From smart cities to engaged citizens

The 3rd EINS summer school 2014

Volos, Greece

July 2014

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I. THE SUMMER SCHOOL

I.1 The EINS project

The goal of the project EINS, the FP7 Network of Excellence in Internet Science, is to coordinate and integrate current research initiatives aimed at achieving a deeper multidisciplinary understanding of the development of the Internet as a societal and technological artefact, whose evolution is increasingly intertwined with that of human societies. Its main objective is to allow an open and productive dialogue between all disciplines that study Internet systems under various technological and humanistic perspectives, which are being transformed by the continuous advances of Internet functionalities and applications.

I.2 Key concepts: citizen engagement, interdisciplinarity, city-specificity

The topic of the 3rd EINS summer school was chosen to investigate an interdisciplinary approach on the design of ICT tools and urban interventions that can support a range of forms of citizen engagement in the evolution of contemporary cities, including the following:

- Smart cities applications and crowd sourcing
- Urban interaction design
- Do-It-Yourself networking
- Complementary currencies

To address adequately these complex processes in a participatory and bottom-up fashion we invited lecturers, tutors, and participants with different backgrounds to exchange knowledge and work together on the design of concrete solutions for a specific case: the city of Volos. In this sense, Volos played then the role of a **boundary object** (Star & Griesemer 1989; Wegner 1996) between engineers, sociologists, psychologists, urban planners, practitioners, and activists, who were invited to treat technology as a flexible construction that needs to be appropriated in order to provide solutions according to the local environment and the local challenges. Instead of focusing on the different methodologies, assumptions and epistemologies that all these different disciplines subscribe to, we concentrated on the city of Volos, its problems and possible ways that technology can help to address them encouraging and facilitating the active participation of citizens.

For this, in addition to the normal lectures and workshops we scheduled an introduction to the city by Vasilis Sgouris, a civil engineer and director of ANEVO[1], Volos development company. ANEVO is a new development agency established by the integrated Municipality of Volos, after the re-organization of local authorities in Greece, and the successor of DEMEKAV (Volos Municipal Enterprise for Urban Studies, Construction & Development) which has played for 15 years a key role in urban development and planning issues of the city of Volos and the region. So, Vassilis Sgouris was the ideal person to introduce the city of Volos and the current challenges faced by its citizens, while the inclusion of many local students from different disciplines and guided tours helped also to provide enough context and local knowledge during the summer school activities.

Participants formed five groups that worked, under the supervision of tutors, on different, but in many cases complementary projects, proposing solutions for making Volos a smart city with engaged citizens. An evaluation committee of distinguished local professionals engaged in city development and education, listened to the realistic proposals developed by the different work groups and provided their feedback. More specifically, the members of the evaluation committee were Vassilis Sgouris, Prof. Pantelis Skayannis, Professor at the Department of Planning and Regional Development, and Dean of the School of Engineering of the University of Thessaly, Prof.

1 http://www.anevo.gr/profil.php?cat=11&lang=en

Elias Houstis, Professor of Computer Engineering and Communications department at University of Thessaly, and Yannis Grigoriou, manager at Volos Municipal Social Services and co-founder of TEM, the local complementary currency[2].

The fact that the participants had to prepare a public presentation of their proposals in front of a committee of prominent local authorities, increased their motivation to absorb the knowledge delivered by the lecturers and contribute actively in the group work, while the preparation of the presentation and its delivery in a succinct way with strict time limits was itself a very useful lesson for the future. Finally, the feedback received was also a very important experience that helped all of us to understand the important gap that often exists between theory and practice, between abstract technological solutions and their deployment in a specific social, political, and economic context.

Finally, having so many different disciplines involved and such a difficult task to accomplish in such a short time, we expected from all participants to become both teachers and students, to self-organize, to be open and flexible toward the new information, knowledge, and different types of people that will be around. To achieve this, we used collaborative editing tools before and during the summer school, and dedicated a significant amount of time for group work and unstructured intra- and inter-group discussions.

I.3 Organization and overview

The summer school was divided in three main parts:

1. Introduction to the summer school and the city
2. Lectures and group work
3. Public presentation of projects

The first part started on Sunday July 13th, the day before the official beginning of the the summer school. Local students from the engineering and urban planning departments of the University of Thessaly guided their colleagues coming from abroad through the city in small groups. In addition to getting to know each other, the participants of the school were introduced to the city's history, important places, and social characteristics. All tours ended at the main beach of Volos where we ate all together, while watching the final of the world cup which helped to break the ice.

During the official opening of the school, after the introductions of the organizers, Vassilis Sgouris offered us a more thorough introduction on the urban everyday life as well as the current status of urban projects and policies for development, which provided relevant information for the individual projects to be carried out during the summer school. Afterwards, Karmen Guevara set the scene bringing the human dimension of the smart city and invited us to reflect whether in our quest for efficiency have we forgotten a key question … what do citizens want? The introductory session ended with a short presentation of all lecturers and tutors that helped the participants to decide on which high-level topic they would like to work in groups the next 3 days.

Finally, before leaving the university of Thessaly, and for those that had still some energy after a full day, we were given a short introduction to capoeira, a Brazilian martial art that combines elements of dance, acrobatics and music. The leader of the group explained us the main principles and gave us some of the traditional instruments to play while the dancers showed us the basic movements. The lesson was offered by the local capoeira group, Okê Arô Grécia, which performed afterwards in public and it was a great opportunity to mingle with the locals in a nice example of a street performance that can act as a triangulator and allow spontaneous contacts between citizens and visitors.

The second and main part of the summer school, was a combination of lectures and group work. More specifically, each of the following days was divided in a plenary morning session where

2 http://www.bbc.com/news/world-europe-17680904

lecturers presented key concepts and ideas for the main thematic areas from their different perspectives (i.e., research, practice, and policy) and an afternoon session where the different groups gathered to work on a concrete project targeting the design of a solution for the city of Volos, supervised by both lecturers and tutors. At the beginning of each day, a short plenary session allowed groups to inform each other on their progress and discuss possible interdependencies between their projects, which did take place between the groups of DIY networking and Urban interaction design as described below.

There were two types of lectures:

1) Scientific contributions related to the concept of the smart city and its human dimension by Sambit Sahu (IBM), Karmen Guevara (Cambridge University), Tamas David-Barrett (Oxford University), Iordanis Koutsopoulos (Athens University of Economics and Business), and George Koutitas (Centre for Research & Technology Hellas).

2) Short introductions to the main topics of the group work related to citizen engagement: crowd sourcing by Daniele Quercia (Yahoo!), DIY networking by Mark Gaved (Open University), urban interaction design by Michael Smyth (Edinburgh Napier University), and complementary currencies by Giuseppe Littera (Sardex.net) and Chris Cook (University College London).

The first type of lectures helped us to frame the problem and identify different point of views and perspectives while the second provided material and inspiration for producing concrete solutions for increasing the engagement of the citizens of Volos.

The last day was dedicated to the individual presentations by the different work groups formed during the summer school in front of our local evaluation committee, Vassilis Sgouris, Pantelis Skayannis, Elias Houstis, and Yannis Grigoriou. People were dressed more formally compared to the previous days, friends and colleagues were also invited, and around the amphitheater groups were preparing their artifacts and presentations, creating an intense and festive atmosphere. After the committee members provided their feedback on the presented projects, participants were given their diplomas and we spend one hour sharing our impressions and organizing the collaborative editing of this e-book.

In the following we provide a summary of the outcomes of the summer school, organized around its four main parts:

- the special characteristics of the city of Volos,
- the introductory lectures on the concept of the smart city,
- the group work on citizen engagement projects for Volos, and
- the final presentation to the evaluation committee.

We conclude with a discussion on the feedback received and future work.

II. THE CITY OF VOLOS

Volos is a port city on the Aegean Sea Coast, located midway between Thessaloniki and Athens (~2-2.5 hours drive) in the region of Thessaly. According to the 2011 census data, the city has a population of around 145,000 inhabitants. Human settlements along the Pagasetic Gulf and at the foot of Mount Pelion -the legendary land of the Centaurs- date back to the ancient cities of Demetrias, Pagace and the Mycenaean Iolkos, from where the mythological hero Jason sailed together with the Argonauts in quest of the Golden Fleece. Until 1840, when the new town Ano Volos/Perivolia was built on a pre-planned layout, the city of Volos consisted of the old fortress from the Ottoman rule, Kastron of Palaia Hill on the location of ancient Pagace. With the increased importance of the harbor in the mid nineteenth century, the town extended first along the bay with

commercial buildings close to the harbor, Magazia, and then along the newly planned grid south-east from Palaia. After the 1881 incorporation into the Hellenic State, there was significant investment in infrastructure for the port and for railway connections, which turned the city into a transportation hub serving the agriculture-based economy of Thessaly. The population of 5,000 inhabitants in 1882 grew rapidly in the next four decades as the city's economy flourished. Moreover, a different influx of population happened in the 1920s, when an important number of refugees from Asia Minor settled in the northern areas of Volos. The town developed quickly on a narrower grid than the city core into the municipality of Nea Ionia. About that time, among significant social movements was the early teaching of Dimotiki by Delmouzos.

In the last sixty years the city has been largely rebuilt following the catastrophic 1955 earthquakes, and in this occasion the urban fabric has been densified by replacing the typical residential mansions with yard with collective housing. With a big impact on the city development, the University of Thessaly was founded in 1984 and more and more Volos is becoming a “student” city. In addition, during the following decades former industrial buildings and sites have been subject to adaptive reuse for the service economy. Currently the economy of Volos is based on tourism and trade, and the harbor is after Piraeus and Thessaloniki the third largest major commercial port of mainland Greece in the Aegean Sea, providing connections to the nearby Sporades and other Northern Aegean islands. Several European countries have established consulates in Volos, and recently was inaugurated the International Airport of Central Greece in Nea Anchialos. On the one hand, there are many opportunities to be explored around developing the tourism and entertainment sector. On the other hand, there are constraints related, for example, to the existence of many protected heritage sites, and also challenges in promoting the area as a tourist destination due to lack of experience or willingness of small businesses to cooperate toward a more consolidated tourism strategy and implementation.

Giving its proximity to the Mount Pelion and the beautiful Sporades Islands (i.e. Skiathos, Skopelos, Alonissos), Volos receives many tourists during the summer time, but mostly as a short-term destination. Moreover, the activity of the university generates a dynamic flux and a relatively fast pace of change of temporary residents, due to the transitory character of student population, as well as due to many professionals and university professors who commute to Volos from larger conurbations like Larissa, Thessaloniki and Athens. From this point of view, the city seems to be in part a place of “passers by”, who distribute their public presence between the passenger harbor, the seaside promenade, and the old town of Palaia, which compared to the waterfront is a more alternative gathering place frequented more by the 'locals'.

At the summer school the city was introduced by Vassilis Sgouris, the director of the development agency of integrated Municipality of Volos (ANEVO). ANEVO was established after the reorganization of local authorities in Greece, being the successor of Volos Municipal Enterprise for Urban Studies, Construction & Development (DEMEKAV), which has played for fifteen years a key role in urban development and planning issues of the city of Volos and the region. At the 2011 local government reform the municipality of Volos incorporated nine former municipalities that became municipal units namely Agria, Aisonia, Artemida, Iolcos, Makrinitsa, Nea Anchialos, Nea Ionia, Portaria, Volos. Like any reform, nevertheless, it brings many challenges including the decrease of political staff from 81 to 49 councilors. That creates a knowledge gap around very diverse municipality domains (e.g. from agricultural or protected natural land, and heritage sites, to the operation of the transportation hub and sustainability of urbanized areas). There is also critical distance between citizens and the first level of administration, for instance, some of the small municipal units have only one member in the council. In order to better organize local services and some transfer of local knowledge, participatory processes seem to be a viable solution. For that digital technology could be a valuable tool and enabler.

The city of Volos has shaped some experience in bridging gaps through new technology. Between 1994 and 2001, the urban initiative program between Volos and Nea Ioania brought to life one of the most interesting highlights of the city, the Tsalapatas former brick and tile factory, which is today a museum of transformation of energy from steam to electricity. Within the restoration of industrial buildings, this was also an effort to connect two parts of the city, the "center" and "N. Ionia", between which there is some sort of 'historical' division (at least when it comes to football preferences), and that a dry river even divide them physically. Another example is from a new culture for start-ups, the TEM local complementary currency that was created in Volos during the recent economic crisis, in order to stimulate exchanges within the local economy.

In the spirit of the mythical Argo, telling the story of the transformation of navigation, in Volos there is huge potential to employ new technologies as mediators between various urban actors. That may transform the actual state of crisis, by creating links between the university and local production, as well as tourism with the broader area, and reducing the distance between local government and constituencies toward more integrated and participatory political processes.

III. The human dimension of the smart city

III.1 A Mirror of the Human condition in Smart City

The future of the Smart City extends beyond technological efficiency to the people who live, work and create within them. People are the backbone of the Smart City. The notion of 'Smart People' is synonymous with the Smart City. In reality, smart engaged citizens or digitzens will be a handful of the inhabitants of Smart Cities, with the vast majority being the 'man or woman in the street' living ordinary everyday lives.

Karmen Guevara (University of Cambridge) looked beneath the 'smart' and examined the psychological pivotal points around which humans organise their experiences in the world. From this we can identify the core elements of identity formation and how it becomes the backdrop for trust and privacy. This dimension of the human condition is important for understanding the underlying processes influencing behaviours and behavioural change. This provides a framework within which to draw the tension points between people, culture, place and technology. The behavioural manifestation of these will shape the challenges of the Smart City. The discussion focused on the socio-cultural and psychological dimensions of human behaviour in urban contexts drawing from cultural anthropology, sociology, social, behavioural and urban psychology.

Karmen concluded by providing a set of questions that the participants should keep in mind during their projects reminding us that in our quest for efficiency have we forgotten a key question . . . what do citizens want? A balance between technology & the ability to be anonymous in a big city, a slightly less 'connected' journey to experience serendipity in their lives once in a while, perfectly constructed lives? OR Are they happy for spaces to be left between technologies to allow the profoundly human elements of life to emerge, the messy ones, the events we never planned, the friends we never thought we'd make, the spouses we might never have met . . .?

III.2 Big Data Analytics and Smarter City Services

Sambit Sahu (IBM) brought the perspective of the industry, representing one of the key players active in development of solutions for the smart city vision. His talk covered two broad topics in the design of smarter city services leveraging big data analytics and presented interesting results based on the pilots conducts across several cities.

The first topic was on the use of smart meter analytics for both smart water and smart energy consumption meters. The idea is to provide insights to residents about their consumption behaviors

and engage them effectively to drive sustainable behavior leading to reduced carbon foot print. He described the method of “activity based” disaggregation analytics that IBM proposes to leverage in order to provide a wide range of meaningful actionable insights for consumers based on smart meter readings. Some commercial opportunities in this space were also described.

The second topic was on sensing people movements from Telco cell phone data (CDR data) at city scale and leveraging this for transit optimization. He described successful engagements with several cities including Istanbul, Dubuque, Singapore, Dubai where IBM derives origin-destination matrices from cell phone call detail records to understand how people move in a city and use that understanding to help city transit and urban planning authorities address a variety of challenging smarter city design problems. In addition, he also described a wide range of commercial and other smarter city services beside smarter transit services that benefit from IBM's mobility analytics.

III.3 Transactive Energy in Prosumer Communities

The smart grid 1.0 and Smart grid 2.0 have developed the required infrastructure for command and data flow in the power grid network. The Smart Grid 3.0 is now delivering user centric services and business models. One of the most promising directions is the prosumer collaboration, where end users can collaborate and interact at will by exchanging energy or even their demand.

In this context, **George Koutitas** (CERTH) introduced the following topics:

• Techniques to allow strategic collaboration between prosumers

• Demand Exchange and Energy Exchange in prosumer environments

• Use of current digital currencies in the prosumer environment

• Transformation of energy commodity to a currency

III.4 The Nature Of Emergent Societies on the Internet — Why It Is So Difficult to Generate Lasting Online Communities

One of the most important questions concerning the Internet has been whether it is going to alter our societies. In the first decade and a half of the history of the Internet it was a commonplace to say that online societies will be dramatically different to the off-line ones. However, with the rise of the social networking sites, the received wisdom had gone the opposite way: it seemed suddenly that the online social world is not that different from the off-line social existence of ours.

Tamas David-Barrett (University of Oxford) presented some evidence that the latter statement is indeed true for dyadic human sociality. He presented the cases of laughter and friendship to prove this point. Second, the talk showed that while dyadic human contact is similar online to off-line, community structures tend to be dramatically different. Online communities tend to be fragile, and tend to last only until a single interest purpose is there for the community to exist for. This effect is very similar to the way preindustrial societies were transformed when fertility fell in the past two hundred years. A good example for the solution to this problem is the urban cul-de-sac neighbourhood, in which a high density social network can emerge autonomously.

The talk ended with a discussion on whether the Internet can learn from urban planners in designing virtual version of the cul-de-sac neighbourhood, and whether this is the way forward to generate lasting, robust online communities.

III.5 Snapshots on Research Challenges in control and optimization problems for smart cities

Iordanis Koutsopoulos (CERTH & AUEB) provided a wide overview of interesting research

problems that he has been working on with his collaborators at CERTH and Athens University of Economics and Business, which are particularly relevant in the context of smart cities. The main emphasis was on sensor networks, participatory sensing and crowdsourcing, smart grid optimization, data privacy, and the interplay of social and communication networks.

Interestingly, Iordanis put his daughter in the position of a (future) citizen on behalf of which we should answer Karmen's question “what citizens want?” and showed that each of the above solution correspond to different needs.

IV. Citizen engagement

IV.1 Crowdsourcing

One form of citizen engagement is the participation in information collection processes, also called crowdsourcing. There are today numerous such platforms, others hosted by local authorities and others by big tech companies, which allow citizens to attach to places a wide variety of information using sophisticated online mapping tools. This information could range from quantitative data, such as the measurements of the sensors available on smartphones, and simple observations like the existence of holes in the street, to reviews of different places and more sophisticated qualitative information.

Daniele Quercia (Yahoo!) introduced in his lecture titled “Urban*: Crowdsourcing for the good of the city” a set of crowd-based solutions with which urban planners can get valuable information from citizens which can contribute actively in the process of understanding the city and what kind of urban design is attractive to the people. For example, the UrbanOpticon web site, a “1-minute game with a purpose” asks the visitor to place on the map random photos from selected cities in order to study their *visibility* – defined as the “ease with which a city's parts can be recognized and organized in a coherent pattern”. Another web site, UrbanGems, asks its visitors to select “which place do you find more beautiful”.

Then this collected information can be analyzed to build knowledge that can be used to improve the life in the city, as for example the computation of “happy” instead of “short” routes for pedestrians or indicators about the beauty of a city to be used by designers and architects. The richer the information, for example through the inclusion of smell & sounds, personal and shared memories, and the distinction of day and night, the more sophisticated would be the algorithm that evaluates the different routes in terms of their qualitative instead of their quantitative characteristics.

So, Daniele finished his talk by asking the summer school participants “Do you want to help build a happier city?” and indeed many joined him to apply his approach for the city of Volos.

IV. 2 Urban interaction design

More and more urban space becomes inherently hybrid since information and communication technology (ICT) acts as a mediator for interactions between people residing in close physical proximity for varied time periods, from neighbours to passers-by and strangers in public spaces. Urban design then becomes inherently hybrid, including both virtual elements (e.g., smartphone or web applications) and urban interventions (e.g., artifacts, signs). In this hybrid space, novel types of communication and citizen engagement become feasible but most importantly the question of the participation of people in the shaping of this hybrid space becomes urgent.

Michael Smyth (Edinburgh Napier University) introduced in his lecture, titled “Life between Buildings - an everyday story of Urban Interaction Design”, the emergent domain of Urban Interaction Design and explored some of the challenges faced through the work of the UrbanIxD project. UrbanIxD is tasked with building a community of researchers and practitioners, and the project has as its focus, the point of interaction with and between humans in the technologically

augmented urban space of the future.

As part of this work the project ran a summer school in 2013 and this presentation considered some of the research themes that emerged and their implications for continued research in the field.

Michael encouraged the participants that would join the group on urban interaction design to reflect upon the modest and the day-to-day aspects of urban life; the locality rather than the whole city. To take an optimistic view, by considering ways that interactive technology can be used to maximise the use of space within urban areas for positive outcomes, to enhance the experience of city living that so many of us would like to enjoy. In this context, issues to think about, things to make you go hmmmmm include:

1. Patterns of urban usage: where & when do people meet/congregate/gather?
2. Rituals in everyday behaviour - dialects of city use
3. Signs and signifiers of use
4. Transient or contested spaces - parasite buildings
5. Negotiation of space
6. The things/behaviours/patterns that bind us together (e.g., eating/sleeping/socialising)
7. The Quantified Self - making the invisible visible

Andreas Unteidig, a PhD student at the design research lab of Berlin University of the Arts), and founding member of the research group *Civic Infrastructures* and co-leads the projects *Neighborhood Labs* as well as *Community Now?*, participated also as a tutor in the urban interaction group. He brought his experience in the development of tools and infrastructures, aiming at empowering citizens to act and articulate themselves politically, as the hybrid letterbox.

IV.3 Do-It-Yourself networking

Wireless technology, cheap off-the-shelf hardware and free and open source software make it easier and easier for people with less-technical inclinations to build their own local networks. They can thus become hosts of local communications between those in physical proximity, without a need to be connected to the commercial Internet, or buy a domain name or online space in commercial platforms. For example, using a Raspberry Pi, a web captive portal, and a WiFi dongle, a local actor can activate today a context-specific social application that invites passersby and residents to engage in various combinations of virtual and physical, interactions in public spaces or a city neighborhood. The possibly ephemeral presence of this invisible virtual space can be announced through physical interventions: a visible container of the device itself, a QR code, or a poster. Most importantly, anyone in proximity can join by simply selecting the corresponding wireless network name and opening a web browser without the need for credentials, private location information, or other identification, except for being there. Being there means also that there are opportunities to design for physical interactions, the inclusion of non-users, and the attachment of meaning to places.

In this sense, DIY networking provides opportunities for citizens to engage not only in the design of their hybrid urban space (see above) but also in the deployment of the infrastructure that will host the virtual elements of this space and thus get ownership over the produced data and choose about important issues related to privacy, anonymity, and durability of information (the right to be forgotten).

Mark Gaved (The Open University) introduced n this talk titled “Pioneers, Subcultures and

Cooperatives: different flavours of DIY networks and some of the challenges they face" the "bottom up" approach to communities connecting themselves to each other and the Internet. Rather than funded by government or commercial bodies, local communities have been connecting themselves and their neighbourhoods with local networks (wired and wireless) using a range of technologies. They do this for different reasons: to increase community-wide communication, to get connected to the wider world, to support other activities or just for the fun of doing it. Mark talked about some examples, and some of the technical and social challenges DIY networkers face.

Harris Niavis, **Ilias Syrigos**, **Kostas Chounos**, and **Virgilios Passas**, members of the NITLab at the university of Thessaly, with strong expertise on wireless networking, joined the DIY networking group, whose focus was on providing hand-on experience to the participants on installing and deploying small scale DIY networking using cheap off-the-shelf hardware such a Raspberry Pi or the TP-Link routers TL-WR703N or TL-MR3020.

Panayotis Antoniadis participated also in discussions related to the use of such networks operating outside the Internet and helped to create links with the urban interaction design team.

IV.4 Complementary currencies

Communities around the world have been experimenting with different types of complementary or alternative currencies for many years in an effort to support their local economies. The success of a complementary currency depends to a large extent on the number of active users, the guarantees offered, the trust in the currency, and the interdependencies between these 3 factors. To establish a liquid currency this needs to be considered with care, in the unique local context.

The vast majority of such currencies, like LETS or time banks, face difficulties to scale in number of participants and volume of transactions and to survive for long periods of time. Some of the reasons include: 1) the natural imbalance between demand and supply among community members (even when there is no interest, which is the case in most complementary currency systems, credit tends to concentrate in the hands of the few), 2) the high dependence on voluntary work by charismatic individuals that inevitably lose their capacity to contribute over time and 3) the integration of complementary currencies into the mainstream economy, and most notably the tax system, which limits the exchanges to services of small value (the example of the Swiss WIR shows that managing to overcome this restriction can lead to scalable and sustainable complementary currencies).

These are indeed some of the challenges faced by TEM, one of the most successful complementary currencies that appeared in Greece, and more specifically in Volos, after the economic crisis of 2009. TEM facilitates C2C exchange of services and goods between Volos locals (without the need for euros), in the social "Third Sector".

Modern technology can support and improve the functioning of a complementary currency, as for example the open source software platform Cyclos, can play an important role for facilitating the deployment of various complementary currency schemes. But perhaps the most important factor of success is the people involved and the level of citizen engagement that they will manage to stimulate.

To achieve a critical mass of users, one has to activate early adopters, decide who these should be and how to get them on board. Here, the right strategies need to be found to get in buyers, sellers and other stakeholders, to create incentives for them to join and to stay on board. Further, there should be some initial investment, on the basis of time, manpower, or resources, as the backing made for the commitments towards the user community. Such commitments need to be formalized as enforceable obligations. To ensure the stable value of the currency, guarantees offered by a government body (e.g. land) are no absolute necessity, but can be highly conducive, as can be the backing through assets (e.g. energy).

The agreement and rules for these aspects can then be the basis for trust in the system, essential for the functioning of any currency. A kind service provider, i.e. a central group that oversees, organizes, and executes, is probably indispensable, to enforce the rules.

Giuseppe Littera (Sardex.net) represented a very successful case study in Sardinia, inspired by the Swiss WIR, and which can perhaps provide further inspiration and important lessons for systems like TEM regarding the correlation between monetary/community design principles and the resulting socio-economic interactions. Giuseppe presented in his lecture titled “Praxis over theory - how Sardex was built and how it evolves” the creation and evolution of Sardex.net (Sardinianexchange.network) and the interactions among its participating members at a specific spatial and temporal context (Sardinia 2010-2014) and within the boundaries of a shared/specific institutional framework based on voluntary participation. He argued that no form of technology, including currency, credits, or money, is in itself neutral.

In the case of Sardex.net, the implemented credit system has its distinct features which influence its function as both a monetary and a social environment. These features are built-in, so as to be consistent with the governance principles set through the agreement that all members sign when joining. Comparisons were made between the Swiss WIR’s initial configuration and Sardex’s on-going development, which are strikingly similar in mission and vision but developed in different ways over time. The design of community currencies like Sardex.net is not a one-time opportunity (see also Bitcoin’s source code releases and frequent forks) but more of a process that never actually ends. Its focus is on enabling proximity-based trustful relations by choosing the right incentives and co-creating with the community a set of tools and services, through a continuous process of trial and error/learn-unlearn-relearn.

As Giuseppe stressed, technology is here and already provide tools that could vastly improve the overall quality of life, even in times of crisis. Humans are far more complex than machines and we all are challenged to go beyond the flawed institutional framework that encircles us in our daily lives (the system). In this context Sardex/C3 is an living experiment that aims at improving the overall quality of life and work for the local economic layer by leveraging socially enabled construction of value and technically available means to track, distribute and share the value.

Chris Cook (University College London) provided an optimistic but concrete plan on the possibilities of Volos to host a local healthy economy based on its local assets. As he eloquently pictured the transition from the past to the future, Volos 1.0 existed for millennia in a decentralised but disconnected economy; Volos 2.0 is the victim of the centralised but connected economy which broke terminally in late 2008; Volos 3.0 will be a participant in a decentralised but connected economy.

As he argued to achieve this vision one needs to invest on three main sources of 'value' in Volos. Firstly, its location, which is to say Volos purely as place/space; secondly the material and other resources embedded in (infrastructure, productive land, buildings) and passing through (eg solar energy & water) Volos; and finally, the largely unused intellectual/human resources - the people of Volos. All of this economic value may be mobilised 'bottom up' through the use of associative agreements/protocols (social contracts) and the simple prepay credit instrument which long pre-dates modern finance. The outcome of mobilising these resources will be a networked Volos 3.0 and exemplars of networked local community peer to peer credit (not debt) clearing and peer to asset (asset-based) currencies.

Brett Scott, an activist and author of the book “The Heretic's Guide to Global Finance: Hacking the Future of Money”, and Christos one of the founders of TEM, joined Giuseppe and Chris in the leading team of the group of complementary currencies whose main goal was to propose a sustainable version of TEM, as described in the next section.

V. FINAL PROJECTS

V.1 VolosGeist: The spirit of Volos' neighborhoods

Participants: Daniele Quercia, Berker Agir, Chaohai Ding, Jiwan Jeong, Panagiota Micholia, Angeliki Anastopoulou, Manos Katsomallos, Alexandros Keramidas

The aim of the project is to identify different sources of data that can be collected from the residents and visitors of Volos through technology in an efficient and non-intrusive way. The idea is to extract and combine information from these sources and build a real-time map of the social heartbeat of Volos. While software engineering helps implement and launch the project, data science comes into the picture to extract the characteristics of Volos's neighborhoods. Also, social sciences might well help in interpreting the results and make them actionable.

From a quantitative perspective, the working group added Volos to the available cities at the urbanopticon 1-minute web game, covering the whole city with photos from 354 places. They managed to attract more than 250 participants to play the game in less than three days and produced a heatmap with the places that were remembered the most. These places were landmarks (e.g., churches), the main promenade, central locations, main street intersections, while non-central neighbourhoods, and places with lack of uniqueness and architectural characteristics were less remembered. The group also managed to crawl 1180 foursquare places and over 17K geolocalized tweets, which were categorized based on gender (as expected sport cafes and strip clubs were found to be dominated by men while places like like hair saloons by women), and on locality (places like the city council or the university were mostly visit by locals where tourist attractions like the lighthouse mostly by tourists). In terms of qualitative data, the group members engaged in field research and annotated the map of the city with an evaluation of the dominant sounds and smells in different locations, which provided more sensorial, and more subjective, information about the city.

V.2 Occupy.here Volos - local forums

Participants: Laura Querci

The aim of the project is to consider the social aspects of community knowledge sharing and digital society. This project needs to set up an occupy node (http://occupyhere.org/) to explore ideas around conversations in local communities mediated by site specific hardware that would enable citizens to talk and share information using their laptops or smartphones to connect to occupy nodes hosting forums.

This is a very useful device for Citizens:

- they can post anonymously
- they can build a shared knowledge base
- they can use their smartphones and have access by themselves

Toward these goals, this project contributes to:

- Develop social and cultural capital. People can organize and create civic associations to promote social, economical, political initiatives and events
- Sustaining community. Citizens can try to solve some problems by sharing ideas and suggestions

V.3 VOLEPSOU: The photobooth project

Participants: Antoine Loriette, Vasilis Niaros, Eleni Dimopoulou, Nikos Mellios, Dimitris Kofinas, Nicole Arkouda, Anja Mück

We want to create a landmark.....where people do what they'd do anyway.....but on a city scale. We want to create a collaborative and interactive portrait of the city of Volos.

The main idea of the project is to create points of interest and interaction among the citizens in the city of Volos by inviting them to join a collaborative and interactive portrait of the city. A colorful chair and an explanatory board attract the attention of the flaneurs passing by, locals as well as tourists. The people are invited to take pictures of themselves and upload them to a website, that can only be accessed by a local network at the location.

On that website there will only be seen a composition of 4 photos at a time. Each new photo will replace a former one: There will be 4 photos that will be shown and then recycled in chronological order (also possibility for comments). Each photo will be cropped in lines and form an image mosaic that will be projected like a promotion sign of the city and also be in the main website. The chair has a raspberry pie device that will be able to connect smartphones with the website in a local network (space limitation about taking photos).

V.4 Volos Daily Quiz Project: Stimulating engagement and smart citizens

Participants: Bendert Zevenbergen, Eleni Dimopoulou

The aim of this project is to initiate conversation between unlikely conversation partners in Volos using the University as a catalyst. The University is a place of knowledge (education & research), debate and community, but it is often disconnected from the general population, as also happens in Volos. University Square is a big but under-used square in Volos.

This project provides a wireless internet connection from a small, colourful booth on University Square. When users connect their smart phones to the wireless connection, they can only access one website, to which they are forwarded automatically. The website provides a new story every day.

A database exists with x-amount of stories (say 100), which are based on 1) (local) Greek Mythology, 2) Local policy, politics and governance, and 3) University research. The stories are short and either factually true or not. The user is given the option to vote whether or not she thinks the story is true or not, including an option to write a short comment on why the user has chosen a certain option. At the end of the day at 19.00h, the wireless node is updated to display the original story plus the right answer, with an explanation and possibly some extra information.

Users will need to come to the University Square to pick up the daily story. They can then discuss this story until 7pm, when voting closes. This will encourage locals to discuss local governance decisions, show off their Greek Mythology knowledge to each other and learn about interesting university research. When the stories are relevant for a certain event that is happening in Volos, such as a museum exhibition, a policy debate or a public lecture by an academic, these can be advertised alongside the answer.

V.5 Logos of Volos: Sensing the city

*Participants: Georgiana Avram, Lilas Duvernois, Gonzalo Reyero Aldama, w*ith the technical expertise of: *Rafael Leira Osuna, Jose Fernando Zazo*

Logos of Volos is a urban participatory design experience which aims at bringing Volos locals and visting tourists closer by engaging them into a perpetual conversation.

'Logos of Volos' has three main objectives:

(1.)Create an easy access medium which involves a simple gesture

(2.)Foster ludic conversations in different places of the city-specificity

(3.) Add serendipity to the daily habits of the inhabitants of Volos and the tourists

Implementation: In each emblematic locations of the city, repository boxes will be displayed and will welcome messages (as any letterboxes would do). Any person will post a message. The following message will be processed by the repository, scanned and uploaded online on the local adress of the box. Meanwhile, the person will get another message back from the box as an answer to his/her input. With Logos of Volos, the locations of the city are filled with conversations, stories, anecdotes and much more.

V.6 CALAMARGO: Playing constructively = calamari + ARGO

Participants: Ioannis Koutsimpos, Eftychia Datsika, Faranak Hardcastle

The project aims to create a social network in the city of Volos. It comprises of hotspots that allow either local citizens or tourists to identify problems and suggest solutions to them. Hotspots give the opportunity to visitors to share their experience in Volos through a user-friendly interface. Companies and service providers can also participate in the project, in order to advertise their services and promote their products.

The hotspots can be easily set up using mini wireless routers with rechargeable batteries. Occupy-here open source software will be installed, minimizing the expenses. Only limitation is the need of a mobile device with Wi-Fi capability from users that want to log in to the hotspots and live the *Calamargo* experience.

Visitors are most welcome to point out whether they had a welcome stay in Volos, the problems they faced and suggest what would add positively to their experience. The local city council can gather the feedback and invest in the places of interest, so that future tourists will consider visiting Volos again. Citizens can also suggest problems that arise in everyday life, in order for immediate action to be taken either by the authorities or other citizens and university groups themselves.

The whole project can be funded by sponsors who are getting advertised through the *Calamargo* platform. The hotspots are not visible to the internet. Only the users that connect to the hotspots

have access to the information submitted. There is a ranking system implemented which is determined by user votes. It allows hot topics, requiring immediate attention, to stand out. There is also an evaluation system implemented, managed by the administrators, rewarding citizens that produce solutions to problems or local services that promote the city. The last feature adds to the whole project a nice and friendly game-like user experience.

The project can later on implement touch screen installations with built-in cameras and microphones, allowing access to everyone, eliminating the need for a smart device. It can also include funny educational games for children and students alike. Even machine learning could be implemented at some point, allowing *Calamargo* to interact with the users.

V.7 The EcoNauts Project @ The Chiron Centre for Social Tech

Participants: Marilena Minou; Kyriaki-Maria Salteri; Bram Naudts; Jonas Breuer; Raimondo Iemma; Brett Scott; Giuseppe Littera; Chris Cook; Christos P. (TEM)

The success of a complementary currency depends to a large extent on the number of active users, the trust in the currency, and the guarantees offered. The project addresses these issues. Its aim is to re-base and re-launch the existing TEM currency, through the creation of an electronic repair hub on land owned by the public. To do so, several underutilised resources in Volos are mobilised to make a difference to the community: (idle) workforce, idle land and buildings, a potential energy supply, and dysfunctional electronics.

The key for achieving this aim is to establish a mutually beneficial partnership framework agreement, in which the Volos public authority facilitates the provision of idle land / buildings. In return for the use of such land & buildings we will create an electronics repair hub on the site. By doing so, the public administration would create social and economic value, at little or no cost and potentially self-sustainable.

The land, and the creation of value it enables, establishes the foundation and backing for the TEM: it roots the TEM community in a concrete location, providing a seat for its operators and a meeting place for the community, where goods/services can be exchanged, and the economic activity and the land itself backs the value of the currency.

To keep the necessary funding low, the participation of all stakeholders is necessary. There are different types of incentive mechanisms to foster participation, which need to be tailored to specific needs: conventional economic incentives, and unconventional social incentives.

Contributors scavenge for broken electronics and bring them to the hub, where the repairers fix them and offer them to the consumers. Contributors and repairers are initially paid fully in TEM while consumers pay in euro, TEM or even both. Most importantly, the TEM starts being used and useful, and has a strong foundation for further uses.

In the long term, the currency can be used in a wider market, also for other products. This is the case mainly due to the guarantee provided by the public administration, the assets backing the currency, and the trust and number of users which increase in turn. Also, the repair hub will act to reduce unemployment by increasing the skill set of the Volos people thereby increasing the total social value of the project and reducing unemployment benefits paid by the public authority.

To ensure the functioning of the currency, an independent executive organisation is likely to be indispensable, which is responsible for management, marketing, dispute resolution, and quality control. The tasks of supervision and management include the units of the currency and the stability of its value, cost and revenue streams, marketing and outreach, legal representation. Further, they include the management on the ground, the allocation of manpower, overviewing the repairing and selling, the TEM currency office and software.

V.8 ARgos – Augmented Reality in Volos – Greece

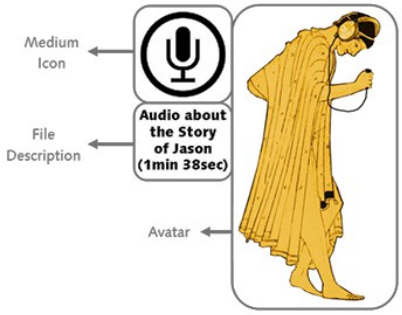
Participants: Joatan Preis Dutra, Dimitris Kofinas

This project aimed to investigate how augmented reality tool can be used for cultural tourism, with mythology and city history's content applied for Volos / Greece.

With the WizARt CMS Tool, which combines different media files (audio, video, 3d, text, links, etc) elements with Junaio, it was possible to use Augmented Reality (AR) to achieve cultural information, creating a different approach on current AR apps. The chosen possibility, was the use of iconographic elements (combining mythological characters, icons and text) that trigger the information according to the proximity of the user, based on GPS location.

The target content for this project is the mythological and touristic information regarding the city of Volos, Greece and whereabouts. The content deals with myths such Jason and Argos, Argonauts, Centaurs in Pelion Mountain, but contemporary information as well, as Giorgio di Chirico, Port of Volos, and so on.

The available information was divided in several media types, categorized as: audio, text, video, comics and link (to external content). The idea was to get historical - and official - information regarding Volos and region, but also to show how the cultural and mythological information about Volos are portrayed on participatory media, as twitter.



For each medium type, there was an avatar to trigger the information. The avatar usually is performing an action related to the medium type, or related to the content. Each avatar is

accompanied with a medium icon and file description.

The Wizart CMS Tool combined with the “3rd EINS Summer School” was an ideal scenario to experiment cultural content using AR, being a perfect opportunity to go beyond, towards something more pragmatic, and where it is possible to empirically validate some of the developed propositions, offering a unique opportunity to analyze the use of AR and Cultural Heritage content. Further information regarding the Cultural hARitage Project (ARgos/Volos and Brussels) project: http://www.culturalharitage.com

ARgos Project Videos:

- POI 1: https://www.youtube.com/watch?v=HsLT5bTbpRg
- POI 2: https://www.youtube.com/watch?v=Z9Jsukn46Ig
- POI 3: https://www.youtube.com/watch?v=vu1sxG6nzuM

VI. Feedback and future steps

After the end of the 10-minute presentation of the individual projects, the evaluation committee provided detailed feedback identifying important challenges for the proposed solutions to be implemented in practice[3]. This critical perspective lead to an interesting discussion on the various trade-offs in the use of technology for improving the life in the city and the role of researchers to this end.

Vasilios Sgouris, appreciated the effort of the participants to explore solutions for the city of Volos, coming from different backgrounds, cultures, and disciplines. As he said, the presentations generated only “positive” feelings but he stressed the fact that the first question raised by someone from his own perspective, as the director of a local development company, is *What could be actually happen in the city the next day? Which from these ideas could we buy right now?*

From this perspective, the proposals that attracted most his attention was the VolosGeist and Argos who can be readily implemented and put in use. Regarding the data mining aspects of the VolosGeist, the issue of representativeness was raised (e.g., only a certain category of citizens use Foursquare) which is particularly important when such data are to used for policy making purposes and need to be complemented with other sources of data.

Regarding the various proposals based on the low-cost DIY networking infrastructure, the main issue raised was the important role of the administrator of the platform and the significant hidden costs of moderation, both for eliminating inappropriate content and for keeping the interest over time.

Pantelis Skayannis, brought the urban planning perspective and acknowledged the importance of the city as a locus of innovation and a product of innovation and the role of technology for stimulating the creative of young people, not only for fun, but also for real work that can be materialized. And he said “bottom-up is good, we are fed up with top-down”, but it has to be combined with collaboration with other entities.

Following up on the challenging issue of administration raised by Vasilios Sgouris, he also stressed the need of dedication (someone has to be there, to administer, to update, to technically support), which then raises the need for money since we shouldn't assume that people can invest their free time in such activities. For this, he suggested as a way to think forward, the possibility to combine the different proposals technically, and especially administration-wise, a combination which could be taken up by a project entity.

3 The 10-minute project presentations and the feedback session are available here: https://www.youtube.com/watch?v=ca_jZsPW-b8

Pantelis Skayannis, referred also to the individual projects, asking critical questions, such as the difficulty to transform the type of data collection performed by the volosGeist project to concrete planning proposal (the “so what?” question); the huge bureaucracy required for the type of building repairs suggested by the EcoNauts project; the issue of density for the placement of the green chairs of the Volepsou project and the danger of becoming boring as the Brussels' cows; the need for someone to decide on the daily question and the need to protect the boxes for the Volos Daily Quiz and City Logos projects (security and safety issues apply to other proposals as well); and the difficulty to use QR codes for the ARgos project, suggesting to complement it with visible information on how it works.

Elias Houstis, brought up[4] a similar point and noted that most proposals assumed users with significant familiarity with ICT technologies, which is not always the case for the population of municipality of Volos. He also wondered why is it really necessary to develop DIY networking platforms when several of these ideas could be also implemented in the existing hardware / software platforms (facebook, mobile networks, etc.). For example, his institute developed a significant portal for the municipality of Volos (dimosvolos.gr) that supports several users and services. The most popular service was the “Voice of The Citizen” that supports interactions by telephone and internet which is based on the standard 311 platform. Most of the citizens used this facility prefer telephone based interaction.

Finally, **Yannis Grigoriou** brought a more optimistic view stressing the importance of the human element and technologies that are playful and make people happier; especially during the time of crisis when unemployment is high and there is a need for people to use their energy and free time in constructive ways.

In the discussion that followed there were interesting arguments related to the main points raised by the evaluation committee, such as the importance of local authorities to overcome bureaucratic issues and the need to avoid constraining the imagination of people through practical concerns (such as this of vandalism). We finished with a more general discussion on the role of citizens and researchers in the planning process. As Pantelis Skayannis commented on the question of participation, to be able to integrate conflicting perspectives into a final decision is an art and the urban planner could be seen as the maestro of an orchestra. Regarding the role of researchers, and to what extent we could imagine that a similar combination of researchers, activists could participate in a real process of proposing solutions for the city, Vasilios Sgouris commented that this was interesting as an experiment, and it is allowed being an experiment. But outside is a tough world and politicians they know, they don't ask. They are voted because they have proposed the best solution and if they really feel it as a need, they would come to you to ask for them to propose. As he concluded, he has a personal experience from bringing new ideas that most of them are not adopted by the local authority. However, there is always hope but one needs to advance carefully and thoughtfully. Good ideas need to be seen in a whole, how they are going to work in practice, be sustained economically, etc.

After this intense session of two hours, we were all happy to go out to the Volos promenade for photos and for promises to keep in touch, and to come back soon to Volos for addressing the criticism of the evaluation committee and propose more realistic and more attractive solutions for engaging citizens in the future development of the city.

4 Elias Houstis had to leave after the end of the project presentations and sent his feedback through e-mail.

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VII.3 Contributors

Organizers and e-book editors

Panayotis Antoniadis, ETH Zurich and NetHood

Ileana Apostol, ETH Zurich and NetHood

Anna Satsiou, CERTH

Leandros Tassiulas, CERTH

Lecturers and Tutors

Chris Cook, University College London

Tamas David-Barrett, University of Oxford

Mark Gaved, The Open University

Karmen Guevara, University of Cambridge

George Koutitas, CERTH

Iordanis Koutsopoulos, AUEB & CERTH

Giuseppe Littera, Sardex.net

Harris Niavis, University of Thessaly & CERTH

Daniele Quercia, Yahoo!

Michael Smyth, Napier Edinburgh University

Sambit Sahu, IBM

Brett Scott, Campaigner

Andreas Unteidig, Berlin University of the Arts

Evaluation committee, representatives from Local Authorities

Yannis Grigoriou, Manager at Volos Municipal Social Services and co-founder of TEM

Elias Houstis, Professor of Computer Engineering and Communications Department at University of Thessaly

Vasilis Sgouris, Director of ANEVO

Pantelis Skayannis, Professor at the Department of Planning and Regional Development, and Dean of the School of Engineering of the University of Thessaly

Summer school participants

Berker Agir, EPFL

Ayomide Ajayi, ULANC

Gonzalo Reyero Aldama, Universidad Antonio de Nebrija

Angeliki Anastopoulou, AUEB

Georgiana Avram, University of Nottingham

Fabrice Bigirimana, UiO

Jonas Breuer, iMinds

Aldo Campi, UNIBO

Eftychia Datsika, IQUADRAT

Eleni Dimopoulou, UTH

Chaohai Ding, SOTON

Joatan Preis Dutra, Bauhaus-University Weimar

Lilas Duvernois-Guevara, OXF

Manolis Efthimiou, UTH

Faranak Hardcastle, SOTON

Vassiliki Hatzi UTH

Raimondo Iemma NEXA

Jiwan Jeong, KAIST

Manos Katsomallos, UTH

Alexandros Keramidas, freelancer

Alexandros Kioupkiolis, AUTH

Dimitrios Kofinas, UTH

Evaggelia Kokolaki, NKUA

Ioannis Koutsimpos, AUTH

Rafael Leira UAM

Antoine Loriette, MobileLife

Nikolaos Mellios, UTH

Panagiota Micholia AUEB

Marilena Minou, AUEB

Anja Mück, Berlin University of the Arts

Bram Naudts, iMinds

Vasileios Niaros Tallinn University of Technology

Georgios Ntarzanos, CERTH

Laura Querci, University of Milano Bicocca

Kyriaki-Maria Salteri, CERTH

Yusuf Sani ULANC

Laura Sartori, UNIBO

José Fernando Zazo Rollón, UAM

Bendert Zevenbergen, OXF