PROJECT FINAL REPORT

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TECHNOLIFE: Executive Summary

TECHNOLIFE has developed a method to map ethical issues at early stages of S&T and policy development and to represent social imaginaries relating to these ethical issues.

This method is a theoretically grounded and balanced suite of exploratory, qualitative and quantitative approaches and consists of the following steps:

1. An ethical issues scoping exercise that defines **hot topics** in relation to the technological fields. Hot topics are issues of concern that involve unsolved social, moral and/or political tensions and that are immature for regulatory definition and resolution.
2. A protocol for a **participatory, deliberative exercise** in which citizens and stakeholders discuss the hot topics. The protocol details the selection and recruitment of groups; the use of media objects (such as films) in conjunction with social media; and an online forum tool integrated with the specially designed **KerTechno** software.
3. An online **voting system** for deliberative purposes that is integrated in the KerTechno software and that allows for **quantitative analysis** of results.
4. A qualitative, **analytical procedure** that identifies the arguments, concerns, imaginaries and alternative frames of understanding elicited by the participatory exercise and defines their relation and relevance to early stages of S&T and policy development.

TECHNOLIFE has applied this method to describe ethical issues of concern to European communities (citizens and civil societies) in relation to the three technological fields of:

- ICTs and the changing configurations of public and private,
- Geographical Imaging Systems and environmental conflict, and
- Converging technologies and the future of the human body.

The results from the case-studies are documented in the final report, in a number of publications and at our website http://www.technolife.no. One robust finding should be mentioned: Citizens are concerned with **social justice, equality and power** when discussing emerging science and technology. This is important for ethical frameworks. Not only issues but also the **frame** of social justice, equality and power should be given be more importance when discussing "conventional" ethical issues such as autonomy, privacy and beneficence. Furthermore, if institutions are perceived not to address concerns of social justice – if people feel blocked, discouraged or obstructed by governments, authorities or private companies – they will find other ways of addressing their concerns and needs in may be called an "**ethics of reciprocity**". When the young and technologically proficient perceive current legal and ethical regimes of IPRs to be obsolete, they will develop creative ways around them.

TECHNOLIFE has delivered a number of concrete policy recommendations. The main and over-arching lesson is the following: **Communication and dialogue** should permeate ethical frameworks, to provide substantive input as well as in the procedural and institutional design. In particular, communication and dialogue is important for social desirability as an aspect of responsible research and innovation, and it should be pursued through methodologies that favour and nurture a **culture of honourableness and good faith**. This becomes even more important in times of economical challenges and social tensions. The TECHNOLIFE method has proved to be one such methodology.

Summary description of project context and objectives

Context and Concept: Imagined Communities as an Approach to Ethics

"The image, the imagined, the imaginary - these are all terms that direct us to something critical and new in global cultural processes: the imagination as a social practice...the imagination has become an organized field of social practices, a form of work (in the sense of both labor and culturally organized practice), and a form of negotiation between sites of agency (individuals) and globally defined fields of possibility...The imagination is now central to all forms of agency, is itself a social fact, and is the key component of the new global order." (Appadurai 1996, p. 31)

The TECHNOLIFE project sought to develop new frameworks for the early identification, characterization and deliberation upon ethical issues arising from a broad range of information and communication technologies (ICTs), including their convergence with other scientific and technological fields (such as bio-nano). Providing multi-layered descriptions and normative analyses through inter- and trans-disciplinary research, the project worked to improve existing conceptual frameworks and procedures for implementing and representing the social needs and interests of citizens at early stages of policy-making and research.

The overall objective of the project was accordingly to address the need to develop ethical analysis and practices at what we may call a societal mid-range level, i.e. pertaining to the actions and concerns of groups as mediators between single individuals and levels of EU or state governance. It proceeded from *the imaginary constitution of groups and collectives*, as predicated on common matters of ethical concern and identity-formation arising at the interfaces between technological systems, society and the environment.

Theoretical inspiration was taken from the concept of *imagined communities* by political anthropologist Benedict Anderson (1983/2006). Anderson, who studied the emergence of nationalism, asked why people who never meet face to face still think of themselves as belonging to the same (national) community. A central part of his answer was that *all* human communities are imagined, defined by the sharing of social imaginaries rather than physical location or interaction. Anderson's classic analysis pointed towards printed media, such as the novel and the newspaper, as intrinsic to the very development of nationalism and nationhood. Hence, central changes to identity and belonging came along with central changes in media and technology.

Shared imaginaries may serve as viable mid-range entry-points for mediation between different localities, communities and agencies. On the same token, they may also serve to mediate between universal and contextual modes of knowledge, i.e. between differing levels of policy makers, experts and lay people. Social imaginaries posit a so far underdeveloped potential for representing ethical concerns of groups, publics and individuals to policy makers and scientists at early stages of policy and research. They also hold out promise for developing ethical frameworks to be used in practices of foresight and forecasting.

The context for the TECHNOLIFE Project was the admitted challenges and shortcomings to existing ethical frameworks for new and emerging sciences and technologies, as explained not only in academic literature but also policy reports and even the work programmes of the

Science-in-Society work programmes and their lines of action. We may summarize this analysis in three points:

First, existing ethical frameworks, as dominant in bioethics and environmental policy, are hampered by a number of shortcomings. The most significant is their reliance upon the cognitive and communicative capacities of individual actors (von Schomberg 2007) and upon formal notions of agency (Expert Group on Science and Governance 2007). At the centre of this problem complex we find prevailing and hard-wrought notions – within theoretical analysis as well as S&T policy – about the proper nature of *democratic representation* and the corresponding procedures for achieving democratic representation. Concerning S&T policy expert authority used to be taken as a sufficient safeguard for the representation of the legitimate concerns of citizens. This is also the case with regard to ethics. Ethical issues of science and technology are broached by professional ethicists or expert panels, sometimes informed by opinion surveys, as when the Eurobarometer is used to represent the opinions of the citizens on specific issues such as biotechnology. In many cases, however, the issues turn out too complex and unpredictable, and so expert ethics can supplement, but not substitute, real communication with citizens and concerned groups (*ibid.*). In addition there is parliamentarian representation proper, in which representatives are elected to speak on behalf of the citizens. As stated in clear and unequivocal terms in the European Commission's white paper on governance however, parliamentarian representation does not exhaust the general problem of representation: "On one hand, Europeans want [politicians] to find solutions to the major problems confronting our societies. On the other hand, people increasingly distrust institutions and politics or are simply not interested in them." (European Commission 2001, 3). If this is true in general, it is no less the case with regard to science and technology.

Second, and closely related to the first point, new technologies that enhance human perception, communication and information handling capacities further accentuate the shortcomings of existing (individual-based) approaches to ethics research and governance. This is not the least due to the radical transformative potential of the communications revolution in which we find ourselves. However, it is also because of the very character of these technologies: communication and exchange of information themselves are at the very heart of what it means to be human and to live in societies with other people (Arendt 1958; Habermas 1981; Aristotle 1994). Hence, it is not sufficient, as in the ethics of nano- or biotechnology, to communicate *about* the ethical issues *of* technology; to a large extent, communication and the exchange of information *are* the central issues of the emerging technologies. Good governance demands that such issues are dealt with in ways that do not unduly suppress their complexities and that promote openness, participation, accountability, transparency and effectiveness.

Third, the character of the European Union as a young and emerging transnational political unit further accentuates the above problems as specifically challenging for the successful implementation of long term EU goals as mentioned above. Whereas within national contexts the implementation of new technological systems will feed into existing structures of production, political and administrative organisation, the expansion of the European Union is, to a large extent, predicated on the creation of the "European Knowledge Society". This places additional pressures on the implementation of new technologies, especially those dealing with information and communication, as these come to make up essential tools for policy (Lodge 2006).

The European Expert Group on Science and Policy recommended that processes of ethical appraisal for policy should "become overtly deliberative, and have as one of their tasks the identification of ethical issues embodied in citizen's concerns, even if these do not correspond with definitions of academic ethical paradigms" (Expert Group on Science and Governance 2007, 87). The TECHNOLIFE project responded to these challenges by suggesting a novel focus on broad social imaginaries as predicated on the concerns of European communities, groups and societies. The focus on groups rather than individuals is not intended to overstep individual rights, but rather to support them by placing the focus more firmly on the numerous and complex sources that inform and validate ethical and political deliberation. Thus, the project also was a response to the Expert Groups recommendation that "ethical appraisal on institutional rather than individual action needs to be developed" (*ibid*.).

TECHNOLIFE was accordingly designed to supply methods for representing concerns of citizens complementary and in addition to established and formal channels for representation. It will develop methods for the identification, characterisation and representation of the ethical concerns of citizens and groups at early stages of policy making and S&T development. Clearly, expert mediation is not to be wholly by-passed; the project itself mobilised expertise from a number of academic disciplines and practical policy. However, we asserted that better and more encompassing methods could be found for the representation of ethical concerns related to techno-scientific development and policy, and that ethics research would do well in including wider perspectives, significantly from sociology, science and technology studies and environmental policy, in order to give voice to the diversity and complexity of citizens concerns.

TECHNOLIFE Objectives

Objective 1: Provide descriptions of ethical issues of concern to European communities (citizens and civil societies) in relation to the three technological fields of:

- **ICTs and the changing configurations of public and private,**
- **Geographical Imaging Systems and environmental conflict, and**
- **Converging technologies and the future of the human body.**

This objective addressed many of the topics of the SiS-2008-1.1.2.1 call: It dealt with new and emerging technological systems, as well as the potential convergence of such systems, in fields of high relevance to European science and technology policy, and for which existing guidelines are few or nonexistent. Whereas biotechnology, medicine and environmental governance have received much attention from ethicists and political analysts, and whereas the field of nano-ethics is emerging, technologies of communication and information have received less attention in spite of the radical and transformative potential of these technologies. The three technologies find themselves at different stages of maturity; hence the project addressed issues relating to both the development and application stages of technological systems and policy.

Objective 2: Develop methods to represent social imaginaries relating to ethical issues of the three technological fields (see Objective 1) to end-users (policy makers, scientists and NGOs) at early stages of S&T and policy development.

This objective responded directly to the overall objective of the Science in Society call to expand, consolidate and spread the knowledge in the fields of history, sociology and philosophy of science for the sake of addressing the relationship between science and society through sound policies. The methods developed in TECHNOLIFE aim at improving processes of ethical review, and hence the science and policy gap of the European Union. For example, descriptions of central social imaginaries about new and emerging technologies, as well as their relation to structures of community and sociability across national boundaries and legislatures, can provide valuable insights for EU policy on national differences within the Union.

Objective 3: Develop ethical frameworks that can be used to take better account of the ethical concerns and social imaginaries in the three technological fields (see Objective 1).

Objective 3 responded to the particular theoretical aspects of the need for new "ethical frameworks". Ethical analyses as well as ethics for policy within existing fields such as medical and environmental ethics, are hampered by shortcomings due to their formalistic and individualistic character. Moving the locus of analysis to the mid-range ("meso") level, and placing greater emphasis on aspects of communication, holds the promise to overcome some of these problems.

Objective 4: Develop a methodology for a web portal open to end-users to organize deliberation of ethical issues in activities of forecasting relating to the above mentioned technologies, and

Objective 5: Provide recommendations and documentation on a generic methodology and web-based solution for similar use relating to other technologies

These two objectives specifically responded to the need for recommendations on how the ethical issues related to the above technologies could be considered in EU policy. Whereas forecasting long since has become established practice within the EU and elsewhere, less attention has been given to specifically ethical concerns related to foresight activities themselves. Objective 4 and 5 were pursued by the creation of an interactive imaginary resource database fed into a deliberative tool.

Main S&T results/foregrounds

The visual and imaginative dimension to TECHNOLIFE is important and integrated into the project idea and the resulting method. Before reading any further the main body of text, we would strongly encourage readers of this report to:

1. Read the 2-page booklet that follows immediately after this page
2. Consult http://www.technolife.no and watch the three TECHNOLIFE videos, each of 3-4 minutes. They can also be found at http://www.youtube.com/TechnolifeDebate.

The report will then proceed to give an overview of the project before going into examples of more detailed results.

THE TECHNOLIFE METHOD

The TECHNOLIFE method maps ethical issues at early stages of S&T and represents social imaginaries relating to these issues. It is a suite of exploratory, qualitative and quantitative steps:

1. A scoping exercise that defines **hot topics** in relation to the technological fields. Hot topics are issues of concern that involve unsolved social, moral or political tensions and that are immature for regulatory definition and resolution.

2. Deliberation within **KerTechno**, our specially designed online open-source software in which citizens and stakeholders discuss the hot topics. The purpose of the deliberation exercise is to elicit arguments, concerns, imaginaries and alternative frames of understanding with respect to central policy issues seen in the light of broader cultural developments.

3. An online KerTechno **voting system**, allowing for quantitative analysis of results.

4. A qualitative, analytical procedure that identifies the **arguments, concerns, imaginaries and alternative frames of understanding** elicited by the participatory exercise and defines their relation and relevance to early stages of S&T and policy development.

Both the theoretical framework underlying it and its balance between approaches are essential features that give TECHNOLIFE its innovative character and robustness.

EUROPEAN COMMISSION

CAPACITIES

TECHNOLIFE is a research project on the ethics of emerging science and technology, coordinated by the University of Bergen. Its partners include Univ. of Copenhagen, Lancaster Univ., Univ. of Manchester, Univ. de Versailles-St.Quentin-en-Yvelines, Univ. of Tartu, Univ. Autònoma de Barcelona and EC-Joint Research Centre (Ispra, Italy)

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TECHNOLIFE on YouTube:
http://www.youtube.com/TechnolifeDebate

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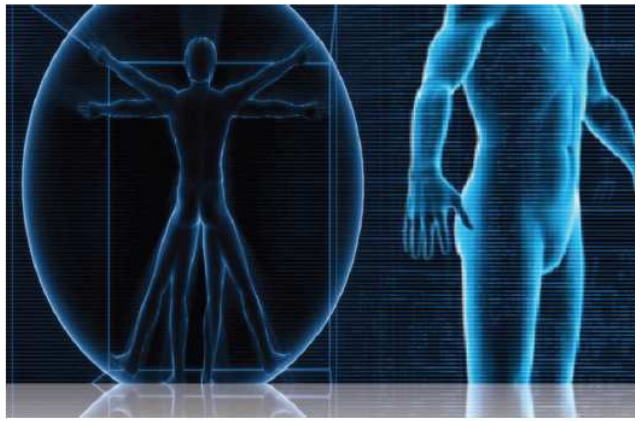
TECHNOLIFE: Ethics with People

Integration of participation and dialogue into ethical frameworks for emerging science and technology

Key Results



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BIOMETRICS, GIS AND HUMAN ENHANCEMENT: HOT TOPICS

In the study of **biometrics** and the changing configurations of public and private, the following hot topics were identified: **Social justice, Surveillance and privacy, and Trust in technology and in government.**

In the case of **Geographical Imaging Systems**, the following hot topics were identified: **Trust in maps and images, Surveillance and privacy, and Equality and power.**

In the case of **Converging technologies** and the future of the human body, the following hot topics were identified: **The relationship between normality and perfection, Freedom of choice and social difference, and Change in the life-cycle and life-span of individuals and the human species.**

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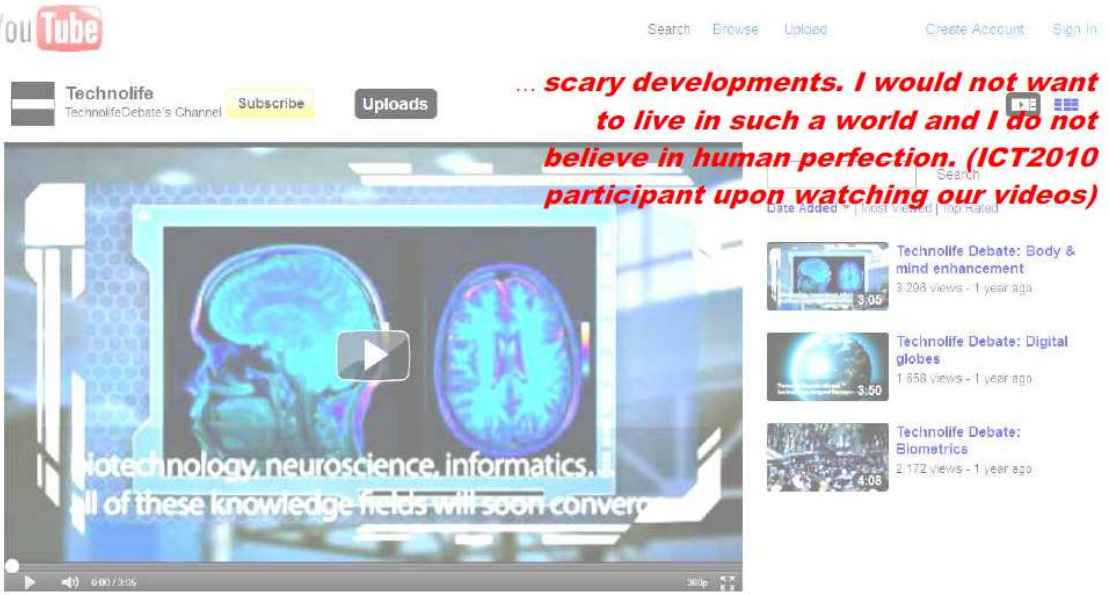
SOCIAL JUSTICE, EQUALITY AND POWER

Citizens are concerned with **social justice, equality and power** when discussing emerging science and technology. This is a robust finding. Even if we as researchers framed the discussion otherwise, the citizens returned to social justice, equality and power.

This is important to of ethical frameworks. First, there are **issues** that should be attended to more than now. Secondly, the **frame** of social justice, equality and power should be given be more importance when discussing "conventional" ethical issues such as autonomy, privacy and beneficence.



THE FEELING OF BEING "BLOCKED FROM ABOVE"

If institutions are perceived not to address concerns of social justice in a satisfactory manner – if people feel **blocked, discouraged, fooled or obstructed by governments, authorities or private companies**, as we have evidence to believe – they will find other ways of addressing their concerns and needs. When the young and technologically proficient perceive current legal and ethical regimes of intellectual property rights to be obsolete, they will develop creative ways around them.

SOCIAL DESIRABILITY AS PART OF RESPONSIBLE RESEARCH AND INNOVATION

Questions of good practice, social desirability, precaution, codes of conduct etc presuppose a culture of **honourableness and good faith** – of honest **dialogue** and voluntary agreements between honourable people – in science in society. TECHNOLIFE has shown that such a culture can be achieved in an online forum, given that the appropriate methodology is applied.

... in this era of rapid and sweeping advancement, we see the old world struggling to guide and restrain the process of advancement into the new (next?) world. Recording companies howl bloody murder in the old courts about people "stealing their livelihood" by making and distributing pirate copies of their intellectual properties. Yesterday's telephone companies become today's facilitators of information and entertainment access. World governments gnash their teeth at the possibility of new technologies sparking sweeping economic change and the dashing of the old world's entrenched economic power structures. Change will happen according to the will and abilities of the masses, regardless of the old world sensibilities, («Rockpiler», TECHNOLIFE Forum participant).

What is TECHNOLIFE? An Overview

The TECHNOLIFE project was a methodological research project designed to provide ethical frameworks for new and emerging sciences and technologies. This part of the report briefly explains the method and the results.

The TECHNOLIFE Consortium consisted of the following partners:

Centre for the Study of the Sciences and the Humanities, University of Bergen (coordinator)

Inst. of Environmental Science and Technology, Universitat Autònoma de Barcelona (Person in charge: Louis Lemkow Zetterling)

Centre for Ethics, University of Tartu (Person in charge: Margit Sutrop)

Centre for Social Ethics and Policy, School of Law, University of Manchester (Person in charge: Søren Holm)

Laboratoire de recherche en économie-écologie, éco-innovation et ingénierie du développement soutenable (REEDS), Univ. Versailles St. Quentin-en-Yvelines (Person in charge: Jean-Paul Vanderlinden)

Department of sociology, University of Copenhagen (Person in charge: Margareta Bertilsson)

CESAGEN, Lancaster University (Person in charge: Adrian MacKenzie, Brian Wynne)

Institute for the Protection and Security of the Citizen, EC Joint Research Centre, Ispra, Italy (Person in charge: Ângela Guimarães Pereira)

Moreover, the scientific work was supervised by a Scientific Advisory Board: Sheila Jasanoff (Chair; Harvard University), Alan Irwin (Copenhagen Business School) and Silvio Funtowicz (EC Joint Research Centre).

A. The TECHNOLIFE method maps ethical issues at early stages of S&T and policy development and represents social imaginaries relating to these ethical issues.

This method is a suite of exploratory, qualitative and quantitative approaches and consists of the following steps:

1. An ethical issues scoping exercise that defines **hot topics** in relation to the technological fields. Hot topics are issues of concern that involve unsolved social, moral and/or political tensions and that are immature for regulatory definition and resolution. In the definition of hot topics, emphasis is placed on situating them with reference to pre-existing cultural understandings and imaginations.
2. A **participatory, deliberative exercise** in which groups of citizens and stakeholders discuss the hot topics. The purpose of the exercise is to elicit arguments, concerns, imaginaries and alternative frames of understanding with respect to central policy issues seen in the light of broader cultural developments. To this end, a protocol has been developed. The protocol includes principles for the selection and recruitment of groups; the construction of media objects (especially films) in conjunction with social media; an online forum tool that is part of the specially designed **KerTechno** software. KerTechno is a tailored, open-source, web-based deliberative software solution building upon the previous KerBabel deliberative software and specifically developed for TECHNOLIFE; as well as principles for moderation of the deliberation.

3. An online **voting system** for deliberative purposes that is integrated in the KerTechno software and that allows for **quantitative analysis** of results.
4. A qualitative, **analytical procedure** that identifies the arguments, concerns, imaginaries and alternative frames of understanding elicited by the participatory exercise and defines their relation and relevance to early stages of S&T and policy development.

Both the theoretical framework underlying it and its balance between approaches are essential features that give it its innovative character and robustness.

The method in its full-fledged version is large to semi-large scale, both in terms of scope and the resources required. The full version is most appropriately used on the level of new and emerging technological fields and/or general issues of concern, rather than e.g. the level of individual S&T research projects. Recent EU policy reports on ethics and governance of emerging technologies (see e.g. Felt et al. 2007) are unequivocal about the need to develop more complex and future-oriented modes of ethics for governance. Important reasons for this include dangers that governance, by focusing too narrowly on "ethics" (or "risk") may effectively ignore and negate the political aspects of policy processes. The method developed in TECHNOLIFE offers early concretisations of how such expanded ethics for governance could be conceived. Furthermore, the method is dynamic in the sense that new rounds of iteration between can easily be performed. This will not only accumulate results but also allows tracking down changes in hot topics. Indeed, in the course of the TECHNOLIFE project, certain hot topics were chosen as points of departure whereas more emerged during the subsequent analysis.

B. TECHNOLIFE has applied this method to describe ethical issues of concern to European communities (citizens and civil societies) in relation to the three technological fields of:

- **ICTs and the changing configurations of public and private,**
- **Geographical Information Systems and environmental conflict, and**
- **Converging technologies and the future of the human body.**

In the case of **ICTs and the changing configurations of public and private**, investigations were focused on biometrics and mobility. The following hot topics were identified:

a) Social justice.
b) Surveillance and privacy.
c) Trust in technology and in government.

Among the elements of social imaginaries relating to these issues identified, we will highlight the ways in which participants showed themselves as highly capable of reasoning about biometrics, even though the field is highly complex, new and partly shrouded in secrecy. In part, responses could be seen to confirm existing policies, such as the importance of privacy. However, many also questioned premises of the technology (will it really provide "security")

as well as central policy concepts (what could "privacy" mean in relation to large-scale, complex systems?). Responses could be found that negated the general framing of the debate. Many were concerned about socio-economic developments and issues relating to justice. It was suggested that "biometrics", or "technology" as such, not was the main problem, but rather the structures (elitist, capitalist, etc.) within which the technology is implemented. As such, biometrics was seen by many as having potential benefits, but many also have problems seeing how it may fit within democratically just societies. Here, it could be instructive to contrast how in the West biometrics has been inscribed in a universe of "securitisation", in which people will have to give up their rights, whereas the Indian UIDAI project is broadly conceived of as empowering, as providing rights. Our specific policy recommendations are given in the deliverable D5.1.2 *Biometrics and mobility in the EU: point of view of deliberation.*

In the case of **Geographical Information Systems**, the following hot topics were identified:

a) Trust in maps and images.
b) Surveillance and privacy.
c) Equality and power.

Among the elements of social imaginaries relating to these issues identified, we will highlight how GIS and digital globes (especially Google Earth) were generally seen in a positive light. Participants highlighted the potentials for increasing environmental awareness as well as potentials for political and environmental mobilisation. Privacy issues were raised; many seem to be, as of yet, by and large positive of Google. For instance, the company has been offering its geo-referenced applications to users for further development without restrictions on software and property. But participants also tend to retain a "wait-and-see" attitude, for instance in the face of the large amounts of information on users stored and utilised by the company. Our specific policy recommendations are given in the report *Citizens as Neo-Geographers and the Challenge of Responsible GIS* (Deliverable D5.2.2).

In the case of **Converging technologies and the future of the human body**, the following hot topics were identified:

a) The relationship between normality and perfection.
b) Freedom of choice and social difference.
c) Change in the life-cycle and life-span of individuals and the human species.

Among the elements of social imaginaries relating to these issues identified, we will highlight the views on normality and individualism put forward by many participants. In general, most were strongly in favour of ensuring that enhancements be implemented within pluralistic and diverse societies and value systems. However, the most interesting results, in part paralleling those of the biometrics line, pertain to the ways in which such imaginations of plurality are connected to broader social and technological visions. Issues pertaining to justice and "the social system" were forwarded by a great number of participants. Furthermore, these were connected to imaginations of broad-scale social and technological shift, even revolution. It would be wrong, as would follow from much of the policy and ethics literature, to tag such notions exclusively onto a transhumanist discourse (i.e. the "Singularity"). More tangible connections, rooted more in everyday experience than utopia and future visions, were made to ICTs and their role in promoting new forms of sociability and community, beyond "industrial

society". Such notions can be related directly back to past imaginations from social movements and revolutions aimed at balancing out increased social divisions. In many cases they also come intertwined with a "hacker ethic", i.e. commitments to greater transparency (as opposed to secrecy), sharing (as opposed to strong proprietary regimes) and broader participation in social processes. In the light of recent events, in the Middle East, Europe and elsewhere, we would urge EU policy makers to consider in depth the relationships between socio-economic possibilities and structures, the use of ICTs and our younger generations. Our specific policy recommendations are given in the report *Citizens as Informed Debaters about Human Enhancement and Body Modification*, Deliverable D5.3.2.

C. TECHNOLIFE has developed an ethical framework that takes better account of the ethical concerns and social imaginaries at early stages of S&T and policy development.

The ethical framework is a **complement** to existing ethical frameworks, and can be applied as such in the following way:

1. For a given issue of concern / technological field, the TECHNOLIFE method for describing ethical issues and social imaginaries relating to them, is applied as described above.
2. The results from step 1 provide broader sets of contrasts from which one can answer the following question: *From which predominant perspective (frame of understanding) are the main ethical issues defined within the existing ethical framework?* These ethical issues are then re-analysed from other, complementary perspectives.
3. The results from step 1 may also provide *other ethical issues as defined from other perspectives (frames of understanding).* These ethical issues are then included and analysed in terms of their policy relevance.

Example 1:

In the case of **ICTs and the changing configurations of public and private**, existing European ethical frameworks represent the issue of biometric policies as a matter of *striking the right balance between privacy and security*. This representation is rooted in a long-standing perspective, within (Anglo-Saxon) political theory, ethics and international relations, in which the individual right is opposed to the interests of the state. Since 9/11 we have seen increasing tendencies, in politics and elsewhere, of prioritising collective interests and security over individual rights. Through these processes the metaphor has now been situated deeply inside the emergence and policies of biometric systems. Progress in the establishment of EU-wide interoperable systems seems to be, by default, predicated on the corresponding sacrifice of individual rights and freedoms. However, we are now seeing great shifts in public opinion: it is dawning that "the war on terror" was based in an imaginary of fear and has been detrimental to western economies and democratic cultures alike. Not the least, such notions are strengthened by a radically changed image of Arab youths fighting for democracy, and by and large ignoring extremism and out-dated political regimes. This indicates that the equation "balancing privacy with security" should be subject to reconsideration and iteration in the

light of recent events and shift in the broader social imaginary. Through our deliberative exercises we came across a number of alternative framings of biometric policies. Ethicists and policy makers would do wisely to search out alternatives to the frames provided by securitisation during the last decade.

Example 2:

In the case of **Converging technologies and the future of the human body**, existing European ethical frameworks represent the issue through concepts and distinctions such as treatment/enhancement, normality and human nature. An extended policy process is imagined in which dignity and human nature is to be safeguarded (i.e. the Nordmann report's dictum "to engineer *for* the human body and soul", rather than to engineer body and soul as such, (European Commission Research, 2004)). Partly, the backdrop for such recommendations has been the wish to distance oneself from "extreme engineering", as proposed by some transhumanists, but also leading technology environments, especially in the US. Whereas we see this approach as laudable, we would also point to the results from the TECHNOLIFE deliberation forum, in which issues pertaining to human enhancement are increasingly inscribed in a social universe and directly connected to issues of social and technological justice. If an extended process on human enhancement is to be had, including public dialogue and participation, one would do wisely in considering: 1) the interests and views of the younger generations, many of which appeared disenchanted and with low degrees of trust/expectations in policy makers and main institutions; 2) the increasing importance of ICTs, as mediators, symbols and drivers of development.

D. The ethical framework of TECHNOLIFE can be applied in combination and synergy with the blueprint developed by the FP7 Project VALUE ISOBARS.

VALUE ISOBARS, an FP7 Project run in parallel with TECHNOLIFE under the same topic, resulted in a blueprint for value-based and value-informed governance of S&T. Ethical values, as well as political, religious and economic values are major factors in shaping the development and public attitudes to science and technology. VALUE ISOBARS proposes that a shift from ethics more narrowly to a focus on a broader discussion about competing and conflicting values sets can reinvigorate the discussion about what kind of scientific and technological future we want to create. The project identified values as complex clusters of inter-related connotations, providing a framework of reference for normative judgments. In recognition of existing data and surveys on public attitudes to science and technology it has suggested ways of improving these surveys in order to bring out the value dimension more explicitly. Through a proto-type, it has also suggested to provide policy-makers with a regularly updated *Science and Technology Value-Atlas* that explicitly focuses on value-based conflicts and issues that enter this policy area. Similar to TECHNOLIFE it has also developed criteria and methods for participatory engagement of sectors of the public, again with an explicit value focus, and it has discussed these issues in relation to biometrics and dual-use of pathogen research.

The TECHNOLIFE and VALUE ISOBARS approaches can be applied in combination and synergy. Individual elements as well as the full suite of the TECHNOLIFE method can be used as input for the identification, description and analysis of issues to be informed by the

VALUE ISOBARS approach. Conversely, the VALUE ISOBARS approach, including the prototyped value-atlas can be used in the mapping of issues and publics in step 1 and 2 of the TECHNOLIFE method. And finally, the results of the two analytical approaches will, when complemented with each other, increase the robustness of policy advice.

E. TECHNOLIFE has developed a methodology for a web portal open to end-users to organize deliberation of ethical issues at early stages of S&T and policy development. TECHNOLIFE provides open documentation and recommendations for such use.

All open-source documentation and recommendations will be freely available on the internet at http://www.technolife.no and by direct contact with the Coordinator. This includes all steps of the full suite of the method. The Coordinator will provide free advice to potential end-users also after the end of the project and at least until 2020. The KerTechno open-source software solution will be freely available on request to all potential end-users.

Beyond the State of Art: An example of how the TECHNOLIFE method produces an improved understanding via the formulation and analysis of imaginaries

Information imaginaries: mediating science and technology with societal matters of concern

> *In this era of rapid and sweeping advancement, we see the old world struggling to guide and restrain the process of advancement into the new (next?) world. Recording companies howl bloody murder in the old courts about people "stealing their livelihood" by making and distributing pirate copies of their intellectual properties. Yesterday's telephone companies become today's facilitators of information and entertainment access. World governments gnash their teeth at the possibility of new technologies sparking sweeping economic change and the dashing of the old world's entrenched economic power structures. Change will happen according to the will and abilities of the masses, regardless of the old world sensibilities,* Rockpiler, TECHNOLIFE Forum participant.

Science and technology play important roles in disruptive events and imaginations, both by providing the material means through which change takes place, and through their power to trigger imaginations of change and improved futures. The immediate past of emerging technologies, from recombinant DNA to Ambient Intelligence and converging technologies, is brimming with expectations and hope, but also with failed promise and disillusionment. For good or for bad: In terms of tangible results in the lives of people, ICTs and the Internet may have a better track record than the biosciences. Recent events, in the Middle East and across

the Western world, illustrate how ubiquitous information brings change across cultural, professional and life-world boundaries.

The introductory quote is taken from the TECHNOLIFE debate forum on **Converging technologies and the future of the human body**. The participant is grappling with and articulating many of the issues hinted at: which are the new socio-technical structures to emerge in this "era of sweeping and rapid advancement"? What's going on in current socio-technical economies? What *should* be going on? Is there any place left for politics, or should the institutions of old simply be swept away? Reading the quote, a likely impression is that the discussion was about new digital media. It was not; the quote is from a forum discussing social and ethical aspects of human enhancements. At that point of the debates, discussion was about attempts to regulate biotech, and the main discussion partner a biotech researcher. What our participants made clear to us was how, *somehow*, the life sciences, digital technologies and calls for social justice may increasingly come together through a number of over-arching *issues*. We shall now outline how these issues, on the intersection of the life sciences, digital media and large-scale societal developments came to be articulated and explored together with a group of extended peer reviewers through an online discussion forum.

The forum was set up to get at broad concerns. For that purpose we settled for the concepts of imagined communities and imaginaries and, at a later stage, socio-technical imaginaries (Jasanoff and Kim 2009), to guide our investigations. We hypothesised that imaginaries relevant for policy would somehow revolve around *issues of concern* generated by or emerging through new technologies. Hence, we articulated an interpretation of John Dewey's political philosophy: *issues spark publics into being* (Marres 2005, Latour 2007). It was also inspired by Ulrich Beck's notion of sub-politics (Beck et al. 2001, see also De Vries 2007): where existing institutions are incapable of dealing with pressing issues, new publics or (imagined) communities may form around alternative imaginaries over social and technical developments (for an overview see Deliverables from WP2).

A social imaginary, according to Charles Taylor, refers to "the ways people imagine their social existence, how they fit together with others, how things go on between them and their fellows, the expectations that are normally met, and the deeper normative notions and images that underlie these expectations" (Taylor 2004, 23). It is clear that this is not a very concise concept, but depends on interpretation and appreciation of the "common understanding that makes possible common practices and a widely shared sense of legitimacy" (*ibid.*). To our minds, it was this "broader background" that could possibly say something about why and how people get motivated to engage politically in the first place. It was also, we felt, this broader background that somehow escaped many expert-based regulatory frameworks. Some more precision can be added through Sheila Jasanoff's concept of *socio-technical imaginaries*, insofar as it refers to the ways in which communities or collectives *reflect themselves* in the unfolding or promotion of new technological projects (Jasanoff and Kim 2009). Socio-technical imaginaries, in this sense, refer to *attainable futures*: whereas not sufficiently specific to direct action, they are meaningful objects sufficiently concrete to guide and coordinate action. In high-tech societies it is hard to see how new imaginaries and collectivities can avoid being, somehow, *socio-technical*.

The character of the exercise, as well as the conceptual apparatus used to interpret it, cannot yield great precision. In the next section we shall turn to the construction of our forum; following that we shall describe some aspects of how it developed. Our approach will be to

follow the issues as they evolved through the forum discussion. The concepts of imaginaries, when used appropriately, may bring to the fore certain aspects of how actors themselves, but also the collectives of which they are part or seek to be part, struggle to articulate and assemble themselves. Indeed, as argued by Benedict Anderson (1983), community is intrinsic to imaginaries, their motivations, articulations and aims. More often than not, the search for community is implied but in need of articulation: the imaginary resides in the spaces between the inarticulate and articulate, the materialities and practices in which we take part, and the conscious representations we make of them.

In observing the development of the issues, and the ways in which they intersect with the imaginary, we shall pay particular attention to the following aspects: first, how are imaginaries generated from below? How do they mobilise, assemble and articulate collective matters of concern? In relative contradistinction to the approach taken by Jasanoff and Kim, the collectives with which we grapple do not, as states, already exist, but are struggling to constitute themselves. Here, the turn towards the contents of politics, as exemplified by Dewey, and later by Marres and Latour, is of importance. Second, how do imaginaries and different modes of imagination interact with different technologies and technological systems? How is community reflected in science and technology projects? Third, how and when do imaginaries and issues turn into political objects? One way of gathering all three questions within a coherent frame of reference is through John Dewey's concept of *imagination as exploratory action*, as attempts at finding out *what the world is like*. Exploratory action takes place in the spaces between the real and the possible, and the imagination is the main resource for working out the relations between them. In Dewey's words, thought is "conduct turned in upon itself and examining its purpose and its conditions, its resources, aids, and difficulties and obstacles" (Dewey 1922). The exploration thereby entailed is performed by the imagination: "Imagination in Dewey's central sense is the capacity to concretely perceive what is before us in light of what could be" (Fesmire 2003, 65). Its aim is to guide action, and this aspect particularly comes to the fore in situations of perplexity and change: where the world becomes uncertain it may take a greater effort for thought and imagination to return to and guide, the actors and practices from which the initial impulse emerged. We shall return to this notion in the course of description and analysis.

The construction of an experimental participatory technology

It was early on decided that the main hub of the project would be an online discussion forum. To our (mainly) academic minds, it seemed reasonable that, due to the complex problems of expertise and framing, there were a number of voices "out there" wanting to be heard but not getting through the official filters. These would be "concerned parties": people who were, in one way or another living with or working with issues relating to the technologies in question, in this case human enhancement. Typical examples would count athletes, handicapped, health care workers, technology developers, models, gamers, transhumanists, and so on. Important here is the idea, to which we still stick, that representativity was not a main issue, but rather the attraction of diverse points of view. Our intention was not a mapping of public opinion, but rather the generation of legitimate but excluded world-views as they assemble around emerging issues.

As constructors and facilitators of the debate, it was clear that we also had to somehow frame the issues we wanted to discuss. What could be hoped for, however, was a framing of issues that spans wider and is more inclusive than normally found in ethics consultancies or

participatory exercises. We had the possibility of influencing the course and topic of the debate in five principal ways: first, by selecting and defining issues relating to body enhancements in the first place. Based on a mapping of science fiction literature, policy and ethics literature and public debate, we settled for the following: 1) *better than normal*, 2) *freedom of choice*, *freedom of morphology* and 3) *forever young*. Better than normal primarily refers to the potential of medical therapies not only to cure but also to enhance, to go beyond normal performance, a recurrent theme in (transhumanist) ethics debates but also encountered in doping, cosmetic surgery, body cultures, commodified life-styles, etc. Freedom of choice needs no further introduction; it is a ubiquitous trope and article of faith of western societies and central to imaginaries of the authentic self (Taylor 2004). Of a more recent date is the application of this ideal to the enhancements of bodies: freedom of morphology. Finally, the quest for immortality resides at the heart of most civilisations, and has been subject to experimental intervention from the alchemists and up until today's transhumanist movement.

Second, much thought and discussion went into the question of how to broach these issues for debate. A number of alternatives were tried out before we settled for the idea to use short movies. We would translate the three issues into images in the format of short movies as a kind of provocation, or an "opening challenge". In that way, we would be able to connect and engage, primarily at an emotional level, then move on to articulate the issues as experienced by the participants. The films last for 3-4 minutes and can be viewed at http://www.youtube.com/technolifedebate. They were made to contain ambiguities and (partly) contradictory messages. The movie on human enhancement centres on a blond, Nordic looking doctor/researcher in a high tech laboratory environment. The rhetoric of the movie is deeply inscribed with consumerist, perfectionist and transhumanist ideals, which nevertheless also appear mixed with conflicting issues such as eugenics. We strongly recommend the reader to watch it for him or herself.

Third, the three issues were mentioned at the entry page to the forum, as suggestions for discussion topics. The forum was moderated and the facilitator of the debate would, from time to other, suggest the topics for discussion, for instance to get deliberations started or for getting discussions back on track. In general, however, facilitation was liberal, a primary aim simply to get people talking.

Finally, coming to the interpretation of the ensuing materials: of the above three issues, the first two generally seemed to resonate with participants, i.e. we had substantial contributions on issues of normality and freedom of choice. As such, the exercise confirmed the general importance given to these topics both in the ethics literature and in governance. Following this we have been searching for patterns or recurring themes on the level of *institutions* (social and political), and concerning the role of *"technology"* (or technolog*ies*). What may "normality" or "freedom of choice" mean when related to imaginaries of the broader socio-technical landscapes within which the figure? As a result of early readings of the material, we also included *"social justice, equality and power"* and *"the Internet as metaphor"* as interpretative categories. A great number of participants were strongly concerned by the general thrust of western industrialised societies. Furthermore, many viewed such issues through the lenses provided by computers and the Internet. As we shall see, the most interesting (and perhaps also surprising) results came as the result of looking at these three categories in conjunction. We now start with some introductory notes on the debate, before we offer some examples of how issues relating to "normality" and "freedom of choice" were

expressed by (some) participants. We then move on to situate these within overarching societal and political imaginations and imaginaries.

Let us briefly return to our introductory quote: Rockpiler demonstrated himself as an astute and articulate observer of socio-technical change. Most social analysts have a hard time following present events, not the least due to the many ways in which they do not fit into established categories of academic analysis or public debate (Latour 2004). So do the authors of this paper. At the same as we recognise this, and even as we sympathise with many of Rockpiler's statements: his is not an objective view of developments. As others struggling to articulate and engage with the present, he is part of the very developments he is describing. He takes part in the articulation of an unfolding *information imaginary*: a collective view of the role of information within larger socio-technical structures and change; how information, technology and community are entangled, including what these entanglements *should* be like.

Exploring enhancements

Initially the TECHNOLIFE strategy was to recruit participants by email: based on people's involvement with and exposure to the technology (work, community, hobbies, ailments and diseases, being included in a category or diagnosis, etc), we would invite "concerned parties" to take part in the forum. At the time when we got around to inviting participants to the forum on body enhancements, this somewhat naïve approach had already showed itself as ineffective in the other research lines of the project. We did send out a large number of invitations to individuals and communities. But other approaches turned out to be more effective. Originally developed to get discussions started, the short movie was transformed into a recruitment tool, used in both online and offline settings. Online, we posted it on a number of discussion scientific and non-scientific forums along with a brief text and a link to the forum site. Offline, we actively used the film to draw attention and trigger discussion at conferences and similar events. By far the most important here was our participation at a three-day ICT industry fair in Brussels, the ICT 2010[1]. We rigged television screens to show the movies and we connected laptops to the discussion forum so that people could make their comments directly after watching the movie. As a consequence of all of these approaches, people gradually started to migrate to the forums.

Initial responses would range from questioning the entire premises (framing!) of the debate, to more or less "plain" discussions over the issues broached by the film. Eventually, as we will return to, the issues deepened and also took on more political characters. At first encounter, many questioned the connections to the EU. One line of entries that was circulated on a number of websites claimed the whole experiment to be an EU scam rigged towards the acceptance of new technologies through a mixture of mind control and crowd sourcing. It even triggered the creation of a "counter-movie", containing clips from all three TECHNOLIFE movies while explaining the conspiracy plot behind them. One such entry, on the Digital Spy forum, read: *These fascists are apparently funded by the EU, somebody please tell me this a joke.* Directly under this, somebody replied that: *I think you're missing the point- the videos are supposed to be from an imagined future, and to spark debate around the ethics of scientific advancement, surely?* Others again took the movie to be a company advertisement for cosmetic surgery or life-style enhancements: *How nice, there´s a new forum with a name just like a corporation… I do not want to qualify this as indecent or immoral,*

[1] http://ec.europa.eu/information_society/events/ict/2010/index_en.htm

because these qualifications are not sufficient for describing the perversities of this video. White, tall, blond, clear eyes and well proportioned…, always beautiful, but all of it made out of a thousand prostheses. I prefer the maori canon of beauty…[2]. The movie also received positive comments and encouragement from unexpected quarters. The transhumanist website Singularity Hub wrote a whole article about the project. Also here TECHNOLIFE was equated with official EU policies, but this time with a positive twist: *I'm skeptical that meaningful public debates still exist in our world, let alone on the internet, but I find the EU's approach to this situation intriguing. As a government how do you actually ensure that the adoption of technologies are shaped in the best interest of the public rather than at the whim of special interests? Well, you could always just ask them. That's pretty much what's happening here*.

The project thus invited meta-reflections, and, quite understandably, some degree of suspicion and a need for honing in on its intention and message[3]. On the other hand, many accepted the challenge posed by the movie straight on. A participant at the ICT 2010 fair made the following entry directly after watching the movie: *I found the video showing scary developments. I would not want to live in such a world and I do not believe in human perfection*. Following this, an online participant, a self-declared transhumanist, replied with the counter-question: *If you lived in the future and saw a video about how humans were created by only evolution (a blind, purposeless and amoral process), how would you feel about that?* Initial discussions frequently took on this character of *pro et contra*, but this changed as the issues deepened. Hence, below the previous quote, another delivered the more philosophical statement: *I also don't believe in human perfection, but I do believe in the quest for human perfection...*(Deth).

As more participants entered the forum, the debates started to take on their own lives. Many were clearly used to blogging, and so the level of articulation and reflection in the entries was generally high. As a starting point, our pre-selected issues seemed to work well: both the "better than normal/perfect" and "freedom of choice" tropes sparked long threads of entries, sometimes also debate and confrontation. We now provide a description of how some of these issues were imaginatively explored. We then move on to how they evolved into, and intertwined with, other and (to us) unexpected issues and imaginations.

Perfection, normality and choice

The short movie ended on the scientist's statement that "to me, normality is a state of perfection". As already touched upon, the preceding messages of the movie were made in a strongly market-oriented fashion (although with clear exceptions, such as when the interviewer draws the attention to nazi eugenics). Although some participants seemed to accept the commercial contents of the movie, many would question these premises. Such questioning would come along with differing valuations of the technologies and enhancements in question. One thread of discussions went under the general heading "What is to be normal?" The topic was proposed by our moderator, and came to turn around qualities and values such as beauty, health, strength and happiness: *does "beautiful", "strong", "happy", etc..mean one single thing?* (anadel)

[2] Our translation from Spanish. After some explanation and negotiation, the author of this particular statement made the way to the forums and participated in the debate.
[3] Thus in part also taking part in the performance of what TECHNOLIFE was and became.

From a critical point of view one participant described the film as *guided by ideals (of bodily perfectionism, of freedom to choose),* that also entailed *an unprecedented technological optimism and a highly aggressive commercialism* (Torjumid). Others would be more welcoming towards the technologies in question, as well as the prospects of enhancements, while retaining the critical view towards commercialisation:

> *I'm the "bald guy" in the video in real-life and what I want to offer with the enhancements I develop is not "perfection"…the video presents this technologies more in the vein of "next ipad" or "next miracle vegetable" context and from a pure market economy mindset. Although, I must admit, this is a legitimate concern; in my opinion it focuses on the wrong aspect of these technologies.* (evrana)

In general, therefore, whereas forum participants would have differing views on a number of issues, the questioning of the "normalisation" and "perfection"-frames of the movie were almost uniform. As another participant commented: *I, too, found the concept of "perfection" misleading in the video. Marketing "perfection" is just catering to a ill-thought out concept. As others have asked, "what exactly is 'perfection'?"* (Midare)

Many of the above entries did not accept strict boundaries between issues. As seen in numerous studies in PUS, issues appear intertwined and interrelated (McNaghten et al. 2010). Accordingly, our second main issue, referring to western imaginaries of *choice*, frequently occurred together with the theme(s) of normality and perfection. As it turned out (and not highly surprising), the questioning of standardising and normalising frames about aesthetic and value categories (beauty, health, strength, happiness), came along with strong preferences for individual choice. The connection between the two was, in most cases, the subjective character of values: *…choices must be very widely left to the individual…The individual creates the necessary diversity that prevents us from stagnating and becoming vulnerable* (Aetherius). Again, entries would range from critical to largely accepting of the status quo. The latter would mean that society remains more or less as it is, but with the addition of new technological options: *These new technologies will enable people to choose to a much greater extent how they want to be, and that's also a very good thing* (Tor Økland Barstad). As an example of a more critical view, individualism and heterogeneity of values and aesthetical norms was opposed to the standardising forces of mainstream media and dominant institutions:

> *There are already "established models" pushed forward by media in various societies, expectations laid out by societal norms and gender roles. Ask any High School student how it feels to not be the perfect: jock/cheerleader/frat/goth/nerd. To suggest that such pressures would be a novel new problem introduced by these technologies is, to me, a little oblivious to the existing intolerances "imperfect" people already face in Western society. Tolerance of others' differences/preferences is needed as we progress forward. Rather than a top-down assessment of beauty there needs to be more exposure to different concepts and support for diversity. Down with the Barbie/Snookie templating, as it were* (Midare).

Now, the interesting thing with this more critical view (which still confirms the value of enhancement technologies), is that it goes some way in articulating conflict and opposition over the development of technology and society: heterogeneity and subjectivity are broadly opposed to the standardising forces of standardising and normalising powers. This is interesting in terms of our theoretical approach: If human enhancement is a form of exploratory action, hence "conduct turned back upon itself", then socio-technical action will

have to pass by technological systems before turning back on the subjectivities in question. This also means that technological systems should somehow bend or adapt so as to support rather than counter subjectivity and plurality. To follow Midare's argument a bit further:

> *I agree with the prior poster who supported making sure enhancement options were not "one size fits all" ideas, it will be important to prevent the society from becoming overly homogelous….it is better to have diversity, even if this means that people will have platform issues with, say, software upgrades…I do not think any form of monoculture is wise to seek on these fronts* (Midare).

Also other participants would, in similar terms, conceive of variety and heterogeneity in terms of digital metaphors, to the extent that the metaphors would re-materialise in future applications, systems and products: *"when all humans with a will to do so have changed themselves with these new technologies, the word "normal" will simply connote "lives as they please, looks however they want",* (Rockpiler).

In a way, therefore, our participants turned upside-down arguments from debates over the social construction of technologies: *determinism and rigid structure were ascribed to the social institutions and not to technology* (especially ICTs). Technology, if only allowed a free space in which to develop, is heterogeneous and complex. Simplicity, standardisation and normalisation are imposed on the digital society top-down by government, media and large corporations. A practising scientist expressed this in the following manner:

> *There is another problem with "general product" scheme; as researchers this has two effects on us 1) It throws us into the lap of big establishments like militaries or big corporations and as a results the research efforts focus on satisfying their needs 2) Generalisation is in a way means simplification of the processes involved; so it reduces the amount of innovation put into the new advances (it also keeps their capacities low as a more complex system has a less chance of come through the excessive regulatory cycles). So in this sense tighter regulations will push us more to big companies as they will be the only ones with the necessary means to pass the regulations.*

Also this participant referred to computers as providing the main paradigm for change. On the views outlined above, then, there is nothing inherent in nature, science or technology that blocks societies or individuals from developing towards heterogeneity and freedom. The decisive stumbling block, instead, is seen as societal institutions, especially, big corporations, governments and the mass media (all possessing different forms of monopolies). We shall have some more to say about the state of these, or of "society". First, however, we cast an analytical glance at the above descriptions, focusing on the concept of exploratory action and connecting it to that of socio-technical imaginaries.

Intermezzo: socio-technical imaginaries as exploratory action

We have described entries that turned around our initial issues, i.e. normality/perfection and freedom of choice. So far, these may still be seen as examples of classical western imaginaries in Charles Taylor's sense, and so not new or emerging. However, something else is also present, namely the wish to turn such age-old *collectively imagined forms of social life* into

concrete technologies and practices, thereby changing and enhancing individuals and communities. In this way participants see themselves in the light of potential futures, which are imaginative extrapolations from past technological stories of success and development. But mostly, the developments in question remain potentials more than real projects that can be put into action. For analysts of human enhancement, such projections are not as new as may seem from recent posthumanist statements. Since the development of modern experimental systems (mainly laboratories, but also cybernetics), utopians such as Julian Huxley, H. G. Wells and J. H. S. Haldane fostered transhumanist imaginations. Such utopian visions of enhancements may be seen to articulate purified and extreme versions of the everyday potential manifest in numerous ubiquitous and mundane technologies. (Michael 2006; Allenby & Sarewitz 2011). The potency and potentiality of technology is almost everywhere present: pharmaceuticals, increasingly also consumed for extra-medical purposes; extended uses of prostheses; implantable sensors and devices; cosmetic surgery and anti-aging treatments; anti-doping campaigns repeatedly and routinely outpaced by innovative drug-makers, ever-more interconnected digital things and networks, promoting the perception that we are increasingly caught up in some higher networked intelligence.

In terms of participants' responses, and our search for emerging socio-technical imaginaries and communities, then, entries do not easily constitute coherent objects of shared imaginations. It is not so much that participants did not provide concrete examples; for instance, Rockpiler described how

> *We see memes wash over the internet on a weekly basis right now. Imagine how powerful those memes will be when they directly and swiftly flow into the physical world in the form of instant clothing, personal electronics, furniture, body implants, engineered organisms and custom-designed matter. Try being "normal" when variety is the order of the day*

As analysts, we do not have to take a stand on the truth-value of this statement; it is a projection of a possible future state of affairs. Other participants would make other projections, sometimes similar but never in the vicinity of generating anything like a "credible prediction of a future state of affairs". Visions remains much more on the side of the "possible" than the "real" and so are not *attainable* as collective project. In STS terms: the imagined object(s) is not sufficiently stable as to stabilise shared action. It is real insofar as it is part of evolving and ubiquitous technologies, applications and practices. But its promise of development provides no more concrete guidance than do highly general imaginaries of "freedom of choice" or "normality". Similar to most trans-humanist projections, it won't qualify as a socio-technical imaginary.

There is, however, one significant exception to this conclusion, which can be seen by how Rockpiler frames his vision: *We see memes wash over the internet on a weekly basis right now*. The internet emerges as both the medium and main metaphor for conceiving of the very developments he is describing. This, then, is a kind of reality principle based in real experience and interaction with the technology. It is also one that is shared, and repeatedly invoked, by other participants. Recall, for instance, how Midare refers to enhancements as "software upgrades" and as inscribed with "platform issues".

This, then, could suffice as a kind of structuring principle: **the real is that with which people can reliably and repeatedly interact**. This can be aligned with Dewey's notion of imagination as exploratory action as follows: **exploratory action takes place by projections imaginatively made towards the "external" world, then returning to the agent (a person**

or a collective), providing guidance and motivation for action. Such projections are mediated through technology and communication with others. Where technology and communication stabilise around relatively coherent representations or projections, a shared world may emerge. Imaginations are changed, enhanced and stabilised by users stepping in and out of the same/similar technological systems. The difference between the outside and the inside of some system (a search engine, a metro…), provides the play of absence and presence necessary for changing imaginations of actors and the collectives of which they are part. Through such dynamics, both *reflection of community in technological projects* and *attainable futures* may start to take on more concrete shapes.

In the forum data, the internet and software are recurring and stabilising themes, providing shared structures and coherence to imaginations, values and experiences that are otherwise highly heterogeneous and unrelated. In the next section we turn to a further description of the internet and software as both medium and metaphor through which emerging socio-technical imaginaries and potential communities emerge.

The emergence of a political object?

> *I personally have a lot of issues with our current social structure. The hoarding of wealth that has come with our Agricultural Revolution, and the tiered social hierarchies that developed to direct such a lifestyle both will need to change in order to establish a more stable and peaceful future, in my opinion.* (Midare)

According to many readings of transhumanist discourse, declared allegiances to liberal political values, such as diversity and personal choice, only mask the underlying totalitarian tendencies provided by a deep faith in extreme progress and technological determinism (STOA 2009, Coenen 2007, Winner 2005, PCBE 2003). The same argument could possibly be used against some opinions voiced in the previous section. However, as a general interpretation the argument would not hold. First, only a minority of participants identified themselves as "transhumanists". More important, however, is the question regarding realism put forward in the previous section: it is difficult to tag transhumanist visions onto any specific technology or concrete development (the closest probably being the potentials imagined through the emergence of converging technologies and nano-technology). As an attainable path towards the future the window of opportunity opened up by transhumanist discourse seems much too narrow and too wide at the same time (Winner 2005).

More surprising were some of the ways in which entries and discussions turned to political issues. We already saw in the previous section how threats to individuality, choice and pluralism were predominantly imagined to come not from technology, but from main institutions (media, government and big corporations). Starting from the previously described discussions over the commercial character of enhancement options, long threads and arguments were spun around the character of present-day, western societal orders. Although critical, it would be hard to tag arguments down as either "socialist" or "capitalist", although both were frequently invoked.

Some arguments over political economy were connected to transhumanist tropes, such as Kurzweil's "Singularity", Post-Scarcity[4], utopian and/or visionary ideals as to future socio-

[4] Post scarcity refers to a state of industrial and economic development were goods, services and information is free, or almost free. See http://en.wikipedia.org/wiki/Post_scarcity

economic systems of living and producing. But as argued these views could hardly be generalised. Indeed, most did not follow such speculations but rather questioned the capacity of the prevailing societal order for providing just distributions of innovations in science and technology: *The only thing I am concerned about is, if all of this would be affordable to common people. I don't care if someone doesn't want to improve memory or add years to life or technologically advance its body. I care if someone wants to do that but lacks money* (Gordon Freeman). Many would connect these issues to the socio-economic structures and environments fostered by capitalism: *Right now, the biggest problem I see is the fact that these new technologies are being developed in a hyper-capitalistic environment, and are being registered to pharmaceutical companies* (Rabbitz).

In a number of entries participants expressed great distrust towards main institutions and their potentials for providing slight and comfortable transitions into the future: *Politics is ending* (Singularity Utopia) and *I've never seen an institution with the slightest interest in improving our lives, they only seem to…The constitutional charter of rights are not respected under the guise of the state of global crisis* (Nicosia Segundario). Strong criticisms were directed at copyright laws, seen to protect only the rich and the powerful: *Copyright laws are protecting medical corporations….Simple cures for common illnesses will mean that the pharmaceutical market might lose millions of euros* (Rabbitz). As for the media, these did not fare much better: *Capitalist media organisations will naturally not be overtly anti-capitalist therefore I am sure many reports are censored* (Singularity Utopia).

Also this time something approaching a common frame of reference was provided by the digital: computers, the internet and (free) software. These provided resources for imagining alternatives to prevailing business and economic models. Predominant regimes of innovation and production based on standardisation and monopolies could be challenged by new ways of living and producing, along lines already taking place in the digital domains. One of the strongest defenders of transhumanist ideas in the forum promoted the idea that technology, almost by itself, would provide the transition into a new and better stage of living, producing and sharing:

Many things today are open source. I am typing this via OpenOffice a free piece of word processing software. Firefox is an excellent browser - free and open. The OpSys UBUNTU is also a good example of the direction things are heading in (Singularity Utopia). Another participant, Rabbitz, was more sceptical of the power of technology alone to provide the required change, and argued the need to retain and protect public institutions and regulations. However, also for him the models provided by open source were paradigmatic of new and better ways of organising and producing:

> *Open source research could help with this issue, by making sure that cheap medicine remains cheap, but it would be naïve to think that people will start cooperating after years of fierce competition…body and mind enhancement should be controlled by the general public with mediation of local governments, open to all but not forced and accesible for those who need them, not only to those who can pay for them* (Rabbitz).

At this stage we may finally return to, and appreciate more, the quote by Rockpiler from the introduction. As stated, it came out of discussions over regulations of research with a biotech researcher, Evrana. We shall not enter into that concrete discussion, but note how the two, in different though resonant ways, rely upon computers and the digital in order to construct a coherent narrative of the present. Let us first listen to the analysis put forward by Evrana:

> *… the scientific boom in WWII that you implied happened in closed quarters; so it was inevitable for it to take an ideological stance. However, the introduction of computers in our lives, mostly inadvertently, changed the evolution of science. Every kid had a go at programming; and as we now know lots of them cracked it very well and brought in changes that the conventional powers have never imagined. I would like to think of the coming biotechnology revolution in this vein too; something that is highly participation based; not something that is done in ivory towers. And this is happening in certain areas (such as bioinformatics, genomics or proteomics); the amount of information and tools available enables a passionate individual not only to learn about these but also to contribute.*

Directly following this entry, Rockpiler posted a similar version of the story: how science and innovation have developed, and how they *should* develop. He shares the analysis of Evrana, pointing towards an "opening up" of the closed structures that (used to) make up the general environments of science and innovation. However, his point of view is not that of a practicing scientist but that of "common people" and interested lay technologists:

> *When we think about "biotechnology," the image that comes to mind most readily is that of white-coated scientists performing exhaustive experiments in sterile environments to make tiny incremental advances in their specific fields. More and more, however, computer technology and software are augmenting this process by automating repetitious or tedious research tasks, modelling interactions or nano-structures, etc. It is entirely plausible that the tasks currently being performed by entire laboratories could one day be accomplished by two or three graduate students wielding next-gen technology. Push a little further down that line and we might see fully-automated virtual tools that let the layperson design unique organisms via their home computer, and distribute the fruits of their labors to all interested parties across the globe with one tiny command. When that day comes, Big Pharma will compete against the ubiquity of information and the will of the people, and it will lose.*

The two previous quotes go some way in establishing a coherent narrative that provides a deepened sense to the issues described earlier: the initial discussions of normality and choice could be seen as variations over long-standing western ideals and values. The introduction of post-human variations over these values did not add novelty in this respect; they are themselves variations over age-old imaginations and utopias (indeed going all the way back to the alchemists). However, the internet and free software do promise to hold out novelty in terms of *attainable* futures that are also reflected in a shared frame of experience. Indeed, what all participants share is a part-taking in the unfolding of a radically expanded capacity to connect and share, only manifest as a strong societal force throughout the last 10-15 years. Hence, the main medium used for carrying out the debates also turned out to be the main metaphor for imagining a number of issues, some of which stretch deep into both popular imaginations, evolving regimes of research (for instance parts of synthetic biology, the bio-punk and DIY movements, Reference), the development of software and the internet. Participants undoubtedly come from a variety of backgrounds and voice a number of differing values and issues. Still, some level of coherence can be spotted. Many share the commitment to values such as pluralism and the individuality of choice. What's more, many explicitly articulate these values in direct connection with a concern over standardised, top-down institutions, modes of production, distribution of goods, resources and information. Hence, a narrative emerges that both articulates a set of values, as well as the main dangers facing these values in today's western societies (and beyond). What's more, the last two quotes from

Evrana and Rockpiler also point towards a greater narrative, that of the development of research and innovation along with others of western societies' main institutions.

From the beginning of our discussions, the potential for progress resided as a general backdrop for discussions; i.e. "human enhancement" had to be understood in any other way than the highly generalised potential for human, technological and societal improvement and betterment. As noted by several analysts, "enhancement" can meaningfully be interpreted as a generalised potential for improvement, residing in the very fabric of experimental cultures and societies. This was also confirmed by a number of participants, who used concepts such as "technology" not just to describe specific material entanglements but also to denote how they see themselves as caught up in numerous and diverse entanglements and attachments that make up high-tech societies. Residing within imaginations of development and innovation we also encountered another object, which could perhaps be described through the terms *blocked from above*: imaginations of the future deeply inscribed with a distrust of dominant institutions. At the heart of this concern also resides a preoccupation with long-standing European and western values of social justice and equality as central to the progression and development of societies: the institutions do not live up to their promise. They impose monopolies, rigid standards frequently shrouded in secrecy, and they allow neither for community nor for technology to emerge freely.

Let us for a moment return to Dewey's conception of imagination as exploratory action. The following quote goes some way in establishing what triggers imagination qua exploratory action, deliberation and a search for alternative courses of action:

> *"…the object is that which objects. There is no difference in this respect between a visible course of conduct and one proposed in deliberation…Every object hit upon as the habit traverses its imaginary path has a direct effect upon existing activities…In thought as well as in overt action, the objects experienced in following out a course of action attract, repel, satisfy, annoy, promote and retard. Thus deliberation proceeds"* (Dewey 1922, 191-192).

On such a reading, the recourse to digital technologies is not merely grounded in a naïve faith in technology (as frequently seen in post-humanist writings); it is also grounded in the very experience of sharing and connecting, of intimate entanglements with computers, the internet and the possibilities opened up by the digital. In that sense, it is collectively shared exploratory action hitting upon a solid object, progress and development *blocked from above*. In this context, the turn to the digital entails the exploration of a path still open. This path, simultaneously reality and possibility, emerges through the digital and it also succeeds in weaving a coherent set of narratives. These narratives in turn enter into what has here been called an information imaginary, a view of the co-productions of information and society: where these come from, what they are and how they should develop. Indeed, this narrative is part of the development of the internet and free software, and can be studied accordingly. As it turns out, what established itself as a common frame of reference for the TECHNOLIFE participants was not trans-humanism, but rather the works, imaginations and stories provided by computer hackers and geeks.

The significance of the imaginations of computer hackers and geeks can almost not be over-estimated in an age profoundly characterised by the developments of ICTs; however, the governance challenges we have outlined above include the structural bias of under-estimating such imaginations as new expressions of a new elite and a new public. First, a new elite, being

the avant-garde of the new and emerging technologies, who paradoxically both reside *within* the institutions (working for public institutions as well as private companies) and at the same time view these structures as "blocking", obstructing and counter-acting them. Secondly, a new public and a new citizenry, characterised by a young generation with a level of ICT dexterity that surpasses that of the avant-garde of the previous generation. At the surface level of European public life one can only see small signs of this generation – the occasional "pirate parties" in Northern Europe (who got 8.5% of the votes in Berlin's state parliament in September 2011) and the "indignados" in Southern Europe may be such signs. To ignore these signs and the emerging communities is to ignore a potentially strong political force (for the better and for the worse). To interpret them as a spoiled and ungrateful citizenry would be a misunderstanding, and a downright dangerous one. Below, we outline what see as the main policy implications of this insight.

Potential impact (including the socio-economic impact and the wider societal implications of the project so far) and the main dissemination activities and exploitation of results

1. Potential impact

The TECHNOLIFE Project was a methodological one, and it succeeded in developing the method that we have called the TECHNOLIFE suite. Part of the impact will have to be assessed from a long-term perspective, as it is too early to know if the method will be wide-spread. We are already (2012) in initial collaboration with others who are interested in using it.

The other main impact of TECHNOLIFE lies in its implications for policy. Several of our Deliverables (D5.1.2, D5.2.2, D5.3.2 and D5.4.2) are policy reports with direct recommendations to the EC, whereas the equivalent series of booklets (one of which is reproduced above) as well as the project website aims (also) at a wider public. In the remainder of this section we present our main policy recommendations (see also report D5.4.2 *Ethics and new and emerging publics: Integration of participation and dialogue into ethical frameworks for emerging science and technology*).

The TECHNOLIFE project confirms the need for knowledge-based governance of the ethical and societal aspects of new and emerging science and technology. The main policy challenge in this respect can be formulated as follows:

> *How to achieve responsible research and innovation?*

The following working definition of responsible research and innovation has been proposed:

> *Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society).* (von Schomberg 2011, p. 9)

The results of the TECHNOLIFE project offer some detailing of the content of this process as well as advice on broader issues of governance. We address each of these points in what follows.

1. Social justice, equality and power

Citizens are concerned with social justice, equality and power when discussing emerging science and technology. This is a robust finding from TECHNOLIFE which also confirms previous research in this field. It is robust also in the sense that even when we as researchers framed the discussion otherwise, the citizens returned to social justice, equality and power.

This deserves attention in the revision of ethical frameworks, in at least two ways. First, there are **issues** of social justice, equality and power that should be attended to more than now. Secondly, the **frame** of social justice, equality and power should be given be more importance when discussing "conventional" ethical issues such as autonomy, privacy and beneficence.

To give an example: An abstract discussion of privacy tends to miss the important concerns, for instance by confronting an absolute, abstract right to privacy with the impossibility of fool-proof data security in increasingly globalised research infrastructures storing personal information or human biological material. Within that abstract frame, one can see all around Europe that the conventional rights-based ethics discourse has lost or is losing the battles. It is relegated to the position of unreasonable and irrelevant "obstacles" to progress.

By this observation we do not wish to imply that there is no place for a rights-based ethics discourse. Of course there is. The point is that it becomes ever more forceless when the debate is framed so as to have the spokesmen of science, innovation, growth and progress on one side and ethics, ethicists, ethical guidelines and ethical reviews on the other. We have not encountered any ethicist or any participating citizen who is against progress. Integrating the dimensions of social justice, equality and power into the ethical framework, however, allows a number of important questions to be asked: Progress for whom? Decided by whom? Judged by which criteria? These questions have become even further actualised in the course of the TECHNOLIFE project, with the social tensions that result from economically difficult times.

Below we shall present some thoughts on the challenge of implementing the integration of social justice, equality and power into ethical frameworks. There is no easy and unique answer to this challenge, and we are of course not the first team of researchers to address it. One particularly difficult issue is the dividing line between "ethics" and "politics" – what should belong to the "domain proper" of the institutions of ethics, and how much this domain should be democratised. The current lack of a unique solution must however not be used as an argument against the importance and urgency of the problem.

2. An emerging "ethics of reciprocity" as a response to being "blocked from above"

The opening statement of the Commission's White Paper on Governance was remarkably candid:

> *Today, political leaders throughout Europe are facing a real paradox. On the one hand, Europeans want them to find solutions to the major problems confronting our societies. On the other hand, people increasingly distrust institutions and politics or are simply not interested in them.*

At the time of the formal closing of TECHNOLIFE as an FP7 research project (November 2011), the relevance of this statement is felt no less, in a Europe struggling to overcome a financial crisis with deep political ramifications. A re-reading of the White Paper invites to seeing the crisis not only as an externally imposed problem: The crisis is financial, but also political, institutional and cultural. It is global, but also deeply rooted in how European institutions, nations, leaders and publics have fared.

In this context, it is important to realise what it means that concerns over social justice, equality and power are firmly rooted in citizens' life-world, imagination and exploratory action. It means that if institutions are perceived not to address these concerns in a satisfactory manner – if people feel **blocked from above**, that is, blocked, discouraged, fooled or obstructed by governments, authorities or private companies, as we have evidence to believe – they will find other ways of addressing their concerns and needs. Outside Europe, the Arab spring of 2011 has showed in dramatic ways the force of the acquired agency. Within the European Union, characterised by relative economic affluence and institutional legality, one

would not expect massive revolt but rather the development of what we will call an **ethics of reciprocity:** When the young generation, characterised by technological dexterity and by the "hacker ethic" of sharing, perceive current legal and ethical regimes of intellectual property rights to be obsolete, they will develop creative ways around them. To the extent that the citizenry regards a technological product or service to be too unfair, it will be hacked or sabotaged. Unless authorities are willing to massively police such behaviours, some kind of accommodation will eventually occur, either in adjustment of the products and services, or in legal and ethical frameworks, or both.

There are policy implications for responsible research and innovation of the fact of the ethics of reciprocity. First, social justice, equality and power ought to be contemplated and discussed upstream, already at early stages at R&I, not only on high moral grounds but also on realist and consequentalist terms. For authorities to postpone these dimensions to an emerging ethics of reciprocity is in effect to take on a reactive rather than a proactive stance. Secondly, the call for responsible research and innovation would also imply the need for anticipatory and precautionary measures with respect to the ethics of reciprocity. For instance, both with regard to human enhancement technologies and synthetic biology one may easily imagine how the "hacker ethic", grounded in concerns over social justice and equality, still may pose serious threats to safety and security other than those that became evident with *Wikileaks*. One such scenario of the future would be "garage synthetic biology": a level of open source-based distribution of knowledge, skills and materials for synthetic biology that allows almost anybody to design and produce their own tailor-made bacteria for their own purposes.

3. Participation and dialogue as an inherent and integral dimension of the ethical framework

We have identified the political phenomenon of perceiving oneself as "blocked from above". Obviously, there is no direct normative implication from these citizens' perception to what authorities and governmental institutions ought to do. Many initiatives from "below" *ought to* be blocked, say, due to their criminal intent. Moreover, it is not always evident that perceived resistance, even irrational resistance, is destructive. We could provide many technological and political examples of how citizens see obstruction and resistance as a challenge and how this triggers engagement and creativity. This is indeed the mechanism of the ethics of reciprocity. A more straightforward implication, however, is the need to improve communication of these concerns "upward", from citizens to institutions and decision-makers.

In this context, communication may be improved in two ways: Improving the knowledge base so that it detects public concerns and needs with finer sensitivity, and improving the channels for communication to become a functional dialogue.

As for the knowledge base, the Commission should reflect upon how the top-down, disempowering perspective to some extent may be built into research methodologies, with the effect that they lose sensitivity for other perspectives. For instance, many public decision-makers and academics may have ample experience that indicates an erosion of public trust in research and innovation policies along the same lines as those of the opening statement of the White Paper on Governance. Still, standard instruments such as the Eurobarometer appear not to detect such signals so well. There are at least four remedies to this problem, and they are not mutually exclusive. First – and perhaps the most common strategy – is that decision-makers acknowledge the limitations and deficiencies of such surveys and choose to rely more on their individual and collective experience as a form of knowledge. Secondly, one can take

advantage of academic contributions by social analysts and critics. To give an example, it would be reasonable to listen to Ulrich Beck or Charles Perrow in the debates on nuclear energy after Fukushima since they have spent decades on formulating and refining their analyses and concerns about our societies' ways of governing risks and accidents.

Third, research developments such as TECHNOLIFE and our sister project VALUE ISOBARS provide other and more direct remedies, however, being on one hand empirical but on the other going deeper than the conventional surveys. **VALUE ISOBARS may be said to go deeper down** in the sense of describing people's values that underlie their opinions and actions. **TECHNOLIFE goes deeper into** citizens' life-world and is closer to **what they do** than a survey of opinions.

To include the knowledge produced by methodologies such as VALUE ISOBARS and TECHNOLIFE appears to us as a necessary but not sufficient change in the ethical frameworks of new and emerging science and technology. The use of the methods can provide decision-makers, ethics committees etc with concerns in the form of other issues and other frames. Still, one should expect institutional barriers to the adoption of the issues and the application of the frames, for a number of reasons. Perhaps the simplest one is the observation that frames such as that of social justice, equality and power is hardly a new political invention and still it came to play no main role in how, say, ethical reviews are designed. Ultimately, what is needed are creative ways of making participation and dialogue permeate governance of science and technology at all levels, including ethics, to become a natural, inherent and integral dimension and not an "add-on" through the occasional participatory exercise. For instance, one very simple measure would be to strive for a plurality of **values** in ethics committees and not just a plurality of knowledges or roles. Another way of saying this is that the politics of science and technology needs to be revitalised.

4. Ethical frameworks and social desirability: How to move beyond cultures of accountability and effrontery

If communication and dialogue becomes integral and a strong guiding principle of ethical frameworks, however, the question remains if not this could threaten the efficiency of the legitimate work within the more narrow frames of "juridified ethics" – making sure that projects comply with guidelines, conventions, laws, principles of consent and of data management etc. This work is important and it relies on a particular kind of ethics expertise that emerged over the latter decades.

In the context of responsible research and innovation, it may be useful at this point to discuss the different roles and functions of ethics also in terms of what we loosely may call organisational and institutional culture.

First, neither ethics nor initiatives for responsible research and innovation nor other attempts at soft governance can live well in a culture of effrontery. Ethical values and guidelines will be disregarded. If there is compliance it will be nominal and not real in terms of intent. Probably all readers of this document know that this happens not only in civil society but also in the world of commerce, science and technology. This is another reason for why communication and dialogue is needed: To avoid and prevent a culture of effrontery. This is becoming an urgent challenge in a situation of economic crisis and social tensions within as well as outside of Europe.

Second, what was called "juridified ethics" above, appears to be most meaningful with a context of responsibility understood as accountability, liability and guilt. This context calls for

an equivalent culture; legality, accountability and predictability must prevail when for instance ethical committees are endowed with the capacity to approve or stop research funding.

Still, most of the challenges of responsible research and innovation are of a different kind, concerned with questions of good practice, social desirability, precaution, codes of conduct etc. Rather than accountability and guilt, they presuppose a culture of honourableness and good faith – of honest dialogue and voluntary agreements between honourable people. This is what one wants in the research world; this is what one – sometimes to scientists' surprise – repeatedly has achieved in public engagement exercises. Listening to the discourse of *los indignados* and other currently emerging social movements, this also seems to be the main value sought by broader groups and in broader contexts. The TECHNOLIFE project has shown that such a culture can also be achieved in an online forum on the internet discussing ethical issues of emerging science and technology, given that the appropriate methodology is applied.

In conclusion: communication and dialogue should permeate ethical frameworks, to provide substantive input as well as in the procedural and institutional design. In particular, communication and dialogue is important for social desirability as an aspect of responsible research and innovation, and it should be pursued through methodologies that favour and nurture a culture of honourableness and good faith. This becomes even more important in times of economical challenges and social tensions. The TECHNOLIFE method has proved to be one such methodology.

2. Main dissemination activities

The address of the project public website as well as relevant contact details

http://www.technolife.no

Please contact the Roger Strand or Kjetil Rommetveit at the Centre for the Study of the Sciences and the Humanities, University of Bergen, P.O. Box 7805, N-5020 BERGEN, Norway, fax +47 55589664, e-mail roger.strand@svt.uib.no and kjetil.rommetveit@svt.uib.no, see also http://www.uib.no/svt/en.

Section A (public)

This section includes two templates

- Template A1: List of all scientific (peer reviewed) publications relating to the foreground of the project.
- Template A2: List of all dissemination activities (publications, conferences, workshops, web sites/applications, press releases, flyers, articles published in the popular press, videos, media briefings, presentations, exhibitions, thesis, interviews, films, TV clips, posters).

These tables are cumulative, which means that they should always show all publications and activities from the beginning until after the end of the project. Updates are possible at any time.

TEMPLATE A1: LIST OF SCIENTIFIC (PEER REVIEWED) PUBLICATIONS, STARTING WITH THE MOST IMPORTANT ONES

NO.	Title	Main author	Title of the periodical or the series	Number, date or frequency	Publisher	Place of publication	Year of publication	Relevant pages	Permanent identifiers[5] (if available)	Is/Will open access[6] provided to this publication?
1	The Technolife Project: An experimental approach to new ethical frameworks for emerging science and technology	Kjetil Rommetveit	International Journal of Sustainable Development		Inderscience Enterprises Ltd		Accepted, forthcoming		No	No
2	Imagining high-tech bodies and minds: Science fiction and the ethics of enhancement.	Ana Delgado	Science Communication		SAGE		June 2011 (online first)		No	No
3	Ethical Issues in Governing Biometric Technologies	Margit Sutrop	Ethics and Policy of Biometrics		Springer-Verlag Heidelberg		2010	102 - 114	No	No
4	Health Ideologies, Objectivism, and the Common Good: On the Rights of Dissidents	Roger Strand	Special issue: from informed consent to no consent?	Cambridge Quarterly of Healthcare Ethics / Volume 20 / Issue 04,	Cambridge Journals		October 2011	pp 605 - 611	No	
5	Tackling Epistemological	Kjetil	Special issue:	Cambridge	Cambridge		October	pp 584-595	No	No

[5] A permanent identifier should be a persistent link to the published version full text if open access or abstract if article is pay per view) or to the final manuscript accepted for publication (link to article in repository).

[6] Open Access is defined as free of charge access for anyone via Internet. Please answer "yes" if the open access to the publication is already established and also if the embargo period for open access is not yet over but you intend to establish open access afterwards.

	Naivety: Large-Scale Information Systems and the Complexities of the Common Good	Rommetveit	from informed consent to no consent?	Quarterly of Healthcare Ethics / Volume 20 / Issue 04,	Journals		2011			
6	From Identity Verification to Behavior Prediction: Ethical Implications of Second Generation Biometrics	Margit Sutrop and Katrin Laas-Mikko		**Review of Policy Research** Volume 29, Issue 1 Pages i–iii, 1–172	Wiley		January 2012	Pp 21–36	No	No
7	Genetic enhancement: futures tense	Kjetil Rommetveit	Futures		Springer		February 2011		No	No
8	Clinical decision making and moral imagination	Kjetil Rommetveit	Oxford Journal of Philosophy and Medicine		Oxford Journals		Accepted, forthcoming		No	No

TEMPLATE A2: LIST OF DISSEMINATION ACTIVITIES

NO.	Type of activities	Main leader	Title	Date	Place	Type of audience	Size of audience	Countries addressed
1	Conference presentation	Kristrún Gunnarsdóttir	TECHNOLIFE: aims and objectives reflecting on two questions: What is Europe's position on innovation and society? What do we expect of assessment frameworks?	4 Sept.	The EASST 2010 conference (track 31) Trento, Italy		45-50	International
2	Conference presentation	Margareta Bertilsson	On Ruptures and Continuities – On the Many Versions of Pragmatism in Sociology and Elsewhere	1-2 June, 2010	Nordic Pragmatist Association Uppsala University			Nordic countries
3	presentation	Kjetil Rommetveit	Introducing biometrics in the European Union	25 March 2010	RISE workshop, European Commission, Brussels.		60	
4	presentation	Kjetil Rommetveit	Governing mobility through biometrics and large-scale information systems in the EU	2010	Workshop on emerging technologies and public participation Barcelona, Universidad Autonoma		40	European
5	Conference	Kjetil Rommetveit	The Technolife Project		Workshop: nanoethics		20	

	presentation				University of Bergen			
6	Conference presentation	Kjetil Rommetveit	Biometrics: technology of (dis-)trust?	30.06.2010	Science and Democracy Network Milton Keynes, UK		40	
7	Conference presentation	Ana Delgado	Ethics, science fiction and imaginaries of body enhancements.		4S Annual meeting Tokyo		30	
8	Conference presentation	Kjetil Rommetveit	"Tackling epistemological naivety: understanding values, choices and the complexities of the greater good?"	November 4-6. 2010	Conference: "From informed consent to no consent? The challenges of new ethical frameworks", University of Tartu, Estonia	"	70	International
9	Conference presentation	Margit Sutrop	"From informed consent to no consent? The challenges of new ethical frameworks"	November 4-6. 2010	Conference: "From informed consent to no consent? The challenges of new ethical frameworks", University of Tartu, Estonia		70	International
10	Presentation	Kjetil Rommetveit	The Technolife Project.	November 18. 2010	Workshop "Governance and Ethics of Emerging ICT and Security Technologies European Parliament, Brussels		30	European
	Conferen	Roger Strand	Sparking Publics into	1 Oct 2010	S.net 2010			International

	ce presentation		Being: The TECHNOLIFE Approach		Darmstadt University			
11	Conference presentation	Roger Strand	The Technolife Approach to Public Dialogue on Body Enhancement	December 9-10. 2010	Conference: the human and its limits University of Bergen		30	International
12	Presentation	Kjetil Rommetveit	Engaging communities in discussions about ethics for governance	February 8.2011	Monthly lunch meeting, DG INFSO, Brussels		10	European
13	Conference	Technolife consortium	Final conference (for details, see program pasted into this document on page…	November 21.-23., 2011	Fondation Brocher, Brussels Final conference		30	European
14	Conference presentation	Kjetil Rommetveit	Technolife: Films, Social Media, and Imaginaries in Emerging Technologies	November 07-10, 2011	S.net Third annual conference Arizona State University, Tempe, AR		50	International
15	Conference presentation	Kjetil Rommetveit	Tales of emergence: biometrics in the European Union	November 07-10, 2011	S.net Third annual conference Arizona State University, Tempe, AR		20	International
16	Roundtable	Kjetil Rommetveit	Biometrics: ethical and societal aspects		RISE final conference, Brussels, 09 and 10 december 2011		40	International
17	Online article on research ethics	Kjetil Rommetveit	Biometri: forskningsetiske utfordringer (Biometrics: challenges for	August 16 2011	http://www.etikkom.no/no/FBIB/Temaer/Forholdet-forskningsamfunn/Biometri/			In Norwegian

			research ethics)					
18	Project website	Technolife Consortium	The Technolife project		www.technolife.no		Approx. 12 000 hits between 01.11 2010 and 01.12, 2011	Online
19	YouTube channel video	Technolife Consortium	Technolife GIS movie		http://www.youtube.com/user/TechnolifeDebate/videos		Approx. 1850 viewings	Online
20	YouTube channel video	Technolife Consortium	Technolife ICT movie		http://www.youtube.com/user/TechnolifeDebate/videos		Approx. 2420 viewings	Online
21	YouTube channel video	Technolife Consortium	Technolife BODY movie		http://www.youtube.com/user/TechnolifeDebate/videos		Approx. 3450 viewings	Online
22	Final video	Technolife consortium	Video: Technolife results	15.01.2012	www.technolife.no		Recently posted	Online
23	Flyer	Technolife consortium	Connected to the System? Biometrics and Mobility in the EU	21.11.2011			300 copies	
24	Flyer	Technolife Consortium	Citizens as Neo-Geographers: the Challenge of Responsible GIS	21.11.2011			300 copies	
25	Flyer	Technolife Consortium	Citizens as Informed Debaters about Human Enhancement and Body Modification	21.11.2011			300 copies	
26	Flyer	Technolife Consortium	TECHNOLIFE: Ethics with People	21.11.2011			300 copies	
27	Stand	Technolife consortium	Technolife ethics lab	27.-29.09.2010	ICT2010 Industry fair Brussels			This is the largest industry fair of it's kind in Europe

28	Online forum (3)	Technolife consortium/UVSQ partner	Technolife forums	01.09.2010 – 31.12.2010	http://www.kertechno.net/kertechno/deliberations		207 registered participants; 10 127 unique visits	
29	Online prototype user portal	UVSQ partner	Ker-TECHNO prototype portal		http://www.kertechno.net/			Online
30	Online article about Technolife	Matt James	Asking the right questions		http://www.bioethics.ac.uk/news/Exploring-TECHNOLIFE.php			Online
31	Online article about Technolife	Aaron Saanz	EU confronts transhumanism with Technolife Project		http://singularityhub.com/2010/09/28/eu-confronts-transhumanism-with-technolife-project-video/			Online
32	Facebook page	Technolife Consortium/UVSQ partner	Facebook Technolife debate		http://www.facebook.com/technolifedebate		324 “likes”	Online
33	News-letters	Technolife Consortium/UVSQ partner	Facebook Technolife debate		http://www.facebook.com/technolifedebate		Approx. 1800 individual newsletters (to registered participants)	

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