



Future Internet Final Discussion Workshop 17 June 2010, Brussels

Workshop Report

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1 Introduction- objectives of the workshop

The goals of the workshop were:

1. To gain a consensus on those elements from a Future Internet scenario that would be the most desirable for Europe, to understand how a Future Internet might be shaped
2. To improve on the scenarios developed so far, by drawing on questions over six key aspects (and possibly additional ones)
3. In order to identify the key priorities for Future Internet ICT research and policy, to understand technological trends which may lead to the different scenarios,

2 Key discussion points

The workshop began with a general wide-ranging discussion during which, several main points were brought up:

- It is more important to understand and operate within the decision making process within internet governance than to define internet governance itself
- Community driven innovation should be the key to future internet progress, rather than commercial innovations for companies living off the internet. The latter point is attached to the concept of whether a European framework is required as the basis for an enabling infrastructure with services deployment and creation.
- Generally, no deterministic view can be derived from technology – the internet’s future is not technology dependent.
- A key question is - what is the role of Government (at all levels) in the internet and more generally? The answer is that its role is to assure services are available to citizens, but



not to provide the services, nor the infrastructure.

- One should not focus too much on current players, but rather on the evolution of the internet, as this will create new opportunities for a new set of players, who will define and build the internet of the future
- The issue of the internet being used as a way of shifting money around – eg from consumers to the major ISPs - should be distinguished from that of global value creation and distribution of value across the globe. Also who will really pay for the internet in the future must be better understood.
- What are the key levers of power for the future internet is a question that will effectively decide its future. A critical problem for the EU would arise if the group of major telecommunications operators (including their In Europe they already control both the internet infrastructure, the networks, and increasingly the services that run over it. The effect of such a powerful oligopoly applying their protected position in a regulatory world to the internet could curtail any future development of the internet in terms of meeting the needs of ordinary users rather than their profits streams. Also we might see dominators from the software and computing industry, who were largely left out of the rise of the current Internet industry, seeing this as a second chance to gain a dominant market position, having missed the first round.
- Today's internet assumes and to some extent enforces an asymmetry of information. While ordinary users give information about themselves (such as websites visited), the major ISP players can use this information to build large databases on consumers and their profiles. Moreover this data can be passed on, eg from content gatherers to those who want to understand the consumer and the effects their ads have on their target consumers. Note that this data is only used by the gatherers and not by its donors. Here technology is most effective in hiding the fact that all this data is being gathered on users. Moreover, its accumulation is not necessarily to any benefit of the users and may pose them problems, eg in terms of targeted harassment, tracking or identity theft. This asymmetry calls for stronger privacy and security restrictions on any data gathered and who may be given access to it.
- One basic question is whether the various forms of a wireless Internet will dominate all scenarios - and if so can Europe take advantage of that (with its past success in mobile technologies eg GSM, etc) and so become a major player in the future internet, a role it has so far given to players from other regions?

The workshop then broke up into four groups to consider all of the scenarios against six key issues. The groups reported back on their internal discussions:

Workgroup 1

- The internet should be a social equalizer across all people. There is a need to have same level of access for all, as it brings education, communications, information etc. However vertical integration should be avoided (eg in the sense that Apple proposes in its business model with iTunes tied to its own products. This can be linked to restrictions on advertising and search) which would eliminate competition and innovation.
- It is desirable that EU research finance open standards for open platforms for the internet at all levels, and not just the lower levels, for dis-intermediation and non-vertical offerings.
- Participatory aspects of the internet are important for social cohesion – digital inclusion needs to be looked at. Open standards are linked to this. Contributing participation for all is important (eg as in Wikipedia) as the internet provides low-cost access for diffusion of ideas. Thus the internet enables better forms of access than TV as it is 2-way. Participation through interaction gives new perspectives on what an internet design

should look like.

- There are some strong indirect affects of the internet due to its power more as a medium of intermediation- for instance the aggregation of users into informal networks. It would be highly undesirable to see the internet become like joining in Disneyworld or Home Box office – as if it were just a distributor of entertainments¹. What is wanted is a non-exclusivity of engagement, so that access to services is not endangered.
- The internet titans gain their power through being intermediaries in aggregation eg the major search engines. In such a situation, it must be understood who really pays for the internet and how, with the monetary flows that occur.
- Content controlled by IPR holders needs to be reconsidered in an internet context – 80% of content providers (IPR holders) would prefer to monetise access than to block it. (Now IPR holders can give search engines a unique identifier – a hash number – which uniquely identifies content, in order to enable tracing and attribution².)
- All scenarios converge except for scenario 2. They are not different enough to be alternatives but are more of a series. Going green (2) is orthogonal - while scenarios 1, 3 and 4 follow the same logic. It might be best to put all into one scenario – for a knowledge based economy in which the prosumer pays for goods and services and produces the real value.
- In the economic scheme of things, prosumers are more important than the large players or governments. The future policy on the internet should reflect the needs of the prosumer.
- Gaming is an important way that the under-25 generation will participate. This entertainment internet for under-25s will only be accessed via a mobile phone.
- Net neutrality is important. However, governments do not act enough to protect it. In fact they are not nearly as active as they think they are on internet issues. Except in security, governments are largely absent from the internet debate. Governments should act more, through procurement policies on openness as well as through R&D support.
- Privacy is long gone on the internet. This is a stronger issue in the EU than in the USA. Will it/ could it lead to the privatisation of internet policing in the future?
- Going green is an EU-only pre-occupation - it is not as important everywhere else in the world (but in Japan it is may be seen as a given need³).

Workgroup 2

- The internet is essential to the economy. Most sectors including government and financial services are increasingly internet dependent. Internet policy thus becomes important. The network neutrality question comes to the fore if free traffic flow is to be assured.
- Innovation and sustainability also must be part of internet policy and are a subject for internet design. Society is being redefined by the internet, so law and regulation generally must be adapted for internet working.
- In terms of problems with the internet, security and privacy are separate issues.

¹ SCF - as in the 'walled garden' model

² SCF – NB this can be attached to features within the content itself – eg based on the robust features in a music track to link the content form to its identifier, and gives a means of recognisable identification whenever is played.

³ In the future internet Tokyo workshop, the ecological necessity of a green internet was taken as a fundamental priority.

Internet usage is connected to reputation and trust which are dependent on both security and privacy. What is needed are forms of arbitration for settling internet disputes for the major conflict areas such as access to content and control of IPR.

- New views are needed on standards and technology – the issues NGN, the cloud etc are the old issues rehashed – which will be replaced by newer ones which we should identify and consider.
- On the scenarios, the first is seen as quite optimistic while scenario 2 is perhaps a way of avoiding descent into the loss of opportunity of a purely commercial internet (as in scenario 3). Scenario 4 (the e-demos) is what we should be moving towards. Europe must ensure that scenario 3 does not become the ruling model. Scenario 1 does address the digital divide, and looks at education – but it is not believable and would tend towards scenario 3. Moreover it does not really address privacy as enforcement is not included. In summary the group indicated:
 - Scenario 1 seems to support the current corporate structures of the major internet players, while in contrast, Scenario 2 shows a far more managed environment. Scenario 1 should be more about society. Internet R&D should focus on social issues.
 - Scenario 2 is a radical proposal for the infrastructure. But it seems one only joins the network if one can go green – although that is the future. Thus internet R&D should look at internet infrastructures for a green environment
 - Scenario 3 is the way we are going now, as the alternatives are all being blocked by the large-scale commercial forces. What is needed is to give back people power to prevent that unhappy scenario from dominating.
 - Scenario 4 needs a set of tools for ordinary people to prevent scenario 3 occurring. In scenario 3, effectively, the internet is being hijacked by commercial interests for their own business ends. The driver to escape this is to put control into the hands of the people. While the information economy drives down the costs of doing business and using the internet, the major incumbent players (– be they from the ISP world or the telco carriers) stop people from taking effective control of that world. R&D should thus be focused on the tools for ordinary people to create their own non-commercial environments.
- When looking at research subjects, perhaps the concept of what should NOT be funded is just as useful as what should be. Thus technologies which control the users and enforce particular commercial or political strategies should not be part of EU research. Moreover, research should reinforce the pluralism of internet technologies, with open standards.

Workgroup 3

- Shaping a future internet requires an understanding at a policy level of the behaviour of the main players. In the EU the largest players are mainly the legacy telcos, who are not real competitors for the titans from the USA, unless they can retake control through future regulatory mistakes in the EU.
- The power of the (local) community should be emphasised. Communities should take the lead in shaping the future internet, not governments or commercial players. This approach emphasises the power of the individual by amplifying it through a community as a collective action, and so therefore carries far more power and justification.
- Perhaps the only way for the EU to have a place in the future formation of the



internet is through radio-based mobile internet services, where its expertise in mobile cellular technology could potentially assure an advantage.

- The relationship between internet content providers and service providers must be examined and understood for any future design of the internet. A future design requires a framework for infrastructure based on such flows. Who pays for the internet and the monetary flows involved between users and providers must be understood.
- Europe can only survive as a high cost, high standard of living environment if it has constant innovation, with a basis in profitable, stable companies. A key example is the German Mittelstand companies, who exploit high expertise in specific domains. The internet of the future should be designed to contribute to and support a European society which continues to be prosperous, through high levels of skill - and thus of education.
- The internet should be valued in non-monetary terms. Instead of pure business returns, it should be valued as a bringer of support, social cohesion and personal creativity for self-fulfilment and happiness. The relationship between the internet and people should not be one of purely technological or economic dependence. This will require incentive structures for innovation in which whole communities may be involved – a uniquely European approach.
- Government's role should be to provide and ensure access. It has a similar role to ensuring that a health service is available to all as the internet can serve as a public good. Moreover other public services (health, education, social security, government services) will increasingly be internet delivered.
- In setting policy for a future internet, there is a need to look far further than the current internet players (or dominators) for who will be the future key players.
- In examining the future internet we must be aware that the elitism of a few experts can be a distorting feature, so a widespread set of views should always be sought.

Workgroup 4

- We need common access to internet services on an equal basis. Services offer the EU a chance to gain a competitive edge in the global market. There should be a new view on standards with a possibility of regional standards for the EU, including metrics and common ways of implementing standards. Thus open internet standards should no longer just be for the lower network layers but should also apply to applications, content and enabling services (eg search).
- Scenario 3 is really about the concentration of power on and via the internet. Cloud configurations are also a key part of the Scenario 3's concentration of power. In this scenario the only security is for financial transactions, to ensure the major players get paid. In this model, power accrues to those who gather data – so power is spread wider than just the content providers. Some of the major players will be pressing for network neutrality in Scenario 3, eg, the content providers as this suits their download promotions, but the carriers may try to block this.
- In Scenario 4, IPR will have to be attributed far more widely as self-generated content appears, broadly based. So new ways of handling IPR will be needed for this far larger class of instant authors.
- The future internet will be radio-based for mobile users. Therefore open spectrum will be needed, not just for pure communications but as the backbone for distributed



processing. New R&D will be needed here.

- The green scenario (Scenario 2) is more interesting in European eyes as we can already see who benefits – we can see the money –the who/where and so the why is less of a barrier. Moreover, internet technology that supports an environmentally responsible world could be a major competitive edge for the EU – eg in sensor networks, etc⁴
- From the EU's point of view of its culture, technology and business, a combination of Scenarios 2 and 4 are the most desirable. The scenarios offer the most business opportunities – with smart growth in knowledge industries and inclusive growth. They also avoid formation of a digital elite, be it among end-users, or in constructing a set of power players who would dominate the internet as in Scenario 3.
- The Internet of Things needs to be taken seriously – a deluge of data would result (and is especially likely for Scenario 2) requiring ad hoc mesh radio networks, peer to peer communications, crowdsourcing, all based on large open source platforms. Such smart infrastructure will be re-used for all types of industry, as well as meeting concerns over the environment, and for public services such as health (eg remote patient monitoring).
- Future research in the EU on the internet needs to be far more multi-disciplinary. It should include social sciences, law and psychology especially. The current study is different to others in that it has no specific timescale and so can take a longer term view on what we need to do.

Final plenary discussion

A plenary discussion followed, which raised further points.

- We, in Europe, have already lost the cloud computing battle as a concentration of power has grown up around the major players in this new market. However it was noted that there is more distributed computing power in mobile phones (especially new smart phones) than in the data centres of the major cloud players. This may be the real cloud processor system for the future. Such a system needs security features and also autonomic capability (failover, well-behaved recovery etc) to be added. Future cloud processing will reside in the homes and pockets of its users.
- We can expect to move from Scenario 3 where we currently are towards Scenario 4, perhaps via Scenario 2. However the question is whether all scenarios concentrate power in the net and not in the users at its edges. For instance VoIP should offer a minimum quality of service and how would this be implemented and the implementation managed to ensure the QoS levels. What is the framework that gives responsibility for QoS – eg who is liable for failure? Also, we need pluralism in technology, and not concentrated end to end technology of a single type. Is the concentration of power we see today good for the EU? Or would a fragmentation of power over the internet be worse?
- There is a dilemma over major players bringing certain benefits of common interworking, through their uniformity of technology and some QoS benefits to the users

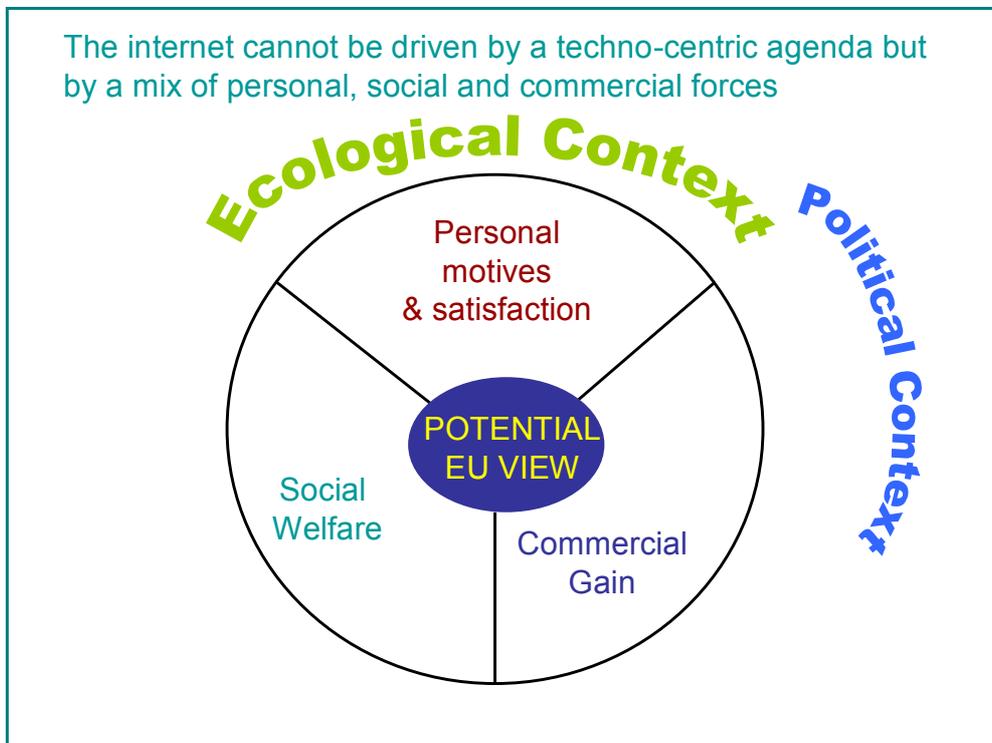
⁴ SCF : Note that these will be equally useful for other real time applications, eg in online health service networks and 'smart grid' electrical power networked systems for load dispatch.

(while yielding to them increasing returns with size) balanced against anti-trust concerns due to limits on innovation with control of pricing. Outside the ICT industries, monopolies might be seen as less threatening as they tend to last for some five to six years or so. Thus different serial monopolies might have some social benefits eg standards, security of supply etc.

- However, due to the ever-increasing returns with size in software and the multiplier of market power by the network effect in the ICT industries, monopolies are much longer lasting – perhaps 20 to 30 years at least, until anti-trust constraints are activated. Governments have been reluctant to enter ICT areas, such as the internet, since they tend to naively believe the story that ICT industry tells them, that ICTs are different to other sectors and should not be regulated in any way. One downside example is PC operating systems, which has suffered an effective monopoly since around 1983. In this model there is strong cross-subsidisation, not just for predatory pricing. Today new players are entering from the internet world. For example, the larger search engine players can offer many services free as they are spin-offs from the advertising business and such services and products attract far more viewings of the owner's website. Only competition from other search services is likely to be effective here, as structural regulatory remedies tend to be very static.
- The power of the local community to decide on activities and policies should be brought out far more, not government, nor the leading commercial players. Empowerment of local and community ownership of the internet and its services should be endorsed.
- The degree of competition in the supply of internet services and technologies is important. Maximum innovation comes from a median level of competition – both too little competition and too much stifle innovation.
- Concepts of information asymmetry are important in understanding internet politics and behaviour of the main commercial players. For example, the larger search engine players use individual profiling to shape their advertising, and offerings. However there is also the issue of interconnect agreements between the main players, be they content or services, which is all under non-disclosure, and covers the hand-on of personal information about each citizen without their knowledge. Increasingly, internet technologies today are focused on hiding information that is collected and on hiding the fact that such data gathering is under way. Consequently, what is the real value of the internet traffic flows is obscure. Therefore, there is a need for methods to value traffic as well as measuring it.
- Predicting the fragmentation of the internet with regional versions may not be positive. Instead the EU would gain more from actively following a global model for the internet to obtain a richer cultural mix, trade links, etc with more connectivity. The treaty of Rome and other EU treaties enable states to claim sovereignty over the internet in their own country. But should they do it? The answer is no as the internet is about global activities and so much is lost if there is only a parochial view.
- EU aid for infrastructure is a possible goal – eg one suggestion is for a fibre optic ring of broadband crossing all Member States (despite the apparent glut of dark fibre left over from the telecoms crash of 2000-2003) - but should this be a privately financed speculative effort is the question?

3 Summary of potential 'desirable' and 'undesirable' scenario features

A summary of the views expressed is that the future internet is shaped by social and economic forces, not technical. Technical factors act as enablers or constraints on a socio-economic- psychologically-driven set of requirements. These drivers sit in the context of various environments– both ecological and political. This signals that the internet has moved on from being a technical network to forming a key social structure, meeting underlying personal needs as well as commercial functions. This is illustrated below:



Desirable and undesirable features from the internet scenarios

Scenario 1 – Smooth Trip – Although an interesting scenario - and an interesting model to aim for - it appears optimistic. It is also uncertain whether it would lead to a digital elite.

Could be improved by a) inclusiveness safeguards so that it will apply to all; b) a description of pro-active security measures; c) distinguishing it from a path to scenario 3

Scenario 2 – Going Green – Desirability is not so much in question as is the credibility. For some participants it is highly unlikely to occur, to others it is unnecessary, and to yet others it is the most obvious and realistic scenario. To the latter, it forms one step in a series, going from scenario 1 through 2 to 4. It is seen by them as not just desirable but the only sane scenario with real social responsibility

Scenario 2 could be improved by a) showing how applies to wider set of impacts than personal life –ie the big picture at a macro level; b) The practical steps needed to build an internet for a green knowledge society

Scenario 3 – Commercial Big Brother – While this seems to be an accurate picture of what many participants expect, it is also a forbidding prospect for the future that most wish to avoid. It has few or no desirable features for a majority of participants.

It could be improved by a) more on how individuals will cope; b) more on how individual

liberty would be impaired

Scenario 4 - Emergence of the e-Demos – an idealistic view but one which many participants seek to approach.

It could be improved by a) making the whole concept and the scenario less idealistic and more realistic; b) to give more material on the practical steps required to build such a society.

4 Future Priorities for research

The discussions from the workgroups and plenary sessions highlighted the following areas for future research:

- The psychology of human interfaces with the internet through whatever user device is the mass choice (eg mobile). Discussion pointed out the value of the World Wide Web in opening up the internet and also the early sense of trust (before 2000) – that this was in some way a believable safe mode of communication and source of information. However this has now been destroyed. Restoring it requires research into four themes, which are separate yet overlaps, of - security, privacy, trust and reputation, and how they can be installed. This demands a combination of psychological, social behavioural and technology research for a new approach to the human interface environment.
- A multidisciplinary approach to the overall architecture and design of a future internet taking in two major areas of need, plus a third which is prior requisite for the other two to be successful:-
 - Social demands, for supportive communications and human networking which protects the individual, and which allows the individual to be creative, while also supporting local communities
 - Economic demands for secure trading with financial transactions, both personal and business
 - Design of the human interface using the psychology of the users
- As society's dependence on the internet increases, internet regulation and law must be examined and where possible, follow existing law, while being practical and enforceable, in an internet context. This implies arbitration processes that are rapid, low-cost and effective in practice. Such an approach also applies to governance of the internet itself. Here, there a problem of a suitable framework of administration and whether creation of new legal mechanisms, are required. This has a technical side, never considered in the original internet's design, to provide a means of reasonably policing the internet, able to reach into all those parties attached to the internet, be they ISPs, regulatory agencies, consumers or business users.
- Methods of creating internet governance processes in which ordinary users could participate.
- Deep technological studies on the technical underpinnings for a simpler safer internet for all, which can support digital presence far more effectively in terms of usefulness with



authentication and transparency.

- When looking at research subjects, perhaps the concept of what should NOT be funded is useful (as Group 2 suggested). In this category would be deep packet inspection that is being promoted as a way of policing downloading of files for pirated content. Thus any products that would be useful to enforce Scenario 3's grip on consumers and censorship should not be funded in EU research programmes. Instead, research should concentrate on the technology for a green internet (Scenario 2) such as smart sensor networks, ad hoc mesh radio and also for Scenario 4's tools for ordinary people to create their own environments as an everyday matter, via useful personal web tools and 'mash-ups' of modular services as well as cheaper and more distributed infrastructure that is less prone to concentration.
- Thus future research should focus on user control, in an end to end manner, of functionality as well as the quality of service. Now and in the past, in contrast, we have typically invested in controlling networks where the weight of design choice has been with the technology and commercial providers. Research should reinforce the pluralism of technologies and reduce the power of commercial lock-in via the technology. We risk building an internet somewhat like the phone networks with handsets locked to one cellular provider, but with a more complex set of application, platforms and standards far more likely to confuse the naïve user.

Attendees

External Experts

1. Amelia Andersdotter, MEP
2. Anne Light, University of Sheffield Hallam
3. [Francesca Bria, Imperial College](#), London
4. Dimitri Papadimitriou, Alcatel Corporate CTO
5. Gloria Gonzalez Fuster, Free University of Brussels, VUB
6. Luc Soete, University of Maastricht, ND
7. Milton Mueller, University of Syracuse, NY, USA
8. Roberto Saracco, Telecom Italia
9. Roger Torrenti, Sigma-Orionis Consultants / coordinator of project PARADISO
10. Bernard Benhamou, Ministere de Recherche, France
11. Afonso Ferreira, CNRS
12. Juan Carlos De Martin, Politecnico Torino
13. Ziga Turk, Reflection Group, Brussels

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14. Fabrizio Sestini, Project officer
15. Mario Compolargo, Director Emerging Technologies and Infrastructures
16. Per Blixt, Head of Unit, New Infrastructure Paradigms and Experimental Facilities
17. Jorge Periera
18. Andrea Glorioso, Internet; Network and Information Security unit
19. Jean-Francois Junger ICT for Government and Public Services
20. Bernard Barani Converged Networks & Services
21. Loretta Anania Networked Media
22. Augusto De Albuquerque, Micro & Nanosystems
23. Prahbat Agarwal INFSO F1 Future and Emerging Technologies
24. Andrea Servida, Internet; Network and Information Security unit
25. Ralph Dum, Unit F1, Future and Emerging Technologies
26. Raffaella Di Iorio DG RTD Science and Society
27. Rogier Holla, Internet; Network and Information Security unit
28. Petra Leroy Cadova, Strategy and Analysis of DG Health and consumers
29. Loris Penserini, Future and Emerging Technologies-Proactive unit
30. Constantijn Van Oranje – Nassau, INFSO Cabinet

Core Team

31. Colin Blackman, Camford Associates
32. Ian Brown, OII
33. Karmen Guevara, psychoanalytic consultant
34. Jonathan Cave, Warwick University
35. Simon Forge, SCF Associates Ltd

Expert Panel

36. Xavier Dalloz, XDC, Paris
37. William Drake, Graduate Institute, Geneva
38. Rudolf Van der Berg, Logica, ND



39. Chris Marsden, University of Essex, UK