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D3.2 DIY networking as a boundary object in interdisciplinary research: vocabulary and methodology

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Task Leader: **Ileana Apostol (NetHood)**
Author: **Panayotis Antoniadis, Ileana Apostol (NetHood), All Partners**

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Executive summary

The objective of this task is to facilitate the necessary interdisciplinary and transdisciplinary interactions around the design and deployment of the MAZI toolkit as this is used for the deployment of different MAZI zones in the MAZI pilot studies.

To achieve this we conceptualize DIY networking and more specifically the MAZI toolkit as a “boundary object”, as defined by Star and Griesemer (1989) around which different design cultures and “social worlds” try to establish a common ground about the most important requirements, functionalities, and guidelines for deployment and evaluations of the MAZI toolkit. All this produced knowledge through the comparison of the different pilot studies will need to be captured in a single web page containing all the necessary information for In addition to creating a common understanding for our common object of design, the MAZI toolkit, this exercise will also help us to clarify certain concepts that will play a key role in the design process like participation, community, governance, and more.

In this first version of the Deliverable 3.2, we make a first step by introducing DIY networking, the MAZI toolkit. We analyze why we chose to conceptualize them as boundary objects for facilitating our interdisciplinary and transdisciplinary research activities, and describe the relationships and envisioned interactions between other related tasks and deliverables, and especially D1.1 and D3.5 (Section 1).

We then start the process of building a common vocabulary by presenting the different perspectives present in our project around the notion of participation in design (Section 2). A structured summary of the role that DIY networking played in various interdisciplinary events on the design of DIY networking solutions provides some first insights on the potential role of DIY networking as a boundary object (Section 3). Section 4 reports on the first version of the D3.2 questionnaire, which will try over the duration of the project to capture the different perspectives on the concept of DIY networking, which will then inform the design of the MAZI toolkit but also of the questionnaire itself.

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1. Introduction

1.1 DIY networking: toward a definition

Do-It-Yourself networking is the central topic of enquiry in the MAZI project, and before analyzing its potential role as a boundary object, we provide a first definition, which we expect to evolve over the duration of the project.

DIY networking has been recently used as a "term" to characterize a variety of technical solutions that enable citizens to build and operate their own communication networks (Antoniadis et al 2014). These can range from large scale wireless community networks (WCNs) to very dynamic ad-hoc networks, built over time through the direct exchange of data between personal mobile devices. A DIY network could be also just a simple wireless access point (static or mobile), hosting a local application that is accessible only to those in physical proximity; an offline network.

Existing wireless community networks cover geographic areas of various sizes, ranging from a small urban neighbourhood (Gaved, 2011; Baldwin, 2011); to a small town like Leiden (van Oost et al, 2009); or large city-regions such as Barcelona (guifi.net), Berlin (freifunk.net) and Athens (awmn.net). On the other hand, ad-hoc or delay tolerant networks have been mostly developed by the networking research community (e.g., Basagni et al. 2013), driven mostly by the highly challenging intellectual and technical issues associated with the creation of networks over time, based on "contacts" of independent mobile devices. Finally, offline networks are rooted in artistic projects such as the PirateBox and DeadDrops, activist projects such as the Occupy.here node and they are popular mostly among like-minded politically engaged people (Dragona, 2015).

Around each form of DIY networking different types of communities were formed over the years with their own history, key actors, successes, and failures. The main motivation for using a new encompassing term is that despite their differences in scale, operation, and governance, all these networking solutions share certain special characteristics and affordances for offering local services: the ownership and control of the infrastructure and the whole design process; the de facto physical proximity of those connected (meaning that all users are physically present within the reach of the WIFI signal) without the need for disclosing private location information, such as GPS coordinates, to third parties; the easy and inclusive access through the use of a local captive portal launched automatically when one joins the network; the independence from network providers and big tech companies; the opportunity to interact privately within a local network, not sharing details beyond the network, with the option of anonymity; the materiality of the network itself; a new mode of communication that can attract curiosity and interest.

The term DIY networking attempts to emphasize a critical quality and distinguishing factor of WiFi networks: that they can operate outside the public Internet (Antoniadis et al. 2008, 2014; Powell, 2006). However, not all DIY networking technologies are the same. More specifically there are three different forms of wireless connectivity, wireless links, that are important to understand and distinguish both for their technical and social implications.

First, *directional* antennas can establish a wireless link between distant locations, many kilometers away. This link could be imagined as a very long cable along the imaginary line connecting two locations, which needs to be clear of obstacles (walls, trees, etc), a line-of-sight. There are also *sector antennas*, which can cover a wider angle toward a certain direction. Such links are often called "backbone" links since they establish the wider coverage area of the network and are not accessible by "end-users". As a social infrastructure, such antennas typically connect like-minded individuals or groups that live far away, which need to coordinate and agree to create a link between them, or reach an Internet gateway.

Second, an *omni-directional antenna*, attached to a router, spreads "cables", radio signals, in all directions around it in order to make it easy for many devices to connect at the same time and independently from their relative location. In this case, the distance between the small antennas inside our devices and the omni-directional antenna can be much smaller, a few hundred meters depending on the environmental conditions. So, omni-directional antennas are more inclusive and can bring in contact people that are not aware of each other's presence. Offline networks are typically single-node access networks with an omni-directional antenna

that are used for local-only communications, often designed and implemented by artists and/or activists (see Dragona, 2015).

Third, omni-directional antennas can be also used to create direct links between devices, which are easier to setup since there is no need for “aligning” the antennas but more costly in terms of noise and interference. These could be backbone links or ad-hoc links between mobile devices that happen to be in “contact”. In this case, information travels in an epidemic fashion and this is why such ad-hoc networks are often called “delay tolerant”. They are rather complex to work properly and make sense mostly for very dynamic temporal applications, here and now. Real deployments for “civilians” have been scarce until now except Qaul.net, the only running system that combines all the above communication modes for both artistic and practical use.

From the above discussion is clear that even restricting ourselves to the analysis of the technical characteristics of a DIY network, it is not easy to provide a single definition. If we add in the discussion the main purpose that a DIY network is meant to play in comparison with Internet-based solution, numerous social, political, and economic dimensions need to be included for answering the question “What is a DIY network?”.

This “interpretive flexibility” of the term DIY networking is both an advantage and disadvantage. On the one hand, it allows for different interpretations of the term and the corresponding technology to fit different contexts and objectives. On the other hand, it creates a confusion that makes it more difficult for various actors to join forces and provide generic tools that would make the deployment of DIY networks easier.

1.2 The MAZI toolkit

The core objective of MAZI is to build a DIY networking toolkit using a bottom-up approach allowing for different interpretations of the DIY networking concept and different disciplinary perspectives tried out in real environments with different characteristics. Through meaningful comparisons and a transdisciplinary methodology based on the “boundary object” theory we will try to abstract useful knowledge from the MAZI pilots and translate it into concrete decisions on the form and characteristics of the different toolkit's components (see D1.1 for a detailed description):

- Installation scripts and step-by-step guides for the deployment of one or more wireless routers, the MAZI nodes
- A set of local web applications ready to be installed on the captive portal.
- Data collection and visualization tools
- A customization interface (the administrator panel) which will enable the owner(s) of a MAZI zone to decide on important design details, like wording, identity management, input constraints, moderation rules, data collection, and more.
- A set of ideas and blueprints on possible physical elements that could contain and communicate the MAZI nodes
- Templates for posters and stickers for advertising, explaining and representing the respective application offered by a MAZI zone.
- Guidelines for the selection of appropriate applications and customization according to the context and the objectives of the local administrators, but also for understanding the potential role of a MAZI zone in a certain place, engaging the local community in its design and governance, and performing various adaptations over time.

In short, the MAZI toolkit, together with its guidelines, will encode the different options and understandings of the role of DIY networking shaping local hybrid space and for this it could be play the role of a “boundary object” between the different partners of the project helping to visualize and eventually bridge their diverse perspectives into a single artifact, the MAZI toolkit, in a way that keeps it at the same time flexible to adjust to different situations, and concrete to be able to provide meaningful solutions.

1.3 Boundary objects and interdisciplinarity

The term “boundary” brings to mind an edge or a periphery. However, the term “boundary object” is coined by Susan Leigh Star and James Griesemer (1989) to mean a shared space, a common object “‘sitting in the middle’ of a group of actors with divergent viewpoints” (Star 1990, p.46). These different groups are often referred to

as “social worlds” (Strauss 1978) or “communities of practice” (Wegner 1998) and the basic assumption is that “consensus is not necessary for cooperation nor for the successful conduct of work”.

To facilitate different groups, social worlds or communities of practice, to collaborate without consensus, a boundary object needs to be characterized by “interpretive flexibility” and allow for a “back-and-forth” process between weakly and strongly structured forms. They should be “both plastic enough to adapt to local needs and constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use and become strongly structured in individual-site use. These objects may be abstract or concrete.” (Bowker & Star, 1999).

As Star stresses in a paper titled “This is Not a Boundary Object: Reflections on the Origin of a concept” (2010), published 21 years after her original work with James Griesemer, “These common objects form the boundaries between groups through flexibility and shared structure---they are the stuff of action ... An object is something people ... act toward and with. Its materiality derives from action, not from a sense of prefabricated stuff or 'thing'-ness.” (p.603)

Interestingly, Star (2010), in trying to explain what is not a boundary object, highlights five “anomalies” that a certain structure could suffer from, as a sign for interpretive flexibility and the capacity to act as a boundary object:

- a) the invisible work hidden by the final “product” of research;
- b) the lack of concreteness or “weakness” of the structure;
- c) the inability of standards to capture the whole complexity of distributed knowledge;
- d) the existence of marginal cases, the “others”; and most importantly for MAZI;
- e) the relations between developers and users and the problem of infrastructure.

But what are examples of boundary objects? In their original research Star and Griesemer describe the importance of boundary objects and methods standardization in the development of the Berkeley Museum of Vertebrate Zoology. Some of the boundary objects that they list include specimens, field notes, and maps of particular territories. Other examples of boundary objects mentioned in different studies include also repositories, dictionaries, diagrams, forms, standards, classification schema, and more. Related to our context, Alison Powel (2015) has recently studies the role of an open hardware *license agreement* as a boundary object between different social worlds (from CERN and the World Intellectual Property Organization to various open hardware associations and informal groups).

Taking the less strict perspective by Lee (2005) who coined the term “boundary negotiating artifacts” that are transient and changing, allowing for more flexible and open-ended interactions between groups, Halpern et al. (2013) developed a set of *cultural probes* to facilitate collaboration in different case studies. For example, a 1-day workshop in Brooklyn organized around the “principle that a set of diverse constituents---designers, academics, students, and urban activists, among others--- can build on and shape successful community practices by joining forces”, and a format very similar to our pre-MAZI workshops.

More specifically, partners of the MAZI project have been organizing various interdisciplinary events and workshops around the concept of DIY networking since January 2014. There has not been a very concrete framework in place to guide those gatherings, except from the placement in the centre of attention of DIY networking as an interesting technology to support local interactions. Our experience has been always that people find very interesting the idea of a local network that operates outside the Internet and manage to very quickly bridge their disciplinary and other differences by brainstorming on different applications, identifying challenges and opportunities, etc.

In those workshops and interdisciplinary gatherings it was the concept of DIY networking that was perceived as a possible boundary object between researchers from different disciplines, local authorities, and activists. Its “interpretive flexibility” allowed indeed very interesting exchanges between different social worlds, which eventually led to the MAZI project.

Today, MAZI aims to make a step further, beyond brainstorming, and produce a specific toolkit that will allow local communities in collaboration with different actors to appropriate the concept and the technology and produce concrete solutions for shaping their hybrid space according to their own values and objectives. The different implemented functionalities, the different customization variables and the corresponding guidelines for deployment and management form a complex structure that today is rather weakly defined at large but which could be easily become a lot more concrete in a specific context. In this sense, the MAZI toolkit seems to

fulfil all the important characteristics of a “boundary object” as defined by Star and Griesemer and we have chosen to use this metaphor, and the implied collaboration process, during MAZI.

However, note that our goal is not to formulate DIY networking and/or the MAZI toolkit as a boundary object according to a desired definition, either this is the original one or others like a “boundary-negotiating artifact” or a “knowledge artifact” (see Cabitza 2015 for an interesting analysis of the terminology and Hadron et al. 2008 for various applications of the concept in transdisciplinary research).

We want only to use this concept as a means, and not as an end, to help us “collaborate without consensus” between the different “social worlds” represented by the different pilot studies and disciplines of our academic partners. For example, during this process, and depending on who is involved, DIY networking could at times play also the role of a triangulator, bringing in conversation people from various walks of life, from different cultures and disciplines (as it happened in many of the events described in Section 2), and at other moments, could play the role of a mediator of more in-depth conversations potentially enabling a fruitful collaborative environment, and thus ultimately becoming a catalyst of collaborative work processes capable to generate proposals for the future.

1.4 Vocabulary and methodology

The first challenge in our interdisciplinary and transdisciplinary collaborations is to create a common vocabulary that will be the basis for comparisons between the pilots and the concrete outcome of the project, the MAZI toolkit. Key concepts such as participation, community, governance, but also DIY networking itself will be negotiated during the “back-and-forth” process between the application of the toolkit in the different pilot studies and the evolution of the toolkit itself.

We will call the internal workings in each pilot, or social world, the **differentiation process**. This includes the interpretation of the toolkit's templates and guidelines according to the local context during the various iterations of the MAZI zone implementation circle (exploration, analysis, design, deployment, evaluation). Then the process of negotiating the different meanings and specific implementations developed in the individual pilots and producing a common output, the MAZI toolkit, will be the **integration process**.

Note that integration is the core, and most challenging, part of a transdisciplinary project and according to Hadorn et al (2008) should be seen as an **iterative process** of “controlled confrontation”, which does not fall into the trap of avoiding to “intrude” in each other domains of expertise but does acknowledges, respects and aims to explore the diversity of perspectives. In other words, “this diversity is not a handicap to be overcome, but an invitation for creative interaction” (Loibl, 2006, cited in Hadorn et al, 2008).

According to Rossini and Porter (1979) there are three basic ways to reach integration: common group learning, deliberation among experts, and integration by a subgroup or individual. In MAZI we will follow a combination of the first way and third way.

Common group learning will be guided by the comparative framework described in D3.5, which will facilitate this “translation” process between different social worlds, which take place in iterations of “back-and-forth” movements between the local/concrete and global/generic. The goal is to allow lessons learned in a certain environment to inform the action, taking place in others, and the development of the MAZI toolkit which will encode all these lessons in a tangible form, a combination of a dictionary, a classification scheme, and a protocol. These two top-level collaboration activities, working all together on a) producing the MAZI toolkit and b) comparing the lessons learned from the different pilot studies, will take place mostly during the plenary project meetings, conference calls, and cross-fertilization events.

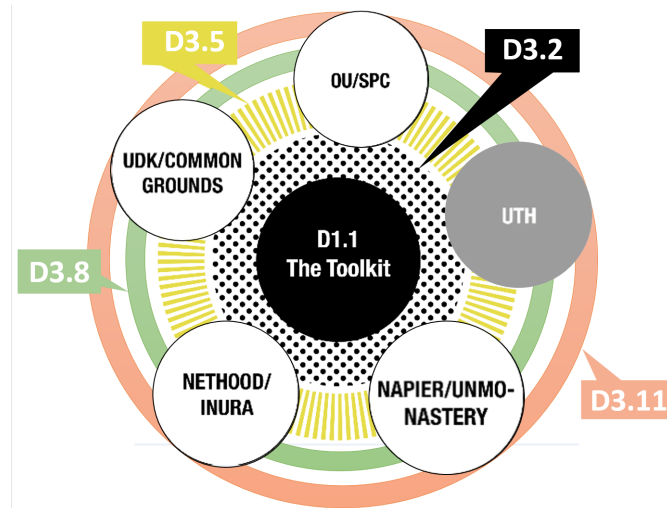


Figure 2: A graphic representation of the main building blocks of the interdisciplinary framework that will guide the interactions between the MAZI partners. The MAZI toolkit described in detail in D1.1. will be the concrete outcome of the project, a proper boundary object “sitting in the middle” between the different “social worlds” of the project represented by the “couples” of each the pilot study together with our engineers from the University of Thessaly, the main developers of the toolkit. Deliverables 3.2-3.4, will document the integration process of finding a “common ground” between the different perspectives and make the required translation to the toolkit’s “language” (i.e., list of functionalities, customization options, templates, guidelines, etc.). These different perspectives will be compared and analyzed through the comparative framework developed in Deliverables 3.5-7, evaluated through the evaluation framework developed in Deliverables 8-10, while the whole process of differentiation, comparison, evaluation, integration will be overlooked and documented in a self-reflective mode in Deliverables 11-13.

Given the significant diversity of the pilot studies, and the short duration of the project, interdisciplinary and transdisciplinary projects typically require much more than 3 years to achieve integration, In addition to these group activities, we will complement our group learning activities with a process of **integration by a subgroup or individual**.

More specifically, a series of questionnaires addressing different parts of our transdisciplinary methodology (differentiation, comparison, evaluation, self-reflection), will be distributed internally by a single partner responsible for the collection and analysis. These parallel “centralized” integration sub-processes, which correspond to deliverables D3.2, D3.5, D3.8, and D3.11 as depicted in Figure 2, will help us to develop different “global” views and identify faster points of conflict and divergent perspectives.

At this stage, In Section 3, we analyse the interactions took place in the three first events organized by MAZI, all with different scope and structure. And in Section 4, we summarize the answers to the first D3.2 questionnaire focusing on the role of DIY networking as a boundary object. In D3.5 we present the first draft of the questionnaire and answers focusing on the comparison of the experiences in the different pilot studies.

2. Participatory practices and design

2.1 MAZI's different disciplines and social worlds

Design research, urban studies, community and urban informatics, and urban interaction design are all interdisciplinary fields themselves, concerned with the interaction and interdependence of humans with our artificial life-world.

Although Design has always been a central perspective in the development of novel technologies, its own development within the last decade has often been described as its “social turn” (e.g. Fuad-Luke 2009, Manzini & Jégou 2003, Wood 2007), meaning that Design is more and more concerned with its direct influence on the social, on our societies and on the sharing of our urban spaces. As these subjects are becoming increasingly hybrid, Design’s multiple perspectives are highly concerned with the shaping of this technological future of “the social”, and seek to make a contribution to the move towards underlying societal change, driven by a changing technological landscape.

Hereby, DIY networking technologies stand out in terms of novelty, democratic value and openness: Novelty, because the conventions, symbolisms, interaction patterns and social protocols are yet to be designed; Democratic value, because DIY network technologies offer a tool for Design in its quest to provide citizens with possibilities to take part (diSalvo 2009), as it has the opportunity to impact on the aspirations of civic engagement and to make it a more profound, direct, effective and diverse experience of engaging in public issues. Our approach promotes citizen-participation through the development of open access tools to advocate for, and engage with, self-actualization and social transformation; Openness, because of the versatility of this technology, which thus offers a diverse range of application and therefor appears as a highly promising tool for design- related problems.

The MAZI toolkit can become then the core, a boundary object, to community centred participation in the building of artefacts, processes, solutions and mediating concepts to bring the differing together over discussions about how our cities should evolve.

Notice that there is a significant body of literature on DIY networking and more specifically on ‘community wireless networks’ that emphasise the social purposes of their technical infrastructure development, and the democratisation of communication spaces. Such networks have been studied as local communities with special form and membership from a social perspective in an effort to understand the motivations and type of relationships developed between those that participate in their creation and maintenance (Gaved & Mullholand 2008; Powell, 2011; Forlano, 2008; Sandvig 2004), informed by a number of theoretical perspectives including community informatics (Gurstein, 2000) and the social construction of technologies (Bijker, 1995)

Research into local technology initiatives is not new: however recent developments in the capacity and affordability of networked computing devices have enabled citizens as well as enterprises and governments to drive innovations (Schiavo et al. 2013) and mainstream media coverage of risks to personal and community data privacy have led to a broader interest in localised and community managed solutions.

The MAZI project contributes significantly to this thread of research and action by collaborating with different communities to explore the role that DIY networking technologies and philosophical approaches can play in enabling local empowerment of citizens, and how this might impact on the social and economic cohesiveness of local neighbourhoods.

Through the process of designing and trialling the MAZI toolkit in collaboration with community participants in a number of varying scenarios and environments, we have the opportunity to identify commonalities and diversity across the installations, and reveal key current challenges and promising avenues for future exploration. Working closely with community organisations our work will have the opportunity to not only inform academic research but also technical communities such as the open source movement, public administrations, and citizen activists.

In this process, the MAZI toolkit will form a “boundary object” which can be appropriated by the different groups while developing concrete local solutions and corresponding instantiations of the toolkit, the MAZI

zones, but also negotiated in a continuous back and forth between the “strong” structure of these concrete installations and the “weak” structure of the generic toolkit.

In the following we provide a short overview of the different perspectives on participation and design represented in MAZI while in Deliverable 3.5 there is detailed description of the different concrete pilot studies in Berlin, London, Zurich, and various cities across Europe.

2.2 Urban planning

At the time when Henri Lefebvre published his revolutionary ideas regarding the right to the city, an American activist engaged in community development studies for the commons, Sherry R. Arnstein wrote a paper on citizen participation from her experience with community work in the US [1]. She proposed a hierarchy of different degrees of citizen engagement in decision-making processes, which she called "the ladder of citizen participation", aiming to provide a finer grain of detail to this generic and ubiquitous term that implies various degrees of citizen power in urban politics. Until today this journal article became a reference for the topic, despite the more 'top-down' organization of participatory processes that she experienced at the time of writing it. So she argued that the degrees of power granted to citizens in participatory decision-making processes vary on eight rungs of the ladder, from nonparticipation (i.e. manipulation, and therapy) through tokenism (i.e. informing, consultation and placation) reaching citizen power (i.e. partnership, delegated power and citizen control).

Since then there are variations of practices to engaging citizens in decision-making processes, which have been theorized under different names such as participatory, deliberative, communicative, or collaborative planning (e.g., [17][25]). Despite all these efforts, there are many concerns regarding the effectiveness of these processes due to various challenges related to the limited time allocated to political activities, and also necessary skills, in addition to power games, top-down settings etc. In spite of many voices claiming that ICTs can solve some of these problems, the promises of e-planning, e-deliberation, and e-democracy are still to be realized; however, the issue of digital divides adds to all of the previous concerns that do not seem to be properly tackled in the digital scenario as well.

As for the MAZI Pilot in Zurich (Kraftwerk1/NeNa1), there is already a long tradition of citizen participation in Swiss politics and in civic actions. Note that the Swiss Confederation is a direct democracy, and political engagement is part of the everyday life of its citizens, who hold more power than in a representative democracy. In context, the so-called 'young cooperatives' (e.g. Kraftwerk1 and NeNa1) give also a material expression to the exercising of grass-roots democracy in the everyday life; the participants in these political constructs operate at the higher rungs of Arnstein's ladder, having either delegated power, or even control over the decision making processes, depending on the type of decisions on the agenda. In this collaborative environment, the MAZI project may bring DIY networking as a communication mediator and catalyst of decision making processes. In planning to address the challenges brought about by technology, the Hybrid letterbox is one main input device, for instance that is playful, non-intrusive and can bridge various digital divides. Moreover, the roles that the MAZI Zurich team play in the pilot are going to alternate dynamically at the 'border' between outside and inside the space of research, depending on the degree of involvement in the grass-roots activities of the researchers or of the activists. Therefore, the main guidelines leading their design of participatory processes are in the realm of the position of researchers relative to the object of study, developing the habit of stranger-like researchers, and in identifying 'problems'. As the design process depends on the state of understanding the problem, the MAZI Zurich team engages actively with the communities, in Kraftwerk1 as well as concerning knowledge transfer to NeNa1 in Zurich or to INURA Athens and Co-app building in Greece.

2.3 Participatory design and design as infrastructuring

When decision-making refers to the design of technology to address social needs (Armstrong et al. 2014), Participatory Design (Manzini 2003, 2006, Björgvinsson et al. 2006) has been gaining attention worldwide and refers to the activity of designers and non-designers working together in development processes. The concepts of living labs¹, cultural probes and co-creation are all instances, elements or variations of the main principle behind the Participatory Design practice: the people who are being addressed by design are no longer seen

simply as users, consumers or customers. Instead, they are seen as the experts in understanding their own ways of living and working. They are valuable partners in the development process.

Although Participatory Design has been rewarded with much attention, at the same time some critics have raised concerns about idealized and un-reflected assumptions and the neglect of power relations. Thus the intent for a more inclusive and emancipated design raises high hopes, but also some important questions: What are the mechanisms through which people can be triggered to become active members in their communities? How can a participatory procedure be sensible to actors with unequal resources? How should one deal with different levels of expertise? And who should be integrated in the design process anyway?

These questions become particularly interesting when thought together with the rapid developments in DIY and open source cultures in recent years. These processes seek to empower people to shape technologies according to their own needs, based on the creation and provision of general tools and methodologies that provide the means to non-experts to become designers of their own technology without the intervention of researchers or decision-makers. These novel ways to easily produce and sell something through digital tools like online marketplaces and Open Source resources, shared online enable virtually anyone to become “a designer”, as Gerritzen & Lovink (2001) put it: “sharing open source, allowing open access, and fostering open innovation are principles of a digital society that speeded up production processes, innovation and even research processes. Through adapting, recycling or remixing, it becomes much easier to create value”.

One promising – and for the Berlin pilot team an action-leading development of participatory design – was described by Pelle Ehn and colleagues as Design as Infrastructuring (Ehn 2008, Binder et al. 2011). This approach foresees experimentation through the construction of long-lasting structures and the development of design tools in order to understand and shape the capabilities of professionals and layman alike to partake in the shaping of our societies in a socially, economically and culturally sustainable way. Instead of looking at the designer as the problem solver, Design as Infrastructuring creates possibilities, in and through which others can create their own solutions to their own issues.

Depending on the given particularities, these structures can consist out of virtually anything like tools, physical spaces, shared language or protocols: Instead of the design of solutions to this or that problem, Design as Infrastructuring focusses on the design of tools to be used by others in solving their own issues. It is often argued that this approach to deploying the resources of designers and technologists are potentially more sustainable, as societal, political, neighbourly problems are by definition constantly evolving and thus can never be entirely solved: “Having durable socio-material structures in place that enable neighbours to tackle their own problems equipped with novel tools and methods can have more long-lasting and profound societal impact on a neighbourhood than the solution to a concrete problem” (Joost & Unteidig 2015).

2.4 Critical design

Another approach in empowering citizens to become part of decision-making processes is to provide concrete and tangible potential future scenarios. These accessible and provoking scenarios can be used to inspire activities that lead to strategy discussions and agenda setting. Critical Design (Dunne, 1999) presents design as a catalyst or provocation for thought. It is a strategy for exploring the space that lies tantalisingly beyond the current and the now. By contextualising this approach at the edges of our knowledge, it is possible to use design to create ‘design fictions’ (Bleeker & Nova, 2009). The role of design fictions is to activate the imagination rather than specify technology or make claims about the future.

The key attribute of design fiction is that it is meant to start conversations (Bleeker, 2012). For example, Lukic, in his book entitled *NonObject* (Lukic, 2011), created an array of near-future objects as a means of surveying the bounds of the believable and pressing against the perimeter of the possible. This characterisation of design as a means of ‘cultural research’ closely parallels the aspirations of Critical Design. The *UrbanIXD* project (Smyth et al, 2013) provided examples of fictions that challenge our assumptions and preconceptions about the role that products and services play in everyday life. The challenge facing such early stage concept generation is to project forward by tapping into higher level needs and desires that are often not obviously apparent.

Through the use of a critical or speculative approach to design envisionment the NU team have developed a range of skills and methods that we bring to the unMonastery pilot. Firstly, the design of participatory workshops centred around active data gathering as a precursor to problem articulation. In such workshops the methods that have been successfully used are guerrilla ethnography & fictional narratives as a means of

gathering the rich visual data about the urban space in which we engage. Secondly, the creation of prototypes (design fictions) to provoke critical dialogue about possible future scenarios. Thirdly, the design of public installations that encouraged people to reflect on various aspects everyday living and finally, the design of public exhibition pieces that encourage dialogue and reflection on our shared futures.

2.5 Community informatics

Community Informatics (CI) is “the application of information and communication technologies (ICT) to enable and empower community processes” (Gurstein 2007 p.11). It assumes that geographically co-located communities of people (‘communities of place’) have characteristics, challenges, and opportunities that require different strategies for considering the design, development, implementation and long-term sustainability of ICT services from addressing an individual’s needs. Castells (2000) amongst others has noted that ‘networks’ are a dominant and pervasive structural feature of our current digitised societies hence a focus on networked technologies is of specific relevance. There is, however, a philosophical tension between the concept of networks as groups of nodes, opposed to communities as expressions of collective actions: Day (2005) contends that CI emerged as a response to the individualised model implied by the concept of a ‘networked society’.

Seeking to empower a ‘local community’ requires a different set of approaches from engaging with an individual as a consumer. A core activity in CI is to understand a community’s ambitions, goals, and challenges, and recognises that a ‘community’ is often not homogeneous (Antoniadis et al. 2015). Empowerment implies raising self-efficacy, and CI approaches seek to understand a community’s resources in the broadest sense (including social and cultural capital as well as financial capacity), how they can be enhanced, and the consideration of appropriate ICT systems that can be sustained long-term by the community itself. A first step for MAZI will be to map current communities and groups and their activities within pilot study locations: an activity that is already underway.

Engagement requires methodological approaches that give voice to the agency and expertise of the community: CI takes a participatory focussed approach to research and in this sense shares common attributes with participatory design that emphasises a “participatory mindset” where designers and researchers work with people, rather than an “expert mindset” where experts design for people (Sanders 2008). Ritas (2003) considers the continuum of possible engagements between researchers and community and CI tends towards participatory or democratic models of relationships, where there is a “convergence of community need and researcher/interest expertise” (p.5) and moving towards a partnership where the community actors play a more active role in steering the decision making processes during the collaboration. This again echoes participatory design with its emphasis on “[building] trust and relationships leading to fruitful collaboration” (Cederman-Haysom and Brereton, 2006). Participatory workshops will be employed, supported by in-depth interviews where appropriate. In some cases, these may be assisted by the use of DIY networking tools, to both enhance the data capture and discussion processes but also to act as ‘boundary objects’ to help stimulate debate.

A key challenge we will face is the best understanding how to configure the MAZI toolkit to best serve our communities, faced with a range of challenges and issues in different situations. To this end, we can consider developing a typology of issues and overlaying this with a typology of MAZI toolkit functionalities, and potentially a classification of types of DIY network developers. We see potential for drawing parallels with Funtowicz and Ravetz’s typology of knowledge (1991) that distinguishes between types of problem solving strategies based on how the underpinning knowledge is characterised by low to high measures of decision stakes and system uncertainty. Moreover, we can draw lessons from Grand et al. (2016) that created a typology to characterise levels of digital engagement with research.

2.6 Engineering

From an engineering perspective, technology is treated as a generic enabler, as a tool, and the objective is to make it work well according to various performance metrics in order to be used by others in ways that are often considered only in a speculative way, if any. Many technologies were indeed made popular for different purposes than those initially anticipated, even for cases that today might seem obvious such as the phone or the SMS. The Internet is perhaps the best example for such a technology made by engineers without asking different “communities” about their specific needs, but which was appropriated in numerous ways to address

exactly such needs. As argued by David Clark, one of the Internet’s architects, and his colleagues (2005), the Internet was built according to the “design for tussle” principle, according to which network designers should avoid to implement hard decisions in the network core, allowing it to adapt according to different social or economic conditions, and other forces.

3. Common group learning

3.1 Before MAZI started

3.1.1 Dagstuhl seminar

Dagstuhl Schloss, Germany, January 19-22th, 2014

<http://www.dagstuhl.de/14042>

MAZI participants: Panayotis Antoniadis, Ileana Apostol, Michael Smyth, Mark Gaved

The DIY Networking community was initiated during a successful Dagstuhl seminar in January 2014, when also the term was coined [5]. A balanced mix of researchers from the fields of networking, media studies, human-computer interaction, urban and community informatics, together with artists and activists worked together on different applications areas of hybrid space design based on DIY networks. Among various collaborations initiated in that seminar, a series of interdisciplinary workshops on DIY networking will be hosted every year in a conference of a different related field; see <http://diynetworking.net>.

Some key lessons learned from this first gathering include the importance of low expectations, the balance between different disciplines and perspectives, but also the requirement to focus on the problems that are collectively identified as urgent or necessary to be addressed, rather than on the need to develop novel technologies. As Mark Gaved mentioned, from his research experience with community catalysts “the two technologies that turned out to be important for social networking were ‘tea’ and ‘cake’” (Antoniadis et al. 2014).

3.1.2 Volos summer school

Volos, Greece, July 13-20th 2014

<http://internet-science.eu/summer-school-2014>

MAZI participants: Michael Smyth, Andreas Unteidig, Harris Niavis, Mark Gaved, Panayotis Antoniadis, Ileana Apostol, Stavroula Maglavera

Just as DIY networking was placed as a boundary object at the crossing of various disciplines within the Dagstuhl seminar, in July 2014 we initiated the first of a series of summer schools that place the city at the core of the collaborative work. The 2014 case aimed to initiate a collective and interactive portrait of the city of Volos in Greece, by means of creating points of interest and exchanges between citizens.

For instance, among the imagined hybrid urban applications by the urban interaction design working group, led by Michael Smyth and Andreas Unteidig, in collaboration with the DIY networking group, led by Mark Gaved and Harris Niavis (University of Thessaly), is a colourful chair together with an explanatory board, which could attract the attention of passers-by – locals as well as tourists – and invite them to take pictures of themselves (selfies) with that particular urban frame in the background, becoming a promotion sign of the city. These images are then automatically uploaded to a website that can only be accessed by a local network at the location, as the chair has a Raspberry Pi device that can connect smartphones with the website in a local network. Once four pictures were submitted and displayed next to each other, the older pictures vanish with the submission of new ones, creating a playful and ephemeral approach to representing oneself in a semi-public, hybrid space.

During the feedback session with representatives from the city authorities, Pantelis Skayannis raised the issue of density for the placement of these chairs, as well as the difficulty of sustaining interest in them over time. For this and other potential hybrid applications, bureaucratic obstacles, security and safety issues like the need to protect the containers of different devices were raised together with concerns about, the digital divide/knowledge gap; many participants valued Vasilis Sgouris' suggestion to combine within a project entity the different proposals technically, and especially administration-wise.

3.1.3 Community Now? symposium

Berlin, February 19-21st, 2015

<http://www.community-now.org/>

MAZI participants: Panayotis Antoniadis, Ileana Apostol, Michael Smyth, Andreas Unteidig

At the Community Now symposium, in Berlin in February 2015, we organized the workshop “Empowering Citizens to Shape Their Hybrid Space.” The goal of this workshop was to explore a variety of methods for empowering citizens to build understandings of the fast evolving hybrid space of their cities, in order to participate more actively in city formation, and to use it for (self-)representation and engagement in local interactions. This process will increase the possibilities for claiming our right to the (hybrid) city from profit-driven development and tech corporations.

In this context the concept of diversity plays a key role. First, the design process needs to integrate elements from urban studies, social sciences, urban interaction design, and computer science, among others, which means that people with very different backgrounds and perspectives need to work together. Second, in practice, the developed ICTs that aim to facilitate hybrid interactions, like those based on DIY networking, have to address the diversity of people that happen to be in physical proximity for small or long time durations. Within this logic, after a short presentation of the workshop aims Ileana Apostol and Panayotis Antoniadis invited the participants to introduce themselves through a personal story on experiencing with diversity, and these thirty, approximately, narratives shaped the workshop content.

Every personal experience brought a new element in better understanding the concept of diversity and its role in facilitating contact between strangers in the city. The exchange levels varied from the simple exposure, (eye) contact and awareness, through speech expressed in language –also touching the issues of using different vocabulary in deliberations– to actions, where the examples ranged from knowledge sharing and service exchange, to personal strategies to 'survive' in either diverse or in homogeneous environments, to collective engagement, governance and long-term practices, including the provision of alternative media, collective construction of knowledge, and education.

A brief overview of the possibilities that DIY technology open up generated a discussion in light of the previous stories, on how to use and also advance the technology as mediator of collective awareness and/or triangulator between strangers in public life. On the one hand, it was suggested that people may be more motivated to use it creatively, if digital technology has a physical expression and a more 'human' friendly face, which could turn it attractive, as well as the inclusion in the design process of perspectives toward better usability, that do not always come from tech-savvy users. On the other hand, it was generally agreed that some sort of moderation is needed while using the technology, with the possibility over time also to reverse 'anonymity', as well as customization according to values toward affirming differences without exclusion.

3.1.4 Unsmarting the city

Brussels, May 27th 2015 and July 7-8th 2015

<http://internetscienceconference.eu/>, <http://caps-conference.eu/>

MAZI participants: Panayotis Antoniadis, Ileana Apostol, Katalin Hausel, Jeff Andreoni

This was a series workshop was organized and executed in collaboration between NetHood (Panayotis Antoniadis and Ileana Apostol) and UnMonastery (Katalin Hausel). The overall goal was to engage people from different disciplines in a collaborative process of speculative hybrid space design using DIY networking as the "boundary object". Unlike previous versions of this workshop, like in Dagstuhl and Berlin described above, we decided to develop a more sensorial approach and invited participants to walk with us and explore the surrounding area of the conference's venue searching for suitable locations and possible situations: candidates for hybrid urban/artistic interventions that can facilitate contact between strangers in public spaces.

So, in the first instance of this workshop, in May 27th 2015, we gathered at the centre of the main square at Flagey, Brussels. While Ileana and Katalin were giving hints on how to analyse the city's built environment and observe people, we were lucky to witness a "pop-up" installation by Pepsi. Then, after a moment of

bewilderment, the "key" was provided by a participant who volunteered to bring us to a very nice monastery close-by. The path was longer than expected but very rewarding, since the contrast between the huge Flagey square and the beautiful open garden of the monastery provided the setting for interesting discussions, which were concluded at an improvised wrap-up session at the cafe of the square. It was very nice to listen to the participants impressions and ideas for possible interventions (like a pop-up "let me show you my favorite place" stand encouraging local people to guide interested passers-by to a close-by place of personal significance), and at the same observe more relaxed the use of this interesting public space.

After the end of the conference, in the evening, one participant noticed that the use of the space had changed, since many young people were sitting now on the pavement drinking beer and discussing, creating a more convivial atmosphere than the one we witnessed earlier in the day.

The second instance of the "unsmarting the city" workshop took place again in Brussels a few months after the first, July 7-8th 2015. As advertised on NetHood's web site "A walking workshop to explore citizen engagement in the smart city, shifting our approach from sensors to senses, from Internet-based locative media to offline DIY networks, from algorithmic matching to genuine serendipity, from powerful mediators to local actors". This time we had with us also Jeff Andreoni (unMonastery) who helped us to explore the advantages of offline networks and smart city concepts for designing technology to serve face-to-face meetings and local communities.

After an introduction to demonstrate the importance of the local and face-to-face for urban development, we guide the workshop participants through a collaborative process of hybrid space design: we go out to the streets to explore the surroundings of the conference's venue to analyze the spatial and social aspects of different places, and to identify locations that are candidates for hybrid urban interventions. We will talk about how to take advantage of the special characteristics of DIY networking ---ownership, de facto physical proximity, anonymity, and inclusive access--- and facilitate contact between strangers in the city. After our collective walk, we will gather at a public space to think together about possible applications and possible processes to design them, including software, hardware, surrounding artifacts and performance. Finally, building on the number and competencies of the participants, and the availability of time we develop a few prototypes of selected applications and organize an urban intervention in the corresponding locations.

3.2 After the MAZI kick-off

After the official start of the MAZI project, the consortium members organized three events of different nature and scope, that were all meant to function as ice-breakers for the collaboration within the project. The first event in January was a two-days workshop introducing to the team a community network in Sarantaporo Valley in Greece, the second one was a hybrid interactive workshop at the Transmediale festival in Berlin, and the third event was again a daylong workshop introducing to the group the Deptford Creek and the Deptford community in London. The locations chosen for the workshops are in preparation of the MAZI pilots.

The following sections present these three events, according to a proposed structure that is subject to ongoing improvement during the project. It includes

- a) brief description,
- b) the transformation process, describing the role of the main event topic, from triangulator to catalyst of exchanges, leading to the boundary object status within interdisciplinary deliberations,
- c) variation and specificity, where detailed descriptions of the discussions, presentations, participants show the rich context of the event,
- d) issues raised, where the conflicting interests, power relations, politics, and trade-offs such as efficiency, context, uncertainty and ambiguity are the focus of attention, and e) complementarity, and expanding the scope of DIY and offline networking.

3.2.1 MAZI kick-off and Sarantaporo symposium

1) Event Description

The MAZI kick-off meeting took place in Volos, Greece, at the University of Thessaly, on January 13-14th. The main objective was to meet each other, get a better idea of the different backgrounds and perspectives, and start organizing our first steps into the project.

The kick-off meeting was followed by a 3-day symposium at the Sarantaporo area, perhaps the only success story in Greece of a functional, open to all, community network. We were hosted by the team of Sarantaporo.gr, the non-profit organization that runs and maintains the network in collaboration with the local communities. See <http://www.sarantaporo.gr/node/377>. Together with more people from Athens and other cities interested on the topic, in total 30 people, we visited different villages in the area that are part of the network, including the "headquarters" at Sarantaporo, and discussed with locals about the present and the future of this remarkable effort on network commoning.

2) Process

Clearly, the role of DIY networking was central during this first gathering of all MAZI partners. Although many of us, actually all the "academic" partners, had been involved in related events described above, the addition of the four "pilot partners" created very interesting dynamics in the group. First, we heard each other presenting our common past experiences to outsiders, and we had the chance to listen to the understandings of people that were only very recently introduced to the topic but also their activist "on-the-ground" perspective. Our visit to Sarantaporo area, further helped to get to know each other and meet the protagonists of a success story. The interactions with the local people, listening about their aspirations and worries, realizing first hand the digital and other divides, helped us to understand the importance of the local context, and take DIY networking out of its "box".

3) Variation and Specificity

Being hosted at the headquarters of UTH's NITOS Lab, the main focus of our DIY networking discussions was the technology itself. People were guided by Harris Niavis and Thanasis Korakis around the laboratory and had the chance to experience various devices and sensors and talk with those that build them. A MAZI zone made out of a Raspberry Pi with an owncloud installation, was also deployed and it proved very helpful and efficient for sharing slides and photos during the meeting.

Panayotis Antoniadis, with the help of the experts in the group provided also a small tutorial on the different modes of connectivity (see also Section 1.1), which clarified many things in light of our visit to Sarantaporo where we saw the big unidirectional antennas forming the backbone links of the network but also the small open-mesh devices that create the access network that covers the connected villages.

Then our small "offline" MAZI zone and the huge Sarantaporo network offering Internet access to 15 villages provided good examples of the two "extremes" of DIY networking's scope.

4) Issues raised

The most interesting, and expected, conflict appeared very soon between the engineers and the social scientists/activists of the project. While discussing the future steps for developing the MAZI toolkit, Harris Niavis asked the representatives of the MAZI pilots their "requirements" from the toolkit. It is a very typical process in engineering projects to gather requirements from the "users" and then implement the corresponding functionality. However, in social sciences such requirements are subject to long processes of participation, deliberation, and decision-making and in our case they would also require as input a comprehensive set of the capabilities of technology. How can one describe their requirements if they don't understand in depth what technology, and in our case DIY networking, can actually deliver?

We resolved this conflict very quickly by agreeing to allow everyone to answer these questions, "What are the requirements of the pilots?" and "What technology can offer?", on their own language. The less constraints we put in the beginning the better we will understand each other's backgrounds, language, and perspectives. Using the boundary object terminology, we can afford having a "weak" structure of what the toolkit is/should be. This will allow more interpretive flexibility and more information available for the next steps of making the structure more concrete.

5) Complementarity and the future of networking

The visit to Sarantaporo helped us realize of what is the current mainstream image of community networks: community-owned Internet access infrastructures. What this means is that our task to present DIY networking technology as means to build complementary networks that operate outside the public Internet with their own local services deployed and managed by local actors will be a challenging task.

Again, the structure of our project, and more specifically that each of our four different social worlds includes an academic partner with a unique disciplinary and methodological perspective on the concept of participation enables us to try different approaches in parallel and learn from each other.

3.2.2 Transmediale festival, off-the-cloud zone

1) Event description

The "off-the-cloud zone" at the Transmediale 2016 festival in Berlin was a hybrid daylong event, Saturday February 6, placing the DIY networking in the middle of the discussion space. The festival accommodated this event in its 'conversationpiece' section; it was organized and moderated by Panayotis Antoniadis, Daphne Dragona, and James Stevens, and planned as a working group meeting open to the public. The event gathered 25 invited speakers and more than 300 people in the public. The "off-the-cloud zone"¹ activity was divided in three main slots including a discussion/workshop session, a session dedicated to talks and presentations, scheduled in the middle of the day, and a panel discussion with vivid interactions with the large evening audience.

2) Process

Many of the invited speakers have been participating in the previous Transmediale 2015 festival in the panel "offline networks unite!", which originated from contacts established through conversations on the "off.networks" mailing list. Their common interest is the provision of grass-roots options, presented either as alternative or as complementary solutions to the mainstream Internet networks, functionalities and applications, no matter if such solutions deal with artistic installations, research projects, resistance actions, proposals for resilience, for social integration, for diminishing the digital divide, and the like. As the description of the event explains, "The choice to go "off the cloud" stems from current disillusionment with networked connectivity, reaching instead for the potential of emerging user-owned and user-controlled infrastructures. Over the last decade a growing scene of artists, hackers, and network practitioners has been actively working on creating community networks, ad-hoc connectivity, and autonomous systems of sensing and data collecting. But how feasible are the changes these groups want to see? ... With open conversation formats and hands-on demonstrations, the event seeks new strategies of joining forces and building common tools to take users beyond the sovereignty of the cloud." (transmediale 2016 Program).

3) Variation and specificity

In the day talks, panel and workshop conversations, the specific interests revolved around various manifestations of DIY networking. For instance, during the independent talks session four different projects have been presented and discussed. This part of the "off-the-cloud zone" allocated around twenty minutes to presentations and reserved another ten minutes for engagement with the public through questions and answers. Below is a short description of each of these projects having as the main purpose to illustrate the broad range of applications within this group's shared aspirations regarding future networking.

A media artist based in Montreal, Evan Light, who undertakes research on privacy and surveillance at the Mobile Media Lab, Concordia University, presented an offline archiving network and surveillance demonstration tool: "The Snowden Archive-in-a-Box". This installation is inspired by David Darts' PirateBox for distributing offline teaching materials to his students. The so-called "Snowden Archive-in-a-Box" could be built virtually by anyone, as it is based on a RaspberryPi 2 mini-computer; improvements to the current versions can consist of high-quality battery packs, adding power for autonomy.

¹ <https://2016.transmediale.de/content/off-the-cloud-zone>

The following demonstration was a hub for aware local area networks by dyne.org. This is an Amsterdam-based not for profit organization established in 2005, developing tools and narratives for community empowerment. Five of its members took turns in presenting the Dowse project: "The Privacy Hub for the Internet of Things" namely Dennis Rojo aka Jaromil, Federico Bonelli, Radovan Misovic aka Rad0 and Natacha Roussel. The main purpose of this project is "to perceive and affect all devices in the local sphere", as "the risks of unconscious abuse and exploitation of information asymmetry are growing tremendously." In the Internet of Things (IoT) context, because "things initiate on the behalf of users", the group is committed to provide insight into such situations by creating a clear overview of what goes in and out of the network. dyne.org created Dowse, "a smart digital network appliance for home based local area networks (LAN), but also small and medium business offices" that they aim to become "a hub which is a part of the experience of the networked person, the networked household, the owner of devices, the Internet participant" (from the website <http://dowse.equipment>).

Christoph Wachter and Mathias Jud are two Berlin-based artists, who attempt through various international open-source projects to resolve the dependency on infrastructure, as well as to uncover forms of internet censorship. Their presentation was on their work "qaul.net: a software and a model for autonomous ad hoc networking". The name of qaul.net comes from the Arabic word qaul that means opinion, say, talk or word. It "offers an alternative to expensive or faulty infrastructures", and "creates a basis to build proper tools to jointly acquire new experiences and new insights". By interconnecting computers and mobile devices via WiFi, the network and its operation become seemingly one, and can "directly initiate a fresh, unrestricted and spontaneous network" (Marc Garrett). Such form of ad hoc networking can provide a local communication tool, very useful, for instance, when there are failures of the internet system. More importantly, their projects provide incentives for citizens to explore new forms of networking, as qaul.net is dedicated to "independence and the strengthening of the individual" in order to invert the understanding of networking from a subjective and specific position.

The artists aim through their work to continue the open source projects using a mesh network 'Freifunk' or 'Funkfeuer', and the aid program 'One Laptop per Child', by combining the server and router software with the applications on the devices themselves. One application of these principles was illustrated through their project "Can You Hear Me?" --a reaction to the NSA's Secret Spy Hub--, which was a WLAN / WiFi mesh network with can antennas installed on the roofs of the Academy of Arts and the Swiss Embassy in Berlin. "The antennas created an open and free Wi-Fi communication network in which anyone who wanted to would be able to participate using any Wi-Fi-enabled device without any hindrance, and be able to send messages to those listening on the frequencies that were being intercepted. Text messages, voice chat, file sharing -- anything could be sent anonymously. And people did communicate. Over 15,000 messages were sent." (Jud 2015).

In this session, the last presentation of a grass-roots project was that of a commons based infrastructure for a community network connecting a group of villages in Northern Greece: Sarantaporo.gr. It was presented by George Klissiaris, one of the project initiators and active member in its management and operation, by Stewart Ziff, an artist who co-founded an Athens-based non-profit collaborative arts organization by the name of Personal Cinema, and by Ilias Marmaras, an urbanist and artist who directed the documentary film on the construction process of this community network. The documentary was produced by the filmmaking collective Personal Cinema, and excerpts of it illustrated their argument in favour of expanding such initiatives. In the Sarantaporo Valley at the foot of the Mount Olympos, and in relative proximity to the city of Larisa, there was no provision of Internet access until this DIY wireless network project was initiated, by a group of enthusiasts in 2010. At present, through the community network they provide free internet access to fifteen villages. "Sarantaporo.gr is an open source wireless mesh networking system that relies greatly on voluntary work both for its development and maintenance. Some volunteers are involved in the project by simply installing an antenna on their roof. Others, more actively engaged with the project, are responsible for sustaining the network by hosting meetings and answering technical questions." (Kalessi 2014) "The Sarantaporo Project is an impressive example of how people can come together and experiment in imaginative ways and exploit physical and digital networks" (Marc Garrett).

Moreover, the entire day the Polylogue interactive installation was active in the same space. The MAZI team led by Andreas Unteidig at the UdK Berlin Design Research Lab first exhibited the Polylogue at Transmediale 2016. The description of the installation explains that "Polylogue is a hyperlocal message feed. Contributions sent through WiFi are transformed into a material stream of consciousness, offline but still short-lived.

Polylogue gives space for thoughts, questions, claims and nonsense to stand next to each other, to object, to relate. These messages and their relationships only exist situational: commentaries that were up to date just minutes ago become obliterated after having had a run of approximately two meters - with a pace determined by the density of the conversation." The Polylogue installation has been a test for the first "Mazi Zone", producing throughout the day more than thirty meters of typed and then shredded successful hybrid exchanges among the fluid audience of the "off the cloud zone".

4) Issues raised

In the workshop-type morning discussion session, issues related to networking rights, motivations, usability and engagement were raised. The invited speakers had different backgrounds and experiences, among them being Juergen Neumann, co-founder of Berlin Freifunk.net (2002), who is a social entrepreneur with over twenty years experience in consulting, building and initiating social and digital networks; Lori Emerson is founding director of the Media Archaeology Lab and an associate professor of English Literature and Intermedia Arts, Writing, and Performance at the University of Colorado Boulder; Sarah Grant is a Brooklyn-based artist, technologist, and educator; Dennis de Bel and Roel Roscam Abbing are two young Dutch artists collaborating on a research project on "post-digital communication in the last days of the web."

The round table included also the audience and it was asked to discuss how and why did community networks evolve? What were the challenges of the late 90s and what are the issues being faced today? What were and are the legal and economical issues that need to be faced?

The conversation extended into the afternoon open discussion that gathered in the same panel a large spectrum of interests, from engagement in the arts and design by James Bridle, Sarah T. Gold, Andreas Unteidig, and Ileana Apostol, to the network pioneer, Adam Burns, and militant networkers like Monic Meisel (Berlin Freifunk.net), and Danja Vasiliev, who helped in the principles formulation of the Critical Engineers Manifesto.

The initial questions were: how literate are today's users on issues of infrastructures? Which groups and populations can nowadays be empowered through offline networks? What can art and critical design/critical making offer? There was general agreement that the DIY networks make sense if "addressing the needs of people" but at the same time that one should resist falling into the trap of making easy interfaces so that users do not need to engage in a reflective manner. For example, Federico Bonelli from dyne.org opted for more selective and engaged users rather than those who seek the easiness of one click. Juergen Neumann mentioned that people are motivated to engage in such initiatives out of their needs, which generated a discussion around the dichotomy needs and aspirations, usability and engagement. A good amount of time was also dedicated to the use of terms, for instance, "users" and the possibility of a better term being in the center of the conversation.

Then George Klissiaris from Sarantaporo.gr suggested that there is global-local relationship that is worth considering as it could produce synergies, like in the case of the relatively isolated Sarantaporo Valley, "the local interest for a community network was promoted through the motivation provided by the global Internet."

5) Complementarity and the future of networking

As Marc Garrett noted in his blog entry documenting the event, "in the Off-the-Cloud-Zone talks we encountered an ecology of strategies to protect our own indigenous cultures from the crush of neo-liberalism, we felt part of a grounded movement discovering new conversations and new methodologies that may provide some protection against future colonisation. Perhaps there is a chance, we can build and rebuild stronger relations with each other, beyond: privilege, nation, status, gender, class, race, religion, and career." Moreover, "These projects are dedicated to creating socially grounded and engaged alternatives to the proprietorial, networked frameworks that currently dominate our communication behaviours. These proprietorial systems, whether they are digital or physical are untrustworthy, and control us in ways that reflect their top-down demands but not our common needs. This reflects a wider conversation about who owns our social contexts, our conversations, our fields of practice, the structures we use, the land, the cables, our history, and so on." It is along one of the qaul.net statements that reads: "We reached the age of constructive and collaborative culture techniques long ago. Individual views are shaped by the conditions of communication. Our dependence, however, is hardly realized until we are suddenly trapped and isolated in a blackout."

Nevertheless, Adam Burns noted, "conversations require time and space to develop a shared context (community)", and mentioned building trust and shared aspirations as worth pursuing in such ongoing conversations. The solution appeared soon at the initiative of Jaromil, a mailing list dedicated to off-the-cloud topics -- <http://fairsky.org> -- for now being just a simple mailing list and a web archive that dyne.org intends to host on the long term. The plan is "to work together on a common and independent platform for the critical debate and recognition of software and hardware projects that are focusing on ways to connect and store data that are not depending from cloud hosting i.e. third-party big data silos. ... Fairsky aims to be a common platform useful to all those of us who like to host their own services, build their own mesh networks and in general be aware of the connections between the local and the global networking contexts." Therefore, the discussion continues...

3.2.3 Deptford workshop

1) Description

The "Mazi Monday" in Deptford² was a one day event, on Monday April 25, 2016, organized by SPC's James Stevens from the MAZI London team, with networking collaborations of Panayotis Antoniadis and Philipp Klaus from the MAZI Zurich group, and over twenty guests including Deptford residents, members of INURA London, MAZI partners and also partners of netCommons CAPS Project. In the middle of the discussion space was the Deptford Creek and the possibilities for the future local network Creeknet. This was a special "Mazi Monday", as the weekly MAZI Pilot meet-ups are called. The day was divided into three main slots of activities. During the first hour and a half, the participants enjoyed a guided low tide walk on Deptford Creek, led by botanist Nick Bertrand of the Creekside Education Trust, who presented the perspective of the Creekside Discovery Centre (<http://www.creeksidecentre.org.uk/>) on the current and future environmental state of Deptford Creek. Then at the current venue of the weekly "Mazi Mondays" --the Minesweeper Collective (<http://minesweepercollective.co.uk/>) -- a series of interdisciplinary discussions took place regarding the objectives of the MAZI project, focusing on the exploration of community interactions via a local network. The day ended with a visit to SPC's main office, 'Deckspace' (<http://dek.spc.org/>) and conversations on DIY networking. This was a very informative event, meant to be an ice-breaker, bringing together a range of actors who previously had little or no contact, exploring the possibilities for the MAZI Pilot in Deptford.

2) DIY networking as triangulator, mediator and catalyst ----> Boundary object

Giving the different activities of the event, the number of participants varied during the day. The MAZI partners from London, Edinburgh and Zurich had the chance to actively engage in conversations throughout the day with members of the INURA London, interactions where the workshop topic played first the role of a triangulator, but then relatively early it became a mediator of more in-depth discussions. The low tide walk brought this group together with a number of Deptford residents; the river ecology and environmental concerns related to fast urban developments bordering the river bed was the main topic during the walk, which itself became an experiential triangulator or, in other words, an exceptional opportunity to meet new people. The roundtable at the Minesweeper Collective was joined also by members of the netCommons project, who are involved also in interdisciplinary research and were eager to know more about the local perspective on community networks, as well as simply to make connections. So the workshop participants have had various interactive experiences, but as the objective of the "Mazi Monday" event was an initial presentation of Deptford Creek and its community, the topic stayed in the realm of mediation of exchanges.

3) Variation and Specificity

The organizer of the event, SPC, has been running a community wireless network OWN (Open Wireless Network) in Deptford, South East London, "to provide free street level Internet access utilising the latest low cost and low power equipment since 2008, developing from their 2001 original network". This pioneering network has always emphasised its social dimension of bringing people together in the neighborhood. On Deptford Creek, there are two particular grassroots initiatives, which were present in the workshop as well.

² <http://spc.org/mudlarking-on/>

One of them is the Minesweeper Collective, located on a WWII Minesweeper boat within the boating community on Deptford Creek. Besides hosting the "MAZI Mondays" it's been operating an art lab and runs weekly artist workshops where screen print, painting and woodcraft skills are shared with locals. The other initiative is the Creekside Discovery Centre, which has the mission of monitoring the ecology of the creek, informing, and educating local residents, school children and other community members about people's impact on the environment and its wildlife; Deptford Creek "remains mostly fresh water with very little saline effect to deter plant and animal propagation" (JS). Other local landmarks like Cutty Sark, the Royal Park and the National Maritime Museum (www.rmg.co.uk) were also present in the event, as participants walked via Greenwich town centre on their way to the Deckspace media lab.

4) Issues raised

At present there is concern in Deptford due to ongoing process of redevelopment and gentrification, which has led to "local debates about the identity and future of the area", thus citizens organize in neighborhood groups to deal with the fast changing situation. During the discussion rounds at the Minesweeper Collective, there were many fruitful exchanges on personal engagement with neighborhood and community service. The interesting mix of participants created a broad range of interests, understandings and experiences with networking at the neighborhood level. Some of the experienced guests from INURA London exchanged with Deptford activists related knowledge and experience. For instance, the collaboration with the London-based non-profit organization Locality (<http://locality.org.uk/>) became at one moment the topic of intensive discussions. Locality presents itself as "the national network of ambitious and enterprising community-led organisations, working together to help neighbourhoods thrive." The neighborhood initiative group in Deptford does not feel so empowered within its framework, according to Paul, while community activists in the Hammersmith district of west London, by sharing their stories, opened a spectrum of possibilities in which Deptford may place their actions.

5) Complementarity, and expanding the scope of DIY and offline networking

Since March 2016 the "Mazi Mondays" are held at the Minesweeper Collective, as James Sevens documents consistently, "to begin exploration of opportunities to improve on existing antonymous energy systems, broadband connectivity and to extend senses of the boat into the creek." Deckspace media lab offers working space to foster creative interests and social interaction. Moreover, the "refurbishment of OWN infrastructure continues with update of the antenna installation at APT on Creekside, linking back to Minesweeper and within easy range of Birdsnest" [local pub and art scene]. While the activities at the Creekside Education Trust are informed, as stated on their website, by the hope "that by working alongside those active in local issues and by supporting respective activities that an improved sense of togetherness and shared benefit, will encourage the voice of those, facing changes they struggle to comprehend let alone influence otherwise."

3.3 MAZI events for common group learning

Exposure to other "social worlds" --of different disciplines and of different design methods-- creates a 'mirror' effect that can stimulate exchanges, comparisons and (re-)interpretations of terms, with the effect of enriching vocabularies, forming concepts and strengthening methods. In using a structure for event analyses, like the one proposed in the previous sections, the events' input to the MAZI project may be explored comparatively. The purpose of such analyses in comparison is not creating classifications or pondering against some ideal situation, but rather to sharpen our understanding of the particular pilot studies that we engage with during the project.

The events presented in the previous sections brought in the project an alternating rhythm of "interactive exchanges - retreat and reflection - interactive exchanges", which potentially will lead to extraction of appropriate vocabularies, to the formulation of guidelines and to development methods that will be included in the comprehensive MAZI Toolkit. In the next section we present one of the reflective sides of such processes, for which we employ structuring questionnaires.

4 Self-reflection and questionnaires

4.1 MAZI questionnaires

One of the core methodological tools to elicit useful information and build knowledge from the various interactions carried out between the project partners and inside the pilots is a series of questionnaires that will try to capture over time the evolution of the “back-and-forth” around our boundary objects described above. One could see this as an ongoing “self-reflection” exercise throughout the project, which is very critical for the successful collaboration of diverse groups like ours.

The different questionnaires will be also subject to improvements and refinement based on the answers we receive, and on the project development. We present below the set of answers we received for the first version of the questionnaire on “DIY networking as a boundary object”, focusing on various events that include all the partners of the project and sometimes outsiders.

A similar questionnaire is under development for the interdisciplinary comparative framework focusing on the “local” activity in each pilot, and is included in Deliverable 3.5.

After the deployment of the first MAZI zones using the MAZI toolkit, a third questionnaire will be developed to document the experience of the different installations, both from the side of the initiator and the participants.

4.2 DIY networking as a boundary object

Our first questionnaire tries to capture the initial understanding and perspectives on the concept of DIY networking, as these have been developed through the initial MAZI events, some of which are summarized in the previous sections. We provide below unfiltered the answers that partners of the project gave for each question to make it easier to observe the diversity of our consortium and compare the different perspectives.

1. From your knowledge and experience, what do you understand by DIY networking?
A human centred approach to the provision of networks that aims to empower people by creating self build toolkits.
A form of small-scale communication network, comprising software and hardware, that is purchased, installed and configured by an individual or small group of people, for their own use.
Not assuming that someone else will best serve your network connectivity and entertainment streams then taking steps to understand how these systems work and self provide, iterate and move forward.
By DIY networking I understand the experimental application of networking technology for large scale (e.g. guify) and (mostly) small scale contexts. DIY networking refers to the appropriation of technology beyond the pre-designed solutions presented to customers by commercial providers. This can be done by the use of off-the-shelf hardware and its customization (or by productive “misuse”) but is in my mind connected to the application of open source hardware that serves as infrastructure, that is open enough to be appropriated for future usage. For me, one central parameter of DIY networking is the opportunity to design the interactions to be facilitated or mediated by ICT in novel ways that are not bound to the “naturalized” processes of communication designed and sold by very successful platforms such as facebook, twitter or the like.
The most important characteristics of DIY-networking are the do-it-yourself component, community ownership and self-organization around technology. The DIY-aspect has to be put in context. Although it is practically possible to make and create these networks yourself, it is clear that a certain interest and digital literacy is explicitly needed. Community ownership of the networks is a vital counter-argument to commercial/traditional digital networks. To assure longevity of the networks, self-organization around content management and maintenance should be vital for the network. Other aspects of DIY networks are the proximity/location based aspect as well as the possibly internet-independence of the networks.

Easy to build, easy to manage system providing wireless access, which allow people to communicate through a network even in absence of a connection to the Internet.
DIY networking is the common provision of telecommunication tools, be it hardware be it software with purpose of independent exchange of information.
DIY networking is the procedure where someone acquires low cost, easy-to-find hardware components, not necessary open source, in order to build a network using open source software. The hardware components include small-sized computers, antennas, network modules etc. and it is generally easy to assemble it and install it, using custom methodologies.
It is a grassroots form of enabling connection and communication at the local level, which could be self-built, self-managed, self-governed and owned at the grassroots level in different forms (cooperation, association of individuals or groups etc); they make most of the community networks.
Do-It-Yourself networking refers to a conceptual approach to the use of low-cost hardware and networking technology to deploy local communication networks owned and sustained by the individuals or groups who have set them up. DIY networks are not only technical systems but also social systems: they rely on people, so are shaped by the participants' motivations, personal and political philosophies, and their goals and ambitions. "Do It Yourself Networking" can operate across a spectrum of several dimensions, it is not a single, homogenous, approach. Researchers and practitioners must consider what is meant by "Doing", what is meant by "It" and what is meant by "Yourself" (and "Networking"). There are ranges of reasons for why this activity is carried out (motivations, purposes, goals) and constituent activities may operate across spectra in different dimensions/aspects. For example, the setting up of such a network might be carried out wholly independently; with the support of other practitioners, or by paying for expert support. A network might operate completely independently of the Internet, or be complimentary or subsidiary to networking capabilities provided by a commercial or government funded network provider. The network may be a small scale purposefully temporary art installation or a long term infrastructure initiative across a city or country. Researchers need to map the constituent dimensions of a DIY networking initiative when considering how to analyse and evaluate activities carried out. There is literature around DIY cultures that could inform frameworks within which DIY networking might be explored, e.g. Ratto and Boller (2014).
My understanding is that normal networking allows individuals working together to form groups around communications infrastructure; DIY networking allows the opposite, communications infrastructure forms around groups.

2. Do you imagine real-life situations in which DIY networking would play the role of a catalyst, and others in which it would not serve such purpose?
The deployment of any network has the potential to act as a catalyst for individuals/communities, in that DIY networks are no different. Maybe a key factor is the investment of effort on the part of the community to build the network (the Y in DIY). A network is an infrastructure to support activities - but merely putting the label interdisciplinary on a lab door does not mean that interdisciplinary activities will take place inside.
DIY networking can be considered as a particular type of technology, or as a particular type of approach to the way technology is used in a situation. From the perspective of a designer, technology is usually considered as a raw material, providing functionality that enables a system to be created that fulfils certain requirements or meets certain goals. These specific requirements are derived from higher-level aims, perceived social needs or market gaps. In this way of thinking, the technology itself is not the focus, it is the practical means to achieve an end goal. Therefore, in order for DIY networking to be a catalyst, it must be discussed as a "concept", method or approach, rather than as a particular type of technology. It perhaps differs from other types of technology only in terms of who controls it.
DIY networking like mechanics, medicine and gardening is an acquired taste but quickly returns value and inspires confidence in other areas of our lives. So it definitely serves as catalyst to further awareness and involvement in other areas perhaps better suited to ones temperament and skills. The experience gained in co-ordination of effort and communication of process aids further interests.
I think this depends on the level of sensitivity towards the use of independent/open/non-commercial products as well as on the level of curiosity and interest in experimental formats. As I work in the midst of political

initiatives that are very critical towards the misuse of data and the commercialization/productization of their communications, the nimbus of DIY is paramount. Also, the opportunities to design interactions without the boundaries of commercialized products are appealing to this particular group. I do not think that DIY networking approaches can beat commercial or large-scale application and services in terms of ease of use, comfort and functional reliability (unless we talk about extreme situations, such as hurricane sandy // tidepools).

Location-based networks, making all the users be in some kind of proximity to one another, always poses the question why not just speak to each other. The same was however asked in the initial phases of internet and email, where we were asking why send an email to a colleague next door. Needs can be produced or induced by the existence of possibilities. In our initial working phase, closely thinking together with other local initiatives, key points of departure for DIY-networks can be in archiving material, broadcasting opinion, storytelling, co-working tools, enhancer of transparency and connecting different initiatives. In the project we have discussed very much the bind in on the one hand wanting to work needs-based, but also lacking the imagination to understand possible needs. The hopeful path of revelation of the project for us would be: Needs-based - lack of imagination - production of needs through possibilities - real needs - growing of imagination - meeting needs through production - needs-based engineering.

The Sarantaporo.gr is a really good example where the community network was built in very close cooperation of Athens engineers with the local community (with no knowledge of technology), prompting openness, and an appetite for further collaboration, to see how new technology can be used to aid with local agricultural production. If the Internet was simply provided as a service, the trust that is necessary to open up towards new technology would not exist. A counter example would be the unMonastery summer camp in Kokkinopilos. The network covered the building, but the tools installed on the system were clunky, and seemed unnecessary, as we went there to spend time face-to-face.

Yes, in situations where locality is a privilege, DIY networking can play the role of a catalyst engaging easier the locals. In addition, in cases where Internet or wider scale networks doesn't exist, the DIY networking could significantly empower locals with tools of similar value and importance as those provided by the Internet. On the other hand, in situations where we need reliability, sustainability, high computational power or high storage capacity, we can not rely on DIY networks.

The existence of a form of DIY networking could stimulate communication and exchanges in the making, maintenance and use of it, which may function further as a catalyst of activities at the local/neighborhood level. For instance, OWN (Open Wireless Network) in Deptford had the role of a catalyst in creating also a space for gatherings either the "MAZI Mondays" at the Minesweeper Collective or the Deckspace media lab, where knowledge could be shared, 'issues' could be discussed and sorted out, and by and large a sense of community is shaped.

There are situations in which DIY networking might be enacted to support the achievement of an individual or a group's goals. In these situations a DIY networking initiative might act as the catalyst for reflection on the broader goals, purposes, and ambitions of the participants. The affordances of the DIY networking system itself will be intended to resolve a specific challenge or support the achievement of a particular goal (e.g. enabling discourse, sharing of information generating knowledge or aiding contact between participants), and through the degree to which it successfully fulfils its purpose, or reveals other opportunities, it may act as a catalyst. For example, a DIY networking approach to the implementation of local environmental sensors might

- a) provide environmental data that can inform debate around a local issue;
- b) empower participating actors;
- c) develop capacity for further action;
- d) generate social interactions;
- e) be appropriated for an unexpected use.

Equally a DIY networking initiative could have unintended consequences such as marginalising already vulnerable groups, reinforcing current power structures or consuming resources that might have been better deployed elsewhere. These debates need to be considered through the theoretical lenses used to explore DIY networks.

The limitations for DIY networking are many, but in certain social contexts it has an advantage. The resilience of a DIY network allows it to function in many adverse conditions. Without a central power source, in conditions

where telecommunications are banned, and also in remote regions. However, in urban environments it would be difficult to compete with the ubiquity of the internet, except in cases where the internet is shut down. The only advantage I can think of in an urban environment is the ability to transfer large amounts of data in very short times, something that the internet still struggles with, especially in countries (several in Africa I can think of) where internet is charged by the megabyte.

3. What are the characteristics, capabilities, and / or limitations of DIY networking?

Communities taking ownership and control over the configuration of technology. Such DIY networks can be configured in such a way as to take into account the needs of the local community. One way that this may manifest is by the limitation of the network by physical location and the proximity of people. The main limitation is the effort required by members of the community to develop the skills needed to create and maintain the DIY network. This is premised on the need for communities to recognise and understand the benefits of DIY networks and for the resulting MAZI toolkit to lower the entry threshold to the creation of community networks. Sometimes it will be easier to adopt off the shelf tools (i.e. Google Docs) when working with other groups who have an existing infrastructure.

The main characteristics that make this technology different are to do with the localised, small-scale aspects, and the issues of ownership and control of the systems. These provide novel capabilities, but also intrinsically include limitations.

At the earliest point of awareness everything seems possible - universal freedom of information and utopian gift economy seems within reach. Indeed, many such ideals are within reach, however, drifting powers of concentration, shifting focus of interest and limitations of imagination condition these expectations over time. Levels of long term commitment and engagement fade as access and technologies evolve become common place and then vanish from sight, overlaid with fresh insights and ambitions.

By DIY networking I associate: Affordable, experimental, open, appropriable, slightly piraty. I think it can: bring about tailored solutions, open spaces for experimentation and invention, sensitize for socio-political/economical issues around the production and use of tech, and so forth. I also, less fortunately, associate: bugs, geeks, frustration.

DIY networking can be picked up as a side project or hobby (and does not require a life-long dedication). It is built from clearly labelled functional elements that are connected with easy to implement procedures without the help of an 'expert'. It is offered, not as to be built as a goal in itself, but as a tool that helps you to do 'your thing' - and comes with a long list of what these 'things' may be.

Characteristic: communication independent from enterprises; Limitations: nowadays it competes with 3G/4G

The characteristics are low-cost, easy to find, easy to install. The performance capabilities are in most situations less than the respective commercial products with several limitations and with less reliability. However, the inherent characteristics of the DIY networking render it more adaptive and closer to the users' needs, since it is built and installed by them.

Characteristics and capabilities: citizen control; built, implemented, and operated through participatory processes, strengthening community ties and a sense of ownership and independence from the profit-making commercial companies, materialized collective choices, satisfied (or not) individual preferences; Limitations: digital divide, users' expertise (technology savvy); overwhelming options from corporations; some technical requirements (no obstacles in the case of antennas)

DIY networking can take a myriad of forms therefore it is important to identify the approaches that you will apply in analysing activities: these will inform the concepts and dimensions that can measure the phenomenon you are investigating. For example, a community informatics approach may ask what the characteristics of a community/neighbourhood/group of people are and the challenges the community seeks to address, and how local provisioning of networked technologies may benefit the community as a collective entity, enabling and empowering community processes (Gurstein 2007). The characteristics, capabilities, and limitations of a DIY networking approach to achieving a local goal will be framed in the extent to which the participating community changes, benefits (or is otherwise impacted). Other research domains may emphasise different interpretations of these key terms (e.g. a computer science approach might emphasise instead the extent to which DIY built hardware or software elements technically perform comparable to commercial solutions). Two high level questions to consider as a response may be "what distinguishes DIY networking from other forms of networking" or "under what circumstances is DIY networking a valid alternative to other forms of networking".

There is, for me, and inherent level of trust in location based networks. This trust can't spread however beyond a small user base. Usually these users need to be tech savvy individuals, which can make it an exclusive technology.

4. What is from your perspective a strong potential impact of DIY networking? (Please elaborate)

We must first define what we mean by 'impact' and identify how we will measure/ evaluate it.

a) strengthening the community ties

More an acknowledgement of community links

Creating and caring for a network as a commons situates the technology itself as a triangulator that has the capabilities of strengthening communities.

Hands-on technology building simply creates trust and a sense of control that cuts short of the fear and resistance people have with regard to automation and machines. Even if it is used primarily as a gateway to the Internet, the relationship with the technology is utterly different. It also offers an ongoing expansion of the group of people who are involved, without a commitment to give up city life permanently, effectively addressing the problem of the emptying countryside. It can become an autonomous point of exchange between the city and the countryside.

Possible but not compelling. Depends on the members and the purpose of the group setting up DIY network

Yes, since people discuss, collaborate and exchange ideas about the design and installation of such networks

Yes: citizen control and materialized collective choices; built, implemented, and operated through participatory processes, thus create a sense of ownership and independence from the profit-making commercial companies.

Like any other activity that happens in a locality, A DIY networking initiative might be invisible to the vast majority of people in the area, or highly visible. This will be in part dependent on the focus pf activities and the manner in which participants approach engagement with 'the community' (however this is defined: a problematic term). A DIY networking initiative may or may not have strengthening community ties as a central purpose, and if it does, the effectiveness of achieving the building of either strong or weak social ties can may depend on the approach of the participants in engaging with 'the community'. A participatory approach to the development of a DIY network may build ties between engaged participants and may reach out to wider audiences or it might be closed to a small group of users. Gaved and Anderson (2006) note that some researchers question whether social capital needs to be in place already for it to be built further (some level of community ties already need to exist).

b) improving communication between strangers in proximity

It is possible but not assured

Playful approaches and artistic installations have the potential to trigger curiosity and playfulness of spectators, which in turn can motivate them to let their guard down and communicate with people they would not come into contact under different circumstances.

The tech-savvy can join the network without compromising the guarding of personal data. Also, there is something remarkable about going to small villages and have full, free internet coverage - as if the traditional hospitality was translated into the language of the 21st century.

Possible but not compelling. For instance setting up a dating platform. could be useful at huge events to exchange information on best spots, best acts, meet whom, where.

Yes, in case of a local DIY network, but I don't think that DIY network is synonym to local.

Yes: in ad hoc installations or temporary events/passages

Networked technologies may offer affordances that can improve communication between strangers in proximity to each other. Specific affordances offered by networked technologies implemented and maintained by participants themselves are not so clear (as opposed to commercial/ governmental provided equivalents), though this may require analysis of the dimensions implied (Do/It/Yourself/Networking) and the resulting socio-technical systems created. In principle, networked technologies may improve communication between strangers in proximity, and applications may be created with this specific goal in mind: many exist in commercial smartphone app stores for example. Interrogating the dimensions of "D-I-Y-Networking" may

identify scenarios where commercial apps are not satisfactory and locally run and managed systems offer benefits. For example, if local ownership and securing of data is considered important, a locally run independent network that doesn't transmit data over a commercial or government run network may have its advantages (e.g. the qaul.net smart phone peer-to-peer communication system).

c) facilitate individual expression in hybrid space

Perhaps collective expression should also be included

Yes, good for expression not necessarily appreciation!

I believe we can and should further experiment with different and potentially novel formats one-to-many and many-to-many broadcasting in public space. One central issue here is imho the disproportional relationship between possibilities to express perspectives, views, etc. and the potential to see something happening with it. For example, it is very easy to let people voice their anger about a construction site, but very hard or almost impossible to have those voices actually change the situation. This is a very dangerous source for frustration – often non-participation is better/less harmful than a mere “performative” participation without real consequences.

It can become a platform for virtual graffiti, tagging virtual space, challenging traditional concepts of ownership, making the platform alive by chaotic expressions of subjectivity.

Not sure. Maybe for artists.

May provide a complementary to the corporate model; the collective formed around them may become the 'public' actor, see above the community ties

As with the response to (b) above, it is imaginable that both commercially run and DIY constructed networked systems might facilitate individual expression in hybrid space. To understand whether DIY networking might have a “strong impact” on this activity asks how we would identify impact and how we would measure it. It will be important to understand what affordances are offered by DIY networking that are absent or less effective in achieving this goal when using commercial or otherwise provisioned services.

d) providing the alternative to commercial Internet providers

It is the path to subsumption or exhaustion - we need to identify new models of operation that fit better with our fluctuating energies and interests.

I think this is central from different perspectives: I) Independency and resilience II) Access and affordability III) “Naturalisation” of ways to use ICT vs. openness in design and use IV) Closed systems vs. opportunities for creative use, misuse and re-appropriation.

Supporting local exchange.

Sure

No, I don't think DIY networks can compete with commercial Internet providers (maybe there are some exceptions), but they can complement them

See above, if in good technical conditions, if well operated and maintained (refer to ninux “single point of failure”) etc

DIY networking can provide an alternative to commercial Internet provision at a local level. For connection to the Internet (e.g. to enable a global link), at some point a DIY network will need to interact with a commercial provider, and could be typified as a ‘complementary’ network. However self-provisioned networks have the potential to prove “First Mile” connections: “broadband infrastructure development that puts the needs of local communities first and ahead of the needs of private sector telecommunication corporations” (e.g. McMahon et al. 2014). DIY networking can provide the starting connection that links to the internet for communities and individuals who would otherwise not be able to achieve a commercial Internet connection, either because of lack of coverage, or cost, because commercial provision is of too poor quality or too restrictive in its offering (e.g. not allowing certain services, censorship (lack of net neutrality) or asymmetric provision of bandwidth). DIY networking can enable alternative (as well as complementary) provision to

Internet service providers where Internet access is not required, or is even seen as undesirable, in scenarios where a local network suffices the requirements of the networked communications. This might also be typified as an 'offline network'.

e) building related skills and knowledge in localities

Taking up social responsibility stimulates awareness of other situations and priorities.

Working within communities, trust is something built very slowly. Once it is there the DIY networking can advance the building of related skills and knowledge in localities. On the one hand because the trust is there to put in own data into the content and you trust the source of the information.

This may make more sense on the Internet (see Wikipedia).

Yes, people are educated and develop related skills during the process of DIY networking

Yes: SPC's Deckspace media lab and "MAZI Mondays"

A DIY networking initiative can enable individuals and groups to develop specific skills around the development, configuration, implementation and onward maintenance of a locally devised socio-technical system (the DIY network and its associated artefacts). The functionalities of the created system may in itself support skills and knowledge development in communities, e.g. a chat space may enable people to exchange stories about their locality; a forum can allow people to respond to questions about a range of topics and develop into a knowledge base; a species register will enable people to understand biodiversity present in their area). As noted above, we must reflect on how we define a "strong impact" and how we will measure this. Within a community context it is less likely this will be through formal testing of knowledge (pre- and post tests) and more likely through a qualitative data gathering approach (e.g. interviews, surveys). 'Learning' might be evidenced across a range of indicators, e.g. Social, Cognitive, Affective, Motivational, Progress (Jones et al. 2014: <http://oro.open.ac.uk/42078/>)

f) other?

Altering the space itself.

I think the DIY networks in the beginning can be the boundary object around which to start thinking and talking about data/technology-ownership in itself.

Intergenerational connection. Kids can build tools for the old, but it forces them to also listen and learn processes of (agricultural) production and ways of life before the internet.

We should consider potential negative as well as positive outcomes. As with any community interaction negative as well as positive consequences may occur, e.g. damaging community ties, diverting resources, reinforcing existing social structures: Kraut, Kiesler, Boneva, Cummings, Helgeson and Crawford (2002) suggest those already rich in social capital may benefit most from a community ICT initiative.

General comments:

At the core of the DIY philosophy are the development of skills and knowledge within the community. By taking ownership and responsibility for the creation, configuration and deployment of the network the aspiration is that this will stimulate participation within the community and better place the participants to take advantage of the other factors.

5. Have you participated in an event around the topic of DIY networking? If yes:

I will try to recall conversations with the extended scene around Neighborhood Academy, e.g. the two workshops.

- What details and conversations do you remember?

Euphoria on hearing the proposition, disbelief such interventions were possible and legal. Expressions of confusion, misconceptions and suspicion of motive. Demand for the simple explanation rather than understanding or any appetite for complexity. Frustration at the slow rate of progress and a fear of missing out

or falling behind the curve of innovation and understanding.

In the beginning, we mainly encountered scepticism. Another "tech" company coming to sell something or to harvest ideas. Hence, the initial discussions focussed on the DIY and FLOSS aspects as well as on the parallels to processes happening outside the tech world, e.g. the right-to-the-city movement, to which we made strong connections by discussing today's struggles in smart city scenarios. After this first phase, we encountered a clearly emerging interest in cheap and open solutions, such as running home-made applications on a raspberry PI or using an altered framework on a router, e.g. pirate box. There was a clear tendency to talk about possibilities to appropriate this technologies for their own work processes.

The first association to DIY-networks is often "aha, an Intranet" and it is hard to pass that point in the imagination of what else it could be. In conversations, it is often easy to imagine the advantages of DIY-networks in very conflictive situations or in countries where data-control are a real threat: i.e. Syria, Egypt etc, but seeing the win-situation in using diy-networks instead of internet in our context is not seen initially and leaves a big hurdle to overcome, when speaking to community organisations with whom we have spoken in this process. This is the point of departure when we are trying to latch on to in our prototyping work. When can using diy-networks be an added value to our actual work and not an add-on to our work, which would only mean a strenuing of our already very limited time and energy resources.

Some people are enthusiastic tinkerers, and some are sceptical conceptualists - Why is it needed if there is Internet? People even refusing to imagine that there could be no Internet. It should always include an element of hands-on workshop rather than exclusive theoretical focus, in my view.

I remember the MAZI Kickoff meeting where we were trying to discuss and come up with a decent plan about the future activities of the MAZI project. Each one of the present disciplines in the meeting had to demonstrate DIY networks from his/her perspective and then we decided about collaboration for a common goal, to build a DIY networking toolkit.

When we started the discussion on possible DIY technology at the Kraftwerk1, there seemed to be first a bit of resistance due to the stress created over the implementation of their recent Intranet. Yet as I experienced in Deptford, such initiatives depend on the way they are presented to the community, on the people driving their implementation, on whether there are effective needs or tensions that the networking will provide or release, on the existing social environment: whether it is eager to engage in, or it is exhausted with collective work, etc

Curiosity often triggers participation, mediated by people's prior experiences of engaging with technologies and media stories. This means that expectations might not align with the realities that practitioners confront (advantages but also challenges). Managing expectations is often a requirement. Different participants in conversations bring their own biases, ambitions, concerns and goals: some may participate because of a personal engagement with technologies, others might have broader challenges they seek to address and believe DIY networking interventions may offer a solution (Gaved and Mulholland 2008: <http://oro.open.ac.uk/17108/>).

- Did DIY networking play the role of a catalyst / "boundary object" and in what way?

Reminded people of the relative information, energy and financial poverty affecting everyone.

Absolutely. After the first phase of us working towards gaining trust in the wider community, the project and with it the topic of DIY networking became a triangulator and boundary object in the sense that it brought people to working together that have been only loosely connected beforehand. Through introducing this community to the wider consortium as well as to the communities around the other pilots, we hope to further deepen and amplify this effect.

Until now, I have only been to one event where different DIY networks were being used: Transmediale in Berlin. Although very inspiring on a discursive level, digital literacy (or the lack of it) as left me as audience and by-stander. I still feel that my own imagination for my own work, is still in the development phase and not yet mature. I can see its potential as broadcaster, as exhibition tool, I can not yet see it as integral part of my working practice. I feel however very motivated.

The best example I saw that was happening was the UDK project at Transmediale, The Polylogue. Usually offline network is a side project - but that object really caught people's imagination. Maybe because the process of information lifespan was so well articulated.

The Mazi zone played its role very well. It facilitated us to exchange important documents of the meeting.
The Intranet at the Kraftwerk1 is already fully functioning for information and service sharing, and therefore we expect that the Hybrid letterbox could have a complementary playful effect during face-to-face interactions. At NeNa1, during working group activities, there is need for well-organized manners to communicate, record, document information and collective activities, and not necessarily requiring internet; as in Deptford, it may play a catalyst role in the communication with the urban life outside their premises, which could bring visibility, leverage, integration etc
Yes. Practical examples of artefacts, or discussions of examples have helped shape conversations and enable discussion not only around the potentials and challenges of DIY networking but also encouraged self-reflection on participants' broader goals (e.g. helping critically reflect on the desired outcomes).

- What was specific about the context in which it was implemented?

We set out to offer free and open networks and adopted mutual coop model for the social enterprise.
We introduced the topic in two main sequences: A first one without any technology and hardly any talk about it (creating a context and a shared base for discussion) and a second one with the actual demonstration of DIY networking technologies. For this, we focussed on introducing first the parallels (see above) as well as the experience of using this technology by bringing several functioning prototypes.
It was an exhibition/discussion round, transmediale...
An art exhibition.
The specificity of the cooperative environment in Zurich is the grass-roots independent spirit, institutional creativity, enthusiasm in collaboration, pragmatism and hard work in self-management. In Deptford, the collective spirit of a few enthusiasts, with similar inclinations as those mentioned for the groups in Zurich.
My experiences have mostly focussed around community provision of network access and services (overcoming the digital divide) and also around the use of DIY networking to support educational objectives (e.g. providing temporary network access to non-networked locations to enable remote access to geology field sites). I have also maintained a peripheral interest in the use of networked technologies to support art installations.

- Which misunderstandings and/or revelations took place during interactions between people with different backgrounds?

Some only saw a commercial system or that one was emerging that might exploit them and their neighborhood. Others recognized shortcomings from their experiences in previous social activation projects and wanted to limit power over each other.
People were surprised to learn that: I) You don't need to be online to use applications II) The hardware needed is actually very affordable III) We can design applications that do not resemble or try to emulate existing solutions IV) It can be easy and playful to use.
We used different "language" regarding our views on DIY networks and we were struggling to find a common way of collaboration.
Misunderstandings were generated by different degrees of individuals' capacity to communicate, or to empathise with the other's position, by their willingness (or not) to give up on 'being right' to becoming porous toward a collective momentary 'truth', the use of words ("users"/finding other more suitable terms), rushing to reach some conclusions before all the voices are heard etc...
Technical capabilities of network technologies. Implications for resources required in setting up and long term maintenance. An expectation that DIY networking solutions are comparable in all dimensions to those provided by a multinational commercial provider.

- How did it impact the local community?

In the scale of things, slowly, lightly and temporarily!
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See above, it brings together actors from a certain scene and strengthens their ties through evoking a shared interest.

For instance, miscommunication within the Deptford neighborhood group may hamper good collaborations with the non-profit organization Locality; an ad hoc network might take on the function of bridging group communication, with a broader impact on the community in the long run...

Events around DIY networking can bring together people who would otherwise not meet and trigger interactions that may be associated with the DIY networking ideas, or other completely independent activities. DIY networking events have provided knowledge about technologies, challenges of running a DIY network initiative, and enabled critical reflection on broader community goals.

- Was there implied any innovative solution?

Keep on trying, be patient and independent. Share what you learn.

We are working on them

Yes - making tangible the lifespan of a piece of information, from birth to death.

Deptford neighborhood group sharing information and experience with the group from Hammersmith district of west London opened a range of possibilities concerning future steps to be taken for functioning communication and participatory processes, and future Creeknet can play the role of a catalyst in this process

In some cases, yes. A participatory approach is best as often good ideas come from participants rather than just the organisers of such events.

General comments:

Conversations about community networks seem to revolve around why there is a lack of take up among the various communities and how this could be addressed. There are examples of successful community networks and it is revealing to reflect on what makes these sustainable and the particular factors of the individual contexts. The DIY perspective has emerged in response to these factors and is grounded on a participatory or co-design approach to the creation and deployment of networks. Currently DIY networks sit as a boundary object between disciplines, but each discipline is still trying to describe and understand the concept from their own perspective. This is a natural evolution and as the concept becomes better understood, so the role of the boundary object will change. This raises the question of conflating the role of DIY networks within the project, are they a potential solution to the problems perceived in community networks, or are they a methodological 'maguffin' to facilitate interdisciplinarity? As a boundary object, DIY Networks are like a mountain that sits between communities, where each has a different name for the same mountain and that name reflects only the facet of the mountain that they can see.

6. In a diverse group of people an interesting discussion topic would be on (and why?):

a) applications

This is the one topic that matters most. People are interested in tools to apply and to appropriate in their own contexts. From a perspective of participatory design, the groups we work with are always very heterogeneous, which can be put to use in the process of ideation and scenario building.

It is important that the applications serve the purpose of the local situation, that they are functional and easy to use.

To find new applications, raise awareness on possibilities

It'd be interesting in order to understand 'why' certain choices are preferred to others

This should follow discussions around individual and community challenges that participants bring. Once these have been identified and local resources have been established a discussion of potential applications might act as a boundary object to clarify specific requirements. No application will be perfect for use and will be locally adopted, appropriated, and reshaped.

b) technical characteristics

I think it is important to take people's fear from technical issues by concretely demonstrating how things work without going into detail. Not everyone needs to know how to read/write code, but most of the times only fractions of this worlds have to be mastered for people to be able to do what they need to do (e.g. changing a question in the back-end of the Hybrid Letterbox).

To make sure it covers the required area, and allows access to enough people.

Exchange experiences, learn how to handle

For the beauty of human imagination and creativity toward innovation

It will be important to clarify the technical possibilities and limitations of this approach to providing networked services.

c) scenarios for implementation

Scenarios help to both come up with applications as well as help to anticipate their appropriation by users. This will provide valuable information for the actual design and implementation, e.g. about the design of GUI's, the anticipation of issues and challenges, etc.

Everyone has ideas, it is like an art project, or a political rally - everyone is an expert.

From my perspective, I am interested in discovering or even inventing new scenarios for implementation of a DIY network. So I would like to hear ideas and feelings from people from diverse disciplines.

It'd be interesting to experience the reasoning and negotiation process toward bringing visions to reality.

Providing prior examples and theoretical scenarios might enable participants to reflect on their own needs and goals. However care must be taken not to lead participants into shaping their goals to fit into the examples provided: they may influence the conversation.

d) political dimensions

This is central in our project, as described in point 5

Because offline networks combine the advantages of physical proximity (being local) and networked communication (non-synchronous, varying degree of anonymity, autonomous participation, easy to invite others, easy to share, differences can be expressed without a degree of confrontation, visible markers of difference can be suppressed {skin colour, clothing, disability, other markers of social status})

Independence it is always a question and topic in socio-political and political-philosophical discussions.

It unveils how people perceive the variations within the boundaries between the private and the public life.

DIY networking might be viewed through the lens of community empowerment, and also wider social concerns around ownership and privacy of data. The cost argument for self-provisioning of networked technologies as opposed to commercial provision has diminished from debate that took place around the turn of the millennium so it may be valuable to ensure debate around the potential affordances of DIY networking are broader than simply a financial comparison.

e) social implications

It has a huge community building potential, as we can see with Sarantaporo.gr

Find out about risks and chances.

It shows the collective awareness toward sustainability.

DIY networking might be viewed through the lens of local engagement and capacity building as well as knowledge generation and resource sharing. Discussions around social implications of DIY networking may encourage critical self-reflection on the ambitions, goals, and challenges of participants and trigger debate around the reasons for engaging with a DIY rather than commercially provided networked technology system.

General comments:

A more critical starting point is to question the purpose of such discussions - for me as a non (ish) technologist, sitting in a room full of technologists talking over the finer points of, well anything really, is not of great benefit - how can I usefully contribute? The same applies for each of these topics, yes they might be interesting it sit in and observe, but how does this progress anything? Maybe its about specialist groups that can dig into the problem and then the role of synthesiser and translator who can report on the progress to other specialist groups.

Presentations or training sessions would be more useful than discussion for understanding technical issues and application case studies. These could be combined with discussions. The discussion on potential scenarios could be together with a discussion on applications, as it is limiting to discuss applications without direct reference to how they would be used in particular contexts or scenarios. Presentations from experts might be more useful to provide informed perspectives. Social issues seem to be the most useful to discuss in an interdisciplinary manner as this could raise issues from different perspectives. As a general point, discussions usually need a specific scenario, information, case study or some kind of research to focus upon. Without good structure and concrete aims, discussions can be rather empty, and can run into problems such as domination from a few people.

It is the social aspects of networking we all share an experience of. The other options here are mostly as a consequence of technology experience. Politics are divisive.. however interesting.

7. What aspects of this topic do you master?

A human centred approach to interaction design.

Design and innovation process, service design.

whooh.. I feel impatient with politics and fatigued with spin so am not very accommodating or comfortable hearing malformed theories and unjustified assumptions. When working with groups, invest mostly in encouraging others to find a voice whilst struggling to organise my own thoughts in the moment, this often limits my input to 'heckling'. Identifying scenarios and experimenting with application of ideas is vital for design. Our technical discussions are characterised by commitment to sharing of information but dogged by inadequacies in reporting and transfer of this knowledge.

Without being able to actually create applications of DIY networking myself without help, I gained a decent understanding of what is possible and how things work. Thus, I can talk with engineers and discuss best ways to solve a problem. Also, I am able to discuss the political, social and designerly implications of concepts around DIY networks with the respective communities. I do however need an engineer at my side in order to create prototypes that I design and I do not expect this to change dramatically.

Scenarios for implementation, political dimensions, social implications - I would most definitely not say I master it, but I feel comfortable discussing.

I already master its implementation, taking into account the political and social implications of the technology.

I would say that I master the network engineering topics.

Assessing social and political implications, as well as imagining scenarios for implementation are closer to my expertise.

Practitioner in DIY networking: set up own networked community. Academic researcher in DIY networking.

8. What related knowledge would you like to deepen through interdisciplinary conversations and experiments?

A better understanding of what constitutes the 'local' and the role that it plays in the lived experience.

Contextual issues, research methodologies, evaluation techniques, goal setting etc,

Adaptability

Having said this, I would like to deepen my technological understanding and ability to create. Apart from that, I am eager to learn more about the contextualization of our common topic in the different areas of expertise and interest, e.g. the arts, urban planning or community informatics.

I would like to deepen my knowledge on the smart-city discourse and the alternative narratives of this discourse.
I am just slowly learning the basic technology. I would like to learn building applications (coding). I wish the engineers would refuse to set up the network and instead, teach us how to build it ourselves.
How to improve organisational aspects of networks and other entities like cooperatives
I would like to deepen in aspects such as the Physical design of a DIY deployment and in ways to build appealing, engaging DIY networks for citizens, which will not only be attractive to them but they will also manage to keep users connected to them.
Technical characteristics and applications, the motivations behind certain design choices, design reasoning and process thinking.
Greater understanding of different theoretical perspectives that might be employed to enable analysis and evaluation of DIY networking initiatives. Updating knowledge of developments around technologies and philosophical approaches to DIY networking. Broader understanding of the academic literature around the field.

4.3 MAZI questionnaires as 'meeting points'

As the section above is meant to illustrate, only within the MAZI partners there is a rich mix of understandings, experiences and aspirations regarding DIY networking. Out of this wealth of knowledge and expertise the MAZI Toolkit will come into being. To this end, MAZI questionnaires provide structure for a different type of exchange than, for instance, face-to-face discussions during project events and working meetings. The collective exposure of what each respondent has been reflecting upon, and then chose to publish in response to the inquiry, creates a more intimate space that we call here a 'meeting point', where our similarities and differences are presented inside a comfort zone. It might be that the boundaries around our 'private' space have been insured already by this 'solitary' dialogue with the questionnaire, and that the complexity of a 'mirror' effect brought into the picture by real-time meetings and outside audiences is eliminated. Such 'meeting points' will generate topics for discussions in working groups, and useful comparisons that can sharpen our power of description and concept formation toward the production of shared vocabularies, guidelines, and the like.

5 Discussion

One of the most important, but also most ambiguous, aspects of the boundary object theory is the space created between the “strongly” and “weakly” structured forms of a boundary object, and the “back-and-forth” process that these two extremes enable. Star (2010) states that “when the movement between the two forms either scales up or becomes standardized, then boundary objects begin to move and change into infrastructure, into standards (particularly methodological standards), and into things and yet other processes, which have not yet fully studied as such.”

At this stage of the project, we are clearly in a situation in which our boundary object, the MAZI toolkit, is very weakly structured. It is a conscious choice not to rush and make things too concrete too early, but allow ourselves to learn from more informal interactions between the academic and activist partners of the project in the context of the different pilots and the corresponding communities.

As a final note, and stated by Hadorn et al. (2008), “there are no agreed guidelines for describing integration in transdisciplinary research, making it difficult to assess and compare studies”. So, there is no guarantee on how our proposed methodology will unfold, since this depends on various factors difficult to predict and control and thus we expect the methodology itself to evolve based on the experiences from its application.

And since every transdisciplinary project is unique, we will invest a lot of effort on the “self-reflection” process documenting our successes and failures, our misunderstandings and revelations, and the evolution of our ways of thinking, in order to extract from our adventure useful knowledge for others, as have done before us people like the contributors of the Handbook of Transdisciplinary Research edited by Hadorn et al (2008).

References

- Armstrong, L., Bailey, J., Julier, G., Kimbell, L. (2014): Social Design Futures. HEI Research and the AHRC.
- Arnstein, S. (1969). A Ladder of Citizen Participation, *Journal of the American Planning Association*, 35 (4): 216-224.
- Antoniadis, P., Apostol, I., Gaved, M., Smyth, M. and Unteidig, A. (2015). DIY networking as a facilitator for interdisciplinary research on the hybrid city. In: *Proceedings of Hybrid City 2015: Data to the People*, University Research Institute of Applied Communication (URIAC), University of Athens, Athens, Greece, pp. 65–72.
- Antoniadis, P., B. Le Grand, A. Satsiou, L. Tassioulas, R. Aguiar, J.P. Barraca, and S. Sargento. (2008). Community building over Neighborhood Wireless Mesh Networks *IEEE Technology and Society*, 27(1):48-56.
- Antoniadis, P., and I. Apostol. (2014). The right(s) to the hybrid city and the role of DIY networking, *Journal of Community Informatics*, special issue on Community Informatics and Urban Planning, vol. 10, 2014.
- Antoniadis, P., I. Apostol, A. Unteidig, and G. Joost. CONTACT: Facilitating Information Sharing between Strangers Using Hyper-local Community Wireless Networks, *UrbanIXD Symposium 2014*, Venice, Italy.
- Antoniadis, P., J. Ott, and A. Passarella (eds.), *Do It Yourself Networking: an interdisciplinary approach* (Dagstuhl seminar 14042), *Dagstuhl reports*, 4(1): 125-151.
- Arnold, M., M. R. Gibbs, and P. Wright. (2003). Intranets and local community: “Yes, an intranet is all very well, but do we still get free beer and a barbeque?”. *Communities and Technologies 2003*. Huysman, M., Wenger, E. and Wulf, V. (eds.) Amsterdam, Kluwer Academic Publishers.
- Baldwin, J. (2011). *TidePools: Social WiFi*, Parsons The New School for Design: Master Thesis. Available at <http://www.scribd.com/doc/94601219/TidePools-Social-WiFi-Thesis>.
- Binder, T., G. De Michelis, P. Ehn, G. Jacucci, P. Linde, and I. Wagner. (2011). *Design Things*. Cambridge, London: MIT Press.
- Björgvinsson, E., Ehn, P., & Hillgren, P. A., ACM (2010): Participatory design and democratizing innovation. *Proceedings of the 11th Biennial Participatory Design Conference*, p. 41–50.
- Bleeker, J. and N. Nova. (2009) A synchronicity: Design Fictions for Asynchronous Urban Computing, *The Architectural League of New York* <http://www.situatedtechnologies.net>
- Bleeker, J. (2012) High-Tech crap you might find at the corner store of tomorrow, *The Atlantic*.
- Cabitza, F. (2015). At the Boundary of Communities and Roles: Boundary Objects and Knowledge Artifacts as Resources for IS Design. In “From Information to Smart Society”, Volume 5 of the series *Lecture Notes in Information Systems and Organisation*, pp 149-160
- Castells, M. (2000). *The rise of the network society: the information age: economy, society, and culture*. Vol 1. Wiley.
- Cederman-Haysom, T., and Brereton, M. (2006). A participatory design agenda for ubiquitous computing and multimodal interaction: a case study of dental practice. *Proceedings of the ninth conference on Participatory design: Expanding boundaries in design-Volume 1*. ACM.
- Clark, D., J. Wroclawski, K. Sollins, and R. Braden. (2005). Tussle in Cyberspace: Defining Tomorrow’s Internet. *IEEE ACM Transactions on Networking* 13(3): 462–475.
- Damsgaard, J. and R. Scheepers. (2000). "Managing the crises in intranet implementation: a stage model." *Information Systems Journal* 10(2): pp. 131- 149.
- Day, P. (2005). Community research in a knowledge democracy: practice, policy and participation. *Proceedings of the Community Informatics Research Network (CIRN) 2005 Conference*. Cape Town, South Africa.
- Dunne, A. (1999) *Hertzian Tales – Electronic Products, Aesthetic Experience and Critical Design*, RCA/CRD Research Publications, Royal College of Art, London.
- Ehn, P. (2008): *Participation in Design Things*. School of Arts and Communication. Malmö University, *Proceedings of the Tenth Anniversary Conference on Participatory Design*

- Ehn, P. (2009). Design Things and Living Labs. Participatory Design and Design in Infrastructurung. in: Multiple Ways of Design Research. Swiss Design Network (pp. 52-63).
- Farman, J. (2012). Mobile Interface Theory: Embodied Space and Locative Media. New York: Routledge.
- Forester, J. (1999). The Deliberative Practitioner: Encouraging Participatory Planning Processes. MIT Press
- Forlano, L. (2008). Anytime? Anywhere?: Reframing Debates Around Municipal Wireless Networking, The Journal of Community Informatics, 4(1).
- Friedmann, J. (1993). The right to the city. In M. Morse & J. Hardoy (Eds.), Rethinking the Latin American city(pp. 135-151). Baltimore: Johns Hopkins University Press.
- Funtowicz, S. O. and Ravetz, J. R. (1991). A new scientific methodology for global environmental issues. In Costanza, R. (ed.), Ecological economics: the science and management of sustainability: 137–152. New York: Columbia University Press.
- Gaved, M. and Anderson, B. (2006). The impact of local ICT initiatives on social capital and quality of life. University of Essex, Ipswich. <http://oro.open.ac.uk/31143/>
- Gaved, M. and P. Mulholland. (2008). Pioneers, subcultures, and cooperatives: the grassroots augmentation of urban places. In A. Aurigi & F. De Cindio (Eds.), Augmented urban spaces: articulating the physical and electronic city (pp. 171-184). Surrey, UK: Ashgate.
- Gaved, M. (2011). An investigation into grassroots initiated networked communities as a means of addressing the digital divide. PhD thesis, The Open University.
- Gaver, W., J. Bowers, T. Kerridge, A. Boucher, and N. Jarvis. (2009). Anatomy of a failure: how we knew when our design went wrong, and what we learned from it. Proceedings of the 27th international conference on Human factors in computing systems, CHI '09.
- Gerritzen, M. and G. Lovink. (2001). Everyone is a Designer: Manifest for the Design Economy. In: Emigre 58.
- Grand, A., Holliman, R., Collins, T., and Adams, A. (2016). "We muddle our way through": shared and distributed expertise in digital engagement with research. *Journal of Science Communication*, 15(4) pp. 1–23. Online, retrieved 10/05/2016 <http://oro.open.ac.uk/46686>
- Gurstein, M. (2007) What is community informatics (and why does it matter)? Polimetrica, Milan. http://eprints.rclis.org/10919/1/WHAT_IS_COMMUNITY_INFORMATICS_reading.pdf
- Hadorn, H. et al. (eds.). (2008). Handbook of Transdisciplinary Research. Springer.
- Halpern, M. K., Erickson, I., Forlano, L. and Gay, G. (2013) Designing collaboration: Comparing cases exploring cultural probes as boundary-negotiating objects, In ACM Conference on Computer Supported Cooperative Work, pp. 1093-1102.
- Healey, P. (1996). Collaborative Planning: Shaping Places in Fragmented Societies, London: Macmillan.
- Harvey, D. (2008). The right to the city. New Left Review, 53, 23-40.
- Huila, I. (2011). The politics of boundary objects: Hegemonic interventions and the making of a document. *Journal of the American Society for Information Science & Technology* 62 (12): 2528–2539.
- Jonas, W. (2006). Research through DESIGN through research – a problem statement and a conceptual sketch. In: Proceedings of the Design Research Society conference Wonderground.
- Jones, A.; Gaved, M.; Kukulska-Hulme, A.; Scanlon, E.; Pearson, C.; Lamas, P.; Dunwell, I. and Jones, J. (2014). Creating coherent incidental learning Journeys on smartphones using feedback and progress indicators. *International Journal of Mobile and Blended Learning*, 6(4) pp. 75–92. <http://oro.open.ac.uk/42078/>
- Joost, Gesche; Unteidig, Andreas (2015): Design and Social Change: The Changing Environment of a Discipline in Flux. In: Jonas, Wolfgang; Zerwas, Sarah; von Anshelm, Kristof (Eds., 2015): Transformation Design. Perspectives on a New Design Attitude. Basel: Birkhäuser, pp.134-148.
- Jungnickel, K. (2014). DIY WIFI: Re-imagining Connectivity. London, UK: Palgrave Pivot.
- Kimble, C., Grenier, C., and Goglio-Primard, K. (2010). "Innovation and Knowledge Sharing Across Professional Boundaries: Political Interplay between Boundary Objects and Brokers". *International Journal of Information Management* 30 (5): 437–444.
- Kraut, R., Kiesler, S., Boneva, B., Cummings, J. N., Helgeson, V. and Crawford, A. M. (2002). Internet paradox revisited. *Journal of Social Issues* 58(1): 49-74.

- Lefebvre, H. (1991 [1974]). *The Production of Space*. Oxford, UK: Blackwell Publishers.
- Lefebvre, H. (1996 [1968]). *The right to the city*. In H. Lefebvre (auth), E. Kofman & E. Lebas (Eds.), *Writings on Cities* (63-184). Cambridge, MA: Blackwell.
- Lukic, B. (2011) *NonObject*, MIT Press, Cambridge, Mass.
- Manzini, E. (2006). "Design, Ethics and Sustainability. Guidelines for a transition phase." In: Manzini, E. & Jégou, F. (2003). *Sustainable Everyday: Scenarios of Urban Life*. Milan: Edizioni Ambiente.
- McMahon, R., Philpot, D., O'Donnell, S., Beaton, B., Whiteduck, T., Burton, K., Gurstein, M. (2014) Introduction to the Special Issue: The first mile of broadband connectivity in communities. *Journal of Community Informatics*, 10 (2). <http://firstmile.ca/wp-content/uploads/2015/03/2014-JoCI-editorial.pdf>
- Morozov, E. (2013). *To Save Everything Click Here: The Folly of Technological Solutionism*. New York: Public Affairs.
- Mulholland, P., M. Gaved, T. Collins, Z. Zdrahal, and T. Heath. (2006). Using ICT to support public and private community memories: case studies and lessons learned. In: *Proceedings: 3rd Prato International Community Informatics Conference*.
- E. van Oost, S. Verhaegh, and N. Oudshoorn. (2009). From Innovation Community to Community Innovation User-initiated Innovation in Wireless Leiden. *Science, Technology, & Human Values*, vol. 34 (2), 182-205.
- Lee, C. P. (2007). Boundary negotiating artifacts: Unbinding the routine of boundary objects and embracing chaos in collaborative work. *Computer Supported Cooperative Work*, 16, 307- 339.
- Powell, A. (2015) Open culture and innovation: integrating knowledge across boundaries. *Media, Culture and Society*, 37 (3). pp. 376-393. ISSN 0163-4437
- Powell, A. (2011). Metaphors, Models and Communicative Spaces: Designing local wireless infrastructure. *Canadian Journal of Communication*, 36(1).
- Ratto, Matt, and Megan Boler (2014). *DIY citizenship: Critical making and social media*. MIT Press, Cambridge.
- Ritas, C. (2003). Speaking truth, creating power: a guide to policy work for community-based participatory research practitioners. Available at: http://depts.washington.edu/ccph/pdf_files/ritas.pdf
- Schuler, D. and A. Namioka. (1993). *Participatory design: Principles and practices*. Hillsdale, NJ: Erlbaum.
- Smyth, M., I. Helgason, M. Brynskov, I. Mitrovic, and G. Zaffiro. (2013). *UrbanIXD: designing human interactions in the networked city*. In CHI '13 Extended Abstracts on Human Factors in Computing Systems.
- Smyth, M. and Helgason, I. (2013). Tangible possibilities — envisioning interactions in public space, *Digital Creativity*, 24.
- Star, S. L. and Griesemer, J. R. (1989). Institutional ecology, 'translations' and boundary objects: Amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-39. *Social Studies of Science*, 19, 387-420.
- Star, S. L. (1990). The structure of ill-structured solutions: Boundary objects and heterogeneous distributed problem solving. In L. Gasser & M. N. Huhns (Eds.), *Distributed artificial intelligence* (Vol. 2, pp. 37-54). San Mateo, CA: Morgan Kaufmann.
- Star, S.L. and Bowker, G.C. (1999). *Sorting Things Out: Classification and Its Consequences*. MIT Press, London.
- Star, S.L.(2010). This is Not a Boundary Object: Reflections on the Origin of a Concept. *Science, technology, & Human Values* 35(5): 601-617.
- Strauss, A. (1978). A social world perspective. In N. K. Denzin (Ed.), *Studies in symbolic interaction: An annual compilation of research* (Vol. 1, pp. 119-128). Greenwich, CT: JAI Press.
- Tufekci, Z. (2014). Engineering the public: Big data, surveillance, and computational politics. *First Monday*, 19 (7).
- Unteidig, A. and Joost, G. (2014). *Design as Curator for Urban Discourses*, UrbanIXD Symposium 2014, Venice, Italy.
- Wenger, E.: *Communities of Practice: Learning, Meaning, and Identity*. Cambridge University Press, Cambridge (1998)

Annexes