Technical Foresight Report
Smart Collaboration Spaces
Magnus Boman & Charlie Gullström, December 2014
Smart Collaboration Spaces

Magnus Boman & Charlie Gullström

December 2014
Executive summary

This report outlines trends, challenges, and opportunities relating to the future of Smart Spaces and ICT-mediated human communication. This report could be seen as an initial and open-ended exploration that seeks to contribute a productive point of departure for future work across the Smart Spaces (SSP) Action Line, using the Innovation Radar platform.

As a foresight, this report identifies and exposes future themes with high innovation potential relating to mediated presence and smart spaces, using a time frame roughly six months to three years ahead. Its purpose is to create a common outlook on the future of ICT and to establish a shared vocabulary and fruitful methodologies for future strategy thinking across the EIT ICT Labs partner organisations.

A series of workshops and other collaborative activities have been organised within the Mediating Presence activity since late 2012. This report builds on and extends earlier reported work [2] while also documenting the SmartCollaborationSpaces activity, concluded in December 2014.

From the perspective of the Innovation Radar, the current report also documents an innovative format for dissemination of results, as it is accompanied by short films produced in 2014, in a collaborative process between four partner nodes.

Trends

- There is a user demand for slow spaces, physical and conceptual places in space and time with restricted or no digital traffic. This trend is developing in parallel to (and perhaps part of a backlash to) that of nowism, instant gratification, and attentionalism, social approval.

- Browser-based service development (WebRTC, HTML5, and a number of open source platforms) has already triggered a thorough transformation of the media industry. Together with lean start-up methods, this has helped re-define the role of the Web entrepreneur, now assisted by an increase in user- and app-friendly cloud solutions.

- Browser-less service development, i.e. cloud-based computable documents not requiring a browser, has the potential to change how people collaborate and search for information digitally.

- New manufacturing methods (like 3D-printing) are radically changing and facilitating new media services and smart spaces. Local and virtual object-printing is abstracting away from physical limitations. A significant share of the maker community can now more swiftly realise ideas within mediating presence.
Challenges

- The overhead associated with any technological answer to the question of how to collaborate in a smart (ubiquitous, accessible, unrestricted) fashion using ICT must come down for large-scale adoption of new mediated presence solutions.

- Critical theory is showing an interest in mediating presence, analysing it from philosophical, ethical, and STS (Science & Technology Studies) perspectives. This challenges ordinary engineer-driven development by forcing design to be value-sensitive, recognising bias and value-ladenness.

- The reformulation of the value chain relating to the media industry, and its tangents into many adjacent fields, is in constant reformulation and difficult to overview in the short term. Analysing what future value is to the customer, measured and understood through profiles, needs, and willingness to pay (attention) is difficult but important.

Opportunities

- The emergence of the Metaverse, the connection of all virtual worlds into one networked and accessible system, will create new opportunities for service development.

- The creation of slow spaces actually requires ICT to remain silent. Monitoring, interference, and control of such spaces are examples of areas with new innovation opportunities.

- Remote physicality (creating and manipulating objects and environments from afar) is affecting all senses, as well as production, mobility, professional collaboration, and social interaction. All of these application areas present new innovation opportunities for researchers and developers.

- The reconfigured media industry market provides new opportunities for start-ups and SMEs, provided IPR and other obstacles can be worked around.
## Document Details

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<th>SSP</th>
</tr>
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<td>KIC Activity Name</td>
<td>SSP Mediating Presence: SmartCollaborationSpaces</td>
</tr>
<tr>
<td>KIC Activity Identifier</td>
<td>14192</td>
</tr>
<tr>
<td>Catalyst</td>
<td>Innovation Radar</td>
</tr>
<tr>
<td>Task</td>
<td>A1404 (SSP) / A1406 (IR)</td>
</tr>
<tr>
<td>Type</td>
<td>Technical Foresight Report TR2014-005</td>
</tr>
<tr>
<td>Date</td>
<td>2014-12-28, minor rev. 2015-05-12</td>
</tr>
<tr>
<td>Status</td>
<td>Version 10: final version</td>
</tr>
<tr>
<td>Editors</td>
<td>Magnus Boman (SICS), Charlie Gullström (KTH)</td>
</tr>
</tbody>
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Contributors

This foresight was written by Magnus Boman (Innovation Radar lead) and Charlie Gullström (Mediating Presence lead), with contributions from Tjerk de Greef (TUD), Kåre Synnes (LTU), Caj Södergård (VTT), Michal Dunaj (DTAG), Elmar Arunov (DTAG), Andrea Guarise (Trento RISE), and Viktoria Lindström (SICS). The main stakeholder is the lead for the Smart Spaces Action Line, Petri Liuha, as well as all Activity Leaders across the Action Line. The participants of a Berlin workshop on September 25, 2014 all contributed directly to tangible output, with the last four being especially invited inspirational guests:

- Charlie Gullström (KTH)
- Tjerk de Greef (TU Delft)
- Caj Södergård (VTT)
- Lara Lorna Jimenez (LTU)
- Marita Holst (LTU)
- Magnus Boman (SICS)
- Andrea Guarise (Trento RISE)
- Elmar Arunov (DTAG)
- Andreas Braun (Fraunhofer)
- Graham Smith (Webchair)
- Peter Eisert (Fraunhofer)
- Carina Leue (Lufthansa Systems)
- Heather Moore (Shapes of Things)
- Jamie Allen (CIID)
- Rachel Uwa (School of Machines, Making, and Make-Believe)

Representatives from all SSP activities also contributed to the follow-up Film Feedback Workshop, at the Smart Spaces Results Day on December 3rd in Espoo. Special thanks and acknowledgement to Kai Kuikkaniemi and Jukka Reitmaa (screen.io), for excellent moderation of the workshop, benefiting from their real-time poll- and voting application.

Finally, we want to thank the four film-making teams who achieved their finished films within a tight time frame and strict budget limitations:

- Optimistic Future ([https://www.youtube.com/watch?v=jWkSi8NWMDM](https://www.youtube.com/watch?v=jWkSi8NWMDM)) by TU Delft (Tjerk de Greef). Production: blend-studio.tv / mankitlam.nl.
- Resonance ([https://www.youtube.com/watch?v=0VIQg1wHbaQ](https://www.youtube.com/watch?v=0VIQg1wHbaQ)) by VTT (Caj Södergård). Production: Magneeto Media.
- Analogue Friday 1 ([https://www.youtube.com/watch?v=5cDeINxzYRk Thumbs up!](https://www.youtube.com/watch?v=5cDeINxzYRk) and Analogue Friday 2 ([https://www.youtube.com/watch?v=Q9rBqDVIINt InstaYum!](https://www.youtube.com/watch?v=Q9rBqDVIINt)), two films by KTH (Charlie Gullström) & SICS (Magnus Boman). Production: Loyal Palace.
1 Introduction

This technical foresight report is part of a foresight task driven by the Innovation Action Line of Smart Spaces. The scope of the report is not the entire Action Line, but the ambition has been to inform the Action Line about future trends relating to the theme of Mediating Presence and to Smart Spaces. This description is intended to be used as a steering document for parts of the thematic work, and so the chief stakeholder is the Action Line lead. It is also intended to inform EIT ICT Labs as a whole on those strategic questions that directly or indirectly are associated with the theme. In particular, the report aims to identify key scenarios, trends, challenges and recommendations in regard of the Action Line to better understand the enterprise aspects. This foresight will help expose future themes with high innovation- and business potential, based on a time frame of six months to three years ahead. The 2014 Business Plan describes the task at hand as:

Foresight to explore how the mediating presence research and its industry will shape human behaviour and inform our future society; its capacity for innovation and business potential. Using the Mediating Presence network of expertise, the task will involve all Smart Spaces activities and in an interdisciplinary manner create future insights relating to the future mediated society. With a focus on technological innovation, the task will further inform the proposed business development task on product definition and business modelling.

This description was communicated in the invitation to the main workshop during 2014 (Fig-1). In preparation for the workshop, the Mediating Presence activity invited its partners to a series of mediated seminars (e-meetings), seeking to identify valuable trends relating to the future of the media industry in general, and to smart spaces in a particular. The participants reviewed and discussed all the recent publications available via the EIT ICT Labs Web site, as well as a wide range of publicly available reports and white papers (Fig-2). As a result of this process, the idea was put forward to produce the four films that accompany the current report. This represents a new form of outreach and dissemination, to be evaluated in 2015 by the Innovation Radar.

The workshop was successfully concluded, with preliminary drafts for scripts, intended for the creation of four short films, handed over to four different film producers by responsible activity researchers in four different cities (Delft, Helsinki, Luleå, and Stockholm). Tentative versions of three films were screened according to plan at the Espoo SSP Results Day event in December, from which valuable feedback was received (Fig-3, Appendix), allowing for the first three films to be slightly revised and completed at the end of December. In parallel, the fourth film was realised in two parts and completed at the end of December. This whole procedure, and the underlying thinking surrounding it, will be described in the two chapters that follow. The final chapter offers conclusions.
**Time:** 13-18 on Thursday 25 September  
**Venue:** Deutsche Telekom facilities at Winterfeldtstrasse 21, Berlin, Germany

The workshop is organised by the EIT ICT Labs’ activities SmartCollaborationSpaces: Bringing Presence and Collaborative Space to the Next Level and the Innovation Radar.

The event is mostly meant for partners involved in Smart Spaces Action Line, but there are a few seats left for others.

**Workshop focus**

Society is in an accelerated process of change and transformation: smart design components, interconnectivity, responsive and open-ended design systems, and intelligent buildings meet the challenges of user-oriented customisation and new ICT-driven manufacturing processes.

- How is this technology shaping human behaviour?
- What intelligence will the citizens of Europe contribute to its smart spaces?

In light of the above we want to explore the greatest business opportunities ahead.

- Can radical market transitions be foreseen?
- What risks will the new technologies bring to society?

**Goal and Methodology**

The workshop will produce tentative scripts or drafts for 1-2 minute films/animations relating to the above themes. The workshop output will be presented and improved upon at a follow-up workshop, as part of the Smart Spaces event “Results Day” in Espoo, Finland on 3-4 December.

The methodology employed is networked foresight. In order to achieve the workshop goal, speedwriting will be used to generate the short film-scripts, as well as other texts towards completion of the business plan deliverables.

If you are interested in participating, please, register to Magnus Boman and Charlie Gullström at magnus.boman@eitictlabs.eu and charlieg@kth.se

**Fig-1:** Workshop invitation posted on the EIT ICT Labs Web.
Fig-2: Mediated seminars and workshops are regular forms of interaction within the Mediating Presence activity.

Fig-3: Feedback session in Espoo on 3 December, as part of SSP Results Day and facilitated by Screen.io (seen stage left) and Charlie Gullström (seen stage right).
This chapter explains the methodology (cf. [2]) used to obtain the results presented in the executive summary above.

2.1 Eliciting Knowledge from Thematic Experts

The Innovation Radar has since 2012 run a series of workshops with the intent of eliciting input from thematic experts, chiefly in the form of written text. The thematic is determined by the Action Line ordering the workshop, so in the material covered in this report the main stakeholder has been its lead, as well as the Activity Leaders across the Action Line. The text was produced in the following methodological steps.

Pre-workshop

0. Preparatory mediated seminars in the Mediating Presence Activity, focusing on shared literature, and publications relating to future trends in the media industry and smart spaces
1. Invitation with concise background material on the area at hand sent out to thematic experts, Innovation Radar team members, and select invited guests
2. Agenda writing and goals for output set by workshop leader and thematic area or activity leader

Workshop

3. Introduction to workshop format and participants
4. Explanation of thematic delimitations
5. Individual silent trend/idea/concept generation
6. Terse text summary on paper, with quick explanations as necessary
7. Clustering
8. Formation of writing groups (voting, interest declarations)
9. Speedwriting sessions
10. Wind-down, review of results, explanation of next steps

Post-workshop

11. Post-workshop editing
12. Decision upon form of publication (production of four short films, distributed over four partner nodes)
13. Internal dissemination, during grace period
14. External dissemination, as appropriate

The steps in this sequence will be shortly explained in the next sub-section.
2.2 Mediating Presence—Shaping Tomorrow’s Society

A workshop was hosted by the Mediating Presence activity jointly with the Innovation Radar in Berlin in September, 2014. Six out of the 15 participants were women, the median age estimated at 35, and the experts were employed at companies (5), research institutes (6), and academic institutions (4). The workshop invitation (Step 1) this time stated that no preparations were necessary, and the agenda (Step 2) ran for five hours. This workshop was the first EIT ICT Labs event that had as its goal to produce film scripts. The introductory step therefore put an emphasis on visualisations (Fig-4).

Fig-4: Results from introductions (Step 3), extended to drawing future smart collaboration spaces, as anticipated in pairs of participants.

The first seven steps (Fig-5) arrived at the following four clusters.

- Gadgets, Technology, and Systems Thinking
- In and out of Synch
- Future Singularity/Anti-Singularity
- Dumb Spaces

The speedwriting (Fig-6) then produced four corresponding sketches of film scripts, the notes for which are presented in the next chapter:

- No more smart gadgets – later labelled Unique
- Out of sync – later labelled Resonance
- Future singularity – later labelled Optimistic future
- Dumb Space-Slow Space – later labelled Analogue Friday
Fig-5: Intense iterations of thinking, writing, and initial clustering (Steps 5-7), seeking and getting inspiration from others, while harshly bound in space as well as time.

Fig-6: The two groups during one of the two speedwriting sessions (Step 9).

The main responsibility for the continued development of each script was assigned to a researcher partner of the Mediated Presence activity, all of whom then proceeded to engage a professional film-maker. Thus, four film teams worked in parallel, autonomously and without interaction, to realise the four film scripts, with films to be completed within three months of the workshop.
Preparatory mediated seminars identified certain trends that were picked up on in the discussions at the workshop, and later ended up in the films (Fig-7). In particular the leaked New York Times innovation report [1] showcased how a leading newspaper agency struggled with ICT developments. In the context of technology foresight, it provides an excellent example of contemporary problems that many traditional companies face. Also, the recent Big Data and Privacy report to the U.S. president [7] was of significance as it shows the power of Big Data and the risks associated with using it for policy advice. The non-technical report is also of interest thanks to its collection of anecdotes, including the famous case of the pregnancy of a young girl being revealed to her father, by means of data mining. Furthermore, the Human Cloud at Work [6] study was interesting as an intriguing perspective on how wearables can be used to increase the efficiency of an organisation, with an eye on the risks of massive data collection.

Fig-7: Early story board for Optimistic Future, by Tjerk de Greef (TU Delft) and team, detailing animations, filmed interviews, and voice-overs.

2.3 Evaluation

Three of the films were completed as tentative versions already by early December and showcased to researchers and developers within the thematic area, who provided feedback. Simultaneously, the three films were shown to the Market Communications leader and staff, and all of their reactions were passed on to the
three film crews for the final versions. The fourth film script was slightly delayed, and consists of two autonomous parts, which were completed by the end of December. All films were made available to all of the attendees of the workshop, and to all the Mediating Presence activity participants, prompting some exchanges on the final outcome, as well as opinions and useful suggestions from EIT ICT Labs management regarding dissemination and use. Low-res versions of each of the films were also published on YouTube, allowing for swift dissemination and sent to the main stakeholder with the invitation to spread as appropriate within the Action Line.

As the film production phase was coming to an end, an evaluation meeting was held with all the script writers, with the goal of capturing lessons learned for future ventures into networked foresight and speedwriting (possibly with film scripts again being a target). Key points and anecdotal evidence from that meeting were:

Enjoyable, and important as the Innovation Radar really helped to think outwards this time. The idea of a provoking movie opened up also my personal perspective. This is important to human capital (scientist, innovator, researcher): understanding where the value lies. (Tjerk de Greef)

Since EIT ICT Labs is a network organisation, human capital in the above sense also becomes social capital. The script writers all felt it would have been great to have time for more iterations of tentative versions of their scripts, although such iterations might have made the resulting films more streamlined (for better or for worse), and the process as followed had its merits:

The move from general discussions before Berlin, then the workshop, and then the clustering: it all worked and was really enjoyable. Admittedly, we pushed the message a bit, creating a provocation, but the feedback at the end of the process of the task also helped crystallise our message. The screen.io worked well in Espoo, which gave us a lot of response quickly. And the final feedback from a film expert and from MarCom was instructive. (Caj Södergård)

I liked the fact that the creative process was free, we could work without many limitations, which was liberating. Even without meeting repeatedly, we were addressing important societal issues, not just commercial company CEO issues. Not asking for formal approvals in the process helped the outer voice to be heard, rather than the mainstream voice. (Tjerk de Greef)

To have some face time with the film producers were important, but the possibilities for it varied, with the LTU team working with a Stockholm-based firm 1000 km away:

Making the films was a great process and made for good deliverables: to only take 3 mins of people’s time and still convey a message. Inspired by this, I am going to force my students to do films. Limitations include too little time for iteration among the people involved. More budget would have helped in this respect. We also had no direct contact with the film makers, just online: I should have been on site with them. A lesson learned. (Kåre Synnes)
The process was also open-ended, in the sense that EIT ICT Labs is not selling anything, merely mediating the results of experts, via networked foresight. This affected everyone involved, not least the film producers:

*It affected me in the sense that some film viewers are expecting a message. In foresighting, you start with something like 100 weak signals and you state that clearly, but here the input was different, giving us more freedom but also more responsibility.* (Caj Södergård)

*I am used to thinking and expressing myself as a researcher. Here the medium forces you to think differently. We are closing the gap with the layperson: the distance between research and the person on the street is smaller with films.* (Kåre Synnes)

Finally, the impact was discussed; what could be hoped for in terms of starting, fuelling, or contributing to societal discourse and to company research and development.

*To make my research area more understandable to people. I am in fact very happy because it is already happening. The first viewing I arranged (50-60 people) fired off a discussion on privacy and other issues, and the level of discussion was great. The second viewing was at a meeting for medical technology. Again, discussion was fired up, this time on eHealth. An audience will always have their own luggage with respect to their own experience, but a film can quickly cut through this, and start a new type of conversation, through its visual language.* (Kåre Synnes)

*Technological concepts like telepresence and wearables (and biosignals) do become understandable through film, much more so than in a report. The modality is important. And we can also use it as discussion starter for, say, a new research programme at VTT or a H2020 application; showing the films at the beginning of a meeting.* (Caj Södergård)

*I used the movie at an invited talk for a humanities audience on highly automated systems and responsibility. Our film provided a great start of a discussion on what AI is, and what are the risks involved. The film helped to provide hints and a context, what is there now and what could be there in the future, a new kind of foresight dissemination. The non-experts could come to depend on these systems and so the issues are important. For students too, I can see how the movie could serve as an example of context. Perhaps also innovation managers could benefit, at least the films could help focus discussion on critical and ethical issues. Provoking is really the keyword. The comments from Helsinki also indicated that via the screen.io feedback: the films triggered people to think.* (Tjerk de Greef)
3 Foresight Notes

In the various discussions, brainstorming sessions, and collaborative work carried out within the theme, four distinctive themes emerged. While not disjoint, they provide different perspectives to what mediating presence and future smart spaces may entail. Reflections relating to the four themes are each given a subsection below. To preserve the tone and sentiment, typos and ambiguities in the respective texts have not been corrected.

3.1 The film Optimistic Future

_input to the film_

AI will solve it all - we will benefit, there are two different entities. Singularity principle says that AI will overtake/replace humans. Myth? Dichotomy? Friendly AI and what will happen if it is not. Community thinks it will be friendly. Assumption: it will be friendly (Singularity institute). Basilisk revenge scenario. Simondon: in every piece of engineering there is an engineer. Rationalism is really groupthink.

Cloned cow was more aggressive: link between genetic engineering and CS.

AI is still only a calculator - how long will it take? Future is on data. Merging of work life and private life - computer mediates. Will the singularity happen at all? The problem of consciousness is very difficult. The singularity has been predicted for a long time and has not happened yet. No significant output from AI in the last 20 years. It is more difficult to find things where humans are better than computers. People are conscious about the implications of a singularity - thus it won’t happen.

The law adapts to new technologies: society adapts to new technologies. What happens with data ownership: data ownership causes data and inference responsibility. The pace of development goes beyond deduction in Kurzweil’s sense. Physical boundaries – google&facebook spends a lot of money on cooling servers.

Cryogenics, uploading. Social redefinition of AI. It’s not about the technology - it is about how we use it. Control about data is very difficult - there needs to be guidelines. Can you be compensated by sharing data - selling personal is becoming a business - can the user be empowered?

Very corporate view of the world. Communicating with objects opens a lot of options. Viewpoint is corporations vs. people, or are small companies getting more powerful.

_reflections on the film_

The information received from the workshop allowed for preparing a clear story with three distinct chapters that in turn led to an initial storyboard (see Fig-7), which emanated in a version useful for creating the final film. An important lesson learned was that two minutes is really short.
The film’s main objective was to make people think about the potential of Artificial Intelligence without taking a leap with the associated risks. Clearly, the power of AI, and ICT in general, has much potential for economic growth but it has many people worried about its societal implications. In particular, there is a field entitled value-sensitive design (see vsdesign.org/) that attempts to balance opportunities and risks, early in the design process.

3.2 The film Resonance

Input to the film

The Normal state: out of synch to become in synch. Elements of synch (and getting in synch).

- Sharing: your data effecting your privacy
- Time: is about timing
- Mother-child bias; humanity needs (empathy) vs. needs, different levels/modalities, we assume computers to be synched, we synch between humans (empathy process)
- Thinking vs. feeling (arts worlds)
- Personalized - customised

What is the role of the computer, as entity vs. mediator? Devices out of synch. Grasp context, short history allows different perspective, and imaging space of others.

Definition of out of synch: different time zones, backgrounds, perspectives, cultures, languages.

Technologies in the future will include brain to brain computation.
Reflections on the film

The film communicates a vision of how current asynchronous communication transforms into a more synchronized model, yet manages to preserve freedom of choice for the individual. Affective telepresence using e.g. biosignals is one emerging technology tool for enabling this. An aim was further to draw attention on the, sometimes undesirable, implications for e.g. your privacy.

Compressing foresights into a short video both has advantages and weaknesses. While it forces you to crystallize your vision into a clear message, the drawback is that more complex analysis is difficult to fit in. We therefore conclude that the benefit of the film format is that of an eye opener, e.g. to present a certain view or a perspective, around which a more detailed discussion hopefully can emerge.

3.3 The film Unique

Input to the film

There are no more rights for the user. The simple aspect of the designer is a place where the person has to provide data: create information that is not speculative, not just open creation, but the purposeful creation of data. Tools for people to select the data, the data they create; there should be a purposeful, 'archive fever'.

5G: infrastructure for the sake of infrastructure, data for the sake of data: what are people really going to use it for? Identifying needs? The values that are imbued in the service? Smart spaces are a service.

The gadget is the interface? It is something that you use for the sake of using it? The post-smart phone is no smart phone... Will there always be a visual interface, and is there a personal media ‘overall’ solution?

Travel is a personal problem amongst us (locality versus globally) meeting people and instituting community: the entry point into communities and how to get into them. Wouldn’t it be nice to share experience virtually...this is a matter of detail? The group and the individual? How to bring about the greatest sense of getting into a community and connecting to the dots?
The environmental solution — giving a number of channels and screens for an ‘all over’ — the laptop / head / face — our experience and their experience — what is ‘present’ about telepresence?

Three scenes:

1. Everything will be individualised, personalised, customised, adapted, specialised to me: MiAspirin, MiCola, MiJeans, MiNews, MiBarrio, MiExperience, MiData, MiRights, MiPrison, MiRobot, MiLife, MiDeath, ...

2. Need = Demand: Things are available off-the-shelf, but very few are buying. Nothing is pushed and everything is adapted to personal needs, precisely then and precisely there. *The future smartphone is not a smartphone.*

3. Lots of hardware everywhere, as in a 50s Sci-Fi movie, but technology comes to us only when we need it, with intelligences merged for cognitive enhancement. We are active (pulling), technology is passive (no push, no marketing).

*Reflections on the film*

The speedwriting workshop contributed a set of future scenarios which led to the initial working title of *MiWay: My way is the micro way*. The main message was that, so far, we have led our lives in macro: as one in a crowd. Now it is time to start living in micro: hailing the uniqueness of each person. In this scenario, individuals might team up with computers for cognitive enhancement and improved human-to-human communication.

During the work process the film was renamed ‘Unique’ and communicates a shift from mass communication solutions to customized products that are fully tailored to the needs of the individual.

![Fig-10: Screen shots from Unique.](image-url)
3.4 The films Analogue Friday 1 & 2

Input to the films:

- Leftover spaces, no one is there, dead spaces, [since they are] not smart
- Go [away totally] everyway from everything, play with a rock, do something stupid
- Alcohol-free zone in Toronto, no access available
- How do you find them?
- Tag that you take to be safe, invisibility coat is what you want, an instant dumb space around you
- To be not connected, just you [a feeling of freedom]
- Filtering of information [and of people who can access information]
- It is illegal to protect against cell phone traffic
- You [should be allowed to] determine what kind of information you get
- Some time ago, you left home and had no telephone, not connected any more
- Scramblers to prevent communication
- Playing a sound such that you cannot hear other sounds
- Management of information, makes life difficult, you set up filters
- Conflict of accepting and rejecting information
- Facebook, several issues with that, you have to administer your data
- Full time job just to manage information, rules etc.
- Dumb space becomes intelligent space if you do not have to do it, intuition exists
- Anti-laptop campaigns in cafes, restaurants
- I love being in a country where I do not understand all the people around me, private issues, easier to concentrate
- Egypt: headset is embarrassing since you do not take part in public life
- Japanese subway, headphone -> personal space
- Have [access to] a place that is silent, you just hear your friend, no one else [and it is pleasant]
- You decide who is in your space
- e-diet, people pay for silence
- Generational questions?
- Trains, silent compartments, not knowing the language helps as well
Fig-11: Screenshots from Analogue Friday 1.
Reflections on the film:

The two films serve as examples to illustrate a movement (which may very well spread across social media and that can be watched without sound, e.g., on an interactive wall) to which people decide to subscribe because they share a need to reflect about the overarching techno-positivism that reigns in our society. By setting aside one day a week, during which no computers or digital tools are used, people may find an outlet to address the changes (for example, in terms of social behaviour) that fairly swiftly have impacted on our life patterns. Our message with the films is essentially to promote reflection and a critical discussion, which we expect would inform design and development relating to ICT innovation in Europe in a very fruitful way. We especially seek to address the younger generations, in which many people seem to find even a thought experiment like Analogue Friday pointless or offensive, since they have grown up with ubiquitous ICT services.

While this is very different to luddite communities, there are indications that similar initiatives may be spreading online, such as the Jomo movement (Joy of Missing Out); 99 Days for freedom (A Dutch project in which participants are encouraged to stay away from Facebook to see if they can notice a mood change); L’Isolé (a Parisian bar that has forbidden all social media usage, cf. Fig-12); Moment (an app that helps you limit and monitor your use of the mobile phone, you set the limits, and you will receive a warning sign). In Europe, some families have decided and agreed on the benefits and drawbacks of a ‘screen-free day of the week’.

Fig-12: Filter, a café in downtown Washington DC, had this sign (of the times, arguably) on their door in December 2014.
3.5 Research and development strands in Smart Collaboration Spaces: The Metaverse

While some of the claims in the notes from the four themes above could be considered leftfield and marginal by some, there are other claims that seem to be part of a more middle of the road (albeit critical) research and development strand. In particular, the Metaverse results from the merging of all virtual worlds and places [3]. Human activity is ongoing at a varying degree depending on economic, technologic, geographic, social, and cultural circumstances in this endless and malleable space, questions of what it is to be human must be raised. What the experience of the Metaverse can be to every individual is currently being mapped out, before its launch, since the changes incurred at some future point of introduction may be swift.

When we move between worlds that arguably are connected in an accessible and reliable manner, our sense of presence and place is constantly negotiated and renegotiated. The humble beginnings of the Metaverse in the form of bulletin boards, computer games, Second Life, etc. had particular graphic and architectural solutions, based partly on, and constrained by, available computer graphics and the limited computational power of personal computers. Efforts to increase resolution and make the experience more lifelike have been continuous. One aim has been to enhance the intensity of the experience; to increase the perceived presence in the simulated worlds. This applies both to applications when one is basically alone and when the activity is single-user, and when one interacts with other people, in the same space, for a poker game, a religious seminar, or a business meeting.

There are obvious advantages of improving virtual experiences, not least in relation to sustainability. If travel can be limited, that would often be a good thing. But also for those where travel is not an option, such as for extraordinary situations or people (e.g., handicapped or under-privileged) improved virtual experience is important. But there are also dangers accompanying the possibility of manipulating reality. We know that facts might not be enough to convince a particular group of the truths of certain claims [5]. With the right means it might be possible to augment and project a reality that never was real, or to create an alternative history that is convincing [8].

The Metaverse here serves as an example of an R&D strand that builds on mediated presence, creating an entirely new form of smart space. The critical perspectives, but also the more traditional techno-optimistic ICT and engineering voices, should be blended and allowed to inform each other. Only then will future ubiquitous smart spaces, in this case standing on the foundation of the Metaverse, be pleasant to use, experience, and inhabit.
4 Conclusions

The real conclusion: the trends, challenges, and opportunities at the top of this report emerged from an extensive network foresight effort. With the process and output having been, unlike earlier collaborations between the Smart Spaces Action Line and the Innovation Radar, directed towards short films, impact and findings must be evaluated differently from earlier reports [4]. Since much of the work and some of the conclusions are open-ended, films were deemed a suitable modality. At the time of writing, it is too early to measure the success relative to more traditional forms of dissemination. That said, this report provides some anecdotes indicating that the films do capture people’s interest and prompt discussion. If this indeed turns out to be the case, the process might be repeated for other foresights in EIT ICT Labs. For this reason, the documentation here is extensive, especially on the methodological side. Extrapolating from the trends, challenges, and opportunities, however, the take home message must be that smart collaboration spaces is an extremely active and vibrant area of research and development, holding promise for continued and rapid development on the technological as well as the social side over the next three years.
References


The feedback from the End-Of-Year event in Helsinki utilised a real-time support for digital voting developed by screen.io. The following instruction was given.

1) Which scenario did you like the most?
2) What does the film trigger in your mind?
Please provide some keywords that you feel describe the film's message, and vote on others' impressions (click "Choose" if you can agree with a suggestion).

3) What do you perceive as the opportunities or risks in the scenario?
Please pair up and discuss this for two minutes, then list 1-3 opportunities or risks. Then vote on others' suggestions individually (1=disagree, 5=agree). Please indicate whether your suggestion is an opportunity or a risk, to avoid confusion.

Results were (only comments given support from at least three voters are listed):

Which scenario did you like the most?
FILM 2 (RESONANCE) 8 votes
FILM 3 (UNIQUE) 5 votes
FILM 1 (OPTIMISTIC FUTURE) 3 votes

FILM 1: What does the film trigger in your mind?
What was the main message? 9
Fast talking 7
artificial intelligence will help our lives 4
Stephen Hawking's recent warning 3

FILM 1: What do you perceive as the opportunities or risks in the scenario?

<table>
<thead>
<tr>
<th>Opportunity</th>
<th>$\bar{x}$</th>
<th>$n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity: solving really hard problems</td>
<td>4,1</td>
<td>10</td>
</tr>
<tr>
<td>Opportunity: co-op between human and machine</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>artificial intelligence can detect problems earlier</td>
<td>3,9</td>
<td>9</td>
</tr>
<tr>
<td>Opportunity: Manually intensive/dangerous labour can be better handled</td>
<td>3,9</td>
<td>11</td>
</tr>
<tr>
<td>Many questions arise on privacy, integrity of data and control of your information generated</td>
<td>3,7</td>
<td>9</td>
</tr>
<tr>
<td>responsibility of AI decision unclear</td>
<td>3,5</td>
<td>10</td>
</tr>
<tr>
<td>what was scenario?</td>
<td>3,4</td>
<td>7</td>
</tr>
</tbody>
</table>
which scenario? 3,4 7
risk: data ownership 3,4 8
risk: privacy issues 3,4 8
Opportunity: use powerful tech for bigger world problems 3,4 8
Risk: use it to change your behaviour without you realizing it: make you buy more products
responsible use of AI technology 3,4 12
Risk of too simple solutions if market drives this evolution 3,3 7
risk: reliability/accuracy 3,3 8
Risk: Limited Access to the power of this technology 3,3 8
Risk: AI takes over 3,1 11
risk: machine Learning can be less personal 3,1 9
humans can be replaced easily due to commercial aspects 3,1 9
jobs are lost 3 7
safe future (opportunity), tech dependence (risk), collaboration (opportunity) 2,8 9
Risk: Jobs with rational/scientific thinking will become obsolete 2,6 10

**FILM 2: What does the film trigger in your mind?**

telepresence is a cool thing 5
i dont want to share my emotions like that 5
goole will own us soon (biosignals) 5
information overflow 4
privacy, sharing, globalization, communication 3
control your availability, be not disturbed 3
it was all about tele-presence 3

**FILM 2: What do you perceive as the opportunities or risks in the scenario?**

I see huge opportunities for google and NSA 4,4 8
New ways to communicate 4,4 8
risk: privacy of personal data 4,3 10
Opportunity: Techgeeks can get a partner 4,2 9
opportunity: language barriers will be less 4,1 8
Risk: full transparency of full data 3,9 7
risks: losing contacts with reality 3,8 8
How to lie in this future? 3,8 8
technology is good when it serves us 3,8 8
risk: misinterpretation 3,7 10
Risk: privacy 3,7 7
opportunity: working in a flexible way (more remotely) 3,6 8
Risk: Limiting real-life social relationships 3,5 8
ownership of biosignals? 3,5 6
How do I control my emotions AND how they are used 3,4 7
Opportunity: improved emotional communication 3,4 7
Being a lier becomes much more difficult 3,3 6
risks: promoting ADHD (Attention Deficit Hyperactivity Disorder) 3,2 9
privacy and onwership of own data is essential 3,1 7
opportunity: synchronization 3 5
know when your friends feel bad 3 6
risks: becoming digital zombies 3 7
nice to call somebody who is feeling the same 3 7
yeah, even more data to be collected! 2,9 8
opportunity: flexibility 2,9 7
big data (opportunity), privacy (risk), lose of control (risk), communication (opportunity) 2,8 6
real time bio feedback while you interact with others 2,8 6
Opportunity: automatic "Red phone button" 2,8 5
If you share your sugar level data with Nestle, they will know when to sell you candy 2,7 6
risk: I need a machine to interpret my and others feelings in the future 2,6 5
FILM 3: What does the film trigger in your mind?

- hiding technology in the background: 6
- hidden technology: 5
- technology everywhere: 5
- invisible smartness: 5
- lots of trendy technologies: 3D printing, IoT, mobile: 4
- high trust on technology: 4
- did he really say “calmputing”?: 4
- technology is everywhere: 4
- Maker culture: 4
- ubiquitous computing: 3
- wearables: 3
- peace, uniqueness: 3
- time for drinks!: 3
- simple, uncomplicated: 3
- computers shift from tools to companions: 3
**FILM 3: What do you perceive as the opportunities or risks in the scenario?**

<table>
<thead>
<tr>
<th>Opportunity/Risk</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>opportunity: usability</td>
<td>4,2</td>
</tr>
<tr>
<td>Risk: what happens behind the scene?</td>
<td>4</td>
</tr>
<tr>
<td>trust too much the technology</td>
<td>4</td>
</tr>
<tr>
<td>Opportunity: makes tech accessible to everyone</td>
<td>3,9</td>
</tr>
<tr>
<td>Opportunities: Democratize technology</td>
<td>3,8</td>
</tr>
<tr>
<td>opportunity: hide technology, opportunity: more human centric life</td>
<td>3,8</td>
</tr>
<tr>
<td>opportunity: no boring times anymore</td>
<td>3,7</td>
</tr>
<tr>
<td>risk: no time for personal communication</td>
<td>3,6</td>
</tr>
<tr>
<td>opportunity: unique services for unique individuals</td>
<td>3,4</td>
</tr>
<tr>
<td>risk: battery power is limited</td>
<td>3,4</td>
</tr>
<tr>
<td>opportunity: in control of technology</td>
<td>3,4</td>
</tr>
<tr>
<td>risk: my son wants his second ipad at the age of 3</td>
<td>3,4</td>
</tr>
<tr>
<td>Opportunity: Tech as second nature</td>
<td>3,3</td>
</tr>
<tr>
<td>Hobbies become more digital, than recreational</td>
<td>3,2</td>
</tr>
<tr>
<td>It's all about the tech, about the tech, about the tech, no troubles</td>
<td>3,1</td>
</tr>
<tr>
<td>risk: disturbing instead of invisible computing (see today's smart signage)</td>
<td>3</td>
</tr>
<tr>
<td>what was the scenario?</td>
<td>3</td>
</tr>
<tr>
<td>lots of opportunities</td>
<td>3</td>
</tr>
<tr>
<td>Risk: get so used to it that u stop asking about your rights eg. privacy</td>
<td>3</td>
</tr>
<tr>
<td>Breakingup/Divorcing through Whatsapp/viber becomes official</td>
<td>3</td>
</tr>
<tr>
<td>nicer view than second film</td>
<td>2,8</td>
</tr>
<tr>
<td>Risk: Building social contacts in the real world will stop</td>
<td>2,8</td>
</tr>
<tr>
<td>it's multiple scenarios in one video (very vague)</td>
<td>2,6</td>
</tr>
<tr>
<td>Practicalities become more efficient in managing</td>
<td>2,3</td>
</tr>
<tr>
<td>Risk: people do not care about technology</td>
<td>2,2</td>
</tr>
<tr>
<td>Transparently mediated communications, where computers becomes more like making phone calls</td>
<td>1,7</td>
</tr>
</tbody>
</table>