ICTethics : *Conclusions and key recommendations* [1]

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The research at Lancaster University (ULANC) has focussed on the ethical implications of prioritising ICTs in a concerted push for a competitive European *Innovation Union*. It has focussed on the combined challenges to ethics, law and society (ELS), engendered by strategic ICT developments over the past 15 or so years. Significant time has been devoted to networking and communicating with ICT visionaries, research leaders and ELS specialists, as can be seen from our activity reports.[2] These networking activities contribute to the research assigned to ULANC on the convergence of physical, mental and virtual phenomena with examples from state-of-the art assistive robotics and smart implant technology. They also support our ethical review of ICT developments across all four research domains included in the ICTethics project: 1) the ***internet of things***; 2) ***intelligent environments***; 3) the ***convergence of physical, mental and virtual phenomena***, and 4) ***ICT for human security***. ScopeNotes produced throughout the lifetime of the project address the findings we summarise here along with recommendations for ICT professionals, strategic thinkers and experts involved in innovation, social and public policy.

(1) *A summary of key findings* (from material presented in ScopeNotes)

Among our key findings is ample evidence of ongoing struggle in the protection of data, privacy and the dignity of persons. We observe that the latest proposal for an EU data protection directive goes a long way in clarifying how the obligations of data controllers and the rights of individuals can be operationalised and accounted for. However, there are unresolved conflicts posed by the agencies who actively seek to override such rights and obligations for the purposes of identifying threats to security and the public order, of predicting and preventing certain kinds of events from happening. These conflicts continue to be on human rights, data and privacy protection agendas but,

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[1] The opinions expressed in this document are not officially those of Lancaster University, or any of its departments. They are solely the opinions of the authors, based on research and analyses for the ICTethics project. Importantly, these opinions are **not** anti-technology and anti-innovation sentiments, although, it may seem so at a glance. The concerns raised here turn on democratic protocol, pragmatism and justice in crafting socially and culturally realistic and responsible futures for Europeans, an effort we argue is an innovation practice in its own right.

[2] See http://neicts.lancs.ac.uk/ictethics.htm

that set aside, the new data protection standards are achievable for well defined settings, functions and purposes.[3] Unfortunately however, they are limited in scope in light of a growing range of situations and practices for which clear definitions are problematic. For example, there is no precedence for coping with advanced sensory and remote monitoring capabilities that take advantage of highly distributed data-handling operations and *on-the-fly* identification and profiling of *types* rather than individuals—processing that does not necessitate databases, occurs without the immediate awareness of those who are simply going about their everyday lives, and is ideal for targeted marketing and other nuisance, including the potential for serious harassment. In other words, the public has become *naked to view*,[4] identified clusters by particular interests. We have learned from expert meetings and workshops that public acceptability is put to the test here, but it also risks being compromised by what is operationally desirable within powerful agencies attending to commercial interests and economic gain.

Another key finding is widespread evidence of overly optimistic expectations of yet-to-be-achieved breakthroughs in artificial intelligence (AI) research. These expectations are encouraged and cultivated by visionaries, research leaders and policy-makers, to support the pivotal role given to ICTs in efforts to solve all kinds of societal challenges. ICT developments over the past 15 or so years are indeed a prominent example of the *strategic turn* in recent times, of setting research and innovation agendas. The promise is that ICTs will improve, among other things, healthcare, education, social cohesion, environmental monitoring, safety and security. An important argument is cost reduction, in particular, in vital services to publics. In reality however, ICTs typically introduce new and unprecedented costs. For example, advanced sensors and *smart home* installations to remotely monitor health and safety-related conditions are expensive interventions as it stands, and not likely to be widely subsidised any time soon by public care provisions. The same can be said about developments in assistive robotics which are designed to take over some aspects of care. ICTs introduce organisational and institutional complications which are time-consuming and costly to correct. They can also fail completely in meeting practical expectations, however, many successful applications have initially been aimed at *first markets* of affluent consumers and profitable businesses, the implications of which is well worth exploring further.

With this in mind, it is pertinent to carefully consider what ICT ethics should be an *ethics of*. Our main conclusions are that:

1. Ethical investigations need to reflect the fact that many of the technologies that come under scrutiny may never exist except in fictional scenarios of uncertain futures.

2. Ethical reflections ought to challenge the political and policy push (and pull) for particular kinds of futures for Europeans, without adequate clarity on who is invited to design those futures and who is not.

3. Ethical reflections need to look very closely at the decision-making protocols, in particular, how decisions are made about public investment, by whom, who actually benefits and why. For example, should one or another industry sector secure for themselves the intellectual property right to new *tools and instruments of production*, whose emergence is subsidised by the European public and economy at large?

4. Ethical reflections need to look carefully at economic incentives and emerging markets, ask how exactly the new innovations are of economic value and contemplate how access to state-of-the-art technologies *that do work* can be addressed, deliberated and articulated if market models fail.

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3   The ULANC team has been in first hand contact over some time now with some of the legal scholars and other experts who are contributors to the development of the new directive.

4   A phrase used by philosopher A.C. Grayling in interview with Steve Hewlett on BBC Radio 4, 2013.

5. Ethical reflections need to engage critically with the stated promises of advanced ICTs to avoid the embarrassment of confusion about their practical potentials and limitations. Prominent examples include:

- **Intelligent environments**: Visions of seamlessness and automation fail to account for the operational challenges of maintenance and necessary ongoing decisions on what to sense, what to record, what to store, what to process and how, and under which conditions more generally data can be operationalised in a relevant and meaningful manner.

- **eHealth**: Socio-technical, political and moral imaginations of empowered citizens and personalised ICT-assisted healthcare, fail to account for the implications of recent shifts in responsibilities—from public care provisions to private enterprise to individual self-care. They fail to take adequate note of how new tools and technologies are *domesticated* in unstructured and semi-structured setting, and in ways which are difficult to predict and subject to accountability.

- **Human security**: While *security* has become a watchword for matters of public safety and protecting the economy, markets, democratic values and *our way of life*, the agencies holding the official responsibilities to gather intelligence, enforce the law and *keep us safe*, face unprecedented organisational, operational and moral challenges in accommodating and accounting for an ICT-driven securitisation agenda.

In short, advancing ICTs alone will not relieve the pressures on care, human security and all the vital resource services to occupational, public and private lives. Where the limitations lie is not obvious to most people, but neither are the potentials adequately accounted for. This points to a lack of clarity, openness and honesty with which technological potential and limitations are communicated by ICT experts.

We further draw together our conclusions into a question that remains unanswered about the European politics of innovation:

> *Can existing institutional arrangements and protocols adequately support open and transparent debate on competitiveness, technological potential (and limitations), assessment models, purposes, direction and matters of fairness, social justice and democratic decision-making?*

The development of European innovation policy and of strategic research and innovation agendas, suggests how relevant this question is, ethically and politically. There are no certain answers. Scientific and technological advances have a prominent role in strategic planning of an innovative and competitive Europe. This calls for a whole host of considerations about power, about who is *the elephant in the room* so to speak. Industries with vested interests seek to steer research and development in one or another direction in the name of *better* society and service to citizens, although, a closer look at what they actually achieve does not clarify very well how they deliver on those promises.[5] There are dominant and sometimes aggressive views on socio-economic needs and concerns, what the threats are to progress and what our way of life should be. There are dominant ways of choosing and framing what the pertinent issues are with reference to particular and often narrow constructs of who the European publics are and what they want, who the relevant stakeholders are and what kind of future can be available to Europeans *before it is too late*.[6]

None of the underlying assumptions and prejudices in these efforts are self-evident and inevitable,

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[5] The Ambient Intelligence initiative (Philips Research) is a powerful example of an innovation agenda pushed in the name of radically transforming for the better people's everyday lives, their environment, vital services, and so on.

[6] For example, European Communities (2006). *Creating an Innovative Europe: Report of the Independent Expert Group on R&D and Innovation (Chaired by Mr Esko Aho)*. European Commission (EUR 22005).

albeit, they typically go unchallenged. We therefore recommend openly addressing the European politics of innovation—the institutionalised practices that cultivate particular views and trajectories of development, choose and frame what the challenges are, and we ask if they make *good choices*.

Our ScopeNotes suggest that ICT developments will continue to require ethical reviews and reflections in a range of topical areas associated with the four research domains of the ICTethics project. Regulatory frameworks provide considerable support already in the key areas of data protection and e-inclusion. The ongoing work on data protection for Europeans has enormous implications for future developments across the whole spectrum of ICT-based developments. Regulation on non-discrimination and equal opportunities supports ongoing work to ensure access and inclusion in the *information society*. Furthermore, there is evidence of efforts to establish curriculum that teaches children about information rights, about threats to privacy and how to manage the informational self and digital citizenship. In addition to that however, there will continue to be concerns about the meaning and value of privacy, about risk management, safety and liability, autonomy, dignity and independent living, technologised bodies, technological fixes, managed social groups, ownership, dual use, distributive and commutative justice.

As regards the research domain assigned to ULANC specifically (*convergence of physical, mental and virtual phenomena*), we observe new possibilities to co-ordinate, co-act, co-operate and co-manage with computational functions in unstructured and semi-structured activities (professional, ordinary, leisure). We observe that increasing physical and cognitive intimacy in human-device relations coincides with increasing human-device interdependence in decision-making scenarios and in socially and emotionally sensitive situations. The direction these developments are taking, and the purposes for which they are envisaged, raise ethical concerns that will certainly need continued attention. One regards the proliferation of new tracking, monitoring and adjustment capabilities of bodies, behaviour and state of being (*health and safety operations, medicine and care, law enforcement and military*). Another regards the increased input of computational functions in performance-critical decision-making scenarios (*remote-controlled and semi-autonomous robots*). There are uncertainties associated with changing perceptions of body, self and identity (*advanced bionics, body/brain implants, cyber-being*), changing perceptions of companionship and human relations (*companion robots for private use and care purposes*), and new experiential opportunities (*body modification involving more invasive procedures*).

(2) *Further considerations for recommending action and new research*

Taken together, our observations and conclusions strongly support the work that already takes place in practical ethics and philosophical scholarship. In addition to that, there are a couple of key points in our conclusions that only recently have begun to see some currency, but our observations suggest strategic action for public policy. One concerns situations and practices for which the new data protection standards are still inadequate, most prominently, the targeting of human clusters by a particular interest / behaviour. The other concerns the pressure on the European Commission to further commercialise subsidised research and innovation while maintaining a cautious approach to *open access*.[7]

We also draw together our observations and conclusions on the state of innovation politics to recommend strategic action to ICT professionals, strategic thinkers and experts involved in innovation policy. There are a number of additional considerations we have taken into account in that respect, based on a follow-up research into innovation policy development over recent years.

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[7] See for example recent report from the UK House of Lords, EU Sub-Committee B on the internal market, infrastructure and employment.

First to consider is that Philips' original vision of Ambient Intelligence (AmI)[8] was a starting point in ELS research for the ICTethics project, however, AmI shifted into the background of ICT developments during the first decade of the 21st century.[9] Already by the time the project began in 2009, the AmI vision had radically diversified and the particularities of the *intelligence* in the original vision were no longer an attractive theme on the agenda of advisory bodies to European innovation policy in matters of ICTs. However, a set of *key-enabling technologies* were mastered, i.e., advances in electronics engineering (including wireless technologies), materials science, computer-human interfaces and social computing. These technologies have translated into novel ICT designs for professional and specialised practices, for educational, recreational, public and private domains.[10] Secondly, the advancement of ICT-based products and services is implicated in every other area of scientific and technological development, and so is the convergence of ICTs with nanotechnology, biotechnology and bio-mimesis, cognitive science and a vast range of other specialities.

Considering the pivotal role ICTs have in delivering the *Innovation Union*, it seems crucial to make sense of the development of innovation policy in general in order to have a good grasp of policy support to ICT advancements in particular. With that in mind, we consulted a list of documents and reports that are implicated in policy development over the past few years, i.e., to better flesh out the considerations we believe are essential to our recommendation to ICT visionaries, leaders and policy experts.

The European challenge

The Horizon 2020 proposal (2011) outlines three priorities to focus available resources towards future growth and long-term European competitiveness.[11] The first calls for **excellence of the science base**, to be achieved by supporting and developing talent and building up research infrastructures. The second calls for **industrial leadership**, to be achieved by encouraging business-led initiatives and corporate investment in industrial/technological development. The third calls for **better society**, to be achieved by addressing major challenges and concerns shared by European citizens. The grand societal challenges identified in this document are: 1) Health, demographic change and well-being; 2) Food security, sustainable agriculture, marine and maritime research and the bio-economy; 3) Secure, clean and efficient energy; 4) Smart, green and integrated transport; 5) Climate action, resource efficiency and raw materials; 6) Inclusive, innovative and secure societies.

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[8]   ISTAG (2001). *ISTAG Scenarios for Ambient Intelligence in 2010*. Report EU Commission (Final Report); ISTAG (2003). *Ambient Intelligence: from vision to reality. For participation – in society & business*. Report EU Commission; Aarts, E. and Marzano, S. (2003). *The new everyday: views on ambient intelligence*. Rotterdam: 010 Publishers.

[9]   Aarts, E. and de Ruyter, B. (2009). New research perspectives on Ambient Intelligence. *Journal of Ambient Intelligence and Smart Environments* 1(1). pp. 5-14; Aarts, E. and Grotenhuis, F. (2009). Ambient Intelligence 2.0: Towards Synergetic Prosperity. In M. Tscheligi, B. et al. (eds) *Lecture Notes In Computer Science (Vol. 5859); Proceedings of the European Conference on Ambient Intelligence*. Salzburg, Austria (November 18-21, 2009). Springer-Verlag. pp. 1-13.

[10] For example so-called 'smart' phones and tablets, wireless sensors, social networking and assistive robotics.

[11] European Commission (2011). *Horizon 2020 - Framework Programme for Research and Innovation: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions*. Brussels, 30.11.2011. COM(2011) 808 final, http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=h2020-documents.

We learn from this proposal about the interdependence of the three priorities. The industries rely on the science-base and only by advancing the science-driven industries can the societal challenges be adequately addressed for the betterment of society. Recent contributions to the development of European industrial policy further reduce this interdependence to an emphasis on strategic approach to so-called *key-enabling technologies* which are identified by industrial leaders and visionaries and seen as essential to deliver new innovations throughout the economy. So, taken together, the implications are that tackling the societal challenges requires the mastery of key-enabling technologies, competitive science-driven manufacturing, industrial competition for growth and jobs, and not the least business-led initiatives and market models that aim at new economies of scale.

What is not clear about this development is how to make room for *all* of the sciences and relevant knowledge-domains and *all* possible kinds of innovation. Leading documents speak of including the social sciences, the humanities, and social and cultural innovation, but *getting down to business* of European competitiveness, obscures their place and potential as innovation practices in their own right. The result is that policy visions of a strengthened science base and science-driven industries become under-socialised and poorly cultivated, one reason being that they represent primarily an urge to find solutions to the problem of an unsustainable *status quo* of production, consumption and other economically and culturally entrenched habits.[12] This creates of course suspicion about lip service and whether any institution is genuinely interested in innovating for societal change and novel improvements to people's lives. It risks the loss of credibility in matters of identifying societal challenges as well as how to address them. For example, it is not at all clear how the grand societal challenges manifest themselves as societal concerns and cause for action amongst the majority of Europeans. There also remains an unanswered question about what exactly can be known in advance about the enabling potential of the *key-enabling technologies* and what the implications of that might be.

The question of enablement

The role of key-enabling technologies (KETs) is elaborated in a number of documents that assess the status of KETs in relation to European competitiveness and industrial policy.[13] A 2011 report by a high-level expert advisory group recommends that six KETs become the *technological priority* in European innovation policy, and thereby included in political and financial instruments like the

> *KETs are knowledge and capital-intensive technologies associated with high research and development (R&D) intensity, rapid and integrated innovation cycles, high capital expenditure and highly-skilled employment. Their influence is pervasive, enabling process, product and service innovation throughout the economy. They are of systemic relevance, multidisciplinary and trans-sectorial, cutting across many technology areas with a trend towards convergence, technology integration and the potential to induce structural change* (European Commission, 2011: p. 10).

Horizon 2020 programme.[14] The KETs identified in this report are: 1) advanced materials; 2)

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[12] It appears to have become an ideological no-go zone to openly challenge the assumption that the only meaningful measure of the health of an economy is the value of the growth indicator, while it is blatantly clear that the bases on which economic growth is even possible is unsustainable

[13] See Commission Staff Working Document (SEC(2009)1257): *Current situation of key enabling technologies in Europe*; Also, *European Competitiveness Report*, Brussels, 28.10.2010, SEC(2010) 1276 final; and *An Integrated Industrial Policy for the Globalisation Era*, *Putting Competitiveness and Sustainability at Centre Stage*, Brussels, COM(2010) 614, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2010:0614:FIN:EN:PDF.

[14] European Commission. (2011). *High-Level Expert Group on Key Enabling Technologies (final report)*. European Commission: HLG KET Board,

nanotechnologies; 3) micro-nano electronics; 4) photonics; 5) biotechnology, and 6) advanced manufacturing systems. A number of possible applications are further specified in this report with reference to advancing and mastering the KETs, such as new types of batteries and power electronics, low consumption lighting, photonics-enabled optics and cameras, tactile screens and optimised surfaces. Strategic response to the grand societal challenges is also envisioned, the de-carbonisation of transport being named as one example. In other words, this report, like many other recent contributions to European innovation policy, insists on the interdependence of industry, science and better society. It also confirms, like many other recent documents and initiatives, that ICTs continue to play a pivotal role.[15] ICTs are implicated as part and parcel of advancing one or more of the KETs, while those selfsame KETs are essential to advancing the kinds of ICT products and ICT-based services that are aimed at tackling societal challenges. Subsequently, the mastery of KETs is implicated by proxy in the four research domains of the ICTethics project.

We conclude that identifying technological priorities in terms of their enabling potential is not in itself problematic, nor are the strategies that tie them to political and financial instruments. It is a method that works. One important learning from the AmI initiative is how its strategic research and innovation agenda became the basis for close to €4 billion EC Framework Programme investment in Information Society Technologies (IST) between 2002 and 2006. The agenda induced disruptive changes of systemic relevance. It supported the advancement of enabling technologies and thereby enabled novel designs of ICT products and ICT-based services. What is problematic however, relates to the work that went into imagining and communicating future lifeworld scenarios, a *new everyday* of AmI environments.[16] These scenarios were situated at the forefront of promoting the policy agenda and marshalling the resources to put it into motion. They had rhetorical and performative roles in a concerted effort to secure subsidy to European electronics engineering and materials science. It is therefore of some interest that the envisaged socio-technical configurations of AmI environments are still nowhere on the horizon more than a decade after these scenarios were first published.

We identify a twofold priority in addressing this problematic, with a view to ongoing policy development in support of ICT-based innovations. One is to account for limitations in the *predictive potential* of positioning *enablement* as a lead strategy in advancing material production. The other is to account for *purpose and direction* in the politics of pushing particular innovation trajectories.

1. If KETs are of systemic relevance, trans-sectorial with the potential to converge and induce structural change, it follows how difficult it is to predict with any accuracy the kinds of applications innovators *could* design from the new-emerging tools of production. In that respect, KETs are like wild cards—they are *disruptive*, as research leaders and visionaries themselves put it. Accordingly, to strategise the mastery of KETs demands that the uncertainties are openly recognised and communicated. It demands critical engagement with visions of progress and the future of society used to substantiate the rationale for pursuing KETs in the first place. It demands informed communication on what exactly is being *enabled* and how to ensure prudence and preparedness for what may come.

2. If KETs enable *process, product and service innovation* for all imaginable societal sectors (occupational, governance, private, public, etc.), it is only reasonable to expect a clear sense of purpose and direction when including the pursuit of KETs in political and financial

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http://ec.europa.eu/enterprise/sectors/ict/key_technologies/kets_high_level_group_en.htm

[15]   E.g. *A Digital Agenda for Europe*, Brussels, 26.8.2010, COM(2010) 245 final/2; European Commission (2011). *FET - Science beyond fiction*. EC - Research EU Focus (No 9).

[16]   Aarts, E. and Marzano, S. (2003). *The new everyday: views on ambient intelligence*. Rotterdam: 010 Publishers; ISTAG (2001). *ISTAG Scenarios for Ambient Intelligence in 2010*. Report EU Commission (Final Report); Aarts, E. (2003). Ambient Intelligence: Building the Vision. In B. de Ruyter (ed) *365 days' Ambient Intelligence research in HomeLab*. Eindhoven, NL. Royal Philips Electronics. pp. 2-5.

instruments. Innovation strategies necessitate directive visions that are specific in problem-finding, in identifying the challenges and suggesting solutions and, thereby, they should also be specific in communicating purposes and a realistic direction. However, to strategise in this way demands that difference and multiplicity in human practice and human sociality is openly recognised and communicated. It demands open and honest dialogue on who is invited to have influence on the development of directive visions and the kinds of future lifeworlds that are depicted in them.

How is science 'in' society?

From what we have gathered so far, it remains elusive what *better* is in the call for *better society*. We observe how competitiveness is articulated with reference to science-driven industrial capacity for sustainable growth and jobs, and how KETs are situated at the heart of what are typically considered innovative products and services with which a better society is expected to emerge. But we also observe how the section of the Horizon 2020 proposal on societal challenges is inclusive in its reference to *science*. It states that, "[a] challenge-based approach will bring together resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities" (p.5). Governing bodies, technologists, industrialists, technology assessment expertise, legal, social and ethical expertise, are indeed all implicated in policy development and decision-making regarding the impacts of new innovations. Their work establishes, among other things, the political, social and ethical legitimacy of decisions that are made for the betterment of society. However, apart from the explicit involvement of legal scholarship, economics and market research, the dominant thinking on research and innovation strategy hardly considers new-emerging and key-enabling social-cultural technologies for societal change and better society. What counts as legitimate expertise, who is a stakeholder and a relevant public for those purposes is in fact bootstrapped in spite of claims to the contrary—claims of openness to advancing science-in-society interactions, involving all knowledge domains, wider stakeholder and public participation in the innovation process, and greater flexibility with respect to what counts as innovation.

To further explore this problematic, we consulted the MASIS final report (2012) on European expert views of policies, activities and instruments in reference to science-in-society interactions. The report shows that an increase in science-industry interactions is classed across Europe as a societal demand and so is intellectual property right, while there is little consistency in supporting science-in-society interactions or even what science-in-society stands for.[17] Only a few of the 27 participating states have formal procedures involving citizens in priority-setting and assessment. Other states in the region appear to lack the appropriate institutions to cultivate inclusive governance. Upstream policy engagement has at best moderate salience and using S&T expertise in decision-making is often inadequate rather than inappropriate. Science-in-society interactions that address ethics, equality, diversity, inclusiveness, and technology assessment, are equally varied in the importance attached to them from one country to another.

It is noteworthy in this respect that the dominant understanding of S&T communication refers to science journalism and other forms of public relations whose primary role is to publicise new-emerging S&Ts and educate on their role in society to gain public acceptance. Prominent examples are media representations that treat as inevitable the ties between innovation, economic growth and quality of life (health, education, welfare, etc). Trust in S&T knowledge and governance is also treated as self-evident. Only the controversial high-risk technosciences, especially the aftermath of catastrophes (e.g. Fukushima), seem to bring out pertinent topical debates about risk implications, impact, trust in S&T expertise, public involvement in S&T decision making, the culture of

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[17]   MASIS, final report. (2012).
    http://www.masis.eu/english/storage/publications/synthesisreports/finalsynthesisreportonsisineurope/.

accountability and of S&T governance, for example, to whose benefit the governance models are oriented and harnessed.

European innovation policy already prioritises support to security technologies, healthcare, climate action and resource efficiency. The ICT policy support programme (ICT PSP) provided strategic support to pilot action from 2007-2013 as part of the Digital Agenda for Europe, to validate a range of application areas—health, ageing, public services, inclusion, energy efficiency, smart mobility, digital libraries and novel web applications. It also supported networking actions for sharing experiences and preparing for the deployment of novel ICT-based solutions. There is ample evidence already of the assistive capabilities of ICTs with meaningful and relevant applications everywhere now operating in occupational, commercial, public and private domains. However, expectations require some management.

For example, the future scenarios of the AmI initiative did not pay adequate attention to matters of trust, security, legality, digital divide, alienation and social responsibility. A robust analysis using counter scenarios reveals what happens when *smart* applications go wrong, when identity-based data is misused or incompletely processed, when people are excluded from service due to lack of interoperability, inadequate profiling and data mismatches.[18] It dramatises the loss of privacy when citizens as consumers are subjected to surveillance and sophisticated activity profiling. It shows the inequalities in access to ICTs, and the risk of spamming and malicious attacks resulting from the expansion of information services across jurisdictions. The key lesson is that ICTs pose a vast range of organisational, operational and moral challenges. We also learn from more recent efforts that ICTs are not the *magic bullet*, say, for solving the challenges of healthcare and ageing. It is not even obvious that the basic assumptions are well founded, for example, that an ageing population necessitates a rising number of idle home-bound persons in need of ICT-assisted care. ICTs will not solve the problems of *keeping us safe* either, no more than *smart* energy production and consumption will diminish the need for energy or that online social networking decreases the demand for travel.[19] The world is not that simple and, frankly, it is an insult to publics at large to encourage unrealistic build-up of expectations. The challenge of better healthcare and an ageing population is also a call to cultivate and support lifestyles much less prone to medical intervention. The challenge of human security is also an opportunity to identify the key-enabling social and cultural technologies in cultivating sustainable social and transnational relations. The challenge of sustainable mobility is also a call for different forms of collective rather than private travel, active travel as opposed to physically passive travel. So on and so forth.

As it stands, it is unclear if social and cultural innovations have any serious currency in innovation policy development. Concerted efforts can of course unleash the imaginative potential of sociological and humanities expertise to innovate and to actively contribute to novel research and innovation agendas, for example, if these specialities were strategically converged with ICTs.[20] However, the indication is that sociological and humanities expertise is mainly *tagged* onto application development of ICT-based products and services, almost as an afterthought and often only at the point of deployment to assess the impact. It is also unclear where to situate the contributions of small start-ups and SMEs in building up the expert knowledge base and delivering benefits to society and the economy at large. According to the 2010 recommendations for an integrated industrial policy, the total SME share of industry employment in Europe is two-thirds with great potential for growth and job creation.[21] The policy recommendations recognise this

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[18] Wright, D. et al. (eds) (2008). *Safeguards in a World of Ambient Intelligence. The International Library of Ethics, Law and Technology, vol.1*. Springer Verlag.

[19] Javons paradox predicts that greater efficiency and cost savings lead to greater consumption and potentially greater waste as well.

[20] An interesting example of such an experiment is the Catalyst project, funded by the UK EPSRC under the Cross-Disciplinary Interfaces Programme (C-DIP), http://www.catalystproject.org.uk/content/about-catalyst.

[21] European Commission. (2010). *An Integrated Industrial Policy for the Globalisation Era, Putting Competitiveness and Sustainability at Centre Stage*, Brussels, COM(2010) 614, http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?

currency and suggest strategic support to start-ups and SMEs—to apply a *think small first* principle in order to identify first markets and get new initiatives off the ground. A programme for the Competitiveness of Enterprises and SMEs (COSME) will now be running from 2014 to 2020 with a budget of ~€2.5bn to facilitate access to finance, encourage entrepreneurial thinking, create a favourable environment for sustainable competitiveness, growth and improved assess to markets.

At a closer look however, the place reserved in the *industrial integration* for small start-ups and SMEs is situated primarily on the supply and demand sides of the large industries. That leaves their independent innovation potential largely unaccounted for. The cultural industries are not implicated specifically, nor any other kinds of novel functions start-ups and SMEs could possibly carve out for themselves across the societal sectors with input from local communities and civil societies, and by bringing together *resources and knowledge across different fields, technologies and disciplines, including social sciences and the humanities*, as the Horizon 2020 proposal puts it.

(3) Strategic actions and new research

On the basis of our summary of conclusions and considerations, we recommend strategic action and new research as follows for ***ICT professionals, strategic thinkers and experts involved in science policy***:

- **The Innovation Union: seeking the hallmarks of *good choice.***

We recommend strategic action that seeks the hallmarks of *good choice* in crafting responsible futures for Europe.

This is an action to ensure inclusive understanding of *innovation*, to shape a research and innovation agenda that prioritises *good choice,* i.e., the generation of difference and multiplicity in computer-human interfaced practices, as a political and moral objective in harnessing novel and responsible ideas.

This is an action that shapes a research programme to investigate, experiment with and improve upon science-in-society interactions, with emphasis on difference and multiplicity in the knowledge base and participation in the innovation process and policy development.

We recommend a strategic actions as follows for ***Public Policy***

- **The value of privacy and the dignity of persons**. We recommend action that aims to clarify situations and practices for which the new data protection standards are inadequate. We recommend this action as the key objective in negotiating a new social contract that can adequately support common sentiments on what are acceptable and unacceptable forms of targeted marketing and other purposes for which human clusters are identified by particular interests / behaviours, and persons intercepted on the basis of profiled *types* of commercial value.

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uri=COM:2010:0614:FIN:EN:PDF.

- **Mandatory *self-defence* training**. We recommend strategic action that systematically prepares the public education systems across Europe to incorporate mandatory up-to-date training in the protection of personal data, in identifying the obligations of data controllers, the rights of persons, how data-protection and privacy is achieved by design, and how to operate privacy-enhancing technologies—a programme that teaches the young about the informational self and digital citizenship, what is lawful and unlawful, debates with them what is socially acceptable, and trains them in self-defence against unwanted intrusion and harassment.

- **IPR and the new tools and instruments of production**. We recommend strategic action that systematically addresses the pressures on the European Commission to commercialise research and innovation efforts through the use of financial instruments, while maintaining a cautious approach to *open access* out of concern for the private sector and its interest in intellectual property right.[22] We recommend this action as an objective to negotiate a social contract that clearly differentiates between novel products and services on the one hand, and *tools and instruments of production* on the other hand (e.g. KETs)—action that regulates on the basis of open debate and societal negotiation on whether or not one or another industry sector, private and corporate enterprise can secure the intellectual property right to new tools and instruments of production, whose emergence is subsidised by the European public and economy at large.

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[22] See for example recent report from the UK House of Lords, http://www.earto.eu/european-news/detail/article/uk-parliament-calls-for-increasing-the-budget-for-horizon-2020.html#sthash.abdelVvc.dpuf