; Zahrnt, A. (eds.) (2010): Postwachstumsgesellschaft. Konzepte für die Zukunft. Marburg, Metropolis.

Business in particular could play a central and active role in any transformation, but at the same time – e.g. because of changed consumer behaviour – it could face serious challenges. It is conceivable that a newly emerging swapping culture or changed attitudes to material things could have a disruptive impact on business. If high quality of life, quality growth and sustainable prosperity are to be reconciled, it is possible that fundamental paradigms of innovation processes and traditional value chains could be called into question, which would create major challenges for most currently existing business models. At the same time, however, there is the opportunity for new business models to emerge.

New business models may emerge

In this connection, possible rebound effects[724] accompanying innovations should also be taken into account. Research efforts could be directed towards a better understanding of these effects, with the aim of finding strategies that fulfil the actual intentions of innovations in the area of sustainability. Research could therefore face the task of navigating as a mediating authority between the individual, sometimes extreme, and competing positions.

Consider and better understand rebound effects

A new consumer culture could also offer potentials with regard to social cohesion. People act in the common interest if a suitable framework for this exists, and collective forms of use in the internet may constitute such a framework. It has been observed in this connection that the commons – i.e. common or public goods – are becoming more significant[725].

In this regard, models of post-materialistic communities could offer an opportunity for the reorientation of society, as they are already pointing to various ways of achieving a balance between growth and sustainability[726]. Science provides orientational knowledge here so that technologies and innovations can be developed which could assist a social transformation of this kind. Here too, however, there is a need for legitimacy, e.g. with regard to necessary control measures. One means of legitimisation consists in greater participation by society in important (political) decision-making processes[727].

Post-materialistic models and balance between growth and sustainability

724 Trend profile 16. Rebound effect: underestimated paradox of sustainability policy.

725 Trend profile 41. Rediscovery of the commons.

726 Trend profile 39. New paradigms of economic growth and social prosperity.

727 German Advisory Council on Global Change (2011): Welt im Wandel. Gesellschaftsvertrag für eine Große Transformation. Berlin.

In the context of a possible post-growth society, rural and peripheral regions could assume a particular significance. In many European countries, these regions are becoming less important due to shrinking populations, and even their continued existence is under threat[728]. In times of globalisation, such a development could happen even to former boom-towns. Because public services such as water and health are difficult to finance in such regions, dialogues are already being conducted with citizens on alternative forms of community. In this way, rural and peripheral regions could serve as pilot locations for a possible post-growth society[729].

Rural and peripheral regions as pilot locations

While it is still uncertain what impacts the emergence of alternative financial services could have on classical financial services, far-reaching transformations could be imminent in this area. Research could provide contributions to models and innovations in connection with ethical and value-based investments in market economies.

The impacts of new growth and prosperity paradigms are also becoming clear with regard to employment. At the moment, any increase in labour productivity is exclusively viewed as being positive, firstly because it is cited as a reason for individual pay increases, and secondly because it is believed to have great potential in respect of global competition. If society focuses more on "soft" prosperity criteria, such as high health capital, this attitude to labour productivity could fundamentally change. Employment without consideration for health, family and free time would retreat into the background, whereas the individual's health capital, more time for family, and a sustainable lifestyle could become more important. This trend could be supported by technical innovations. Investments in social and human capital could very well have positive effects for businesses with regard to globalised competition, but questions still need to be answered concerning future productivity, efficiency and costs[730].

"Soft" prosperity criteria could fundamentally change attitudes towards labour productivity

728 Kröhnert S. et al. (2011): Die Zukunft der Dörfer: Zwischen Stabilität und demographischem Niedergang. Berlin, Berlin-Institut für Bevölkerung und Entwicklung.

729 Trend profile 12. Villages as pioneers in shaping the post-growth society.

730 Badura, B. (2012): Gute Unternehmensführung. Sozialkapital, Gesundheit und Organisationserfolg. In: Wirtschaftskammer Österreich (ed.): Das Kapital 2. Wirtschaftspolitische Blätter, 1/2012.

5.6 New challenges between transparency, post-privacy and privacy protection

Short description

Digitalisation and networking are shaping ever more areas of life

Digitalisation and networking are key drivers of global economic growth, and they are shaping ever more areas of life. People shop, chat, e-mail and tweet online, use online banking, search engines and smartphones, and create personal profiles in social networks. One side-effect of these convenient applications is gigantic data collections held by various providers, from which extensive user profiles can be derived. For the sake of convenience, users voluntarily give away ever greater amounts of personal data. The internet's long-term memory is a problematic factor here. In some cases, it is extremely time-consuming or impossible to remove personal data from the internet once it has been made publicly accessible. Lifestyle habits and preferences can be derived from this data. There is great interest in utilising this data, and not only for market research purposes.

Challenges are increasingly arising because of the linking of data

Challenges arise not only through the misuse of specific data sets, but also increasingly through the linking of individual, isolated pieces of data, which it was not previously possible to utilise, to form large masses of data (big data). In this way, knowledge about people or even confidential business information is generated by third parties, without the knowledge of the persons concerned. Apart from a cultural change in the private sphere, negative economic impacts on German industry are possible too.

Possible development paths

Possible development paths are:

The technological capabilities of Web 2.0 have noticeably changed the boundaries of private life. In the future, this influence will continue to grow, and significantly, even without the direct involvement of users. Possible development paths are a loss of control over at least some personal data, referred to by the term "post-privacy", a deliberate effort to achieve hypertransparency[731], i.e. virtually everything should be made public, and a state of maximum achievable data security.

731 Cf. trend profile 58. Consequences of hypertransparency and hyperpuritanism.

A – Post-privacy with a partial loss of control

A
Citizens may not achieve complete self-determination over their data, or they may approvingly accept a loss of control

With this development path, citizens may not achieve[732] complete self-determination over their data, or – for example as adherents of the post-privacy movement – they may approvingly accept a loss of control. In 2030, the factor determining whether a violation of privacy has taken place will still be that data has been published or used by third parties against the will of the person concerned. In 2030, involuntary publication or disclosure of data will still mainly be the result of user behaviour. In other words, personal data (such as photos) are published in the internet without giving thought to potential risks of misuse by third parties. In the future, however, data protection problems will no longer arise solely because of individual data sets falling into the wrong hands. They will increasingly result from the linking and generation of personal information from individual data traces. This yields new knowledge about individual people which was not originally stored as such.

The possible more widespread use of data glasses (e.g. "Google glasses") or similar human-machine interfaces will further limit control over personal data and photos. Being in the wrong place at the wrong time could have far-reaching and drastic personal consequences.

B – Hypertransparency dominates society

B
Many users have a need to communicate with other people, present themselves to other people and compare themselves to other people that is greater than their need for data privacy.

Extreme adherents of the post-privacy movement advocate a society without secrets, which in the opinion of members of the movement means a better, freer society, in which no one needs to hide. This hypertransparency is based on technological capabilities which, in the adherents' view, are bringing about an inevitable cultural change regarding society's notion of privacy. People are increasingly publishing information about their own private lives in social networks, blogs, quantified self apps, etc. Many users have a need to communicate with other people, present themselves to other people and compare themselves to other people that is greater than their need for data privacy. In 2030, individuals' medical data gained as a result of this need could form the basis for health insurance charges.

Yet the systematic publication of personal information such as income, political opinions, medical conditions, police records and personal inclinations also constitutes a state of restrictive social control, with a high conflict potential, as efforts to achieve transparency will no longer be guided primarily by moral or ethical values.

732 "Right to informational self-determination" in the "census ruling" by the German Federal Constitutional Court, 1982.

As a consequence, citizens' attitudes may move between two extremes in the future. Some will have no concerns about giving away ever more information about their private lives, even though they aim for a state of hypertransparency not necessarily deliberately. Others will withdraw from the digital world to an ever greater extent because of the uncertainty of the possible consequences of data being misused. They will yearn for a return to a simpler world. This turning-away may result in a general rejection of networked technologies, and therefore an erosion of the sense of progress[733]. In 2030, there would be significant economic consequences for numerous established services and products.

Two poles: some sections of society will give away their data, while others withdraw from the digital world

C – Maximum possible data protection

C
Awareness among users and strict global IT security requirements create the greatest possible security.

Extensive awareness among users and strict global IT security requirements create the greatest possible security through interaction between technical security systems and users, who do not unthinkingly disclose information about their private lives, or turn their back on the digital world, but instead competently use networked technologies. Technical systems are continuously developed in a foresighted way, and offer the greatest possible security against attacks by hackers etc. At the same time, users are extensively and continuously informed about data protection and possible risks. As a result of this competence, users are aware of what they are doing in the internet, and they preventatively avoid potential data privacy problems. Service providers need to transparently inform users about their terms and conditions with regard to the handling of data. All in all, a state is reached that significantly reduces the likelihood of data misuse, even though one hundred percent security cannot be guaranteed, and users feel more confident.

Opportunities and risks for society – challenges for research and innovation policy

Ever more service providers are storing extensive personal data and using it e.g. for "anonymised" customer analysis. The risk of misuse rises considerably as a result of systematic storage[734].

733 Trend profile 55. Erosion of the sense of progress.

734 Trend profile 25. Human-machine: development between autonomy and control.

The current debate surrounding the activities of the National Security Agency (NSA) – the U.S. intelligence organisation – shows just how far systematic data collection and analysis can go. However, the **risks** lie not only in the fact that an ever increasing amount of personal data exists in digitised form, but also in possible links between these repositories of personal data. In research too, preserving the anonymity of research subjects is becoming an ever greater challenge because of increasingly large collections of personal data. Instruments used for anonymisation imply the possibility of reversing this process and re-identifying test subjects[735].

Risk of misuse as a result of the systematic storage and linking of personal data

Digitalised forms of communication are increasingly used in private and professional life, especially in dialogue with initially unknown persons and systems. Because of concerns about increasing cyber-crime under the protection of the internet's anonymity, the issue of data privacy may have a major influence on many of our communication activities in the future[736]. In the future, a more direct threat to privacy may arise from the increasing spread of data glasses such as Google glasses, miniature drones, and the (legal) surveillance of public spaces[737]. In cities, surveillance cameras and systems are being widely installed in conjunction with sophisticated technologies that recognise people automatically. These systems can produce almost continuous movement and contact profiles[738].

Surveillance cameras and automatic person recognition make it possible to generate movement and contact profiles

There are great **challenges** for every individual person and society as a whole. Everyone should understand what can happen to personal data, and what consequences the careless handling of personal data could have. Technological innovations can help to protect users' privacy. Data misuse may be reduced through continuous advances in security standards and encryption methods. However, new technologies alone will probably not be sufficient. Human behaviour is a major weak point when it comes to data protection. This creates the **challenge** of developing appropriate educational content.

Data protection as part of the educational curriculum

735 National Academy of Sciences (2014): Proposed Revisions to the Common Rule for the Protection of Human Subjects in the Behavioral and Social Sciences. URL: http://www.nap.edu/catalog.php?record_id=18614. Accessed on 10 April 2014.

736 Trend profile 22. Trust in the internet age.

737 Trend profile 26. Amateur drones are pervading everyday life.

738 Trend profile 50. Urban governance – solving global challenges locally in cities.

Debate in society about the balance between privacy and the use of big data

Another **challenge** consists in creating suitable conditions for future activities in the information and knowledge society that make it more difficult to misuse data, enable control over one's own data, and make new service offerings transparent. Society needs to debate the issue of a balanced relationship between privacy and the use of big data, and work out clear rules for the use of this mass data. For example, business models are already emerging in which private data can be traded as a currency or as a new type of asset[739].

International efforts are required

Data protection awareness, high technical security standards and appropriate legal frameworks are some of the key prerequisites for the development of modern knowledge societies. This is what enables them to effectively utilise the diverse **opportunities** that result from digitalisation and networking. Through international efforts, less effective isolated national approaches can be avoided, and extensive legal frameworks can be designed. Germany could instigate a European approach with regard to framework conditions and infrastructure.

In the overall picture, guiding visions may help to develop specific ideas and goals for a balance between freedom and security, from which options for research and innovation policy can be derived.

5.7 A pluralistic society in search of belonging and distinction

Short description

By 2030, as a result of global migration processes – driven by factors such as poverty, war, and also the demand for skilled workers in industrialised countries – a dynamic pluralisation of society can be expected[740]. These migration movements could lead to social processes that can no longer be described using familiar terms such as integration/exclusion and native/immigrant. It is conceivable that different cultures and subcultures will become aggregated and that people will compose their own multicultural identities, world views and biographies out of existing cultures.

A dynamic pluralisation of society can be expected by 2030

739 World Economic Forum (2011): Personal Data: The Emergence of a New Asset Class. URL: http://www.bain.com/Images/WEF_Personal_Data %20_A_New_Asset_Class_Telecom_opportunities.pdf. Accessed on 27 February 2014.

740 Clifton, J. (2010): 150 Million Adults Worldwide Would Migrate to the U.S. URL: http://www.gallup.com/poll/153992/150-million-adults-worldwide-migrate.aspx. Accessed on 10 October 2013.

http://www.bain.com/Images/WEF_Personal_Data% 20_A_New_Asset_ Class_Telecom_ opportunities.pdf. Accessed on 27 February 2014.

740 Clifton, J. (2010): 150 Million Adults Worldwide Would Migrate to the U.S. URL: http://www.gallup.com/poll/153992/150-million-adults-worldwide-migrate.aspx. Accessed on 10 October 2013.

This trend could result in the emergence of new cultural combinations and new national realities[741].

A different understanding of established cultures and religions is also possible. For example, the proportion of Muslim citizens of different geographical origins in Germany is likely to increase further[742]. Their growing involvement in social, cultural and political life could mean that they contribute to a stronger link between European and Islamic values, and hence also to a new understanding of Islam in Europe and Germany[743]. The rising mobility of employees and students, and the increasing diversification of the employment and higher education landscape, could favour such a new appreciation of other cultures and religions.

Migration, labour mobility and the development of various new forms of families promote the pluralisation of society

However, the pluralisation of society will involve more than just migration and labour mobility. For example, it can be expected that the future multi-option society[744] will result in the development of new forms of families. The traditional nuclear family, consisting of father, mother and one or more children, could become less important in the future and increasingly be replaced by alternative, often more complex ways of life such as non-marital partnerships or same-sex partnerships with children[745]. A changed view of people with disabilities as a result of greater inclusion is another key factor in the further pluralisation of society.

Values are shifting towards global empathy

The developments mentioned above could cause younger people's values to change in the direction of global empathy. Trends can already be identified in which empathy no longer extends only to family and the closer social environment, but increasingly to all people regardless of their origin or social or cultural position[746]. The global spread of such empathetic value patterns is closely linked to ever greater global communication, increasing mobility processes between nations, growth in tourism, the spread of English as a world language, the rising education level, and global migration as mentioned previously.

741 Cf. trend profile 60. Post-ethnic culture as a result of migration.

742 Grim, B. J.; Mehtab, S. (2011): The Future of the Global Muslim Population: Projections for 2010-2030. Washington, D.C., Pew Research Center.

743 Trend profile 11. A European Islamic culture is emerging.

744 Gross, P. (1994): Die Multioptionsgesellschaft. Frankfurt, Suhrkamp Verlag.

745 Trend profile 9. Families in the multi-option society.

746 Trend profile 56. Younger people's values are shifting towards global empathy.

The ageing of society could call the prevailing cultural youth paradigm into question

Demographic change also has impacts on social structures. For example, the ageing of society could call into question the prevailing cultural youth paradigm. Although it can be expected that youthfulness will remain an important value for best-agers, i.e. people aged over 50, youthfulness could be combined with their own notions regarding life experience, comfort, their own standards of quality, and also with an interest in civic participation. Thus new models of "active un-retirement" could emerge[747].

Individualisation makes it possible for people to free themselves from the rules of behaviour of traditional communities

Greater freedom, higher income, better education, social security, mobility and more leisure opportunities mean that many people have greater individual opportunities to be active. This individualisation of the individual makes it possible for people to free themselves from the rules of behaviour of traditional communities, for example those of the traditional nuclear family, religions and social classes. Yet individualisation does not mean complete distinction, i.e. separation from social groups. To find security and stability, but also because of a need for rituals, humans search for belonging and join together with others who follow similar lifestyles and life goals, or they follow role models from the media or pop culture[748]. While traditional communities and affiliations mostly have a lifelong influence, people leave or change their new elective communities more frequently when personal circumstances suggest it is appropriate to do so. In this context, lasting friendships become more important both for the individual and for society, as in our individualised society, friendship relationships increasingly occupy places that were formerly filled by family[749].

Possible development paths

Possible development paths are:

Individualisation, and the search for belonging and distinction, are not new or unknown phenomena. However, they gain a new dynamism in a context of increasing migration processes. Thus the pluralisation of society depends in large part on the extent of immigration, on the decreasing importance of family membership and religious affiliation in Germany, on immigration policy, and not least on developments in poorer and troubled countries. Two possible development paths are described below. Their dynamics stem in particular from the development of migration.

747 Trend profile 10. Youth as a future marginal group?

748 Trend profile15. Cosplay (Longlist; s. Kap. 3.1)"

749 Trend profile 13. The social function of friendship is gaining importance.

A – Inclusion, cultural hybridisation and post-ethnic culture

A
Large sections of the population regard cultural diversity as enrichment, or at least accept it

By 2030, as a result of various individualisation processes, a further pluralisation of society will take place. The associated change in structures and lifestyles can be described with the terms cultural hybridisation or post-ethnic culture. By 2030, both immigration and emigration have become a structural feature of modern societies. Furthermore, in a Europe which is open and has grown closer together, a high level of mobility prevails. This applies both to those in work and, for example, to the student population. International work teams and international cooperation have become the norm. Citizens' awareness of multiculturalism is a topic of active interest, and it is actively promoted, e.g. through education opportunities for migrants[750,751]. As a result, large sections of the population regard cultural diversity as enrichment, or at least accept it. Cultural diversity and inclusion go from being catchwords to being features embraced by our society. Cultures and subcultures become aggregrated through free associations. Politics, labour market institutions, services, education and even religious practice have adjusted to these new realities[752]. However, religious, cultural and professional options will also lead to a relativisation of established social structures and associated certainties.

B – Call for adjustment with further increase in tolerance

B
Migrants are required to adapt themselves to prevailing lifestyles to a greater extent

Europe's internal borders continue to be dismantled, and labour mobility increases. As a result, the community of states and their citizens grow ever closer together, and vital synergies are developed. At the same time, war, displacement, environmental changes[753] and associated social disparities cause further flows of refugees into Europe[754]. Germany and the European Community continue to live up to their responsibility with respect to refugees from third countries.

However, society increasingly judges migrants by their benefit to the jobs market[740,751], and despite decades of increasing tolerance towards

750 Pries, L. (2008): Die Transnationalisierung der sozialen Welt. Sozialräume jenseits von Nationalgesellschaften. Frankfurt am Main, Suhrkamp; Treibel, A. (2003): Migration in modernen Gesellschaften. Soziale Folgen von Einwanderung, Gastarbeit und Flucht. Weinheim/Munich, Juventa-Verlag.

751 Lange, D. (2009): Migrationspolitische Bildung. Das Bürgerbewusstsein in der Einwanderungsgesellschaft. In: Unsere Wirklichkeit ist anders – Migration und Alltag. Perspektiven politischer Bildung. bpb-Schriftenreihe (series of the German Federal Agency for Civic Education), vol. 1001, pp. 163-175.

752 Nassehi, A. (2010): Mit dem Taxi durch die Gesellschaft. Soziologische Storys. Hamburg, Murmann.

753 Government Office for Science (2011): Migration and Global Enviromental Chance. Future Challenges and Opportunities. London.

754 OECD (2009): The Future of International Migration to OECD Countries

immigrants, the majority of society rejects a hybrid or post-ethnic culture[755]. Instead, migrants are required to adapt themselves to prevailing lifestyles to a greater extent[756].

Opportunities and risks for society – challenges for research and innovation policy

The fragmentation and formation of new social narratives, frameworks of norms, and structures as a result of demographic turning points and migration processes in a multi-option society could provide the basis for new identities and lead to an erosion of the social contract and the creation of a new one.

High job mobility between countries is an opportunity to counteract a possible skills shortage

For example, high labour mobility between countries could be an opportunity to counteract a possible skills shortage. In the future, nations will no longer attract new citizens only with financial incentives, but also with social recognition and cohesion. In the "global war for talent"[757], it will be possible to cite high social cohesion as a reason to choose Germany[758]. One challenge could lie in persuading immigrants, with clear arguments, that in addition to financial security, freedom and more opportunities for personal development, they are also welcome in the heart of our society. As part of this, it is also important that multiculturalism is accepted in society, and that the primary objective is a pluralisation of cultures – instead of an assimilation. Providing education about migration policy could set an appropriate course. Associated with this, another global challenge consists in preventing, in the future as well, social disparities and hence a division of society caused by economic marginalisation and the loss of security by individual social groups[759,760]. A visionary migration policy that is not based on short-term cost-benefit calculations could represent a major opportunity in this respect. The science and research community could serve as a model for future cooperation, in terms of the way it works and operates.

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755 Treibel, A. (2011): Migration in modernen Gesellschaften. Soziale Folgen von Einwanderung, Gastarbeit und Flucht. Weinheim/Munich, Juventa-Verlag.

756 Rubin J. et al. (2014): Intolerance in Western Europe. Analysis of trends and associated factors. RAND.

757 Michaels, E. et al. (2011): The War for Talent. Boston, Harvard Business Press.

758 Trend profile 59. Social cohesion – the cement of 21st-century societies?

759 rend profile 47. Social disparities – fault lines of global development.

760 World Economic Forum (2014): Global Risks 2014 – Ninth Edition. Geneva, World Economic Forum.

Many areas of the world of science exhibit collaborative and multicultural features that favour global cooperation. Strengthening this interculturalism in teaching and social science research as well is both an opportunity and a challenge.

Future migration governance is firmly bound up with the development of European integration

In this connection, future migration governance is firmly bound up with the development of European integration[761]. Citizens' potential uncertainties in this regard constitute a **risk,** and could influence the future course of European integration. A rejection of multiculturalism, scepticism towards immigrants, and associated criticism of the EU could lead to a fragmented Europe – which could also potentially impact on international cooperation in politics, business, research and development. At the same time, future European integration also affects research. In this context, especially the establishment of suitable control mechanisms could be a further **challenge.** Conversely, however, it is also important to recognise and use **opportunities** resulting from an increasing spread of globally empathetic value systems. These value systems may lead to a paradigm shift in our understanding of innovation, towards collaborative and needs-oriented innovation.

Increased migration requires adjustments in the education sector

Furthermore, the aggregation of cultures and subcultures – in which people assemble their own multicultural identities, world views and biographies using various ethnic resources, producing new cultural combinations as well as national realities – has impacts on sectors of society including R&I policy. For example, increased migration requires adjustments in the education sector. Intercultural learning and mutual understanding between persons from different cultures and groups are primary goals of a post-ethnic culture.

Internationalisation and globalisation increasingly require working in multicultural teams

But in the context of greater labour mobility, purely practical **challenges** in management and specifically in innovation management also need to be solved. Internationalisation and globalisation require increasingly multicultural teams. If such teams are to function well, intelligent management and innovations are essential to remove obstacles to collaboration such as a lack of linguistic or cultural competences. Innovative approaches to increase motivation – for example from the field of gamification, i.e. the application of game-design elements in non-game contexts – could help to overcome such obstacles.

It is therefore conceivable that persuasive games – i.e. digital games that are not intended primarily or exclusively as entertainment – could be used to practise positive behaviours and shape values [762].

761 Trend profile 52. Future European integration scenarios.

762 Trend profile 27. Gamification – persuasive games in ever more areas of life

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APPENDIX 1: GLOSSARY BMBF FORESIGHT CYCLE II

Need

A need is understood to be the social objectification and embedding of human wants and desires.

Need antennas

“Need antennas” are people with crucial knowledge about future needs, who – for example because they work professionally as artists, therapists or educators – have an external view of newly emerging social needs.

Need pioneers

People who have new or extreme needs for the innovation system. Although these needs are still marginal phenomena at the moment, they could be relevant to a large part of the population by 2030, e.g. because of demographic trends or changing attitudes in society.

Desire

A desire is an elementary individual feeling of want that produces a striving to resolve the state of tension.

BMBF Foresight

Foresight is a strategic instrument that provides a long-term perspective for observing future-oriented trends. The goal of Foresight is to generate orientational knowledge and information for management purposes. BMBF Foresight processes investigate future trends that are driven by research and technology (“technology push”), or which create new demand as a result of new developments or changes in society(“demand pull”).

Research and technology perspectives

Innovative or disruptive solution approaches from research and technology.

Social trends

Social trends are defined as far-reaching new developments or changes in political and social processes[763], and in their structures and actors[764]. They are trends that produce and/or change social needs. In BMBF Foresight Cycle II, there is a particular focus on innovative social trends that may become relevant by 2030. For the search process in Foresight Cycle II, three manifestations of social trends are distinguished:

Open social trends

New social developments or changes that are already discussed as trends by various actors in social systems such as science, business, politics and media, and are linked to predictions for the future, an increasing number of people affected, and social organisational tasks.

Hidden social trends

New social developments or changes whose effects have so far gone almost unnoticed by research and innovation in Germany.

Normative social trends

New social developments or changes which are predominantly shaped by ethical standards shared either by sections of society or by society as a whole. A characteristic feature of normative social trends is that a social practice or pattern of behaviour, e.g. “veganism”, becomes closely associated with values, visions and ethical aims. Protagonists of normative social trends aspire for their postulated concepts to become established in the long term as generally accepted, mandatory, and even sanctionable values, norms and regulations[765].

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763 Political and social processes take place in communication, cultural rules and conventions, routines of action and forms of collectivisation.

764 “Actors” specifically means individuals, groups, organisations and institutions. The structures of social coexistence can be described in terms of roles, institutions, markets and networks.

765 Cf. concerning values as a subject of research: Schüll, E. (2009): Zur Forschungslogik explorativer und normativer Zukunftsforschung. In: Zukunftsforschung und Zukunftsgestaltung. Beiträge aus Wissenschaft und Praxis. pp. 223-234, here: p. 230.

Social challenges

Social challenges – i.e. challenges for society – are defined as the specific organisational tasks facing large communities which arise or change as a result of the transformation of society and/or technologies.

Lead user

Needs arise earlier among lead users than among average users. By fulfilling their needs, they obtain a particularly large benefit for their work and/or their leisure time. Since they have the necessary application knowledge and object knowledge, they are able to innovate.

Lead users at the margins

A bell-shaped diffusion curve is assumed in theory for the spread of innovations or in this case of needs in social systems. Lead users are active before this curve begins. They may initiate this curve, but do not necessarily do so, and are therefore difficult to detect in this "marginal" region. This group also includes social entrepreneurs.

Scenarios

Scenarios are descriptions of complex pictures of the future. They give an impression of future situations, making it possible to experience the future more directly. Scenarios may be simply imagined, or they may be the result of an extensive scenario process, in which key factors are identified and consistent scenarios are calculated.

Trend profiles

The social trends identified during the search phase are written up in the form of trend profiles which are specially developed for BMBF Foresight II. The profiles are subdivided into the categories of society, culture and quality of life, business, and politics/governance. The trend profiles have a uniform structure (short description of the trend, drivers and dynamics, relationship to research and innovation, relationship to the knowledge society, and assessment) so that the trends can be compared with each other.

Source in the Foresight process

Each quality-reviewed article – whether in print or online – relating to the specialist and social discourse in topic areas such as politics, business, science and media.

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