IST

Institute Society & Technology

SOCIETY AND TECHNOLOGY
TRENDS
IN FLANDERS

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PREFACE

The Institute Society and Technology develops activities for the Flemish parliament, which are relevant for both society and technology. One important mission of the IST, as a research institute in a rapidly changing world, is to keep an overview of the current developments, trends, and evolutions. It is therefore appropriate to regularly and thoroughly examine these trends from the perspective of a possible optimization of the relevance of the work that can be done. On the other hand, the societal, scientific, and technological context is not evolving that rapidly either. There are no yearly revolutions in trends. This trend note is in fact a revision of the one that has been put together in 2008 and an addition to it, but as such, in its observations about societal trends, it does not constitute a rupture with respect to its predecessor.

Besides the overview of current trends, this note also contains a discussion of certain important 'weak signals' that might announce future long-term developments. Weak signals obviously connected with the trends listed in this note, will be discussed under the heading "Links with other relevant trends". Four weak signals without a clear link with the nine trends of this note will be discussed in a separate chapter at the end of the document.

This document presents nine relevant trends situated at the interface of society, technology, and science, and having a societal impact on Flemish areas of competence. This note goes more deeply into the scientific and technological aspects, their relationship with other trends and their policy relevance. The information in this trend note constituted an important source of inspiration for the team that put together the IST Working program.

Have a good read.

Robby Berloznik, director IST

THE TRENDS AT A GLANCE

1. Technologization of medical science and health care
2. Changing approaches in mental health care and the increasing importance of brain sciences and pharmaceutics
3. Technologization of food production and growing interest in organic food
4. Mitigation strategies with regard to climate change: energy and clean technology
5. Growing need for sustainable mobility and cargo transport
6. Increasing opportunities of ICT for inclusion
7. Maker culture, networks, collaboration, open access
8. Safety, privacy, and copyright issues are gaining importance
9. Cross-medial character of culture, media, leisure activities

METHOD FOR DRAWING UP THE TREND NOTE

This trend note is based upon the trend note of 2008, the written input of international technology assessment experts, and a horizon scanning of a series of electronic sources.

The international experts who added content belong to the partner institutes of the IST, parliamentary technology assessment institutes that support their parliaments with information and advice on issues in the fields of science, technology and society:

Sergio Belucci (Director TA Swiss, Switzerland)
Lars Klüver (Director Danish Board for Technology, Denmark)
Tore Tennoe (Director Norwegian Board for Technology, Norway)
Arim Grunwald (Director Büro für Technikfolgenabschätzung des Deutschen Bundertags, Duitsland)
Jan Staman (Director Rathenau Instituut, The Netherlands)
Rinie van Est (Trend watcher Rathenau Insituut, The Netherlands)
David Cope (Director Parliamentary Office for Science and Technology, Great Britain)

Michael Nentwich (Director Institut für Technikfolgenabschätzung, Austria)
Walter Peissl (Institut für Technikfolgenabschätzung, Austria)

We referred to the following sources:

Mediargus: Database of newspaper and magazine articles published in Belgium
Z-Punkt Trend Database: German data base with trend discussions
Innovation Watch: Collection of links and posts by David Forrest, the Canadian consultant in strategic management, who recently started to collect trends too, in Futurepedia.
FutureEdition: of the Arlington Institute
Club of Amsterdam: Journal and blog
BBC News Science & Environment: online news coverage
Wired Magazine: online news coverage
CORDIS: European scientific news
Mailinglists: from the World Future Society and World Futures Studies Federation
Twitter netwerk: personal network of 50 professional futurists and trend analysts

The authors of this note also commissioned an exploration of less visible trends, the so-called "weak signals". These are less apparent signals, so far, which might, however, become more important in the long run. That is what makes it worthwhile to start thinking about them right now. Pantopicon, a studio for future orientation and vision development, carried out the explora-tion of the weak signals, partially based upon inspiration coming from conversations with the following people:

- Jan Van Den Bergh (i-Merge, Holaba, Boondoggle)
- Alain Thys (Futurelab)
- Lorin Parys (Uplace, FlandersDC)
- Dirk Vananderoye (Philips Design)
- Fons Van Dyck (think.bbdo)
- Serge De Gheldere (Futureproofed)

SELECTION CRITERIA

This trend note brings a diagnosis of a few big tendencies that have become apparent recently. Our society shows developments in various fields and evolutions that may greatly differ in scale and amplitude. Of course, there are more trends than the few societal trends that the present note describes and discusses. A selection has taken place on the basis of what we mean, within this framework, by 'trend', and taking into account its spread over various societal subfields, its scale, its societal relevance, its connections with scientific and technological aspects, and its policy relevance. We ignored short term and superficial phenomena, such as fashion and design trends. Only mid long and long term tends have reached our short list.

The Z-Punkt database defines a trend as a permanent and continuous development, as opposed to cyclical changes, fluctuations or new evolutions. An important characteristic of trends is their structurally changing impact, making evolutions take place within (sub) systems. Originally the term has been used in market research and economic statistics, but nowadays, it has become more widely used.

Trends can manifest themselves in different fields. They can be more or less encompassing, broad or narrow, deep-drawing or merely superficial, ... In this note, we selected trends in three societal areas selected for their significance for various meso and micro trends. Within each of the three discussed main areas, we present trends with a connection with scientific and technological evolutions and their societal implications

The first main area is health, a "soft" sector where an increasing technologization is predominant. We discuss the technologization of medical science and the growing interest for mental health. Some of the trends that are dealt with in the broad field of environmental safety, where reducing the ecological footprint is the main issue, have also connections with health: food, mobility, and mitigation strategies for climate change. In the third main area, information and communication technology, the impact of the growing digitization on social relationships plays the leading part. "Mitigation strategies", one of the major trends discussed under this heading, have an obvious link with environmental safety too. The four other ICT-related trends have to do with social relationships and attitudes that go together with the increasing digitization.

1. TECHNOLOGIZATION OF MEDICAL SCIENCE AND HEALTH CARE

1.1. Societal trends

The economic importance of medical technology in the industrialized world should not be underestimated. Societal factors, such as an ageing population and higher health awareness, result in a high demand for medical applications. In addition to this, the interdisciplinary character of medical technology allowed considerable progress and helped in creating a growing and prospering sector.

In medical technology, more than half of the turnover is coming from products that are less than three years old. The pressure to innovate is extraordinary. Product cycles in the pharmaceutical industry are longer. This innovation pressure reveals itself in the high competitiveness of the industry, which urges the academic and industrial world to cooperate within international networks.

The available technological applications have a huge impact on a patient's medical history. We think of applications for intensive care, diagnoses with high definition 3D rendering of the body, routine pacemaker implantation, minimally invasive or remote surgery, pocket laboratories, e.g. for diabetics, or electronic information cards for patients. Patients often recognize "how lucky they have been" that a certain therapy or diagnosis is available at all nowadays, whereas ten years ago, this might not have been the case. On the other hand, patients also feel confronted with a 'cold' medical science, which tends to reduce them to separate bodily processes, without taking care of their experience as a person.

Neurotechnological applications have not become prevalent yet but are not insignificant either. They allow us, for example, to remotely monitor vital functions in patients. There also exist hearing prostheses, microchip implants for nerve stimulation, neurally control-led prostheses, brain-computer interfaces and eye sight improving chips. Too rapid neurotechnological developments can have far-reaching technological, social, and economic implications. Connecting man and technology (literally!), thanks to the converging bio, nano, information, and cognition technologies (studied in earlier IST-projects) holds out the prospect of extending the scope of medical science from cure to "human enhancement". All kinds of issues about the desirability and acceptability of different aspects of such forms of enhancement make clear that medical technology is not only a matter of basic research and applications but also of ethics and morality.

Growing possibilities imply growing responsibility. Medical technology will give us a certain amount of control over the most fundamental characteristics of a person. Medical technology goes to the heart of our deepest human perceptions and experiences, no matter if we talk about brain science, fertility, pregnancy counselling, birth, the treatment of illnesses, or the approach of a physical or mental defect. Bio-political questions deserve particular attention, for example questions about the socio-political consequences of the biotech revolution or the acceptability and desirability of interventions in the human consciousness, taking place in an educational or psychiatric context, or the ethical issues with respect to the technologization of medical science. As new possibilities become visible, the question will arise how, for whom, and to the benefit of whom those possibilities will be developed and applied.

1.2. Scientific and technological evolution

Biotechnology, medical technology, pharmaceutics and health care are characterized by an important growth rate. Medical technology is based on very diverse disciplines, such as information science, biotechnology, telemetry, signal processing, optics, pharmacology, materials science, microtechnology, nanotechnology and cybernetics.

The continuous progress in medical sciences is based, amongst others, on developments in microsystems, microelectronics, micro-optics, micromechanics, signal processing, sensors, actuator engineering and robotics. The latter facilitate minimally invasive surgery. Medical imaging is very relevant for diagnostics and basic research. The most important methods at this moment, in addition to the classical x-ray, sonogram, and endoscopy are computer tomography (CT), magnetic resonance imaging (MRI), and positron emission tomography (PET), which provide detailed 3-dimensional images of body tissues.

Medical (red) biotechnology backs up the development of new medicines and vaccines. The identification of genetic pathogenic mechanisms, aiming at the development of appropriate therapies with genetically modified micro-organisms and stem cells. Biotechnology is a key technology that turned medical research based upon the principle of "trial and error" into goal-oriented research. Proteome research (into the interactions of all the proteins in an organism) is the next big thing after decoding the human genome and after the establishment of a real genetic sequencing industry. All these disciplines need to process and manage enormous amounts of data and therefore depend more and more on bioinformatics.

Bioinformatics bundles informatics, statistics and mathematical methods in an attempt to answer questions about (molecular) biology. We distinguish fundamental bioinformatics (to resolve basic research issues in biology) from applied bioinformatics (for the analysis and evaluation of the collected data).

In the decades to come, we expect information technology and biotechnology to converge more and more, in biocomputers, biochips, organic information technology, designer babies, bioprosthetics, etc. Neurotechnologists develop more accurate interfaces between the human nervous system or brain and technological systems. Neurostimulation, neuroprosthetics and brain-computer interfaces are central research topics. The Blue Brain-project in Switzerland, which tries to unravel the hardware of the brain, in order to artificially reproduce it, is an important research project in this field.

Quite another dimension of the technologization of the medical sector is 'e-health', which refers to the use of information and communication technology in health care. Diagnosing, preventive medical counselling, follow-up and education increasingly take place online. Sis-cards (social security card) and electronic biomonitoring also belong to the new electronic health applications.

1.3. Links with other relevant trends

- The enormous progress in biotechnology and life sciences also influences other disciplines than only medical science. In this trend note we pay attention to its impact in the food industry and in environmental safety too.

- That our population lives longer is not only the effect of better hygiene and healthier food, but also in part of medical progress. And life expectancy is still rising. Added to decreasing birth rates, this leads to an ageing population, which can be felt in various areas: in the leisure industry, the course of people's careers, housing arrangements and living facilities, intergenerational relationships, etc.

- The rationalization of medical science entails an increasing alienation of the body, which explains in part the popularity of alternative and more holistic health approaches.

1.4. Policy relevance

The technologization of medical science brings about new possibilities in terms of capacity, which may have a real impact on public health in Flanders. The economic and demographic impact of this trend is important for the policy areas 'Welfare' and 'Public health' and for 'Housing policy' and 'Care'. They must think about the way new medical technologies in Flanders can be applied and put into service. Questions arise as to the cost of the renewal of medical equipment and infrastructure in nursing institutes, as well as to the cost

(and the benefits) of new forms of treatment for health and care insurers. The ways in which new medical technology can be put into action in prevention and the opportunities for expanding e-care and e-health are important points of interest. There is a demand for better and better medical technological applications, but at the same time specific applications and possibilities arouse resistance. The government can guide the relationship between citizens on the one hand and the promoters of modern medicine on the other. Finally, this trend is also of great importance for the policy area 'Science and innovation', which supports research and developments in medical health.

2. CHANGING APPROACHES IN MENTAL HEALTH CARE AND THE INCREASING IMPORTANCE OF BRAIN SCIENCES AND PHARMACEUTICS

2.1. Societal trends
Worldwide, stress and depressions are an expanding phenomenon and Flanders is characterized by a high suicide rate and an equally high incidence of depression. As far as the number of psychiatric hospitals bed per 10.000 inhabitants is concerned, Belgium is number two worldwide, behind Japan. On top of that, an increasing number of patients receive ambulatory care. The number of psychiatric care centres and sheltered housing initiatives illustrates the trend towards more extramuralization.

There are the so-called 'anxiety disorders', mood and affective disorders, such as depression, dysthymia or bipolar personality disorders. Alcohol, drugs and medicine abuse can be a cause or consequence of psychiatric complaints. Patients often suffer from more than one disorder at a time: comorbidity. People with a poor mental health more often suffer from other problems too, such as back troubles, asthma or heart conditions that hamper their social functioning.

'Mental health' is an encompassing concept. In the industrialized world, more and more people need help from psychotherapists and other counsellors. That has something to do with both the high pressure and stress at work and in daily life, and an approach of 'body and mind' as a connected whole. As the number of mental health complaints increases, people more easily tend to make an appeal to medical solutions. Personal and social problems are regarded as medical problems.

At the same time, the quality of the diagnostic process in psychiatry is improving. Particularly brain problems in older people and behavioural disturbances and personality disorders in young people receive more and more attention. Medicines already exist to treat several new syndromes that have only been discovered in the past decades. However, the pharmaceutical treatment of behavioural disturbances in children and adolescents, such as ADHD, is questioned. In the research into brain illnesses and loss of memory affecting our ageing population, the hunt for efficient therapies is in full swing.

The global consumption of psychiatric drugs is rapidly growing. Antidepressants are the most commonly prescribed drugs in the world, with a sales figure of over 13 billion dollar. The abuse of all kinds of prescription drugs as recreational drugs also calls for attention. We only need to think of the Ritalin traffic among school children and students

Mental health problems constitute an obstacle to active participation in professional life. So they have an immediate impact on someone's income, social participation and sense of dignity, but they have larger economic repercussions as well. Employers too face the challenge of keeping watch over the mental health of their employees. Sickness absence due to depression or stress-related syndromes has an important impact on productivity.

2.2. Scientific and technological evolution
The medical scientific research into the aetiology (the underlying causes) and treatment of mental illnesses is very productive and evolving at a rapid pace and brain sciences and pharmaceutical industry play an important part in it. The improving pharmaceutical technology has lead to the development of a whole range of new and more effective medicines, with fewer side effects. New drugs for mental health not only become more rapidly available, they also get approved faster than has been the case before.

Biological sciences and genetics offer perspectives on the possibility to prevent certain hereditary psychiatric illnesses, such as schizophrenia. Direct genetic interventions will also become possible, for instance for vaccines against addictions or for the treatment of serious disorders, such as psychopathy. Expectations run high on medical science and complex ethical questions arise.

The pharmaceutical development and the progress in genetics might support a medical-psychiatric approach and curative treatment. In the meantime, other approaches too, which focus on support and care for people with serious and chronic mental problems that could not be cured so far, are gaining importance.

2.3. Links with other relevant trends
- There is an obvious link between this trend on mental health and the ongoing technologization of medical science in general, as we already stated above, under trend number 1.
- The ageing population has a considerable impact on this trend. One may expect an increase of brain illnesses, proportional with the growing number of highly aged people. There is a huge demand for treatments that offer respite or recovery.
- The growing medicalization of mental health is closely connected with the technologization of medical science, which entails a growing alienation of the body.

2.4. Policy relevance
It goes without saying that his trend is directly relevant for 'Welfare', 'Public health' and 'Family'. The way in which the government interprets and approaches mental health and health care, can both strengthen or weaken the positive as well as the negative aspects of this trend. In addition, the government can play a role in defining the context for the current commercialization of mental health care. Through its support, the policy area 'Science and innovation' can promote scientific research in brain sciences, genetics and related disciplines in Flanders. The development of new medication for the treatment of psychiatric complaints can give the pharmaceutical industry a real boost. In addition, sickness absence as a result of mental problems has an economic impact too. Therefore, this trend is also relevant for the economic policy.

3. TECHNOLOGIZATION OF FOOD PRODUCTION AND GROWING INTEREST IN ORGANIC FOOD

3.1. Societal trends
Because of the pressure of time, smaller families, changing role patterns, and the growing demand for flexibility, both at work and for entertainment, convenience food has come to form an important part of our eating habits. There is more and more convenience food, easy to prepare and easy to consume: from industrially processed products and flavours through complete ready-to-eat meals.

Industrially processed food is dominating the shelves. A big majority of the population in developed countries uses this kind of products on a regular basis. The growing interest in health issues means that consumers also expect a better nutritional value and health benefits form these industrial products. That is an important stimulus for the functional food market.

The acceptance in Europe of genetically manipulated ingredients is growing slowly. Nevertheless, a vast majority of the public in Europe remains sceptical about genetic manipulation in general. Large sections of the population disapprove of the patent regulation for genetically modified seeds. Consumer confidence in food safety becomes a more and more important factor for the food industry, all the more in the light of events such as food scandals and epidemic diseases in cattle breeding.

Together with the technologization of food production, we see a growing demand for organically grown food.

The increased environmental awareness and first of all the continuously growing interest people (e.g. young parents) take in health issues feed this trend. After a dip during the first years of the new millennium, the sector returned to growth. Organic food no longer exclusively belongs to the specialized niche of whole-food but is almost in every shop, particularly in the big supermarkets. The offer is expanding, both in variety and in quantity.

3.2. Scientific and technological evolution

Food production increasingly becomes a matter of technology. The food production industry uses technology to process and preserve its convenience food. Furthermore, better transportation and storage conditions strengthen the trend towards convenience and functional food and allow to better preserve the functional ingredients and nutritional value. The emergence of functional food, having an extra active ingredient in addition to the normal nutritional value, is based on progress made in biochemistry, medical sciences, pharmaceutics, genetics, and nanotechnology.

The combination of genetic research and food science, with new insights in metabolism, even gave rise to a novel research area, called nutrigenetics, where the interactions between food and the genetic layout of the consumer are being investigated. The ultimate goal is the development of designer food tailored to the genome and metabolism of the individual consumer. It is obviously far from being reached, but the idea to interfere with the composition and the nutritional value of our food is finding wider application. 'Nutraceuticals' are foodstuffs with medical or therapeutic properties. We already have cholesterol-lowering margarines, bread with enriched nutritional value and probiotic yoghurt. Lots of products contain added minerals, vitamins or omega-3 fat acids. The food-drug borderline is becoming more and more vague.

In addition to its part in industrial food processing, biotechnology also finds applications in cultivation and breeding. In genetically modified plants, specific characteristics are being introduced in a more accurate

way than traditional breeding techniques used to allow. The best known example is that of modified corn. This plant protects itself against insects. Other modifications should increase crop yields and climate resistance. Since 'genetic engineering' brings about radical changes in long-term processes, it is difficult to oversee all its implications. As a result, it is highly controversial. Antibiotics resistance, allergen substances, uncontrolled spread of modified plants in the environment, possible health damage, … are just a few of the risks that have to be taken into account.

Finally, also the technologies for accurate food safety testing are continuously in development. The enable us to detect the smallest amounts of genetically modified material or harmful substances can be detected. We may even say that most of the recent food scandals only could have been brought into the open, thanks to the technological progress in the field of food safety. Otherwise, the problems would have remained unnoticed.

3.3. Links with other relevant trends

- The increasing attention for dietetics is connected with an equally increasing attention for health in general. A continuous concern for the impact of our environment and the food we eat is part of it. As a result of the medicalization of life, consumers get used to food and pharmaceutics growing ogether.
- Competitiveness in a globalizing world and large-scale food industry, agriculture, and stockbreeding are contributory to the processes and techniques involved.
- The feverish pace of modern life — at the same time one of the factors that explain the increasing use of convenience and functional food — is closely connected with developments in the field of information and communication technology. In addition, these technologies also offer citizens a channel to find information about eating habits and health.
- Food industry, agriculture, stockbreeding and fishing are industries that are not only affected by

health trends but also by environmental safety.

3.4. Policy relevance

Because food is directly and closely connected with health, it is obvious that this is an important trend for 'Welfare', 'Health', and 'Family'. The eating habits of the Flemish population are changing little by little. Governmental information campaigns can help citizens in making good food choices. The government also has an impact on industrial practices, both on production and on commercializing and distribution level. Because local organic agriculture is gaining popularity as a counterbalance to the international food industry, it is also a meaningful trend for agricultural policy. The increasing consumption of food products with active supplements in sports brings the trend to the attention of the policy area 'Sports' too.

4. MITIGATION STRATEGIES WITH REGARD TO CLIMATE CHANGE: ENERGY AND CLEAN TECHNOLOGY

4.1. Societal trends

The world population is growing and so do energy consumption and environmental use per capita. A lasting growth of the (economic) activities can be expected, as well as an increase of the energy intensity for the various technologies and activities involved. As a consequence, the future of our global climate is rather dark. Only if the growing ecological awareness will bring about sufficient structural and attitude changes, will we be entitled to any hope of limiting the damage done by global warming.

Since the Brundtland commission report, the concern about our environmental future and climate change have become societal and political facts. Ever more attention is paid to the necessity to turn away or at least spread the risks and to split the cost of it.

The economic cost of a global warming of 2,5°C is estimated at an amount between 1 and 2% of the GDP of all the OECD countries (Rotte, 2001). Hence the necessity to regionally mitigate the adverse con-

sequences of global warming. Consumption patterns, such as an increased demand for drinking water and food, give rise to more land use and an extra need for new facilities for agriculture and cattle breeding and thus a growing ecological footprint. The growing need for living space and energy, as well as the increase in passenger and cargo traffic, the increase in aviation activity and the industrial boom all have an impact on climate evolutions.

Climate change will have far-reaching consequences for our societies, certainly in agriculture and forestry, but just as much in public health (new diseases), soil hydrology and water management (changing precipitation patterns) and energy consumption. Not only climate change itself, but also the strategies to mitigate its adverse consequences will strongly affect the way of living in developed countries, in terms of purchasing power, consumption, and comfort.

4.2. Scientific and technological evolution

The very big majority of scientists agree with the observations and forecasts of the IPCC: during the following decade, global temperature increase and climate change will continue, even if all Kyoto and post-Kyoto strategies would have been meticulously met.

Within the research into environmental safety in the everyday environment, climate change pushes the other subjects into the background. The ever increasing processing power of our computers supports the research into the likely climatologic evolutions, by allowing more and more complex and detailed models to be tested. Moreover, the resolution of the models increases along with the growing amount and greater accuracy of the observations.

Research and development, and demonstration of clean technologies, energy efficient production processes, and other green technologies are gaining importance. We have ICT based green technologies at our disposal for production processes, with energy saving technologies, waste processing and product recycling technologies, product technologies, with ecological

designs that do not require a lot of resources, and product distribution technologies.

Because of the causal link between energy production and climate change, research and development in the field of renewable energy, such as solar and wind energy, hydropower, etc. receive particular attention at this time. The available technologies become more and more efficient and less expensive. From a merely technological point of view, today already, each family could provide in its own energy needs, by making use of renewable energy sources, without having to sacrifice any personal comfort. In the meantime, work is also done to develop alternatives for the transportation industry (e.g. by replacing gasoline and diesel engines).

4.3. Links with other relevant trends

- The causes of climate change often affect other aspects of environmental safety too. In most of the cases there is more at hand than merely local problems, such as fine dust (due to the use of fossil fuels for transportation or in the industry), noise pollution from airplanes, or road traffic.

- It becomes more and more obvious that sustainability also constitutes an important economic factor. Therefore, more and more companies, when developing their strategies, take into account the ecological factors.

- There is an explicit connection between this trend and the developments in the food industry. Land use, distribution patterns, the agro-industrial production of biofuels, all have an impact on our climate.

4.4. Policy relevance

The relevance of this trend for the policy area 'Environment' is obvious. Climate change is a phenomenon that requires an international, European and regional answer. The problem is so all-encompassing that it touches to almost all partial aspects of life, making it relevant for almost every policy area. It is a key factor in the approach of energy and mobility

issues. Research into clean industrial and domestic processes and the development of the associated technologies, green ICT and its applications, and a public debate on what might be a desirable approach all remain absolutely necessary.

5. GROWING NEED FOR SUSTAINABLE MOBILITY AND CARGO TRANSPORT

5.1. Societal trends

Mobility, the ability to move from one location to another, is of vital importance in contemporary society. Mobility determines part of the social world and quality of life of the individual. The transportation industry, both of goods and passengers, keeps expanding. However, in spite of continuously increasing fuel prices, road traffic becomes more problematic by the day: growing congestion, increasing number of road traffic victims, negative impact of motorized traffic on public health. Following the economic principle of 'just in time', the lion's share of our cargo transportation circulates over our Flemish roads, one of the busiest crossings in the densely populated heart of Europe. The construction of new roads has contributed to the sealing of the soil surface, creating problems for the rainwater drain, to fragmentation of the landscape and smaller and smaller, interrupted and cut off animal habitats.

So, the attention for clean transportation technologies is not only motivated by the share of the transportation industry in the anticipated climate change but also by locally relevant concerns with respect to the environment, health (for example the fine dust problem in cities, the measures in London to keep traffic out of the city centre, at the occasion of the Olympic Games, and the Lange Wapper controversy). Since they also constitute an important economic issue, mobility and the organization of distribution channels too receive lots of attention. The higher demand for cargo and passenger transportation is both a result of the economic activity and a potential bottleneck, capable of bringing that economic activity almost literally to a standstill.

Air transport is still a growing industry. One might have

the impression that this form of transportation in the industrialized part of the world, has reached the limits of its capacity. Nevertheless, these limits are further put under pressure, for instance by the instauration of a common European airspace and the increasing use of regional airports. Not only climate activists but also more moderate opinion leaders insist on lowering the ecologic pressure of air transport on the long term.

5.2. Scientific and technological evolution

Various technologies contribute to a cleaner and more sustainable mobility in both passenger and cargo transportation.

The ecologic cost of fossil energy sources stimulates competitiveness in the development of new power technologies. Biogenetic fuels constitute a provisory solution for the mid term, but in the long run we have to consider alternatives such as hydrogen and fuel cells. As far as power technologies are concerned, there is room left for surprises and breakthroughs, especially in the field of electrical storage (batteries, capacitors). We will witness a differentiation in this domain in the years to come and various power technologies will coexist for some time. Hybrid technologies combine the benefits of different technologies within one and the same vehicle. Gases, such as LPG will go on being used and, on a global scale, biogenetic fuels gain importance.

Modern telematics help us to better map and control traffic flows. They are expected to play an important part in toll-collection, to eventually save energy and protect our climate. Novel information and communication technologies enable the development of monitoring and analysis platforms, where vehicles communicate with the control systems. They consider traffic flows as a complex system, in which several elements have mutual relationships, that can be controlled. Automatic speed limiting devices and real-time traffic information in individual vehicles, supported by such technologies, can have an impact on transport-related pollution.

The combination of different transport modes is not only relevant for passenger transport, where public

transportation has to be promoted. Through the use of RFID chips, railroad transport, shipping and aviation too can benefit the intermodal cargo transportation and help it grow. That kind of identification chips enable the development of new, fully or partially automated systems for goods conveyance, including transfer stations, interfaces surface-underground and vice versa.

5.3. Links with other relevant trends

- There is an obvious connection with trend 4, where mitigation strategies against climate change are discussed.

- The globalization of commerce and the development of a world economy depend on transportation systems. The growing share of the knowledge economy, where no big amounts of products have to be transported any more, will reduce the pressure on mobility.

Not only the transportation system of the future will be smarter. As far as a city itself can be considered as a system too, the tendency will also manifest itself on city level: various structures can communicate and develop a memory. From road surface to traffic lights and information signs, from house fronts and shop-windows to mobile phone networks: lots of systems in the city people interact with on a daily basis, start to develop a memory, communicate better and better and learn to adapt themselves in a smart way to the dynamic needs of their users, both groups and individuals. The smart city of the future will be a hybrid system of interactions between people, physical structures and technolo-

gical and social networks. In the same way as social networks have had a far-reaching impact on the print, music and video industries, the urban web itself will be able to change into a multi-layered, information-rich, collectively mouldable medium.

City applications of intelligent technologies open up lots of possibilities to better organize city life and adjust it to the needs and desires of their inhabitants. One can think here of the personalization of services, efficient use of urban mobility infrastructures, energy supply and sustainability of building, but as well of food supply and purification of the air. Examples of small-scale experiments and applications are: vehicle to grid integration (which allows electric cars to efficiently make profit of energy peaks, to recharge their batteries) and trash track tags, to make waste flows more transparent (see for example MIT SENSEable City Lab), etc.

5.4. Policy relevance

The policy areas that take an interest in this trend are not only 'Mobility' and 'Town and country planning'. The search for clean transportation technologies and efficient solutions for traffic congestion certainly constitute important points of interest. The impact of mobility on economy is undeniable: Flanders as logistic centre, smooth commuter traffic, road maintenance and monitoring. So, from that perspective too, this trend deserves attention within the policy areas 'Economy', 'Work' and 'Housing policy'. Transportation and traffic often hold an important place in the analysis of energy and climate issues and also have an impact on the local environment. Questions that transversally interest various policy areas are: to what extent can technology be seen and used as a real remedy or is it only a makeshift measure, and how can we realize a better and cleaner mobility.

6. INCREASING OPPORTUNITIES OF ICT FOR INCLUSION

6.1. Societal trends

Although work is done to develop better interfaces for the interaction of persons and ICT, some members of the population keep having problems to make use of these technologies. The digital gap, discovered more than a decade ago, still exists. The challenge is not only to come to a better balance in the use of ICT between developed and less developed countries, but also within the industrialized world. Bridging the digital gap can have an important positive impact on opportunities, capabilities and active participation in society for specific sections of the population, such as senior citizens, handicapped people, migrants, ...

Whereas the digital gap was originally understood as a yawning difference in the (physical) access to ICT, nowadays, in the industrialized part of the world, the skills to handle these technologies have also become an important dimension of it. The ability of individuals to deal with new media and technologies increasingly

determines their success in society. More and more, technological media fulfil a socially structuring function. The fact that being acquainted with the use of ICT is a precondition to fully participate in society means that several disadvantaged groups are facing serious problems. At the same time, the opportunities offered by ICT can also be interpreted as an incentive and a helpful instrument in the integration of these communities.

Therefore the 'digital gap' not only refers to the divide between users and non-users of digital media and communication but also to the knowledge gap and the important difference in social integration between both groups. In addition to that, the competence level in the use of ICT is strongly diverging, even in Flanders. Diverse applications within e-health, e-democracy, etc. confront the less familiarized users with huge problems, although they have been developed precisely to simplify and improve processes and promote the access to health care and the participation in democratic society.

All kinds of measures have been proposed to develop the digital skills of disadvantaged groups and to make use of ICT to improve the living conditions of the individuals belonging to these groups. Small-scale, local projects, targeted at very specific groups appear to have the greatest actual impact.

Small, local digital literacy projects not only aim at improving the skills of individuals but also promote local integration and social cohesion. Moreover, as far as the older sections of the population are concerned, the connecting power of social (network) applications is regarded as a considerable helping factor, the success of 'SeniorenNet' being an obvious example. So, digital literacy is not only a matter of education and helping children and youth develop the necessary skills, but also of specially adapted applications and ways of instruction for other sections of the population.

6.2. Scientific and technological evolution

The developments and possibilities of information and

communication technology (ICT) are growing exponentially. The applications of such technologies seem endless and thanks to the high innovativeness of the industries, they produce a continuous flow of innovation. Digital data processes have more and more communication options and offer a faster access to information and faster information processing. Although the world wide web has only become accessible to the public at large, some 20 years ago, in 2007 it already had 1,1 billion users.

The internet is not the only example of technological developments in the information society. More and more of people's interactions with their bank, with care providers and government administrations go digitally. ICT affects the way we work on the floor, but also by offering new opportunities such as teleworking. As a matter of fact, ICT has pervaded all spheres in society and in the individual's life.

6.3. Links with other relevant trends

• This trend has a connection with the economic and social trends in employment, education and participation. Of course, digital literacy is not the only factor affecting the chances of disadvantaged groups. The economic, social and cultural capital of the members of these groups is determined by other factors too.

• At the same time, this trend has important implications for the methods used in citizen participation processes organized by government administrations and research institutes.

• Combined with trend nr. 7 (maker culture) and trend nr. 9 (cross-medial character of culture), this is a trend that greatly affects the 'uses and gratifications' of culture.

Globalization, individualization, continuous communication and connectedness with data, networks that by far exceed Dunbar's number (the average maximum of 148 persons with whom one can maintain a certain relationship), hyperconsumption, mass competitiveness, the loss of traditional social bonds (religion, trade union) have created new needs in terms of community building and social safety. Whereas before, lots of people belonged to a limited number of networks, mostly physically located and activity-related, numerous technologies have given access to an unlimited number of networks. These networks are based upon all kinds of relationships, thematically or not, characterized by various degrees of involvement (long term, ad hoc, ephemeral but intensive). Members of such networks may share the same musical preferences, ideology, confession or political conviction, an interest in virtual worlds, or simply work together, for instance on a new software application.

All kinds of technological platforms help us manage and master our relationships, in real-time or in an asynchronous way, and not limited by geography. Thanks to the success of smart phones and 'anywhere, anytime' internet connections, 'always in touch' has been made into reality. Nevertheless, it seems as if virtual contacts, made possible by the new mobile technologies, simply support real physical contact. Information flows and physical flows of people have become more and more strongly intermingled. According to some observations, in some cases, the possibility proves to foster the need to visit one or another neighbouring tribe. It also seems that the number of people that feel loosely but firmly connected to do something together or share something has never been larger than it is today.

It is necessary to make these opportunities accessible to all sections of the population, precisely to prevent the huge potential and the many identity-affection applications from widening and deepening the digital gap.

6.4. Policy relevance

The digital gap is a point of interest that directly has to do with equal opportunities. Besides, it is obvious that fighting the digital gap can contribute in a very helpful way to poverty reduction. The digital gap will also receive interest within the policy areas 'Education', 'Youth', 'Culture', and 'Media'. Wherever the gap becomes apparent, say at school, something can be done about it. Children who do not have a computer at their disposal at home, perform less well at school. At the same time, it is precisely the responsibility of our education system to familiarize these children with the information technology we have at our disposal in current society. Given the fact that what is learnt in the cradle lasts till the tomb, this issue also carries with it an important responsibility for our youth policy. That traditional media can promote an easy use of digital media and other information technologies is not a

contradiction. Precisely those traditional media can make lagging groups aware of the possibilities of such technology in their own life.

7. MAKER CULTURE, NETWORKS, COLLABORATION, OPEN ACCESS

7.1. Societal trends

The existence of groups of actively co-creating individuals has brought into being a new divide between the users of ICT. Readers or 'passive consumers' surf on the web, consult blogs and wikis, look at videos and screencasts, listen to podcasts, etc. A second kind of user is rather to be regarded as a participant or active contributor, who will herself, or himself make contributions to blogs, wikis and other websites or give ratings and write comments. The active user is sharing links by using online bookmarking services and brings about

connections with others through instant messaging, sms, microblogging and social network sites. The third type is the creator or proactive maker, who creates his own content, who shares and who contributes to the creation of instruments to have links and discussions with others.

The participatory and contributive spirit that fosters this development is not only important for the internet but also for the way people experience democracy. Moreover, it creates opportunities for a direct democracy, for the course of market transactions that are increasingly carried out by peers and multiple interested parties, as well as new attitudes towards learning and gathering credentials. The newly defined group of so-called prosumers, amateurs with professional needs, can also be considered as a consequence of this trend.

Citizen journalism and citizen science are two important social phenomena resulting from this trend. As a matter of fact, we observe that collaborative and creating attitude more and more often outside the internet context too. The existence of a group of active, creating users is not an exclusive ICT phenomenon. We observe the same "maker culture" in the material world too, in both a lo-tech and a hi-tech version (3D-printing) of do-it-yourself. Nevertheless, we must recognize that passive consumption and flagrant apparent indifference remain the dominant pattern.

7.2. Scientific and technological evolution

The evolution of the so-called web 2.0 is not that recent anymore. Whereas the early internet used to be a hyperlinked 'digital library', it is becoming more and more a platform for collaboration and interaction. Communities are created and social networks built and maintained. In addition, collaborative software enables its users to collaborate in concrete ways, without being bound to the same physical location.

The ICT-applications that are at the basis of this evolution include:
- Social network technologies, such as Facebook or LinkedIn

- Tagging of content, in order to make it possible to be linked to other related content
- Social bookmarking, to enable sharing of links and sources on the web, such as Delicious
- File sharing through online creation, storage or sharing of all kinds of formats, and not only pictures or video, on sites such as Picassa or YouTube, but also presentations and documents, e.g. on Slideshare or Issuu
- Real-time communication with instant messaging and chat, web meetings, and live broadcasting, or asynchronously through e-mail.
- Collaboration on the net, in jointly creating documents, presentations, and mind maps, with applications, such as Googledocs, Etherpad, or more full-fledged platforms to collaborate on projects (e.g. Basecamp).
- Reading or writing blogs and commenting on them
- Podcasting (to create mp3-files and/or listen to them)
- Microblogging as in the well-know example of Twitter
- Edge feeders, aggregators and reconstructors, such as RSS

The Linux boom and the whole open source movement too have been important driving forces behind the concept of active co-creation, as opposed to passive consumption. This movement insists in keeping the source code of operating systems and other software accessible to the user community, in order to allow those with sufficient skills to make modifications. In addition, the use of peer-to-peer networks to share data, information or knowledge, is also an important motive to develop a group of active users. The fact that this peer-to-peer infrastructure in distributed networks is becoming technologically robust considerably supports this development.

7.3. Links with other relevant trends

- This trend has a connection with trends in health, where self-diagnoses, consultation and sharing with fellow-patients and other interested people on the internet has become an important activity, which

might enable new forms of mental health support, among others (see trend nr. 2).

- This trend can also be observed in the energy industry, where the term "prosumer" has first been introduced to refer to a consumer producing his or her own energy (for instance through solar panels on the roof of the family home).

- Combined with trend nr. 9 (cross-medial character of culture), this is a trend that strongly affects the 'uses and gratifications' of culture.

WEAK SIGNALS:
Prosumption, the consumer becomes a producer and a professional

For a long time, consumers had no choice, except for the offer as it was defined and produced by the industry. By doing so they could exercise some influence on the market and the products and services it offered, albeit most often indirectly. Since, technological developments such as 3D printing, rapid prototyping, fablabs and user friendly design tools have put design and production capabilities in the hands of the consumer. He or she evolves form a consumer to a prosumer, along a continuum reaching from mass-customization on the one side, via design and production of unique pieces, thinking along with the producer and modifying existing designs according to personal requirement, through designing (or having designed) and producing, thereby supported by a whole new battery of technological possibilities.

Mass production is no longer the only way to develop and manufacture a certain solution, in an economically viable manner, however massive or limited the production may be. Other changes in the economic structure have become possible too. One could imagine for instance the geographical spread, from design, production, marketing to consumption, to become smaller and smaller, tending in some cases to zero-logistics. Some consider this as a lever to a more sustainable society, while others understand it just the other way round. In one of the 'standard' future images, more and more prosumers create or download designs, share them on-line and eventually 'print' at home what they need or want. Besides, the first printers capable of printing their own components are in the pipeline.

On top of offering the possibility to produce products and services on a local level, prosumption also includes the redefinition of existing economic frameworks, community relationships and responsibility structures. Not only products, but also energy, knowledge and services belong to the conceptual framework with regard to prosumption.
Behalve de mogelijkheid creëren om goederen en diensten op lokaal niveau te produceren, omvat prosumptie ook de herdefinitie van bestaande economische kaders, gemeenschapsverbanden en verantwoordelijkheidsstructuren. Niet enkel producten, maar ook energie, kennis en diensten behoren tot het denkkader omtrent prosumptie.

WEAK SIGNALS:
How will the era of the creative class unfold?

If we consider, in the footsteps of Marshall McLuhan, media and technology as 'extensions of man', we observe, for quite some time already, that more and more tools have an 'enabling/empowering' effect on people and the scope of what they are capable of. Opportunities that used to remain out of the reach of non-experts, nowadays, thanks to breakthroughs in the field of software and hardware developments, ICT, etc., sooner and more often become accessible to the average user. We may think of high value information, multimedia content creation and sharing, design, planning/coordination, manufacturing, etc.

Shifts have place, not only in capacity but also in the need patterns of people. We observe a shift from the fulfilment of basic needs to the higher levels of Maslow's pyramid. When technology creates new opportunities to create, and provided that the basic needs are covered, new opportunities will open up and allow creation that yields appreciation and recognition and leads to the realization of the higher objective of self-development. But the impact goes beyond the individual. Given the spirit of the times, it is exactly against the backdrop of an increasingly complex society, that these new creative opportunities allow individuals to individually or collectively engineer solutions, while old structures no longer cover the needs, or only insufficiently do so. In short, new challenges constitute the ideal target for those who are looking for self-realization, recognition and esteem, through the creation of new solutions, facilitated by 'enabling technologies'.

From this point of view and based upon numerous considerations (sustainability, etc.), in a post-industrial economy, and for the benefit of people's well-being, it is an opportunity and a necessity, for both market players and government, to make the transition from a 'consumer oriented' model (see lower-order needs) to a model that also takes into account a broader range of individual and social needs. As products and services, instead of being designed as consumer goods, are understood as 'enablers/tools', the passive consumer becomes an active consumer and (re)appropriates responsibilities and support of needs that used to be outsourced.

7.4. Policy relevance
In the long run, the existence of a maker culture can have a serious impact on the Flemish economy. This trend will face policy-makers with new questions about what "production" and "working" mean and will force them to think about the desirability of a new "cottage industry" (refers to a period before the industrial revolution, when home-based individual producers were working in their own houses). The government can weaken this trend, by encouraging companies and small and medium enterprises to deal with it in an innovative way. For the time being, the trend is particularly apparent in a sectors such as culture and media, where a considerable share in the production of content comes from a large group of non-professionals. A young segment of the population is at the basis of a trend that will be of explicit interest for policy domains such as 'Youth' and 'Media', in the first place.

8. SAFETY, PRIVACY, AND COPYRIGHT ISSUES ARE GAINING IMPORTANCE

8.1. Societal trends
The infrastructure in networked societies becomes more and more dependent on ICT. Important economic industries, such as energy, telecommunication and transportation cannot or hardly without the availability, integrity, connectivity, and reliability of the supporting technologies. Electronic safety is gaining importance, both in public space and functions and in personal life.

This is a trend where three different subthemes come

together. First, there is the fact that society has become more dependant on the reliability of the ICT infrastructure. Secondly, privacy and private property have to be protected. And finally, there are also the challenges with regard to ownership and property of organizations and companies (copyright). For the three subthemes, the determining context is the extended network infrastructure, where data can be freely exchanged and shared.

Theft and sabotage form an ever-bigger threat for the security of data about persons and organizations, which as a consequence require more protection. Open borders in a globalized world, the continuously changing society, the real or supposed threat of terrorism, a strongly technologized and computerized world, where privacy and property are not in any case unthreatened, … These are all reasons why persons and institutions (companies, public administrations, …) strongly invest in protection and security.

Originally, privacy referred to a spatial and symbolic personal sphere, separated from the public space. In digital environments, citizens do not have a lot of experience with privacy anymore and therefore fail in protecting their own security and privacy, the way they should, even if they have the necessary instrument at their disposal. This implies that not all issues with respect to privacy and property can be dealt with using technological makeshift measures. Attitudes and behaviour have their importance too.

Privacy is not only a technical and/or legal issue but has to do with confidence as well. Moreover, any presentation of the privacy question always requires a comparative assessment of protecting the personal privacy and guaranteeing the necessary security. When applied to relationships between parents and children, employer and employee, doctor and patient, that kind of questions becomes very tangible... In the context of an antiterrorism and security policy, privacy violations, in this case by public services, can assume vast proportions. We can easily argue that Flanders risks to grow into an overdone 'surveillance society'.

The protection of digital property becomes increasingly complex, and so does copyright enforcement. Regulation and business models for the exchange and for sharing knowledge, information, artistic creations, and so on, are still in their infancy and there is no consensus about how to handle this. Supporters of movements such as the 'Creative Commons licence' believe that a changing world also needs a different approach to copyright.

8.2. Scientific and technological evolution

New technologies offer new possibilities to improve the protection of the digital infrastructure, the everyday world, the activities on the internet, or, in other digital spheres, immaterial property and privacy. These developments however do not keep pace with other developments that have become a threat, in exactly the same areas.

The threatening possibilities include data-phising (stealing via the internet), identity theft (using personal details, thereby adopting another person's identity to do things, make purchases, etc.), music and film piracy, industrial espionage and monitoring individuals for sales, marketing or police purposes, electronic terrorism (extreme forms of hacking), ... The technologies to prevent these threats make a flourishing industry. Technological developments aimed at providing information security include anti-spam systems and virus scanners, RFID-technologies, electronic tracing, data tracing, copy protection of non-material products and data encryption systems.

Computer scientists develop reliable systems allowing data centres to exchange information. These systems have to stand surety for shared interfaces and protocols, in such a way that no security relevant or internal data get spread. Improved system architecture and system infrastructure guarantee less dependence and consequently a smaller risk of a domino effect in case of a failure of one of the components. These systems also operate more and more autonomously and apply self-monitoring.

8.3. Links with other relevant trends

• This trend is connected with the growing divide between passive and active users that has been discussed above. Active internet users leave a lot more information about themselves than someone who is just sitting in his or her living room and watching television.

• Furthermore, this trend is also connected with the growing feeling of unsafety, which can also be observed outside the digital context. Although crime rates do not increase much, there seems to be a concern about the physical and material safety of the citizen.

8.4. Policy relevance

The security of digital data and data traffic, as well as the stability of the technological infrastructure are preconditions for a smoothly running economy. The industry that provides that infrastructure contributes to the Flemish economy in terms of turnover and employment.

Copyright and privacy issues do not only concern the policy area 'Economy' but also puts challenges to the policy area 'Media'. Companies and organizations and private persons as well are concerned. The various actors (open-source users or developers, big software editors, music distributors) have different opinions with respect to the issue. Technology evolves at great pace and continuously develops new data protection methods. In the meantime, European policy has been evolving as well. The policy areas 'Economy', 'Innovation' and 'Media' should take this trend into account. Copyright and privacy issues can slow down innovation, because some knowledge will not be shared but on the contrary be protected as private property. At the same time they give rise to innovation and new technological solutions or procedures. The government itself is an actor here, among others through its efforts to develop its so-called "crossroads database", and by encouraging intra- and intergovernmental data traffic with an eye to administrative simplification.
Finally, this trend receives a lot of public attention, when it comes to the safety and privacy of children

using IT. This trend therefore constitutes a particular point of interest for the policy area 'Youth'. It does not only include the debate and the regulation with regard to what are (un)acceptable on-line practices, but also sensitization campaigns to teach children and young people a responsible behaviour.

9. CROSS-MEDIAL CHARACTER OF CULTURE, MEDIA, LEISURE ACTIVITIES

9.1. Societal trends

Almost everyone uses new media but the attention of most people is not spread over the various channels in a constant manner. Moreover, information that reaches the user through various channels has a greater impact, when compared to information that has been received from only one medium. Not only the repetition factor is relevant, but also the variation in the form under which content is presented. In addition, marketers, advertisers and campaigners know that information is registered more easily if one had to deal with it in an active way. In other words, if you click on a hyperlinked word, the information in the publicity film you will subsequently see, will penetrate more easily than would have been the case if the film was transmitted before the television news, when the viewer did not ask to see it. This means that some channels must be considered as a stronger means of communication for specific purposes than others. Although none of them exceeds the effectiveness of the aggregation of all channels put together.

While the number and variety of media channels are constantly growing, the quantity of content on each of them is also increasing. Whereas a few decades ago, the BRTN (nowadays VRT) did not schedule any programmes during daytime, except for Wednesday, it now has two channels at its disposal and both broadcast all day long. Since users themselves add content on various types of internet sites (such as social networks, wikis or through specific channels, such as YouTube), the total offer has become enormous.

This development has a considerable impact on how

users deal with the offered content. For many of them, it is hard to find their way in that immense offer and to assimilate the continuous flow of content. Even the more competent users experience a constantly fragmented attention, attention disorders and new motivations for the use of media. That surely has serious consequences for more traditional media. At present, all the Flemish newspapers have a web site and the number of paper copies sold is decreasing dramatically. For some years already, doubts are arising about the future of the newspaper industry. Ideas, such as newspapers on 'digital paper' cannot be realized quickly enough and become superseded in no time by new news providers, such as the 'news aggregators' (RRS feeds allowing you to receive an endless flow of news messages and other content on your computer, at home, at work, or on your portable computer, when your on the road).

The cross-medial character of the cultural landscape has an impact on the user and on the economic relations within the media industry. Traditional media (including radio and television stations) find themselves obliged to join the club. At this time, VRT and more specifically Canvas and Ketnet work very hard at their cross-medial programming. They argue that they need to make use of all the alternatives, in order to survive in such a variegated media landscape and to be able to send out messages with any impact. If you are not everywhere, you become invisible, so to say. It turns out to be quite a job for the traditional media to adapt to the new situation.

9.2. Scientific and technological evolution

The technological evolutions in new media and in information and communication technologies of all kinds, have already been discussed in the chapters on the digital gap and the maker culture (numbers 6 and 7). It is important that all these different communication channels exist side by side, in a separate way, but they are used in a mixed up way. Content, information about societal questions, entertainment, education, are all offered through different channels.

9.3. Links with other relevant trends

• The connection with trend nr. 7 (maker culture) is obvious. The same technological evolutions are at the basis of this trend and the developing forms of use of new media are under discussion in both trends.

• While traditional media do not easily adapt to the new communication landscape anyway, there is also the budgetary pressure as a result of the worldwide economic crisis and the accompanying drop in advertising receipts and/or government subsidies.

9.4. Policy relevance

Of course, this trend is relevant for media policy and has an important connection with culture and education, which have to deal with the skills that are necessary for a citizen to get familiar with the large supply offered by a crowded media landscape. How to keep an eye, under these circumstances, on the independence, the multiformity and quality of the media and the dissemination of information is also an important question for the government.
Information-anxiety, information-overload and fragmentation of attention also have a link with mental well-being, which implies that this trend can also be considered from an welfare perspective. Scientific research into media channels and the social and emotional consequences of this development is necessary to better understand and control this trend.

You are your data: when measuring becomes an obsession

Will you soon have to mention your BrainTraining score, the number of Facebook friends you have and your tweets/hour in your résumé?

More and more aspects of our life have become in some way or another measurable or registrable, from the steps we have taken in one day, to the number of 'friends' we have, where we are at what time and what we are doing there, etc. Not big brother, but competitiveness, social pressure, etc. urges people to register and measure themselves and what they do, by their own free will. In some cases, this interest assumes obsessive proportions.

People's pursuit of a healthy or healthier life style has lead to the availability of a whole range of products to test one's condition and measure health-related parameters: step counters, pulse meters and devices to determine if a person has rested enough, how many fat and calories one is burning, what a man or woman's fat percentage and cholesterol level is and how these data relate to one's weight and food ingestion (e.g. fitbit). By linking these data to software applications and (social) networks, people get a better insight in the evolution of their personal health and performances. By doing so, they can fix themselves certain objectives, and try to reach them with the help of the available software and sensors.

By sharing their scores, people can also compare their performances with those of a larger group. This mechanism makes competition into a substantial component of the motivation to change one's behaviour. From measuring, to sharing, further to correcting and the loop is closed. But measuring and registering is about more than health alone. It is also about status and reputation, or simply about the benefits that come with sharing data. In any case, statistics become more and more often scores in games, which make us into each other's (if not our own) rivals.

Robotization, the robot as a fellow man?

Will robots soon constitute a social group in its own right, with its specific rights and obligations?

Even if, for the greater part of us, robots are still associated with androids made out of tin plate (see Star Wars and the like) or with robot dogs as companion (see Aibo), robots in the large sense of the word nowadays fulfil a key part in lots of situations, going from assembly lines in the automotive industry, surgical interventions in the operation room, via driving underground trains and cleaning windows in skyscrapers, through to harvesting and processing technologies in agriculture.

As technological and scientific insights grow, robots become smarter and more autonomous, and acquire verbal and social skills, on top of their technical capacity. They no longer exist of metal but have a skin made of, let's say, silicone. Aesthetically and functionally speaking, they are no longer systematically designed according to the human model. Research is no longer exclusively directed toward the smart robot as an individual, but also to group intelligence of various robots that are each of them simpler, if considered separately. Robotics is gaining importance, not only on human scale or macro level but also on the nano level.

The general expectation is that future robots will increasingly become part of our everyday life and everyday world. In Japan and other countries, robots are being considered as an important strategic weapon in the fight against the aging of the population. When robots will also leave their backstage jobs in the factories and mix with other people, this will result in new questions and challenges, also on a socio-cultural level.

Existing examples of robots include companion robots for elderly people, care robots, patient robots for dentistry training and nanorobots for medical applications (see also nucleic acid robots).

Singularity, or an intelligent explosion

Where to draw the line between human and artificial?

Singularity is about the tendencies of technologies to increasingly converge and of artificial entities to become more intelligent and systematically promote and advance their own intelligence. In short, it is about exceeding the limits of human capacity and pushing back the frontiers of being human in itself, with the help of technology.

According to Moore's law, the processing power of a chip is supposed to double every one or two years. When combined to the far-reaching blending of biological and artificial systems, this should make us expect that the intelligence of systems will increase with great strides or in a way that is even difficult to conceive at this time. Lots of scientists expect an 'explosion of intelligence' in the following years, coming from autonomously learning systems that will not only come close to human intelligence but will also be capable of improving their own design.

'Technological singularity' was introduced as a term in an essay by Vernor Vinge. Until the moment that technological singularity will take place, the line between man as an independent entity and artificial systems, such as instruments and resources, will probably become increasingly thin and vague. This is an important conviction within the views of the so-called transhumanist or posthumanist movement, which aims at an endless enhancement of human life in terms of physical, intellectual and mental capacities, by means of technological interventions (medication, implants, sensors, prostheses, etc.). Both the technological developments as such and the transhumanist ideology, raise ethical issues and questions about the meaning of being human, of identity, quality of life, standards and values, widening gaps, etc. Besides the possibilities and opportunities coming from technoconvergence, potential risks and dangers also appear on the horizon. These technological, ethical and socio-cultural threats ask for our attention.

It is hard to foresee what exactly will happen when technological changes happen in so quick a succession that man-developed systems have become more intelligent than man himself and capable of taking autonomous decisions, or that through his technology man will in an increasing degree intervene in natural evolution, etc. Yet, that its foreseeable impact on numerous aspects of our life will be enormous, is beyond dispute and is regarded as an important stimulus for proactive dialogue.

Synthetic biology: modification and creation of new life

How to keep the upper hand over bacteria synthesized to capture carbon dioxide?

Synthetic biology is a new discipline in research that finds applications in numerous fields. Everything seems to indicate that our society will dramatically change in the long run. Synthetic biology can be regarded as a multidisciplinary research field where developments in molecular biology, physics, ICT (e.g. bio-informatics), nanotechnology, and various subdivisions of biotechnology and life sciences in general come together. Researchers describe synthetic biology as a new form of biotechnology, where modifying existing, natural forms of life has gradually gave way for targeted design of new, artificial forms of life. By means of organisms and living materials of all kinds, the design process of nature is being repeated artificially. This gives rise to numerous breakthroughs and innovations, including new materials, new fuels, medicines, new biochemical functions, diagnostics, etc. Examples of applications include: bio- and nanosensors and devices (blood and urine testing, testing for other substances), DNA chips to diagnose certain cancers, biomaterials (polylactic acids for artificial bone material or artificial veins), bio-energy (fuel production, CO_2-storage), food production (genetically modified crops), and even bio-art (for instance Eduardo Kac's fluorescent bunny).

The Institute is joined to the Flemish parliament