

Notes about building people and life oriented visions of future technology

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Kari-Hans Kommonen (kbk@uia.fi), 26.9.2003 (rev. 12.6.2004)

*ARKI research group, Media Lab, University of Art and Design Helsinki ULAH
Hämeentie 135 C, 00560 HELSINKI, Finland*

Introduction

All technology development is based on some kind of vision of the future where the technology will be used for something. The nature and quality of future vision is important, because it influences the quality and nature of the outcome very much. While the future vision is often implicit, there are also conscious efforts to create shared visions; WWRF¹ is one of those efforts, and vision development has been named as its central task.

In order to succeed in this, it would be important to pay even more attention to the problem of how to build informed and useful shareable and shared future visions, and invest the necessary resources into this activity. Visions are often produced as a side activity, they start with unreasonable or unuseful assumptions, and they do not evolve nor communicate with other visions. And they are usually created by domain experts, disconnected from the rest of society, or, in other cases, by non-experts, disconnected from the development community or the development process.

Because of the importance and impact of future vision, vision building should be constituted as a serious and substantial R&D activity. It should be a long term effort, the vision should be updated as it becomes incompatible with the developments. Several parallel, independent but communicating vision building processes are probably needed, so that many different relevant voices and lines of thought can be accommodated but still brought together, and they should be developed in partnership with relevant representatives of all stakeholders.

Good quality visions that include relevant aspects from technology, culture, economy and politics would be very valuable for guiding investments in R&D efforts, and especially for co-constructing the social, economical and political circumstances that determine so much of whether a new technology or product can become successful in society.

The significance of “future vision”

All technology development is based on some kind of vision of the future where the technology will be used for something. In many cases, these visions are implicit and possibly not articulated or shared by the developers. Developers must have a set of beliefs about what the technology will be used for in order to be able to make decisions about its implementation details. In this paper I will use the concept “future vision” to signify this set of beliefs, whether it is implicit or consciously, explicitly developed.

The nature and quality of future vision is important. It plays a crucial role in the development process, and influences the quality and nature of the outcome very much. It will be difficult to make sure that right features are built into the technology and that they perform in the right way if the vision is flawed.

There is always a future vision of some sort guiding the development, but it may not be consciously developed or reflected upon. There are also many examples of purposeful visions that have been developed to guide and inspire development and that have been fairly successful and helpful in that. The visions of Vannevar Bush about Memex², J.J. Licklider about man-machine symbiosis³, Douglas Engelbart about augmenting human intellect⁴, Ted Nelson about Hypertext⁵, Alan Kay about the Dynabook⁶, or Mark Weiser about Ubiquitous computing⁷, have had a tremendous effect on the development of the digital environment we have today.⁸

Visions and scenarios are today used more consciously as tools for getting developers to work for shared goals. For example, the EU commission has used the scenarios created by IST Advisory Group (ISTAG) about Ambient Intelligence as a description of the desired direction of development⁹. And, the WWRF has raised the vision building as the central aim of its existence¹⁰.

I believe that the WWRF is a very significant and valuable effort, for two reasons:

- the importance and significance of vision building in general is not well appreciated, and the fact that such a prominent body has been set up with so clear support from the central players of the field, with the explicit purpose of vision building, is likely to increase the interest in doing more of it
- in the future stages of the development of our wireless digital infrastructure the coherence and clarity of a shared, common vision is much more important than it has been before, because this technology increasingly becomes – and is specifically striving for it - an indispensable component in everyday life, in its full diversity and complexity

Another especially positive characteristic of the WWRF is that in its charter, it is clearly stated that in the vision that is built, the user must be “on the driver’s seat”. It is crucial to choose to award the users the key position, because technology can only become successful if it does fulfill the users’ needs.

It seems that in order for the resulting vision to truly have a user centric characteristic, it is not enough that the authors, the technology developers, feel that “the user is on the driver’s seat”; for general usefulness of the vision, it will be necessary that non-technology-experts that are introduced to the vision can understand it and get a feeling of its meaning for their and the society’s everyday life, and maybe even agree that “yes, I think that this technology will meet important needs that people have”.

While users are respected by developers, and more and more are considered in the development processes, development is generally still very much technology, not use driven. It seems that the ability of the global technology development system to develop almost any fathomable technological solution is much better developed than the society’s ability to find practical and economical uses for the solutions.

In very many areas of industrial activity where the product or technology has clearer boundaries (car, building, movie), the problem of understanding its applications or relationship to people also has manageable boundaries, and a good set of methods exist for tackling it. But when we talk about wireless future digital universal platforms that will be used by all people for all purposes at all times in all contexts and locations, we have very little existing knowledge or

research methods that can help us in understanding how to even try to define or determine well enough the set of things that people might want to use it for.

The methods for user centered design are an important step in the right direction, but may not take us far enough. User centered design comes from a tradition that is still implicitly product and technology centered, as its reference to people as “users” reveals.

People do not think about themselves as “users”; it is producers who see them as users of their products. This way, a person, when called a “user”, becomes implicitly framed through her interest in using a planned or speculated product. The activities, interests and motivations that appear unconnected to “using the product”, are usually deemed by the observer to be of little relevance to the current focus of study, and are filtered out.

If, as in building a vision of life in the converged future, we are not looking for the needs that might be related to a single product, but instead looking for the right ideas of what the possible products should be in the light of any possible needs, we should avoid filtering our potential information in the wrong way. In many cases, if we truly start from the individual’s perspective, it is not at all clear what kind of a constellation or configuration of various solutions could provide the best overall match to the observed problems or needs.

Another problem hard to take into account in the development of single products, is the contribution of the socio-economic context for the technology use; many problems that people have in their everyday life with technology do not result as much from bad engineering or design as they do from an inability of the actors in the field to collaborate or agree on interoperability or information exchange methods and standards, or from too high pricing and subsequent too low social usage of useful features.

Conscious vision building

To build user centered future vision, presents a substantial challenge for the technology and product development community, because normally it is used to working on its own among problems it knows how to solve. To build shareable and socially and culturally meaningful understanding of the uses of future technology is a *novel kind of a problem* (for technology developers as well as for most of society – but it is here the R&D community taking the initiative to approach it), and requires new kinds of competences and understandings.

Some of the how-to issues, that point us towards what competences we need, are:

- 1) how to characterize the future possibilities in a useful way and how to conceptualize and organize the related insights (*analysis and translation*),
- 2) how to communicate about the future possibilities in a useful way (*communication and illustration*),
- 3) how to understand what people do and might want to do in general, and bring that understanding into the envisioning process in a way that can inform illustrative design scenarios of future uses (*understanding of people and cultural and social processes*)
- 4) how to invent, design and explain new uses and practices that might make sense given the understandings noted above (*invention and design*)
- 5) how to cover a wide enough but still manageable scope so that relevant ecosystemic dimensions and issues are considered and dealt with to appropriate extent, (*systemic and architectural considerations*)

- 6) how to take into account the true diversity of individuals' lives and needs to match the digital technology's capability to be infinitely customized, to the appropriate extent (*revealing and noting the demands for diversity*), and
- 7) how to arrange and run the social processes that may be necessary to construct such understanding (*development of social processes*).

And, these issues must be dealt with at the same time, while they interact with each other, so we can not 'purchase' the components separately and assume that by summing them up we get meaningful results.

Characterizing and illustrating the possibilities

How to illustrate future possibilities and uses in a way that makes it possible for as many as possible of the stakeholders to understand them and contribute creatively to the invention of a constructive future vision, is a central how-to issue.

Even if a person or a group has been able to develop a good insight, it is always very difficult to communicate it so that others will understand what the originators actually mean. The difficulty is greater when the insight is based on long term collaboration during which difficult and novel concepts have been internalized and probably further evolved by the authors, because this process was not shared by the audience.

The first point, characterizing the possibilities, requires understanding of technology, because it is the technology that is changing and bringing in new possibilities that may facilitate change.

But the harder problem is that these possibilities should be expressed with narratives, concepts and language that can be understood by all participants in the process, also those who are not experts in the field. In order for a vision to be understandable by a general audience, a significant conscious investment must be made to the development of a set of concepts, verbal and visual language and other means for supporting and facilitating the communication. This *shared design language* probably has to be developed together during the process.

Designers, artists, and communication and media specialists should be included in the envisioning process – not only as the illustrators and decorators of the final reports – so that they can become intimately involved in understanding the nature of the envisioning problem in all its complexity and propose solutions that have strategic nature.

The individuals involved must also understand enough about the technology so that their illustrations, whether in the form of text, oral narrative, illustration, poster, schema, animation, comics, video or drama, are accurate and true to the nature of the things they describe. This is important especially because their products are used as design components in scenario making, and the designs will be useless if the components are not really useful.

Understanding everyday life and practices

Gaining and organizing insights about the uses and practices in everyday life is difficult for all of us because we are all so embedded in our own lives that it is hard to see how it is constructed.

Also social sciences that study people and life have shortcomings in this area for our purposes, because their interest in everyday life or the format of constructing and reporting results does not generally include or explicitly address a point of view of design. And moreover, social sciences describe how things are based on empirical findings, and it is usually seen to be against their professional practice to predict, plan for or speculate about the future.

There is, however, a growing community of social scientists who have engaged in R&D groups and developed new ways to look at life and people that are more aware of and sensitive to the needs of design. These pioneers can help in growing this process.

Design approach

Envisioning future uses requires a design approach. Existing data can't simply be used and aggregated. New kinds of syntheses need to be made. Quantum leaps in certain areas must be taken.

Designers have a lot of practice and skills in creating a great diversity of new ideas, as well as in developing these further in various kinds of processes. They are often also good in illustrating the ideas and possibilities.

However, the design in this particular area requires a lot of new understanding of people, social processes and new materials from the participating designers, and it is important that the designers are involved in the whole process. This can only happen in collaborative projects and exercises where these competences are present and evolved further together.

Ecosystemic issues and diversity

The reality of everyday life is both systemic and individual. Products are used with other products, and their interactions with all aspects of everyday life are the reason why the user has the product and relies on it in the first place.

For envisioning purposes, it is important to realize that the everyday life product ecosystem and the diversity of people is not well understood and considered by the R&D process, and that serious envisioning processes should pay special attention to this problem.

As these two dimensions of the problem are in the context of the WWRF the most significant, I will address them separately below.

Social process

There is no easy way out of the reality that for serious envisioning, as advocated here, a large number of people need to be involved, brought into a collaboration, and persuaded to learn new things and produce many new ideas, over a long period of time – a few years, at least. It is a significant social process. It is difficult to do it, and moreover so to motivate people to make such a commitment and contribute. The point here is that the format these activities will take is not self-evident nor established, and requires a serious R&D effort.

The main challenges for future technology: the ecosystemic reality and massive diversity

Every person has a life that is for the most part different from anybody else's life. No two people on earth have completely similar lives. While this sounds like a trivial statement, we do in fact rely all the time in R&D on information about people that treats large groups of people as similar, for example, by creating, say, 9 user types to represent the diversity of users.

We can only find similarity through reduction: consider only certain parameters and certain predefined values for those parameters; for example, we ask a person only for their age and four most important ways to use the mobile phone. This kind of reduction is necessary for producing usable science. To be able to produce a representative survey of what are the most important ways how people use mobile phones as a function of their age, we need to reduce the

complexity and produce a simple result. However, that information, while possibly being a valid scientific result, may be useless for design purposes; we have no way to know beforehand, for sure, what information about the user is useful for design. Because of this, we should be careful about what kind of reductions we perform.

When the flexibility of the materials and systems that together produce the final design for the users increase and as the products are expected to be intimately and pervasively connected to all details of everyday life, it becomes an imperative for design to not reduce the details away. For users of these future products, the ignoring of their personal details is simply the worst thing that the product can do.

As an example, everybody understands that a mass printed newspaper will have to include information that individual people do not need or want, and that it remains their own responsibility to filter the content appropriately. This is part of the “contract” between the newspaper and the user. But if similar unwanted content is sent to the user as email, it is categorized by users as spam, and it causes aggravation, because email is seen as a highly customized, personalized and intimate medium – this is part of its contract.

Email is also a good example for illustrating ecosystemic concerns. There are numerous email facilities available to people, but many use tools like Outlook Express by Microsoft or Eudora by Qualcomm for their mail.

For the users, the tool for using mail is, however, not at all the essence of their “email system”; it is the complex social network and numerous communication streams that they manage through these tools. They would probably be very happy if they could replace the tool they currently use for another one that better fulfills their needs. But they would not tolerate such a solution that would not be compatible with their email archives of several years back. These archives, streams, messages and social networks and their management are the most important characteristics of email for people, and their successful processing and sustainment depend on several other interacting systems. For example, when the user travels, her infrastructure for email may suddenly completely break and leave her floating in vacuum from the point of view of her social interactions.

In terms of software, the email product connects to the operating system, the internet ISP, the mail server, the software that produce and display attachments and so on. Users need to be able to make these connections work regardless of their situation. The producer of the mail program can not solve the users’ problems all over the world, and is not attempting to do so. Through an evolutionary process where different participants in the email network have made appropriate adjustments, the parts have begun to interact fairly smoothly so that it is now possible to use various computers, travel around the world, use various network connections, and remain connected to the social system of the email to the extent that people are starting to rely on it as a primary system for communication on important matters. A wealth of new social practices basing on the availability of a reliable, ubiquitous, pervasive and personally manageable email platform has emerged and is growing. Ecosystemic disruptions, of which spam is probably the most acute, are the worst enemy of this development.

Spam is a good example of a failure in ecosystemic design. It would be easy to fight spam if the email technology community would (have) work(ed) together and produce(d) design solutions against it. For example, if all email had a fairly reliable sender’s signature, filtering anonymous or unreliably signed emails would clean up my mail completely. But since the email ecosystem evolves without a lot of concern for coordinated activity, the evolutionary solution to the spam problem is slow and painful to find.

Ecosystemic issues relate to the fact that products are not alone in the hands of users, used for standalone applications, but instead are used together with other products, interacting with them, using information from them, producing information for other systems, synchronizing with them and so on. Users always end up as the *final system integrators* who need to make sure that the product fits in to the particular, personal ecosystem. And if it does not, it can't be used, regardless of its cool features and wow factors.

These ecosystems are individual, and even if they may be close to each other and overlap, the differences between two ecosystems may be critical to the users. For example, two classmates may share the same social network, but the other one's other parent may be from another country, with a different culture, language and customs, and she might have a need to merge these two cultural worlds in a completely personal, idiosyncratic way while maintaining compatibility with both her classmate and her family. For a person in this situation, it is not useful if a device has a setting for culture A and culture B unless the features could be mixed freely and for example according to with whom the communication takes place.

But in general, when we set out to create future design ideas, taking seriously the imperative of dealing with the immense diversity of situations and circumstances that the world's user communities represent, there seems to be no way to solve all these problems for people through presets or artificial intelligence. Instead, the only feasible path seems to be to make the technology easy enough to customize by the users, for their own purposes, since they are the only experts of their own lives, and the only ones that can finally know what they actually want the technology to do. (Of course, there may be local customizers, say individual small design businesses, that perform many of such customizations for a fee. Etc. But the essence is not to be held hostage by a "shrink wrap at the factory" scenario.)

Technological convergence and increasing performance (more features can be fitted in smaller and cheaper space) is making it possible to include almost any functionality with almost any product. For example, a digital television can become also an email tool. Or a telephone a web browser. This creates a great opportunity to expand a platform's coverage, so that, continuing the use of email as an example, a user can remain in touch with the social network with yet another ubiquitous tool.

However, there is a tendency for developers to seek to own applications, as they try to gain ownership of the customers as well. And often they pursue this by creating artificial software boundaries between the new application and the old ones. While this may sometimes and for vertical purposes work well for some time, in the end it harms the whole environment and interferes with the users' ability to construct and customize according to their needs. Sometimes closing applications is done as a usability feature – based on the ideology that simple is easier to use. But there are other possible strategies that could produce more usable solutions as a whole, but would require greater collaboration and openness between developers. This seems to require also new kind of business thinking, new business models, that capitalize and economize on collaboration, seeing it as a strategic pooling of resources rather than as a problem.

It is not in the interest of technology and software developers, operators, content authors nor users to have a massive universe of idiosyncratic, non-communicating, vigorously competing products that try to own customers and make it difficult for them to migrate to better or simply different solutions according to their liking. This current situation on the market alienates people from experimenting with new technology. People have bad experiences of investing a lot of personal cost, time and intellectual capacity into developing new practices with new tools, just to find that it does not work for them and they have no use of that investment with any other system or in any other configuration. Simply to switch from a mobile phone to a new one is so time consuming that many people avoid buying a new model because of that, even if they would like the new features.

WWRF is a forum that could address all of the above concerns, if it can mobilize a serious, coherent and sizable future envisioning activity.

In conclusion

One problem area is that vision building is not yet recognized as a meaningful activity of its own, and there are few funding sources or organizations that can mobilize the kind of efforts that would be necessary. This is a major concern for WWRF to tackle.

For technology developers, they need to create future vision for their own R&D purposes. But because the problem (and opportunity) area is so vast considering the flexibility, ecosystemic and diversity aspects, it is beyond the scope of any corporation's means to foresee it all alone. On the other hand, if large numbers of people are involved, it may be also nonfeasible to attempt to keep it as an internal secret process.

Society at large would need a better understanding of where it is going, and what is the role of technology in the development. It is very natural and belongs to the charter of large public technology development funding agencies to invest in future vision building. But I believe that they will only do so if the industry strongly demands them to do so.

Vision building can be the best way for the industry to find the appropriate layers of where collaborative strategies are better than strictly competitive ones; where should open source be the dominant model, and where trade secrets are appropriate.

Better and more shareable vision might encourage collaboration, better targeted take-up encouragement and faster adoption of crucial features that may enhance dramatically the experienced usability of new technology with a very low development cost.

It is important to realize that most people are used to the idea that visions that are presented to them by businesses are commercial messages, not intended as realistic or meaningful for their future. If a serious shareable future vision is to be built, it will be necessary to introduce a new kind of language and process for sharing it.

Vision building can not be solved by introducing some new clever method as part of the traditional R&D cycle, but instead a new R&D direction and sizable effort are required. Visions are important products that can have a very high value if they are good. High value useful visions should not be expected to be created in one-afternoon or even one-week exercises of ad-hoc expert groups.

New visions of future applications of future technology and the understanding of everyday life practices that they require, need to be developed in long term collaboration with people, in several research projects operating with different communities. These projects should, however, make a conscious and coordinated effort to create shareable language and concepts that can make the new potentials of technology visible and understandable and make it possible for the non-expert people themselves invent new possible applications, and thus participate in the vision building. A special strand of R&D dedicated to vision building should be started, and a fairly large number of people should strive to specialize in it. And, as this should happen in collaboration to be effective and coordinatable, WWRF could be a great mechanism for furthering this idea.

We¹¹ have been involved in vision building since 1995 and collaborate in that with communities of interest. Our experience is very positive, but has made it clear to us that ambitious goals require ambitious investments and efforts; transdisciplinary collaborations that take a long time to grow; and several communities of people and research teams working in collaboration.

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- ¹ Wireless World Research Forum: <http://www.wireless-world-research.org/>
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Links: <http://www.theatlantic.com/unbound/flashbks/computer/bushf.htm>, <http://www.cs.brown.edu/memex/>
- ³ Licklider, J. C. R. (1960) "Man-Computer Symbiosis." *IRE Transactions on Human Factors in Electronics*, HFE-1:4-11.
Links: <http://gatekeeper.research.compaq.com/pub/DEC/SRC/research-reports/abstracts/src-rr-061.html>
- ⁴ Engelbart, Douglas (1962) "Augmenting Human Intellect: A Conceptual Framework." Excerpt from Summary Report AFOSR-3223 under Contract AF 49(638)-1024, SRI Project 3578 for Air Force Office of Scientific Research, Menlo Park, California: Stanford Research Institute.
Links: <http://www.bootstrap.org/augdocs/friedewald030402/augmentinghumanintellect/ahi62index.html>
- ⁵ Nelson, Theodore H. (1965) "A File Structure for the Complex, the Changing, and the Indeterminate." *Association for Computing Machinery: Proceedings of the 20th National Conference*, 84-100. Ed. Lewis Winner.
- ⁶ Kay, Alan and Adele Goldberg (1977) "Personal Dynamic Media." *Computer*, 10(3):31-41.
Links: http://www.mrl.nyu.edu/~noah/nmr/book_samples/nmr-26-kay.pdf
- ⁷ Links: <http://www.ubiq.com/hypertext/weiser/UbiHome.html>
- ⁸ These influences have also been documented, for example in J. M. Nyce, P Kahn, (1991) *From Memex to Hypertext: Vannevar Bush and the mind's machine*, Academic Press Professional, Inc., San Diego, CA.
- ⁹ "The focus of the IST Programme is on the future generation of technologies in which computers and networks will be integrated into the everyday environment, rendering accessible a multitude of services and applications through easy-to-use human interfaces. This vision of "ambient intelligence" places the user, the individual, at the centre of future developments of an inclusive knowledge-based society." --- "ISTAG with the help of the IPTS institute (Institute for Prospective Technological Studies) of the Joint Research Centre has also developed a set of "scenarios" for Ambient Intelligence in the next 10 years."
Information Society Technologies, Programme for Research, Technology Development and Demonstration, Work Programme 2002.
Links: http://www.cordis.lu/ist/bwp_en2.htm
- ISTAG: Scenarios for Ambient Intelligence in 2010, K. Ducatel, M. Bogdanowicz, F. Scapolo, J. Leijten & J-C. Burgelman, February 2001, IPTS-Seville, Spain.
Links: <http://www.cordis.lu/ist/fp5-istag.htm>, <ftp://ftp.cordis.lu/pub/ist/docs/istagscenarios2010.pdf>
- ¹⁰ "The present draft report, "The Book of Visions 2001" is the outcome of the first year's work of the Wireless World Research Forum, WWRF. Alcatel, Ericsson, Motorola, Nokia, and Siemens founded the "Wireless World Research Forum (WWRF)" in early 2001. The objective of the forum is to formulate visions on strategic future research directions in the wireless field, involving industry and academia, and to generate, identify, and promote research areas and technical trends for mobile and wireless system technologies."
Links: http://www.wireless-world-research.org/general_info/Bookofvisions/BoV.html,
http://www.wireless-world-research.org/general_info/Bookofvisions/BoV1.0/BoV/BoV2001v1.1B.pdf
- ¹¹ Research group ARKI in the Media Lab, University of Art and Design Helsinki UIAH. <http://arki.uiah.fi>