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Executive summary

This deliverable D6.4 reports on the study on *citizen centric smart city approaches* that can lead to greater involvement of citizens in the shaping of digital Internet of Things services and applications in smart cities. The best practices guide for all relevant stakeholders; city councils, entrepreneurs, citizens, makers; will be presented and marketed as an *infographic* (section 4) that will be hosted on the SocioTal website and on Council to ensure support after the project has ended (D6.6). The main findings are described in an article for a forthcoming Springer publication on Smart Cities, edited by Adam Kapovits (section 3).

Section 1 - Introduction

All over the world smart city programs are being rolled out. Often it is an interplay between municipalities and large full stack service providers such as Cisco, Huawei and or Hitachi (to name just a few), or local service providers offer platforms, such as Technagara, a tech platform for urban India, works across scales – from a pan-city level to a community level. It can host apps for any *gated community, apartment complex or a ward*, with just a click. The platform then acts as a social medium where users can join specific groups and share data. This service in particular is likely to find "huge success with businesses looking to collect business data, the creators say. "The opportunities to create more such innovative tools are endless. For instance, we have put in use a simple mobile-based tool that alerts parents about their children's vaccination schedules," said Ashwin Mahesh, founder of Mapunity."ⁱ

The report *Societal Impact for the Internet of Things* claims that the emerging IoT has huge potentials, especially in the context of cities, which face the twin challenges of promoting economic growth while also ensuring sustainable development. IoT is a novel public infrastructure that has the potential to serve the interests of citizens and commercial companies alike. However, current public-private initiatives are in danger of falling short of these requirements. With public interest in these infrastructures comes the requirement "to seek solutions that ensure public accountability, transparency, openness, and equitable sharing of costs and benefits. However, these public infrastructures are not neutral, being intended to promote specific values, and should be investigated in the context of its normative system."ⁱⁱ

Section 2 - Validation strategies

In this section the validation strategies used in the SocioTal project are presented. The methodology behind them is examined and proposals for future smart city stakeholder coordinations can be build from this.

Throughout the project SocioTal has identified three main barriers towards sustainable publicly supported broad adoption of IoT: lack of trust, lack of awareness and lack of productive and co-created use cases. The strategies chosen by SocioTal to address these barriers were an open software toolkit, co-creation workshops to build productive use cases and starting and maintaining on a daily basis a diverse group of stakeholders in a Meetup ecosystem. The three main barriers each have their particular validation strategy.

2.1 Lack of trust

The lack of trust is addressed by offering a privacy by design and secure platform that individual citizens can use to expose their own IoT devices to a community of users that they choose, and SME can deploy as part of their own IoT architecture. JP Buntinx writes in his article *Consumers Feel Less Than 10% of IoT Devices Are Secure*; "Convenience has often trumped security for most consumers, but that situation is coming to change. Given the recent increase in a number of data breaches and



hacking attempts, the Internet of Things is facing scrutiny all of a sudden. Consumers don't want their data to be stolen when their coffee machine is hacked.”ⁱⁱⁱ

In Stockholm a new at home delivery service, Glue AB, delivers directly to your fridge. This works because people install a special lock that you can phone to and control with an app. The SocioTal tools could provide strong security with an extra contextual layer that authenticates the delivery person not only by their ability to call the number (which can be hacked or stolen) but also by matching the phone itself through the face to face enabler.^{iv}

Two validation strategies were chosen. The first was a Hackathon that took place during IoT Week in Belgrade. This event aimed at non-developers (developing new use cases and business models), developers (testing the usability for both developers as well as non developers) and hackers asked to break the security mechanisms. The results, including the surveys done with the participants, are described in D6.5.

The second validation strategy was to engage an IoT developer (and author of iotmethodology.com) Tom Collins to fully independent from the project work on a tutorial that can be used by anyone outside of the project without support (to mimic the situation after the projects lifetime). This work is ongoing and will culminate in two developer workshops in August (10th and 12th), one in Hacklab Gent (Whitespace) and one in Nijmegen with the developers of the online platform mijnbuurtje.nl that after a first workshop in Santander are looking into the possibility to use the tools in their attempt to add ‘devices’ to the online portal next to ‘people’, ‘events’, ‘news’... Tom Collins is also part of the developer team of a predictive maintenance application and service called PLEQ with industrial customers in the UK. He is testing the tools in that context. The results and outcomes of these developer workshops (a direct result from Meetup Gent), as well as the developer workshops in the Meetups in Guildford, Santander, Grenoble and Novi Sad, will be described in D6.6.

2.2 Lack of inspiring use cases

The lack of inspiring use cases that can lead citizens to discuss what a smart city means for them, or cases that show immediate results like smart parking apps and smart routing through the city was addressed by bringing citizens and SME's as early as possible into the creation of the use cases, demos and pilots. The process that describes the success of the chosen method of co-creation workshop to bring internal consistency to the usecase as well as lead to a greater integration of smart city applications and debate in public space will be described in the section that deals with the pilots in D6.6.

The infographic will point to full description of co-creation workshops undertaken in the project, other potential methodologies and a list of practitioners as well as the email of the Community Manager to ensure that this will be a living and updated document.

2.3 Lack of awareness

The lack of awareness was addressed by setting up Meetups in five cities and investigating (see D6.1 and D6.3) what kind of activities could be hosted and what kind of relationships could grow without very little programmatic focus, simply announcing a wide range of topics and drawing out the first lead users and early adopters as well as practitioners in #IoT. On June 9th the total number of members in the Meetups was 1575. A total of 67 Meetups has been organized until June 2016: Grenoble (9), Santander (6), Guildford (17), Novi Sad (11), Gent (22), Cagliari (2). Meetings in Cagliari were hosted on 8th and 9th June. These meetups engaged 30 people: 15 non developers and 15 developers. The Meetup.com platform was not used, but they collaborated with needfornerd.com, a local startup targeted to developers mentoring.

As described in earlier deliverables, one of the key outcomes of these informal gatherings is the potential to build regional leadership which has been clearly been demonstrated by the success of the local ecosystem that was portrayed in the 2016 IoT Week in Central Europe, Belgrade. One of the key drivers of the IoT Week and IoT Forum, DunavNet has created a strong regional focus with its



offerings and also because of its leadership in the Meetups in Belgrade and Novi Sad. Follow up and continuation of the Meetups is ensured.

One of the workshops planned in SocioTal with Ana Milicevic from the Belgrade Chamber of Commerce has been moved to a later date in Fall as part of a Horizon 2020 project Tag It Smart, ensuring that the ecosystem build in and for SocioTal will stay vibrant in and for other (EU) projects. In Gent because of the Meetup ecology that has been effective from the start of the project, Rob van Kranenburg as organizer was invited to local debates^v on the smart city organized by political parties.

The infographic will link to relevant policy environments and projects like DSI4EU^{vi}, that builds on the work from Digital Social Innovation and aims to support, grow and bring together social entrepreneurs, hackers, communities and academics working on key DSI fields such as the makers movement, the collaborative economy, open democracy and digital rights. In Y3 most effort has been spent on aligning principles in the Onlife Manifesto (see section 3) with the solutions of Meetups and co-creation workshops in SocioTal (see appendix). Derval O'Neill wrote in The Internet of Things - what the big players had to say this morning on the topic:

"The lecture hall at the Università Bicocca in the centre of Milan was full to overflowing for today's conference on the Internet of Things at Politecnico di Milano university - www.osservatori.net/internet-of-things on the 15th of April 2016. All 930 seats were taken with standing room only to hear what the big names in the industry had to say on the topic. The event was opened with a summary of results from research conducted by the "Osservatorio Internet of Things". The concluding presentation on the topic was given by Rob van Kranenburg, the founder of the IoT Council who made a number of interesting points. Van Kranenburg is working on the EU project, SOCIOITAL which addresses the objective : "A reliable, smart and secure Internet of Things for Smart Cities". He said that we need engineers not just operationally but also in politics, at the top to facilitate the growth of IoT. He also said that to get the public onboard with IoT, people need to own their data, whether it comes from wearables, from their car, from their home, from all applications... the user should then entitle service providers to enrich that data and play it back to them. If we really want IoT to take off, this is what needs to happen!"

DG Connect created the STARTS initiative – innovation at the nexus of Science, Technology, and the ARTS, which proposes solutions from all angles of attack: Through the Horizon 2020 work programme 2016-17, IoT Large Scale Pilots up to 100 Mil. EUR in Smart Agriculture, Assisted Living, Wearables, Smart Cities and Autonomous Cars, are supported. In at least two of those pilots Unit E1 sees creative people and artists involved:

- a) for the *Wearables* like armbands etc. for healthcare, well-being, safety, security and infotainment applications, the entire innovation value chain should include creative and artistic people;
- b) for *Reference Zones* in Smart Cities, involvement of creativity hubs such as fablabs and co-working spaces is sought.

WP6 gave input for AC8 - Societal Impact and Responsibility in the Context of IoT Applications, of the IERC^{vii} on this topic, as well as co-hosted a panel during the IoT Week^{viii}.

Finally, the infographic will link to theoretical work that can help to support rational and productive arguments in the smart city debates.

Section 3 - The Study

In this section the D6.4 study is presented in the form of an article in the forthcoming Springer book on *Smart Cities Designing, Developing, and Facilitating Smart Cities: Urban Design to IoT Solutions*, edited by Angelakis, Tragos, Kapovits, Pöhls, and Bassi.

Title: Smart Cities don't leave your citizens behind! Making Onlife principles into actionable guidelines for smart city frameworks and #IoT policies in the SocioTal project.

Authors: Rob van Kranenburg, Nathalie Stembert, Ignacio Maestro, Carmen Lopez, Nenad Gilgoric, Michele Nati, Colin O'Reilly, Srdjan Krco, Alberto Serra, Christine Hennebert, Antonio Skarmeta (sociotal.eu)



"building the raft while swimming" - Rober Madelin

"Since action is the political activity par excellence, natality and not mortality, may be the central category of political, as distinguished from metaphysical, thought" (Arendt 1959, p. 11)

Before the Cloud appeared around 2000, Internet of Things or #IoT was present as smart gadgets, smart offices and smart connectivity in demo form only as the data coming from the applications could be stored and analyzed only at huge costs. The EU facilitated large research programmes. In this text we make an attempt to integrate two policy frameworks informing responsible innovation, the Onlife Manifesto and IoT development in Research and Innovation Projects.

Abstract:

SocIoTal research identified as main barriers to broad IoT adoption in 'smart' cities: lack of understanding by SME's and City Councils, lack of third party trust providers and lack of involvement of end-users in building use-cases and developing news services. The lack of understanding is addressed in Meetups, introducing research questions and listening to the local stakeholders. The lack of involvement of citizens we addressed in co-creation workshops with researchers from UC, Santander and Novi Sad. The co-creation workshops were prepared and executed by Nathalie Stembert and Rob van Kranenburg. These solutions needs an ethical framework to inform decision making about decision making on what kind of #IoT system architectures to support. The Onlife Manifesto might be relevant in this context.

3.1 Early EU research

The need for non-technical research in the area of machine to machine communication and Internet of Things as the developments got closer to market and everyday lives of citizens was acknowledged in the 1996 EU Call for Proposals of the i3: Intelligent Information Interfaces, an Esprit Long-Term Research initiative. Its aim of i³ (pronounced "eye-cubed") was to develop new human centred interfaces for interacting with information, aimed at the future broad population.

This approach "was also the starting point and rationale for the EU-funded proactive initiative "*The Disappearing Computer*" a cluster of 17 projects by interdisciplinary research groups. Its mission was "to see how information technology can be diffused into everyday objects and settings, and to see how this can lead to new ways of supporting and enhancing people's lives that go above and beyond what is possible with the computer today."^{ix} The third research iteration of this approach was Convivio (2003-2005), a thematic network of researchers and practitioners developing a broad discipline of human-centered design of digital systems for everyday life. The coordinator of Convivio stated that human centered design "still has little influence either on governmental and super-national policies or on industrial strategies. As a result, it also has little impact on the quality of ICT in public and private life."^x

In i3magazine 2003, Jakub Wejchert of Future and Emerging Technologies Unit, European Commission, project officer of i3 and Disappearing Computer Research Initiatives, said:

"In the long term, as we move towards a 'knowledge-based society', we have to ask: "Have we been supporting only one kind of knowledge up to now"? and "How can we best support different kinds of knowledge"? To do this we need to support a diversity of things we understand by 'knowledge' – ranging from the cognitively abstract, through to knowledge that is 'at hand' and embodied in our physical everyday world, to sequences of past events, and our memories of past experiences... This will involve rethinking what we mean by 'knowledge representation', constructing new forms of 'flows' between content and context, and exploring the balance between the 'global' and the 'local'. Perhaps in the future we will look back to our preindustrial roots as inspiration – back to a reverence for 'place', 'location' and the importance of the 'being within the world' and the 'here and now'... Perhaps in the future, we will live in a world that is more 'alive' and more 'deeply interconnected' than we can currently imagine?"



The need for non-technical research as the developments got closer to everyday lives of citizens was acknowledged in the 1996 EU Call for Proposals of the i3: Intelligent Information Interfaces, an Esprit Long-Term Research initiative. Its aim of i³ (pronounced "eye-cubed") was to develop new human centred interfaces for interacting with information, aimed at the future broad population. This approach "was also the starting point and rationale for the EU-funded proactive initiative The Disappearing Computer a cluster of 17 projects by interdisciplinary research groups. The third research iteration of this approach was Convivio (2003-2005), a thematic network of researchers and practitioners from many backgrounds (computer science, human sciences, design, business) developing a broad discipline of human-centred design of digital systems for everyday life. De Michelis (coordinator of Convivio): "this (design and arts) community – our community - still has little influence either on governmental and super-national policies or on industrial strategies. As a result, it also has little impact on the quality of ICT in public and private life."

In his 2003 text Lessons learnt from LIVING MEMORY @ 1:3 - listening to and developing technology for ordinary people, Steve Kyffin of Philips, involved in the LiMe project that build an interactive table to be used in the neighbourhood and be placed in community centres, bus stops and other local meeting spaces, says:

- *"USEFUL ...listening to and developing technology for ordinary people sums up what we might refer to as Co-Creative design. Involving the end user in a core and proactive manner at all stages in the product or system creation process.*
- *RELEVANT ...listening to and developing technology for ordinary people is so relevant because the 'ordinary...ness' is the issue. Much of what we concentrated on in Living Memory was the means by which people interact with each other (the technology) and the interfaces to that technology, which we offer.*
- *IMPORTANT ...listening to and developing technology for ordinary people. The world of stuff is not enough... the design discipline is changing fast. Design must now respond to an economic model which supports the provision of converged and connected solutions, such as LIME, combining products and services to suit individual needs.*
- *SUCCESSFUL ...listening to and developing technology for ordinary people. The extent to which the project was successful is the subject of the complete review and validation process, which we conducted. Design is often seen as an applied discipline, where fine art may be regarded as the pure discipline. We believe that this is not the case and that it is possible to: research the 'pure' Design discipline in order to develop its future role in differing contexts; to use Design as a research tool to help us better understand and contribute to the changing nature of People, Culture and Society and in turn assist in the integration of emerging and future technologies into the lives of 'ordinary people'; to find more effective tools and research areas for Design to consult and investigate in order to provide more holistic and relevant propositions within our commercial practice.*
- *INSPIRATIONAL.... listening to and developing technology for ordinary people. Certainly, in all the ways mentioned above...inspired us to find NEW KNOWLEDGE: NEW ROLES FOR DESIGN: ways to integrate SYNTHETICAL and ANALYTICAL research: NEW IP: seeds for NEW OPEN PRODUCTS-SYSTEMS-SERVICES...*
- *DIFFERENT ... Research is by definition, DIFFERENT, especially when it is this trans disciplinary, collaborative, human focused, artistic and scientific driven end results in such enriched experiences for people..."*

The industry has been able to capitalize on the early ubicomp and ambient EU projects, enabling them to actualize the idea of the new more participatory user and user-centered design. The EU #IoT programs and projects up to Horizon 2020 however have not integrated this vision as endusers - citizens - have not been involved in building use cases in FP7 IoT projects. The renewed focus on impact and business in Horizon2020 aims to change this.

3.2 Internet of Things

Why would we want an Internet of Things? We want it because it can offer us the best possible feedback on physical and mental health, the best possible resource allocation based on real time



monitoring, best possible decision making on mobility patterns and the best possible alignments of local providers with global potential. Operationally this means that we can define Internet of Things as the seamless flow between the BAN (body area network): wearables, LAN (local area network): smart home, WAN (wide area network): connected car, and VWAN (very wide area network): the smart city. Key to this flow is having control of the data. That is why Google is offering a Glass and a Lens so you can synchronize your health data into the NEST and the Google Car throughout the smart city applications of google.org. The idea is that in consumer applications and services you never have to leave the Google Cloud. The products are gateways linking up the networks.

Internet of Things is a new beginning. In our current architectures we are used to dealing with three groups of actors: citizens/end-users; industry/subject matter experts (SMEs); and those involved in governance/legal matters. These all are characterized by certain qualities. In our current models and architectures we build from and with these actors as entities in mind. The data flow of IoT will bring forth new entities consisting of different qualities taken from the former three groups diminishing the power of the traditional entities.

In his seminal text *The Social Order of a Frontier Community*, Don Harrison Doyle, wrote that "social conflict was normal, it was inevitable, and it was a format for community decision making."^{xii} Sociologist Lewis Coser also advised that, instead of viewing conflict as a disruptive event signifying disorganization, "We should appreciate it as a positive process by which members of a community ally with one another, identify common values and interests, and organize to contest power with competing groups."^{xiii} The new environment of the IoT will resemble these "frontier communities" because of their seeming disorganization where conflict will be the norm.

It needs an ethical framework to inform decision making about decision making on what kind of #IoT system architectures to support. The Onlife Manifesto might be relevant in this context.

3.3 The Onlife Manifesto

The deployment of information and communication technologies (ICTs) and their uptake by society "affect radically the human condition, insofar as it modifies our relationships to ourselves, to others and to the world. In order to acknowledge such inadequacy and explore alternative conceptualisations, a group of scholars in anthropology, cognitive science, computer science, engineering, law, neuroscience, philosophy, political science, psychology and sociology, instigated the Onlife Initiative, a collective thought exercise to explore the policy-relevant consequences of those changes."^{xiv}

The *Onlife Manifesto* is a positive contribution to rethinking the philosophy on which policies are built in a hyper-connected world. It attempts to describe, explain and give a policy framework to the *Digital Transition*, which can be understood as pervasive digital presence in everyday and institutional practices, the real world IT context enabled by the Cloud.

The Digital Transition is a change in ontological foundations, questions that run deep to what it means to be human. The Onlife Manifesto therefore states that "redesigning or reengineering our hermeneutics, to put it more dramatically, seems essential, in order to have a good chance of understanding and dealing with the transformations". It addresses the widespread impression that our current ICT conceptual toolbox is no longer fitted to address new IoT, Internet of Things -related challenges: "We grasp reality through concepts. When reality changes too quickly and dramatically, as it is happening nowadays because of ICTs, we are conceptually wrong-footed."

There are strong links between Onlife and CAPS. The initiative "Collective Awareness Platforms for Sustainability and Social Innovation" (CAPS) aims "at designing and piloting online platforms creating awareness of sustainability problems and offering collaborative solutions based on networks (of people, of ideas, of sensors), enabling new forms of social innovation. CAPS are expected to support environmentally aware, grassroots processes and practices to share knowledge, to achieve changes in lifestyle, production and consumption patterns, and to set up more participatory democratic processes."^{xv} Practically this translates in the objectives of the DCENT project. By "enabling multi-agent systems and opening new possibilities for direct democracy, ICTs destabilize and call for



rethinking the worldviews and metaphors underlying modern political structures" which is exactly the focus of DCENT.^{xv}

The *Onlife Manifesto* states that the impact of the Digital Transition is due to at least four major transformations; "The blurring of the distinction between reality and virtuality, the blurring of the distinction between human, machine and nature, the reversal from information scarcity to information abundance, the shift from the primacy of stand-alone things, properties, and binary relations, to the primacy of interactions, processes and networks."

It states that ICTs "are not mere tools but rather environmental forces that are increasingly affecting: our self-conception (*who we are*); our mutual interactions (*how we socialise*); our conception of reality (*our metaphysics*); and our interactions with reality (*our agency*). In this new conceptual space we can co-create notions of solidarity (economics), privacy (self), security (trust), assets (potentials), risks (resilience) and threats (competition), tailored to a reality of today.

The Online Manifesto builds on two drivers that have been articulated by Hannah Arendt; *plurality* and *natality*. Arendt recognizes that **plurality** can best be experienced *at city-level*. "*The larger the population in any given body politic, the more likely it will be the social rather than the political that constitutes the public realm*" (Arendt 1959, p. 39). With big numbers, plurality degenerates into mere and unendorsed interdependence, while natality and its inherent openness and unpredictability are perceived only under the categories of uncertainty and risk.

Arendt describes plurality as "the coexistence of equality, specificity and reflectivity. The threefold understanding of plurality (equality, specificity, and reflectivity) undermines radically an omniscience-omnipotence utopia's worldview."

In the perspective of mortality, "the future is coloured with the certainty of our eventual death, while in the perspective of **natality** it is coloured by the recurrent remembrance of the "*infinite improbability*" (Arendt 1959) of our birth and conducive to *confidence* and *wonder*. The philosophy of Arendt is anchored in the praise of beginnings."

The Onlife principles that have as a basis Ahrendt's positive and life-affirming yet critical view on technology are able to address real world issues in an actionable context.

Carl Schmitt distinguishes between der *Wirkliche Feind* and the *Absolute Feind*. The latter is '*die eigene Frage als gestalt*.' The absolute enemy is the inability to change convictions, alliances and opinions. The absolute friend is always very near to you, consisting of everyday routine skills; it is your blind spot. The real enemy can differ from time to time and period to period. Each historical situation demands the capabilities to define as those real enemies the ones that can redefine all that you hold normal, dear, and take for granted. The relation self describes a situation where there is a productive balance between the energies directed at these two types of existential questions. *Onlife* believes that everybody needs *both* shelter from the public gaze and exposure: "The public sphere should foster a range of interactions and engagements that incorporate an empowering opacity of the self, the need for self-expression, the performance of identity, the chance to reinvent oneself, as well as the generosity of deliberate forgetfulness."

Onlife considers the distinction between private and public to be more relevant than ever: "Today, the private is associated with intimacy, autonomy, and shelter from the public gaze, while the public is seen as the realm of exposure, transparency and accountability. This may suggest that duty and control are on the side of the public, and freedom is on the side of the private. This view blinds us to the shortcomings of the private and to the affordances of the public, where the latter are also constituents of a good life."

Ethics has become a matter of social being(s), much in the sense of enaction of Varela. He claims citizens by definition possess an ethical sense and sensibility. Responsibility for the effects brought about by technological artefacts are thus no longer only attributed to their designer, producer, retailer or user, but to an ever increasing semi-autonomous interoperability of products and services in intranets, and an IoT ecology that globally knows no firm standardization, though there are attempts.



Notions of distributed responsibility must thus inform any transaction whether between City Council and vendor, B2B, B2C or C2C (the Sharing Economy).

Onlife thus states that "the development of a critical relation to technologies should not aim at finding a transcendental place outside these mediations, but rather at an immanent understanding of how technologies shape us as humans, while we humans critically shape them."

This immanent understanding can only occur in dialogue and co-creation. Co-creation workshops and Internet of Things Meetups are capable of readdressing technological concepts in cultural contexts, bringing real dialogue with stakeholders in the cities in which they live. In the following Chapter we describe how co-creation workshops and Meetups were able to give direct feedback to smart city development questions.

3.4 Co-creation workshops in the EU project SocioTal.eu: building use cases with endusers

At the IoT Rotterdam meetup during IoT day (April 9) ^{xvi} Ben van Lier^{xvii} showed how the old Shannon paradigm of communication allows engineers to port ,meaning' onto a different plane, out of their immediate consideration. This explains the huge speed and convergence of efficiency intrinsic system and applications only. It also explains that we feel somehow ,stuck' in ,selling' platforms to citizens who can not articulate their need and do not see the offered services as something so amazing in the age of their own daily app agency with smartphones and companies like Google, and Facebook gradually spilling over into the real world objects. That means that only in the recent decade system engineers realized ,meaning' had to be patched 'back on' as semantic interoperability.

Maybe we should rethink the entire structure so that it reflects the on-going connectivity as a ,new' reference framework?

SocioTal is an EU FP7 funded STREP project addressing the objective FP7-ICT-2013.1.4 “A reliable, smart and secure Internet of Things for Smart Cities” and more specifically sub-objective a) “A reliable and secure Internet of Things”. SocioTal designs and will provide key enablers for a reliable, secure and trusted IoT environment that enable creation of a socially aware citizen-centric Internet of Things by encouraging people to contribute their IoT devices and information flows. SocioTal research identified as main barriers to broad IoT adoption in 'smart' cities:

- ✓ lack of understanding by SME's and City Councils
- ✓ lack of third party trust providers
- ✓ lack of involvement of end-users in building use-cases and developing news services.

The lack of understanding is addressed in Meetups, introducing research questions and listening to the local stakeholders. The lack of involvement of citizens we addressed in co-creation workshops with researchers from UC, Santander and Novi Sad. The co-creation workshops^{xviii} were prepared and executed by Nathalie Stembert and Rob van Kranenburg.



Figure 1 Co-creation workshop in Novi Sad

1.1.1. Nathalie Stembert: Brief description of the co-creation workshop from the UC researchers

Six people within and out of the SOCIOTAL project were involved in the session in Santander. After the welcome and a brief introduction about the different steps to follow in the co-creation workshop, we started the first of the two main parts of the activity, which was to create a use case (UC) from scratch. We started creating from some cards where different situations in a city were represented. From those cards we were asked to select those who could present situations where IoT could offer some benefits. After a bit of discussion, there were selected three cards related to the transport, one related with IoT education and other about Smart Shopping. After an initial description of the use cases extracted from the cards, and after establishing the pros and cons of each of them, we selected the Smart Shopping to be analysed deeply. We analysed the UC looking for *who* (who are the actors?), *where* (places involved in the UC), *what* (the process, different steps, on the UC) and *why* (what necessities does the UC fulfil?). After that, we translated and represented that descriptions on a Santander map, establishing the objects, the intelligence and the connections between them using different pieces and totems. Also, we selected the devices needed and analysed how the user would observe the use case through them. Finally, we finished this first part with some conclusions, highlighting the benefits added by the UC, the barriers that could be found, and also benefits from the activity per se (sum up in the next section).

During the second part of the session we explored the car-pooling UC described by the University of Cantabria in the SOCIOTAL project. We carried out the same previous process, observing that different points of view, extensions of the UC and new ideas to enrich it rose.

Conclusions to highlight:

- The structure of the session allows to guide users easily to create a complete description of a new UC



- In the case that the UC is already described, it allows to discover the point of view of the final user who could offer new requirements, and descriptions about what really are new valuable functionalities for them
- It is a more visual, enjoyable, and collaborative way to introduce people within the IoT and to take advantage of all their ideas to elaborate or re-elaborate the UCs
- The materials used allows the users to become abstract ideas for them into touch pieces
- Allows us to discover users' reaction to the UC, acceptance and barriers. Also, it allows to explore the availability of devices which at the end could be translated into the acceptance of a new service or the necessity of change technological aspects of the UC
- It is interesting in order to capture potential users in pilots and trials
- In order to success in future co-creation workshops with final users it would be necessary to select the UCs to explore in these sessions and to find people with profiles that could enrich the proposed UCs

All of the participants contributed to the Co-creation workshop Santander in a very valuable way. The collaboration between multiple stakeholders led to more empathy between them. The City Council, DISMAP and UC obtained very detailed information from the participants from the target group. The people with a physical disability who participated have first hand experience and can therefore convey the experience and problems that they face in their daily lives. Consequently their ideas and suggestions are very rich and contain detailed information that a person without a disability could never imagine. The *use case: accessible routes in the city* was explored in depth and led to valuable information concerning the design and the development of the application.

As general feedback the Smart Santander team decided that this workshop process could help rank the necessities – the must and should haves – with end users in the current use-cases, as it will draw good and structured feedback from the real users: “In the first IoT Meetup in Santander there were two local speakers who had ideas and concrete projects to build on top of Smart Santander. Rocio Muñoz was one and her project is about getting more real time feedback from city services. It is clear that a workshop like this could help align her needs with our expertise.”



Figure 2 Co-creation workshop with researchers from UC in Santander



3.5 Natalie Stember: Notes - Workshop Santander. From a facilitator point of view:

From scepticism to enthusiasm! The SOCIOTAL researchers started a bit hesitant with the co-creation workshop, giving it the benefit of the doubt. The first step, deriving three use cases from the interaction cards, needed explanation. The reason behind the steps was therefore explained frequently during the process, moreover there was emphasized that the workshop is designed for collaboration with the target group and that several aspects are therefore simplified. Soon the SOCIOTAL researchers, assembled three use cases, describing and evaluating them by means of positive (incentives) / negative (barriers) aspects. After which they decided to work out the use case about smart shopping. At this point they already became more convinced about the purpose of the workshop and discussions were fruitful. When the co-creation artefacts appeared on the table to whole process and its steps became clear to the SOCIOTAL researchers. They mapped the activity chain of the use case, by means of the metaphorical objects and sensors, while discussing the interaction in the mean time. The data flows were visualized, the scenario was played out with the actor artefacts and the interfaces were visualized on the device templates. Conclusions about the use case were written down, to subsequently end in an enthusiastic discussion about the benefits of the co-creation workshop.

Accomplishments

- An entirely new and feasible use case was developed.
- The use case was visualized in terms of location, objects, intelligence (sensors and network), data flow, interface input/output and actors involved.
- The use case was evaluated in terms of incentives, barriers, devices and willingness to use these devices for the purpose of the use case.
- By playing out the use case insights were gained in the interaction of the target users with the Internet of Things network.
- The workshop led to a number of requirements for the old and new use case.
- It moreover turned out to enable SOCIOTAL researchers to prioritize requirements above others (based on the needs of the target group).

Improvements

- The device icons can be removed from the object tokens.

Recommendations for the workshops with the target group

- Discussions are most important to elicit.
- Time has to be managed carefully; one use case is the maximum to elaborate in per workshop.
- Participants have to be selected according to their level of technical expertise.
- Collaboration between the SOCIOTAL researchers and the target group is important to guide the participants (the process can be still too technical), yet also to let the SOCIOTAL researchers engage with the target-group to uncover their needs.
- Objects for the use-case concerning disability and parking have to be developed.

In the Novi Sad workshop the core of stakeholders in any local situation was present. The Belgrade Chamber of Commerce main task is to integrate local initiatives and look out for co-financing models. The local development offices are considering to open up data from local databanks in a dual way; a particular level for free and an optimum service for more granular data. For end-users it would be interesting to add user generated content, personal stories that can become part of feedback and validated information, like rating someone routes with the bonus that certain users become trusted sources of information. It becomes clear that is impossible for the local service #IoT and M2M companies to go beyond the efficiency and cost cutting paradigm and propose innovative and meaningful applications on their own. We are facing a clear situation of a no win for the first investor; result a current deadlock for a citizen-centric IoT.



As citizens' active involvement is thus the necessary precondition of possible success, according to Ezio Manzini, we need "to take in account why and how people collaborate is a fundamental component: collaborative economies, collaborative services, collaborative consumption, collaborative innovation spaces, collaborative events are very diverse initiatives, with a common denominator: they all ask for collaboration. We can recognize these typologies:

- Vertical collaboration: individual citizens collaborating with solution promoters. Example: Fix my street.
- Vertical and horizontal collaboration: individual citizens collaborating with solution promoters and then, collaborating among them in a p2p way. Example: Carpooling.
- Horizontal collaboration: p-2-p collaboration among citizens. Example: Circle of care and Collaborative housing."

Rich scenarios embed all three types of collaboration. We can therefore investigate, as Louisa Heinrich^{xix} suggests,

- "Help identify patterns within communities, indicators that might help newcomers to a city or area decide where to visit or where they might want to live
- Give people modular tools that they can use to 'mark up' and monitor what's important to them – whether that's embedding history into the physical environment (personal or official), keeping track of noise and pollution levels, or planting and maintaining communal gardens

The idea of the project would be to design and prototype a small set of hardware and software tools that could be given to a community and then used by them in whatever way made the most sense."

The key elements as they were voiced during the discussions in the co-creation workshops were:

- ❖ **a mentality change:** "How can we all (ourselves included) make the switch from 'This is their building', to 'This is our building, our street, our park?'. This is a mind-set change and extremely complex. Pretty much a lot of citizens are depressed. Youth unemployment is very high, much to high. There is a sense of togetherness^{xx} that is missing."
- ❖ **mixing public and private responsibilities:** The funding should come partly from the government and partly from crowd funding and private donors as ownership must be taken by citizens and it should not feel as if everything is already decided. A business model could be on some basis of vouchers: I can donate time, money or can I buy a plant or tree? I have certain skills: "Can you use them? In exchange of what?"
- ❖ **not inventing the wheel:** use for example taskrabbit.com in the idea for the portal where citizens can log in and subscribe to donate a gift – time, money, a tool to a problem or cause in the street or neighbourhood.

3.6 Meetups

According to Marshall Van Alstyne, a business professor at Boston University, companies have a "really difficult time with the mental models. It's fascinating. Most companies compete by adding new features to products. They haven't been in the business of thinking of how to add new communities or network effects. In many cases, the governance models have not been established. For instance, population density can be determined by mobile-phone distribution. A telecom company owns that data. How do you motivate them to share it? All these sensors are capturing data, but how do you divide the value? Those are the rules that need to be worked out, and that's the missing piece of most of these discussions about the Internet of things. You have to build economic incentives around it, not simply connectivity."^{xxi}

Key findings from the 2014 report, The Hansard Society's Audit of Political Engagement, the only annual health check on British democracy: "Levels of knowledge and interest in politics have improved this year, but the public continue to feel powerless." They feel that they have very little influence on decision-making and that their own involvement in politics will have little effect on the way the country



is run...the desire to actually be involved in decision-making, both locally (43%) and nationally (38%) continues to outpace their personal sense of efficacy and influence...67% of the public say 'politicians don't understand the daily lives of people like me'

Actionable reasoning in this new 'middle' is not formed by academic conferences or informed structured debate but in informal and open Meetups where practitioners listen to each others experiences over a beer. The numbers of people engaging in IoT Meetups globally is rising fast. At the end of 2014 the total number of members in SocloTal Meetups was 431. On August 9 2015 it is 1063 in five cities: Santander^{xxii}, Novi Sad^{xxiii}, Guildford^{xxiv}, Ghent^{xxv} and Grenoble.^{xxvi} Along the journey of the Meetups, a lot of interesting interactions have appeared that have helped us to learn more about the relation between society and IoT, and that have given rise to various situations to take advantage within the project, like the one described above. Engaging with local developers, businessmen, researchers, geeks, hackers, artists and citizens devoted to unique and idiosyncratic technical solutions is messy and very hard to formalize as it is in the praxis of doing that real interaction. We can discern certain types of interactions: regional coordination, informal learning and facilitating and building local connections.

regional coordination

Srdjan Krco: "One of the developers from a local SW company who attended Meetup in Novi Sad (one during which I spent time behind the screen came to us afterwards looking for collaboration. We helped him with some of the hardware kits and at the next Meetup (next week) he will be talking about his IoT experience - how he learned to program Galileo and use related tools."

The coordination linking up IoT incubators, conferences, startups and regional policy makers, based on the work of Srdjan Krco and Community Manager RD who was invited to Brno, Cluj, and Bled " to map countries in CEE, all stakeholders who want to work together, plan events, put in entrepreneurial orb all of the companies to synergize them and start delivering solutions on a bigger scale, beyond some fancy gadgets and apps. Damir Čaušević^{xxvii} is "already in Brno Smart City Committee, which has a direct influence on the whole region of South Moravia. We're now building the Smart City concept, putting in place processes and procedures (not overdoing it) and setting up the solid ground for the infrastructural projects." RD posted the view of a modular and domain specific IoT approach on Council ("If you look once more into my article Rob posted less than a month ago^{xxviii} (you'll notice how it can be developed."); Telco's between Damir Čaušević (Brno), Tomaz Vidonja (Bled), Srdjan Krco (Novi Sad), Radu Ticiu (Timisoara), Andree Balaci (Cluj) is set for March 11 led to further coordination during the 5th Living Bits and Things 2015 June 8th – 9th, 2015, Bled, Slovenia, the event that gives attendees insights and understanding of the central and east Europe (CEE) region and opportunity to share and discuss the challenges with professionals and experts. Among the key results from the 5th IoT event »Living bits and things 2015« is that the IoT CEE Community is rising as well as the awareness in the region (especially well connected with JIC, Czech Republic), according to organizer Tomaz Vidonia.

informal learning

Srdjan Tadic wrote that the Meetup "helped me to get more structural view on things we see on every company-brainstorming." (IoT meetup #6 (a prvi u Beogradu), February 10 2015)

A 2015 Vodafone study claims that local government "still remains unaware, by and large, of the opportunity presented by smart city technology, and how it can be used to deliver better and more cost-efficient public services." The survey questioned 1,624 UK adults and 629 councillors, revealed that "smart in-building energy management systems and street lighting alone could save local councils across the country £402.3m."^{xxix} The study revealed "67% of urban councillors were not aware of machine-to-machine (M2M) technology and how best to take advantage of it, even though 77% of people living in urban areas said they would support their council's decision to invest in the internet of things (IoT) to improve public services. The gap in understanding, said Vodafone, would explain why smart city technology has not yet been widely deployed – beyond a few test beds in tech-heavy locales such as Bristol and Milton Keynes – to improve lighting, rubbish collection, traffic, public transport management and so on." The interview with Ana Milicevic^{xxx} Senior Advisor, Association of IT activities, Belgrade Chamber of Commerce (www.kombeg.org.rs) shows the local awareness of this gap and the attempts to bridge it, validating the Meetup as an important positive factor. She point to two - important factors. First, the importance of the host. Ana M recalled how she felt quite lost personally in the 6th SocloTal Serbian Meetup (Belgrade, February 10) as she is used to more formal



arrangements where someone introduces the participants and is used to meeting CEO's and CTO's of companies, not the coders. Not knowing what to expect she felt confused and surprised to see the makers, the coders, not the business men. At that particular Meetup WP6 leader RD was present, saw that she was struggling and introduced her to Srdjan and the others. For the project this means that social skills in the Meetup are very important even if - as it is hosted mainly by engineers and computer scientists - these skills are not the primary skills of coders. The main outcome of recognizing this diversity is that Ana M realized that she had to find a way to include the coders themselves in the activities of the Chamber of Commerce, that there is a special value in these informal meetings, of new way of creating knowledge together, that she was surprised by the feedback in email that she received after the Meetup, "actually it was the first time I had such feedback". Ana Milicevic, subsequently took part in the co-creation workshop on Open Data in Novi Sad. She is very positive about the process and format of the co-creation workshop. She is realizing in her practice that #IoT is a horizontal operation that is connecting different startups scenes that she sees happening in Belgrade at the moment. Therefore she plans a co-creation workshop^{xxxii} in Fall 2016 in Belgrade with a focus on the *sharing economy and new business models. What does it mean for startups in technology, advertising, design, gaming, retail.... to collectively think together about business models from the start, not on their own?* And what kind of third trusted party would be able to convince them of doing this? What kind of process is necessary to build this kind of trust? This workshop will be done in the context of Tag It Smart, a Horizon 2020 project as SocioTal has ended by then.

facilitating and building local ecosystems

nigel stirzaker (*Internet of Things Guildford*):

"Hi Thought I'd find out about the kind of things your likely to look at going forward and let you know where I'm coming from. I was really nice to see your group. As I work in London (Dev for Disney in Hammersmith) I don't often think to look for groups closer to home (Woking). One of my main interest/passions is getting kids involved in tech and I'm looking to move what I "offer" (all free via schools and hackathons) to include more hardware. This is on top of my general passion for tech. I'm looking forward to the BBC MicroBit coming out with the hopes that it will give another push to IoT."

A similar account can be made for all partner cities; Ghent, Grenoble, Novi Sad, and Santander. It testifies to a strong effort of all partners involved to invest a significant amount of (extra) hours in activities that do not directly lead to concrete results but that are helping to build a local atmosphere of communication and trust. This focus is in Guildford.

Michele Nati: *"Everybody found it very interesting and people usually ask to present in some of the upcoming Meetups. Recently we had in April a very low attendance one (6 people). Didn't have time to properly prepare the program due to proposal submission. We ended up to sit in few persons and informally chat in the pub. Mark Hill, entrepreneur in IoT (former bank employee in London) really wanted to help this local Meetup to fly and compete against the London one. He gave some suggestion and we came up together with a strong plan. We put this in practice for the May Meetup. The result was a fully booked Meetup and a room with 70 people, sponsors, and 4 great presentations. We will definitely keep doing this. Participants always try to connect together and few relationships started among entrepreneurs, companies and borough councils. Zebra technology who gave a speech last time wants to partners as mentor for 5G activities at University of Surrey."*

Section 4 - The infographic/Stakeholder Coordinator Toolkit

In this section the content for the Stakeholder Toolkit that will be presented as an Infographic in D6.6 is presented.

IoT Nexus survey: "So what are the barriers to the enterprise using the Internet of Things? Well, largely, it's a lack of understanding."

Claire Milne, Visiting Senior Fellow at LSE's Department of Media and Communications, puts forward the case for much wider debate on consumer and public interest issues relating to the Internet of Things (IoT), especially around the vital areas of privacy and security: " An output of the early EU efforts, she states, was the IoT Comic Book, which aimed to explain IoT to a lay audience. She acknowledges that the recent Staff Working Document Advancing the Internet of Things in Europe calls for a "human-centred IoT". "But the lead European body for advancing IoT, the Alliance for



Internet of Things Innovation, has made little progress in its stated aim of getting civil society organisations to join, and planned membership fees won't help. Any takers for this opportunity to influence Europe's IoT?"^{xxxii}

SocioTal wants to take up this challenge with a communicative way of presenting its outcomes.

The Infographic will be part of D6.6. A designer has been engaged. The Infographic will have five sections, on security, relevance, ecosystem, compliance and mega trends in smart cities. It will be marketed through all possible social media channels in order to get it viral. In this section of document a description of the contents of the Stakeholder Coordinator Toolkit that the Infographic captures in one image is presented.

4.1 Am I secure? Security Customer Support Journey

This section combines the tutorial of Tom Collins and the SocioTal partners into a as plug and play possible toolkit of security enablers, hosted in the FIWARE Foundation.^{xxxiii}

From a centralized point of view, the Communities Manager tool (ComM) was developed to allow users to create communities where they would be able to share resources only with those users who belong to that community. The ComM allows users to create new communities, and register their devices within them. Also, the creators will decide whether or not approve other users within their communities. In the case they give their approval, the owner will provide to the new member a role to be played in the community, thus specifying the actions they are allowed to perform over the entities. All this information related to the user and their relation with certain communities and their resources, is defined by a community-token, which provides information about the user and the role they have within a specific community. This tool is available through a set of APIs focused on developers who want to create new applications, and it is also integrated with the Web User Environment, which provides a friendly interface to both, developers and final users, to create and manage their communities.

The User Environment is responsible for defining the *bubble*, associating the set of identity attributes required to belong to the bubble. The mobile environment of the user will be in charge of discovering in the Context Manager the attributes required in that bubble as well as the entities (e.g. devices) associated to the bubble. Knowing that, the Mobile Environment of the user can set up the cryptography policy associated to those attributes in order to encrypt/decrypt the information shared. The data sharing through the CM is done by updating (cyphering the values) of the entity(s) belonging to the bubble (making use of our Group Sharing API). In principle, it is not a main concern whether anyone can discover the bubbles or even subscribe to its associated entities, since they are not going to be able to decrypt the information, unless they have the proper identity attributes (and therefore the associated cryptographic keys to decipher the information).

The tutorial will lead the developer through employing the tools in a real world setting, in this case the two workshops with the online web portal mijnbuurtje.nl. Mijn buurtje wants to add 'devices' to its platform, and has chosen to look into SocioTal.

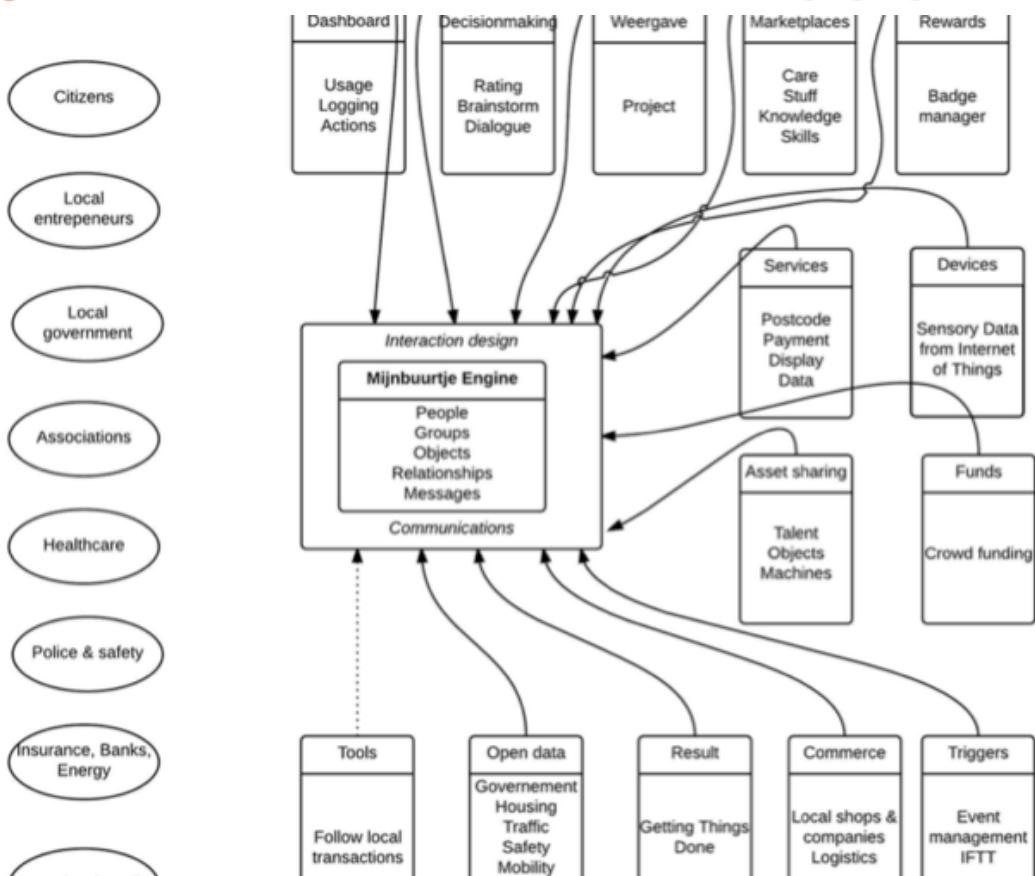


Figure 3 The mijnbuurtje.nl architecture. We focus on the box 'devices'

Tom Collins has prepared the meeting with the mijnbuurtje.nl developers fully independent from the project, only working with the online available material (to be described in D6.6).

Recent developments in selling #IoTappliances as services has led to the rise of the concept of *Customer Support Journey*. A good example is Sungevity ^{xxxiv}. It sells solar panels and starts with approaching citizens in neighborhoods based on Google maps of their roofs. It then takes them step by step towards creating a local support group of buyers. Three aspects are interesting for us:

- ✓ Their full focus on delivering a Customer Journey from beginning to start
- ✓ Their use of local champions, that resonates with the position of neighborhood connectors, *buurverbinders*, in mijnbuurtje.nl
- ✓ A working notion of *security in daily life*. The people that we share our public space with are friends, family and colleagues "but more often, and particularly in public urban spaces we inhabit, the individuals who affect us are ones that we repeatedly observe and yet do not directly interact with – our Familiar Strangers."^{xxxv} Examples that will accompany the tutorial break down the day of a family of four into a set of activities, clustering around morning, afternoon and evening, the main issues centered on all the traffic and trips families undertook which coincided with their immediate neighbours. Coordinating children's trips to school, shopping trips and sharing of tools that too many people own individually – coupling green with social cohesion - through local sharing economy platforms such as Peerby, Changify.^{xxxvi}

4.2 Am I relevant? Co-creation Workshops

This section presents a list of possible workshop formats and addresses to the designers that host them, a general enquiry address to the Community Manager, descriptions of workshops in Santander, Novi Sad and Nijmegen and links to good practices.^{xxxvii}



There are three stages where engaging artists and designers are productive and fruitful for all parties involved. Outside these stages there is no meaningful interaction and the result will be unsatisfactory. Then there can only be a predictable and logical misunderstanding. Skillsets must be applied methodologically in particular phases in order not just to be relevant for the active skillset but also to be seen as relevant for other ones.

4.2.1 Concept development: reciprocity

The first stage is in the development of the *concept of the project, its scope and impact*. The main driver at this stage is *reciprocity*. Reciprocity requires thinking beyond the short term into longer-term repercussions of decisions that are made now. Reciprocity means that every object, process, person, can be a stakeholder and must be 'heard'. In order for it to be 'heard' it may need to be made visible first to all stakeholders involved. Artists are able to make them visible. The role of design is to make that what is made visible actionable as a set of qualities that the engineers can translate as capabilities.^{xxxviii}

Kathy Buckner from Napier University on FET i3: "*Creative tensions were rife - software developers were learning how to work with concept designers. Ethnographers were learning how to do 'rapid ethnography' and interpret their findings in a way that would support concept design and prototype development. Rapid prototyping was ... well... rapid... though sometimes for those waiting to get on with evaluation it didn't seem to be so rapid. In a way we were all, within those multidisciplinary, multicultural teams, learning how to work effectively with each other.*"

4.2.2 Use case and pilot development: Co-creation

The second stage is in the co-creation of the *actual content* of and in the pilots and use cases that can and should not be defined as the project starts but be left open so that these can be developed with real stakeholders that are locally grounded and can potentially exploit the results afterwards. The main driver at this stage is *co-creation*. In the commercial #IoT world of today platform wars are not so much on actual performance and capabilities of systems as they are all more or less of the same functionality. Key focus is on building long lasting and deep relations with developers and facilitating impact on real communities. An example is *Living memory: agent-based information management for connected local communities*: Living Memory aimed "to provide the members of a given community who live and work in a particular locality with a means to capture, share and explore their collective memory, with the aim to preserve and interpret the richness of local culture."¹ It "investigated the application of multi-agent systems to develop intelligent information interfaces for connected communities, a class of computer applications aimed at enhancing the way people interact and socialise in geographically co-located communities such as neighbourhoods."²

4.2.3 Community Building: inclusivity

The third stage where the skillsets of the co-creation designers and artists are productive is in creating an all *inclusive shared experience* of the actual content of and in the pilots and use cases that can and the results that have to be exploited by local SME and developers as well as by the Consortium. In order to achieve this the space where #IoT really is alive needs to be captured and 'occupied'.

Most 2016 paradigms of innovation still assume a center and a periphery in which tactics and strategy can operate. That model accommodates three groups of actors:

- ✓ Citizens/end-users

¹ This statement serves the intriguing reflexive function of being the sentence which Living Memory members have used as the means to capture, share and explore their collaborative research by reference to this 'credo'. We used it in the initial funding application, in most of our academic publications and presentations, in our publicity brochures that we produced for distributing in our study area, and in giving face-to-face explanations during our fieldwork. It is the 'text' which have struggled hard to translate into various other more detailed texts (i.e. specification documents, project reports etc.) and also into other things such as coffee tables, software agents, postcards and websites.

² Living memory: agent-based information management for connected local communities Kostas Stathisa,* , Oscar de Bruijn, Silvio Macedo Department of Computing, School of Informatics, City University, Northampton Square, London EC1V 0HB, UK Department of Electrical and Electronic Engineering, Imperial College of Science, Technology and Medicine, London SW7 2BT, UK



- ✓ Industry/SMEs
- ✓ Governance/legal.

The data-flow of DIY and artistic communities will engender new entities consisting of different qualities taken from the former three groups. A fundamentally new Innovation Framework needs to identify and work with these new entities that are being formed and built as new actors in mind. The DIY communities in themselves have qualities of these new entities as they create datasets and knowledge that is in between validated forms within the old paradigm.

The outcomes of the co-creation workshops confirm that granularity of data quality is one of the most important factors in bridging IoT to end-users. If applications are not meaningful for real everyday problems then the added value of a sensor grid that is monitoring obvious situations is not seen as relevant. But at the same time, it is acknowledged that there are serious situations, for example the detrimental to health and ecology, which are in need of monitoring on a wide scale even though the added value cannot yet be shown.

Cities, industry and residents must collaborate to prevent sustainable community development from faltering and spur the use of technology to reduce pollution and increase efficiency in cities, said Charbel Aoun, an international smart cities expert...."Seven years I've been working on smart cities, and it's not happening as we all hoped," he said. "It's very important to face that reality, because if we don't, we will keep talking for another seven years with bullet points, and nothing's going to happen." He blamed the lack of smart city development on gaps in understanding, for example, between citizens and government. Residents, for example, often not care about how cities deliver water as officials work hard to ensure system reliability. They only care about whether it arrives to their tap...^{xxxix}

4.3 Am I alone? Meetups

This section describes the steps on how to set up a Meetup and how to host one. It has links to the SocioTal Meetups in Gent, Grenoble, Novi Sad, Guildford and Santander. It will explain the notion of lead users and present links to arguments that strengthen #IoT investments in local providers and companies.

Lead users are "users whose present strong needs will become general in a marketplace months or years in the future. Since lead users are familiar with conditions that lie in the future for most others, they can serve as a need-forecasting laboratory for marketing research."^{xli} In Meetups you identify lead users. An example that will be provided is the meeting with all LORA providers in Gent.

- ✓ **Proximity matters.** "In the wake of Hurricane Katrina, many of New Orleans' locally owned businesses reopened within days of the floodwaters subsiding and played a pivotal role in drawing people back. National chains, meanwhile, kept their distance. Yet, locally owned businesses have been largely ignored in the city's redevelopment plans. Instead, New Orleans has been lavishing massive public subsidies on big-box development. Now a new study is calling that policy into question, finding that the city's independent businesses generate twice the economic impact of big-box retailers like Target, while consuming a fraction of the land."^{xlii}
- ✓ **SME is overwhelmed:** "Many small business owners feel they have very little resources to help them navigate the vast tech landscape, according to a recent study. The report, from Brother International Corporation and non-profit SCORE was conducted by Wakefield Research and covered 500 small business owners with fewer than 100 employees. It revealed that 64 percent of small business owners still feel "overwhelmed" when it comes to technology. That sentiment is apparently not based heavily on financial concerns. For the first time in five years, economic worries of small business owners waned significantly; down to 42 percent from 58 percent last year. Instead, many SMBs feel they have no one to turn to for tech guidance. The majority have no dedicated IT support. In fact, the study shows that 59 percent of those surveyed said there are "insufficient resources" available in small business communities to help them. Mobile devices top the list of the technology that small businesses feel is imperative, according to the study."^{xlii}



- ✓ **Restoring a sense of community:** "While the charming quirks of a city can lie in its inefficiencies and randomness, the people are what create and comprise its culture. Enabling more engaged, efficient connections between those people will only amplify the culture and community of cities. Cities are getting 'smarter,' and we probably couldn't stop them if we tried. LCD screens tell us how many spaces are available in our parking structures, the lady on the speaker gives spot-on updates of the inbound trains arrival time, and now smartphone apps are connecting us with our neighbors, our classmates, and our ride to work from a perfect stranger. Technology will continue to change the way we live within a city, and will hopefully restore a sense of community along the way."^{xliii}
- ✓ **Citizens need to involved and sometimes lead:** José Pedro: "The new raw power of our cities is in the control over the applications and services that can be build on top of the data we are collecting from our cities, our cars and bicycles, our houses and our bodies. This data collection is being enabled by the internet of things and it's sensors, but what makes the smart cities we are building, are the applications and services created on top of that data. Those who control the protocols, interfaces, and gateways that enable the applications and services to use the data we are collecting, will own the cities and control the new raw power. In order for us citizens, to keep the control of our cities, over the cities being controlled by corporations, we will need, not only to have mechanisms to own our one data and keep it private at the extend one requires, but also, to make sure that data will be available to everyone that complies with the city rules and policies, and not dependent on the limitations imposed by the corporations. Call for action: We need to build our own smart cities. Same applies to smart farming, smart environmental management, smart medical care, smart markets, etc."

4.4 Am I compliant? Policy relations. Data Protection 2018

This section will describe the regulatory framework in the EU around privacy by design and data protection.

In the *General Data Protection Regulation (GDPR)*^{xliv} Privacy by Design and by Default (Article 25) require that data protection is designed into the development of business processes for products and services. The Commission's "primary objectives of the GDPR are to give citizens back the control of their personal data and to simplify the regulatory environment for international business by unifying the regulation within the EU." The EU Council and the Parliament both adopted the regulation in April 2016. The regulation will take effect after a two-year transition period and, unlike a Directive it does not require any enabling legislation to be passed by governments.^{xlv}

In this new regulation privacy settings are set at a high level by default. Data Protection Officers (Articles 37–39) are to "ensure compliance within organizations. They have to be appointed for all public authorities and for companies processing more than 5000 data subjects within 12 months."

Privacy by Design is based on 7 "foundational principles"^{xlii}

- ✓ Proactive not reactive; Preventative not remedial
- ✓ Privacy as the default setting
- ✓ Privacy embedded into design
- ✓ Full functionality – positive-sum, not zero-sum
- ✓ End-to-end security – full lifecycle protection
- ✓ Visibility and transparency – keep it open
- ✓ Respect for user privacy – keep it user-centric
- ✓ Global adoption

The SocioTal platform is an important step in this direction, fully complying with the new Directive. These are indeed global challenges. Of the recent "reindustrialization" of Hong Kong, which refers to the promotion of high-value-added industries, it is said that unless "the government can coordinate the development of the IOT and break down barriers in data sharing, it will be difficult for this technology to become truly popular among the public."^{xlvii}



4.5 Am I leading? Mega trends

This section will describe the most important mega trends that are going to affect the smart city framework paradigms.

- ✓ **Circular Economy:** *Intelligent Assets: Unlocking the circular economy potential*, finds that "pairing circular economy principles with the information generated by intelligent devices creates a fertile ground for innovation that could enable this decoupling, and lead to broad social benefits." "With up to 50 billion connected devices predicted by 2020, a pervasive digital transformation is reshaping the economy. Will this 'fourth industrial revolution' lead to an acceleration of the extractive, 'linear' economy of today, or will it enable the transition towards a society in which value creation is increasingly decoupled from finite resource consumption?" "Products will communicate with users, collectors and remanufacturers to ensure they are returned and reused after their first life cycle. Additionally, condition monitoring of sensitive goods during transport, storage and use will expand product lifetime, says Frank Appel, CEO of Deutsche Post DHL." Intelligent Assets establishes an interplay between the 'value drivers' of a circular model, and the potential benefits offered by a network of connected devices and information.... "The internet of things, with its smart sensors and connected technologies, can play a key role in providing valuable data about things like energy use, under-utilised assets, and material flows to help make businesses more efficient. Their role in building a future with a more circular economy is critical and we are excited about the role of technology will play in realising this vision." **The European Commission adopted an ambitious Circular Economy Package**, which includes revised legislative proposals on waste to stimulate Europe's transition towards a circular economy which will boost global competitiveness, foster sustainable economic growth and generate new jobs. The Circular Economy Package consists of an EU Action Plan for the Circular Economy that establishes a concrete and ambitious programme of action, with measures covering the whole cycle: from production and consumption to waste management and the market for secondary raw materials. The annex to the action plan sets out the timeline when the actions will be completed. The proposed actions will contribute to "closing the loop" of product lifecycles through greater recycling and re-use, and bring benefits for both the environment and the economy.
- ✓ **Maintenance and repair:** The second mega trend is described by Lee Vinsel & Andrew Russell in *Hail the maintainers*. They claim that: "Innovation is a dominant ideology of our era, embraced in America by Silicon Valley, Wall Street, and the Washington DC political elite. As the pursuit of innovation has inspired technologists and capitalists, it has also provoked critics who suspect that the peddlers of innovation radically overvalue innovation. What happens after innovation, they argue, is more important. Maintenance and repair, the building of infrastructures, the mundane labour that goes into sustaining functioning and efficient infrastructures, simply has more impact on people's daily lives than the vast majority of technological innovations." They emphasize a shift from means, "including the technologies that underpin our everyday actions, to ends, including the many kinds of social beneficence and improvement that technology can offer."
- ✓ **#Accelerate** An important philosophical building block in a larger policy framework and potential inspiration for scenarios is to move the decision-making capabilities into a more relevant balance between actions taken from IoT scenarios and current party politics. In Accelerationist thinking: "quantification is not an evil to be eliminated, but a tool to be used in the most effective manner possible. Economic modelling is – simply put – a necessity for making intelligible a complex world. The tools to be found in social network analysis, agent-based modelling, big data analytics, and non-equilibrium economic models, are necessary cognitive mediators for understanding complex systems like the modern economy."
- ✓ **Fourth and finally, policymakers need to think of themselves less as social engineers and more as 'system stewards'**. As Michael Hallsworth from the Institute for Government (IFG) explains, rather than engineering specific outcomes, government's role as system stewards is to create the conditions in which interacting agents in the system will adapt towards socially desirable outcomes. Policy design and implementation are thought of as



integral rather than separately, and mechanisms for feedback and continuous learning and improvement are built-in from the beginning. The IFG recognises, however, that such an evolutionary approach may not be suitable for all circumstances. In some situations, for example emergency disaster relief or national security situations, a traditional top-down approach may be required when speed is of the essence, where clarity and consistency is critical, or when the capacity of actors further down the chain is limited.^{xlviii}

Section 5 - Conclusion

To arrive at an integrated stakeholder analysis methodology, Reed et al^{xlix}. (2009) have suggested investigating the potential for combining existing methods to derive more useful results." The Internet of Things "is largely characterized by complex and dynamic environments containing a wide range of stakeholders, from hostile to conciliatory, from obstructive to collaborative [Crocker (2007)ⁱ ", and as such it is an open and ongoing environment characterized by change, real-time combinatorial innovation and the status of "experimental evaluation". New technologies get developed in an envelope of regularity that resembles this particular situation as the logic of innovation. The disruptive qualities of the potential to not only build new roads but envisage other kinds and forms of transportation, other notions of dwelling, moving, staying, going, learning, 'being', get snowed under the institutional tendency to make the road a little wider, better, 'smart'.

According to Henry Doss in *It's Time To Build A National Innovation Infrastructure* significant gains toward creating authentic, incremental innovation means applying the science of complex adaptive systems to . . . "well, systems, rather than pieces of a system." He claims that we must begin recognizing that it is the system — not individuals, not particular tactics or strategies, not a business model, not products, not anything in isolation — that causes innovation. This is difficult to get a handle on, "because it suggests that when we talk about innovation, we are talking about culture — and that leads to hand wringing and denial. Even though most leaders readily acknowledge the outsized role that culture plays in innovation — and all organizational outputs — most will also shy away from a systemic, holistic approach to actually engineering culture."

"This is simply because culture — organizational system states — defies easy answers, clear definitions and traditional metrics. It is messy. For lack of an accessible and clear answer to the culture question, most will then default to a set of tactics or actions that address something that feels like innovation." ^{li}

In our infographic, the best practices guide, we do not want to hide this fact but highlight it. Stakeholder coordination, participatory practices are never easy, they are very difficult, and require a lot of energy from all stakeholders in the ecosystem.

ⁱ Technagara can work across cities and within communities too [K.V. Aditya Bharadwaj](#)
<http://www.thehindu.com/profile/author/k.v.-aditya-bharadwaj/>

ⁱⁱ The Societal Impact of the Internet of Things: A report of a workshop on the Internet of Things organized by BCS – The Chartered Institute for IT, on Thursday 14 February 2013. The Chairs were Jeremy Crump (BCS) and Ian Brown (Oxford Internet Institute, University of Oxford). <http://policy.bcs.org/content/internet-things-coe>

ⁱⁱⁱ Consumers Feel Less Than 10% of IoT Devices Are Secure JP Buntinx June 4, 2016 News, Technology The Merkle. The Internet of Things will connect even more devices to the Internet than many thought possible. But without proper security measures, this initiative will go nowhere anytime soon. As it turns out, consumers are not all that confident in the security of IoT products.

<http://themerkle.com/consumers-feel-less-than-10-of-iot-devices-are-secure>

^{iv} MATTHIAS VERBERGT, STOCKHOLM—In Sweden, groceries and fresh food can be delivered in your absence and directly to where they belong: your kitchen and fridge. May 30, 2016. A Scandinavian courier company, PostNord AB, and supermarket chain, ICA AB, are testing the new service with about 20 households in the Swedish capital, promising that messengers will remove their shoes and unpack online deliveries, even when customers are away.

^v

DI, 7 JUN. OM 19:30 ,GENT, BELGIUM Toekomst van de slimme stad Door: Jong Groen Gent
Debat rond de toekomst van een hyper-technologische slimme stad. Met als sprekers:

- Meyrem Almacı, voorzitter Groen
- Tom Casaer, CEO AllThingsTalk



- Rob van Kranenburg, Founder of Council theinternetofthings.eu
<https://www.eventbrite.nl/e/tickets-toekomst-van-de-slimme-stad-24935059434>
- vi DSI4EU: Shaping the Future of Digital Social Innovation in Europe, DigitalSocial.eu has been setting up an international network of digital social innovators using the internet and digital technologies to tackle social challenges.
vii <http://www.theinternetofthings.eu/sites/default/files/%5Buser-name%5D/The%20relationship%20between%20art%20and%20design%20and%20Large%20Scale%20%23IoT%20Pilots.pdf>
- viii <http://iot-week.eu/industry-day/>
- ix The Disappearing Computer II (DC) Proactive Initiative <http://cordis.europa.eu/ist/fet/dc2-in.htm>
- x Letter to the Convivio community, Giorgio De Michelis, Convivio network coordinator, <http://daisy.cti.gr/webzine/Issues/Issue%201/Letters/index.html>
- xi Harrison Doyle, Don. T Social Order of a Frontier Community: Jacksonville, Illinois, 1825-70, The University of Illinois Press, 1983
- xii Coser, Lewis A. Social Conflict and the Theory of Social Change The British Journal of Sociology, Vol. 8, No. 3. (Sep., 1957), pp. 197-207. <http://links.jstor.org/sici?doi=0007-1315%28195709%298%3A3%3C197%3ASCATTO%3E2.0.CO%3B2-H>
- xiii The Onlife Manifesto
<https://ec.europa.eu/digital-single-market/en/onlife-manifesto>
- xiv Collective Awareness Platforms for Sustainability and Social Innovation. Although there is consensus about the global span of the sustainability problems that are affecting our current society, including economic and social models and the environment, there is little awareness of the role that each and every one of us can play to ease such problems.
<https://ec.europa.eu/digital-single-market/en/collective-awareness>
- xv Managing the commons in the knowledge economy Decentralised Citizens ENgagement Technologies. D3.2 Carlo Vercellone, Francesca Bria, Eleonora Gentilucci, Giorgio Griziotti. The work leading to this publication has received funding from the European Union's Seventh Framework Programme (FP7/2007- 2013) under grant agreement n° 610349. FP7 - CAPS Project no. 610349 D-CENT Decentralised Citizens ENgagement Technologies.
- xvi <http://www.theinternetofthings.eu/iot-rotterdam-kudos-martin-pot-and-martin-spindler-short-report>
- xvii <http://www.theinternetofthings.eu/ben-van-lier-information-crucial-when-considering-future-mankind>
- xviii Her master thesis with the topic "participation and co-creation in the public domain", represents the final project of the master Design for Interaction at the faculty Industrial Design Engineering, University of Technology Delft (TUDelft) and was executed for the STT Netherlands Study Centre for Technology Trends in The Hague (STT). The project is introduced in chapter one where the design brief, involved parties and project process is elaborated on. The goal of the initial design brief was "design a means that facilitates people with the possibility to participate and co-create, with other citizens and authority, in the Dutch public domain of 2030". To reach this goal a process similar to the VIP method was followed. First the current situation was deconstructed, whereupon the future situation was constructed and a concept was designed.
<http://cocreatetheiot.com>
- xix <http://www.louisaheinrich.com/2015/03/12/internet-of-neighbourhoods-part-1-post-19100/>
- xx In the Activity Chain Societal chaired by WP6 leader we are investigating exactly this: In the practice based PhD project TOWARDS TOGETHERNESS of Rosanne van Klaveren the possibilities of artistry, creativity and new media to create a temporary feeling of togetherness during participatory practices is researched between 2009 and 2015.
- xxi A. Regalado. „The Economics of the Internet of Things. As everyday objects get connected, brace yourself for network effects, says one economist.” <http://www.technologyreview.com/news/527361/the-economics-of-the-internet-of-things/>
- xxii <http://www.meetup.com/IoT-Santander/>
November 21, 2014 · 7:00 PM
3er IoT Santander Meetup!
- xxiii <http://www.meetup.com/This-group-is-part-of-the-SocioTal-eu-project/events/175295532/>
April 21 · 3:00 PM
IoT meetup #7 - Beograd po drugi put
February 10 · 5:00 PM · Rate this Meetup
IoT meetup #6 (a prvi u Beogradu)
February 9 · 5:30 PM
Meetup #5 - Nastavljamo dalje, ovo je godina IoT-a
xxiv <http://www.meetup.com/Internet-of-Things-Guildford/>
Tue May 19 7:00 PM



IoT Guildford Meetup#11: Alexander Sewell, Zebra Technologies

April 14 · 7:00 PM

IoT Guildford Meetup#10: Open Forum, collaborations and some news

March 17 · 7:00 PM

IoT Guildford Meetup#9: EU FP7 SocioTal and IoT Lab projects

February 17 · 7:00 PM

IoT Guildford Meetup#8: IKaaS (ICS), More TBA

January 20 · 7:00 PM

IoT Guildford Meetup#7: Images&co, OperaBit, Vzzual

December 16, 2014 · 7:00 PM

IoT Guildford Meetup#6: with Frontier Cities, Aiseedo, Day Digital and more

November 18, 2014 · 7:00 PM

IoT Meetup 5- Yue Cao (University of Surrey)+new ideas 5 minutes pitch

^{xxv} <http://www.meetup.com/Internet-of-Things-Ghent/>

March 19 · 7:30 PM

What is the Internet of Things? Met Katleen Gabriels

February 25 · 7:00 PM

Pitches for the Intel Galileo or Edison contest

February 5 · 7:30 PM

Piet Vandaele & Veselin Pizurica: Waylay: The next step!: creating new value

January 20 · 7:00 PM

Tom Collins introduces IoT Methodology and Dirk Roziers Intel evangelist

December 4, 2014 · 6:30 PM

Humans & Things

November 6, 2014 · 7:30 PM

Listen, Talk and Vedett with Alessandro Bassi (IoT-A)

^{xxvi} <http://www.meetup.com/Internet-of-Things-Grenoble/>

January 27 · 6:00 PM

Rencontre avec Rob Van Kranenburg, animateur du meetup IoT de Ghent (Belgique)

December 15, 2014 · 6:00 PM

Parler de l'architecture de l'Internet des Objets

^{xxvii} Manažer startup akcelerátoru StarCube | Startup Accelerator StarCube Manager

JIC, zájmové sdružení právnických osob INMEC, Purkyňova 649/127, Brno – Medlánecké náměstí 612 00

^{xxviii} <http://www.theinternetofthings.eu/damir-%C4%8Dau%C5%A1evi%C4%87-entrepreneurial-orb-modular-service-approach>

^{xxix} A. Scropton. Local government blind to internet of things savings Networking Editor 09 Jun 2015 16:15: A report from Vodafone says local councils could save billions by implementing smart city systems, but are ignorant to the possibilities.

<http://www.computerweekly.com/news/4500247803/Local-government-blind-to-internet-of-things-savings>

^{xxx} Comments from Ana M: " Thank you for sharing text with me. It is good. I would like to point out that IT and ICT communities become very popular and appealing way of socializing and great business opportunities, which is not one of the main characteristics of people in IT sector. From my point of view, that kind of event (meetup, formal and informal gathering) brings value for people in IT industry, who are not on the managing position. It also contributes to the growing Belgrade startup scene and communities and on the other hand to our business environment, employment of youth etc.... "

^{xxxi} Addressing: "Going beyond theory, potential opportunities and technology viabilities ... I was lucky enough to meet last year a former CIO of a very traditional industry company which is in aluminum business. Some years ago they diversified the low value added business of aluminum production and started to design, produce and sell »city furniture«, like benches and other outdoor equipment for children playgrounds, parks etc (company called Kreal – which stands for Creative Aluminum). And when they recently found out about the IoT, they extended their solution and products into the cyber-physical world. The main challenge ... what I just wrote is not a selling proposition and no customer would understand what the heck are they trying to offer/sell.

So they have been now for a year testing on the market few (IoT, gaming based) solutions, and moving from the product to service selling in the smart city segment. For example ... they produce benches and other outdoor equipment with embedded ICT (which are not only power supply outlets for the phones, but also sensors etc.). Their recent product is an artificial outdoor climbing wall, basically designed for kids. With built-in sensors, connectivity and in combination with apps kids are now challenged to train, compete in this cyber-physical world. They are playing games, they compete with each other, they can choose opponents, select different difficulty stages, measure and compare results, improve their ratings etc. and yes, they are physically active, not sitting in their room for hours and playing PC-like games ..." (Tomaz Vidonia)

^{xxxii} Helping to shape the Internet of Things – a role for civil society?

<http://blogs.lse.ac.uk/mediapolicyproject/2016/06/03/helping-to-shape-the-internet-of-things-a-role-for-civil-society/>
This blog gives the views of the author and does not represent the position of the LSE Media Policy Project blog, nor of the London School of Economics and Political Science. Copyright © 2014 LSE



xxxiii See D6.6 for the internal discussion with Eclipse.

xxxiv <https://www.sungevity.com>

xxxv This research project explores our often ignored yet real relationships with Familiar Strangers. We describe several experiments and studies that lead to a design for a personal, body-worn, wireless device that extends the Familiar Stranger relationship while respecting the delicate, yet important, constraints of our feelings and relationships with strangers in public places. Intel research 2002. Eric Paulos and Elizabeth Goodman; Familiar Stranger project. <http://www.paulos.net/research/intel/familiarstranger/>

xxxvi Changify is a platform for locals to share all things they love or would like to change in their neighbourhood. Nicole Kobje: D4SC is the startup bringing people into the Internet of Things Startups. Too many smart city systems ignore residents, but this British startup is changing that. <http://www.d4sc.io>

xxxvii The radical local and the urban curator

<http://www.jeanneworks.net>

The Town Toolkit^{xxxviii}

A methodology involving tools for citizens, developers and SME into a coherent socio-economic view on light communities follows *the Town Toolkit* of Christian Nold. This project resulted in "a cultural and technical toolkit for small towns which is designed to bring local people and local political entities together based on emotions, personal perceptions as well as environmental pollution data." The project resulted in the creation of a new local community organization that now runs a local farmer's market. The project also led to the proposal to redirect car traffic in the town.

<http://www.situatedtechnologies.net/?q=node/108>

Digital Communities Ars Electronica Archive

2014^{xxxix} and 2013^{xxxi} This archive goes back to 2004 and here you find a decade of history as what the artistic community saw as

Online tools of debate & direct voting:

1. Loomio: <https://www.loomio.org>

2. DemocracyOS: <http://democracyos.org>

3. LiquidFeedback: <http://liquidfeedback.org>

(cooperates with: <http://www.interaktive-demokratie.org>)

4. getOpinionated: <http://opinion.pirateparty.be/>

xxxviii Pachube was among the first citizen focused IoT platforms. It started directly from an artistic and design context. Pachube was Usman Haque's attempt to strip the narrative from the core of connectivity. With Pachube he has no story at all, but it becomes the 'pipe' or 'the platform' for others to tell stories with and on. The most famous example being the Fukushima disaster (<http://spectrum.ieee.org/tech-talk/energy/environment/radiation-monitoring-in-japan-goes-diy>) It is an example of #IoT that started from no industrial, pure technical or economical motive, but purely from investigating the nature of communication and interaction. As such it is always open to new and surprising ways of use. It has the potential to slowly be appropriated by people and thus it slowly builds a community. Pachube was an artistic investigation that actualized itself as a company, much in the same way as the other investigations actualized themselves as performance, spectacle, or immersive user research.

xxxix Steve Lynn: Expert: Smart city movement losing steam. "FORT COLLINS – Cities, industry and residents must collaborate to prevent sustainable community development from faltering and spur the use of technology to reduce pollution and increase efficiency in cities, said Charbel Aoun, an international smart cities expert." <http://bizwest.com/expert-smart-city-movement-losing-steam-2/>

^{xl} Eric von Hippel: Lead Users: A Source of Novel Product Concepts

Sloan School of Management, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

Permalink: <http://dx.doi.org/10.1287/mnsc.32.7.791>

Published Online: July 1, 1986

Accurate marketing research depends on accurate user judgments regarding their needs. However, for very novel products or in product categories characterized by rapid change—such as "high technology" products—most potential users will not have the real-world experience needed to problem solve and provide accurate data to inquiring market researchers. In this paper I explore the problem and propose a solution: Marketing research analyses which focus on what I term the "lead users" of a product or process.

^{xli} Stacy Mitchell and Justin Dahlheimer, Local Businesses Key to Rebuilding New Orleans' Economy. Sep 18, 2009 The content that follows was originally published on the Institute for Local Self-Reliance website at <https://ilsr.org/local-businesses-key-rebuilding-new-orleans-economy-study-finds/neworleans-pals.jpg>

^{xlii} <http://www.pcmag.com/article2/0,2817,2455603,00.asp>

^{xliii} Jeff Jackel: Smart Communities are the Heart of the Smart City Machine

www.huffingtonpost.com/jeff-jackel/smart-communities-are-the_b_3513397.html?view=print&comm_ref=false 1/2

Smart Communities are the Heart of the Smart City Machine

www.huffingtonpost.com/jeff-jackel/smart-communities-are-the_b_3513397.html?view=print&comm_ref=false

^{xliv} http://ec.europa.eu/justice/data-protection/reform/index_en.htm

^{xlv} https://en.wikipedia.org/wiki/General_Data_Protection_Regulation

^{xvi} https://en.wikipedia.org/wiki/Privacy_by_design



xlvii The bottleneck in the development of the Internet of Things

<http://www.ejinsight.com/20160606-bottleneck-development-internet-things/>

This article appeared in the Hong Kong Economic Journal on June 3. Translation by Alan Lee

xlviii How the Profound Changes in Economics Make Left Versus Right Debates Irrelevant. Eric Beinhocker introduces the 'new economics' research programme

https://evonomics.com/the-deep-and-profound-changes-in-economics-thinking/?utm_content=buffer31e4b&utm_medium=social&utm_source=twitter.com&utm_campaign=buffer

xlix Who's in and why? A typology of stakeholder analysis methods for natural

resource management. Mark S. Reed a,* , Anil Graves c, Norman Dandy d, Helena Posthumus c, Klaus Hubacek b, Joe Morris c, Christina Prell e, Claire H. Quinn b, Lindsay C. Stringer b. *Journal of Environmental Management* 90 (2009) 1933–1949

¹ Enabling Things to Talk: Designing IoT solutions with the IoT Architectural Reference Model. Alessandro Bassi, Martin Bauer, Martin Fiedler, Thorsten Kramp, Rob Kranenburg, Sebastian Lange, Stefan Meissner Springer Berlin Heidelberg, 28 Oct 2013 <http://www.springer.com/gp/book/9783642404023>

ⁱⁱ <http://www.forbes.com/sites/henrydoss/2016/06/01/its-time-to-build-a-national-innovation-infrastructure/#55944bc70723>