

FUTURE INTERNET WORKSHOP ON RESEARCH ROADMAP FOR EU FRAMEWORK

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The Next Internet Explained:

The psychological, social and economic forces that will shape the future internet.

Research Area:

The links between technological, social, psychological and economic trends relating to the development of the future internet.

INTRODUCTION

This paper is based on the study **“Towards a Future Internet”** (<http://www.internetfutures.eu/>) carried out for the European Commission’s DG Information Society and Media over a period of twenty months in 2009/2010. The focus of the research was to investigate the links between the technological, social and economic trends as they related to the future internet, to explore the future needs of internet users and to outline the principles that should guide its future development. The following four sections draw from the findings and conclusions presented in the final report.¹

CHANGES

A sea change is at hand in the core dimensions of our society in Europe and globally. In the economic dimension there are major developments that will impact the future use and application of the internet and its technical infrastructure. Already we have an internet-based world economy which has now become an essential mechanism of our prosperity and survival, driving GDP and employment. Therefore it is inevitable that economic forces will shape the future evolution of the internet.

The economic driver to have the greatest impact is the ‘globality’ or global scale, because in trade, reach and speed is everything. This affects the rate of investment and therefore internet-based trade stimulates higher global liquidity as the ease of pursuing international commerce increases. With the death of distance it is as easy to reach a customer in Toronto as in Timbuktu or Tours or Tokyo.

Furthermore, globalization of trade shifts the focus of design and user influence on the internet as developing nations will be dominant in gross GDP terms between 2030 and 2040. Emerging markets will show the fastest rates of inward investment as well as growth over the next few decades. This means they will have the greater influence in defining the new shape of a future internet.

Two further economic forces are driving change. Education is a major economic force at both a micro- (personal) and macro-economic level, in the movement towards knowledge work and a knowledge society.² Internet based learning will become a vital ingredient to future education. Linked with education is the demographic trend of an ageing population. The need to re-skill will be an essential requirement for an ageing workforce to gain employment in a knowledge-based economy. This is coupled with the progressive shrinking of health and social services that push the requirement for in-home health and social self-care.

In a broader view of the social dimension, globalisation and the explosion in connectivity will be fundamental in directing and shaping the course of the future internet. The predicted growth is from over 2 billion ‘connected’ people across the world to 7 billion by 2020. The main growth is predicted to come from the markets in the developing world for all forms of mobile communications, but especially high-speed data for internet access. This exponential rise in connectivity will redefine the very nature of the internet through the way in which it used and for what. The next several billion users will bring influences from a far wider range of societies and cultural enclaves. In addition, the social and political elements that influence a future internet will differ region by region.

¹ www.internetfutures.eu/wp-content/uploads/2010/11/TAFI-Final-Report.pdf

² See for instance *The Green Knowledge Society*, 2009, a study created by SCF Associates Ltd for the Swedish Presidency of the EU, available from the Swedish Government’s Visby Agenda Conference website and which considers internet-based education impacts: http://www.se2009.eu/polopoly_fs/1.16246!menu/standard/file/A%20GREEN%20KNOWLEDGE%20SOCIETY_CREATIVE%20COMMONS_%20WEB1.pdf

The important societal changes in the way in which people organize their lives due to accelerated lifestyles into which more has to be fitted. In the increased complexity of daily life and demographic changes all are driving the internet towards becoming a vital new component of society. At the same time these conditions are redefining how and why the internet is used.

Intersecting with these changes are the principle elements that characterize the psychological dimension. These will exert a strong influence over the use and application of technology and in how the future internet evolves. For example, key to the internet's future is the psychology of trust. At the core of user trust lies privacy, protection, security and reliability. In a digitally pervasive world where there is an increasing dependence on technologies, user demand for these will increase enormously.

The psychology of human needs is closely linked to the strong attraction of social networking and its expected continued growth. In particular, the trio of human desires for presence/belonging, relationship and contribution will continue to drive internet technologies to create infrastructures for communication, creation and interaction. User psychology in terms of desires and fears will dictate internet usage in the future – what it is used for and the degree of use. The potential success of the future internet will depend on the extent of its compatibility and adaptability to the psychological anatomy of users.

The critical part that the matching and meeting of human needs will play in future technologies gives rise to the importance of the human interface. It is a further major influence on future internet design because it is the controlling and fundamental variable that dictates internet take-up and use. The discipline of human interface design will impact all aspects of future internet engineering, from the scale of take-up to the types of traffic, to forms of naming and addressing required by users.

VISION

A vision of the future is founded upon the question that directed the evolution of the internet and emerging technologies, "*How can we guide the evolution of the internet (and technology) so that it best serves the needs of society*"? Intrinsic to this are fundamental design principles for leading design decisions and outcomes.³ The following principles embody a vision for the future.

Available & Accessible

There is an internet that is available to everyone with full global reach. This fulfils the goals of the Digital Agenda for Europe so that by 2013 coverage has reached 100% of the EU and by 2020 fast broadband is available to everyone. It is also fully and equally accessible to everyone locally and globally with no forms of exclusion. It has been designed for all people, whatever their needs and wherever on the globe they may be.

Diverse & Inclusive

There are no gaps in society magnified by the internet as the danger of digital exclusion has been thwarted. Also forced or coerced inclusion does not exist in this digital world. People have the freedom of choice of participation in its multi-facets: the when, the where, the how and with whom. There are multiple internet environments based on user preferences and personalization.

³ www.internetfutures.eu/wp-content/uploads/2010/11/TAFI-Final-Report.pdf Chapter 3

Scalable & Sustainable

The internet has full global scalability. The difficult challenge of constructing a resource-limited infrastructure for the vast users in the developing world has been met. The state of the internet is maintained as open, therefore there's global access at low cost to those with innovative ideas and with new business models. The internet has become a new business creation machine. A balance has been struck between controls for safety and entrepreneurial opportunity.

Open & Shareable

The internet avoids lock-in to proprietary constraints. The insistence on interoperability has driven the development of a ubiquitous network. A standards-setting process is open to all and is not dominated by a privileged set of governments or countries. "Shareability" is widespread to increase efficiency, effectiveness, lower cost, and to provide resources and information at any time to anyone - opportunistic networking has become the norm.

Green & Affordable

The cost of internet technologies has a more significant impact now than ever in the past. Therefore the internet architecture controls the two key parameters in terms of energy use – how much energy goes into the lifecycle of equipment, and in its operation. Developing nations are now the largest users and therefore their concerns were the basis for engineering the internet for low cost, low-energy, on a thinly-spread infrastructure and with energy and environmental management using smart grids and metering.

Reliable & Resilient

As the internet has become an ever more critical infrastructure, on both a technical and socio-economic level the challenge of ensuring ever-higher resilience has continued to remain a top priority. The internet was carefully designed around security, privacy and resilience. Extreme care went into design for crisis management, failover operation, with autonomic features of self-healing, via failure prediction, prevention and automatic recovery at all levels, plus detection and protection from all forms of attack.

Safe & Secure

The internet has been made highly safe and secure for users and organizations by protecting them from as many aspects of cybercrime as possible. The critical infrastructure of the internet has the protection required at all levels: not only from accidental shut downs, but also from malicious attack, both nationally and globally. Very importantly, there has been an evolution of liability and regulatory regimes placing responsibilities on network and service providers to ensure safety and security.

Trustworthy & Private

A healthy balance has been struck between a safe society and a surveillance society. A balance has also been struck between ubiquity and security, pervasiveness and privacy, centralization and surveillance. The issue of user trust has been solved through the protection of individuals' rights of expression, action and association from government. A holistic, participative and transparent governance structure has been created around the internet. This has brought a balance between over-regulation and under-regulation.

Appealing & Usable

All the traditional boundaries of the internet and the technical perspectives that surrounded it have dissolved in favor of how the user population perceives it to be. The totality of the user *internet experience* has become the new boundary. Core to these experiences are attributes like attractiveness, usability and the performance of technologies and services.

Customizable & Adaptable

Now there is an internet that is completely adaptable to all user types. It is open to participation by all in a technically and socially neutral manner, with no barriers stemming from digital illiteracy. It is also adaptable to machines as well as people. The connections of billions of sensors and actuators over the internet has been made possible through achieving reliable and secure transmission. The internet interfaces have been conceived on sociable design concepts that have resulted in the engineering of very sophisticated user interfaces.

CHALLENGES

Today there are four powerful forces that are shaping the future internet:

The vested interests in guiding the internet towards purely being a market.

One of the strongest forces lies in the tension between the vested interests of the different stakeholders, who see it in terms of “their internet market”. These conflicting interests between the players could seriously impede business and technological evolution, and prevent fair competition by limiting openness. The internet only came into being with whatever success it has now, because it enabled free spirits to express themselves, without commercial dominance by the ISPs or the telecommunications industry. In fact the nightmare of one of the scenarios in our study is shutting that down, so the future internet becomes simply a combination of more commercial TV channels, for advertising, and a retail channel of decidedly doubtful security and honesty.

A second force is the shift in the context of the internet.

The internet no longer sits within a straightforward technical context of bits and bytes. Its pervasiveness has expanded its context to include the non-technical global world – social, cultural, political, economic, and commercial. This context requires that these key dimensions be considered in terms of their inter-relationships and inter-dependencies.

The third potential shaping force is governance and regulation.

In order for this to become a powerful force in shaping the future internet it must evolve from its current state. Therefore policy makers and regulators need to become more knowledgeable about the internet and its business models, not least to prevent abuse of dominant market power.

The fourth factor is the future user of the internet.

This demands a shift from technology driven design to user-needs driven design, based on technical and socio-cultural requirements. This requires an emphasis on the whole human interface environment, which goes beyond the interface of a device and defines the internet’s ‘reach’.

SOLUTIONS

The findings and analysis from the Future Internet Study have led us to focus on three areas that are particularly crucial to the solution path.⁴

The first is research to humanize the internet by a focus on a new type of needs analysis.

⁴ www.internetfutures.eu/wp-content/uploads/2010/11/TAFI-Final-Report.pdf Chapter 5

A key thrust for a future internet should be centred on human culture and social interactions, with an understanding of psychological factors within economic dimensions. This has several facets:

- Understanding the interplay between people and their use of internet technology – the personal exploitation of internet technology to enhance and augment their lives, to do things they could never do before. This includes the social networking side. But it really means going further and understanding what will happen next in ‘social technology’ when we go past Facebook and YouTube. Comprehending that requires targeted research into the psychology of human needs for internet usage, which is closely linked to the strong attraction of social networking and its expected continued growth, in particular, the trio of human desires for presence/belonging, relationship and contribution. New research should explore internet structures and technologies for better infrastructures for communication, creation and interaction, shaped by the user’s psychology in terms of desires and fears, in order to establish what the internet will be used for, and the degree of use. As noted, success of the future internet will depend on the extent of its compatibility and adaptability to the psychological anatomy of users.
- Using the above research, a specific internet element can be designed - the human interface environment (HIFE) that the ordinary populace will need in the future, which may take many forms. For example it must take account of the integration of work and non-work activities, e.g. multi-tasking far more. It must also extend into areas of how digital presence will be handled. The HIFE could include the mental state of the user, and even extend eventually into the subconscious drives as recognised in psychognition.⁵

The second is the multidisciplinary character that is now needed to approach this new era.

- Internet research needs to be far more multidisciplinary because each discipline brings a different form of conceptualization and approach to a problem space. Defining the nature of that space depends on the perspective and observing position, which is why multidisciplinary framing is essential and invaluable.
- There is a clear requirement for future research to have a convergence of hitherto separate subjects, increasingly including non technological areas – such as sociological design, psycho-economics for decision making, design influenced by cognitive factors and comprehension analysis. Moving towards an internet at the meeting point of human-centred aspects and technological complexities is the challenge.

The third is policy, rules and eventually, regulatory requirements.

Overall, internet governance should consist of a range of technical, economic, legal and societal rules and instruments, to create in a clear framework for operation. The framework should encompass the transfer of useful inherited principles from other sectors into the internet domain. The priorities among regulatory domains may also need to be respected. For instance, security and law enforcement generally take priority over economic regulation.

As society’s dependence on the internet increases, a legal framework for internet regulation becomes increasingly necessary. Where practical and enforceable in an internet context, existing practices, regulation and laws, should be used. This implies, for instance, discovering arbitration processes that are rapid, low-cost and effective. Naturally, internet governance processes in which ordinary users could participate are also needed.

⁵ Psychognition is a methodological approach for eliciting the subconscious processes which influence human behavior.