

EXPAND

Enhancing co-creation in JPI Urban Europe through widening Member State and stakeholder participation

Report D3.8

Research capacity building through UERA: Summer school report

Task 3.5: Joint solution for research: Capacity Building (IFSTTAR)

Besides aligning national programmes and policies, the alignment and cooperation of the research community is needed to strengthen European urban research and innovation. The “human capacities” will be built upon the framework of the Urban Europe Research Alliance (UERA) and the SRIA. Based upon the SRIA a shared vision will be developed among the UERA community on how to support the SRIA implementation best.

Utilising the proposed alignment actions of the alignment strategy, appropriate instruments are selected to strengthen human capability building by sharing of skills, concepts, experiences, case studies, research results, solutions, etc.

Thematic Working Groups (TWGs) will be organised focusing on selected SRIA research questions according to the UERA partners’ priorities. These TWGs will provide networking and scientific exchanges in order to develop a shared vision around the key questions, to specify how to come beyond the state of the art, to jointly work on advancing these topics and create activities and new solutions. **A summer school dedicated to young researchers like PhD students and postdocs will be organised around key topics selected by the TWGs.**

Deliverable D.8

D.3.8 Summer school report

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Context of summer school and the collaboration EERA-UERA

UERA and EERA collaboration

The European Energy Research Alliance (EERA) is an association of European public research centers and universities active in low-carbon energy research. Bringing together more than 250 organizations and around 50,000 researchers from 30 countries, EERA represents Europe's largest energy research community. Energy being an important subject for Urban Europe, several contacts has been taken between both organizations. During a UERA-EERA joint meeting in Prague July 2016, it was decided to co-organise and co-found a workshop and a summer school. The workshop was organized in Barcelona in November 2016, thanks to the RMIT support, on *Sustainable smart cities*. For the summer school, Mohammad Royapoor from university of Newcastle, member of EERA, proposed to host it. It was thus jointly decided to organize and co-found jointly a first summer school on **smart and sustainable cities** at University of Newcastle. The team was composed from Jennine Jonczyk and Mohammad Royapoor from university of Newcastle on one part, representing EERA and Anne Ruas from IFSTTAR representing UERA from the other part. Information related to the summer school was regularly shared with UERA steering board and UERA members to work on the content and to advertise the event.

A common view on holistic necessity for smart city

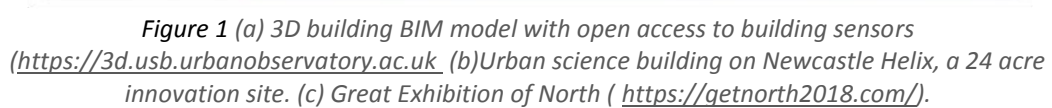
From EERA-UERA on smart cities, the importance of **interdisciplinarity** and softer skills around communication is often overlooked, and the course was designed to equip the next generation of smart city researchers and leaders with a holistic appreciation of the wider context of their research and build confidence in communication skills. It is the network of people, how they communicate and drive meaningful collaboration that will facilitate smart city solutions that deliver benefits to society and the environment

Location: Urban Sciences Building, Newcastle University, UK.

Newcastle University is uniquely placed to host the first UERA-EERA summer school on sustainable smart cities: it will be delivered at the Urban Sciences Building at Science Central. Newcastle is home to the Urban Observatory (www.urbanobservatory.ac.uk); the Newcastle Helix site is a data-rich, sensed environment; and the host building itself is a living lab, gathering sensor data on its performance, energy sources and consumption, and even its building skins (<https://3d.usb.urbanobservatory.ac.uk/?demo>). Newcastle has extensive urban sensing at micro (appliance), meso (building) and macro (city) scales (www.urbanobservatory.ac.uk/data)

Data gathered from the building, city quarter and wider metropolitan area can be mediated to stakeholders in a purpose-built facility: Newcastle has developed Decision Theatre methodologies and spaces for co-creation and visualisation of research data to explore information from multiple sectors simultaneously. Newcastle hosts a £300,000 dedicated venue with high-resolution projection and touch screen system in an immersive, interactive 3D environment to facilitate the use of socio-informatics co-creation techniques in this course.

The city of Newcastle was the host city for the Great Exhibition of the North during the summer 2018, (<https://getnorth2018.com/>). The exhibition was a 3 month showcase of design, arts and innovation in the North of England. The participants had the opportunity to see some exhibits during the evening programme, which focussed on continuing discussions in a more relaxed setting.



Summer School Programme

Pedagogical objective

The pedagogical objective of the school was to give the participants opportunities to develop understanding of their area in the wider, international context of smart city activities.

During the summer school, the participants would:

- experience and engage with the complexities of **urban sensing**,
- **implement** sensing in a live urban observatory in hands-on practical sessions,
- discover new ways of **cross/multi/inter/transdisciplinary working**,
- learn and practise methods for **collaboration and co-creation**,
- hone **communication skills** for pitching, explaining and translating research,
- develop and **extend their international network** of interdisciplinary smart city researchers.

Delivery of course materials

Lecturers/ researchers from different institutions from the EERA/UERA smart city JP were sought to demonstrate some of the expertise across the network, and to give the participants international perspectives.

The participants received course material from staff from Newcastle University, From University of Zaragoza and Public University:

- **Newcastle University staff**
 - Professor Simin Davoudi
 - Professor of Environmental Policy & Planning,
 - <http://www.ncl.ac.uk/guru/staff/profile/simindavoudi.html#background>
 - Dr Sara Walker
 - Senior lecture, teaching on renewable energy and energy efficiency technologies
 - <http://www.ncl.ac.uk/engineering/staff/profile/sarawalker.html#background>
 - Dr Mohammad Royapoor
 - Research associated, engineer with academic and industrial involvement in the design and optimisation of heating, ventilation and air conditioning (HVAC)
 - <https://www.ncl.ac.uk/engineering/staff/profile/mohammadroyapoor.html#background>
 - Researchers from OpenLab, School of Computing Science
 - <http://www.ncl.ac.uk/computing/research/groups/openlab/#about>
 - Researchers from Urban Ob
 - <http://urbanobservatory.ac.uk/who-we-are>
- **Campus Iberus: University of Zaragoza**
 - Dr Ana Lazaro
 - Professor of University, thermal machines
 - <https://i3a.unizar.es/en/investigadores/ana-lazaro-fernandez>
- **Campus Iberus: Public University of Navarra**
 - Dr Francisco Falcone
 - Professor of University – IoT, communication and electronics
 - <https://www.unavarra.es/pdi?uid=2774>

Overview on the program

	THEMES	TALKS	ACTIVITIES	LEARNING OUTCOMES
MONDAY	Introduction	Welcome to summer school Keynote Speaker-scene setting Intro to summer school, EERA & UERA Interdisciplinarity 101 (<i>Simin Davoudi</i>)	Ice breaker activities Guess-who delegate game	Awareness of EERA & UERA aims and objectives and network opportunities
TUESDAY	Urban Energy Networks	Thermal energy storage, Energy networks and buildings (<i>Ana Lazaro</i>) 'Building as a power plant' (<i>Mohammad Royapoor, Sara Walker</i>)	- LEGO energy networks - USB tour - Intro to data on USB	Understanding of energy efficient interactive buildings and district energy networks. Interdisciplinary working – team working
WEDNESDAY	IoT, Urban living labs and Urban Observatory	Communication protocols in IoT systems and applications. (<i>Francisco Falcone</i>) Digital civics & Urban Observatory (<i>Jennine Jonczyk</i>)	'sense my street' community tool box using Newcastle/ Science central as test bed (project) UO data on USB (Link back to Tues)	Understanding of digital civics. Transdisciplinary appreciation_ industry Practical sensor experience –deployment/ monitoring Data handling/ data quality
THURSDAY	Co creation and Communication	Training session: how to run a decision theatre –a socio-informatics tool for co-creation Communication Think tank - TED, tools of engagement, elevator pitches and creating impact (<i>Claire Walsh, Casper Hewitt, Cap-a-pie theatre company</i>)		Communication skills – experimenting with different ways.
FRIDAY	Project and conclusion	Prep of mini project presentation, presentation, discussions and feedback (<i>Jennine Jonczyk, Mohammad Royapour</i>)	Project presentations, discussion and feedback.	

Table 1 Summer school program

Sum up of the content

Disciplines and interdisciplinarity (Prof Simin Davoudi)

Scene setting and introduction about disciplines and interdisciplinarity.

In the literature as well as our daily conversations we tend to come across a confusing set of terms, such as multi-disciplinary, interdisciplinary and transdisciplinary. They are often used interchangeably despite conveying different meanings (See Sillitoe, 2004). Multi-disciplinary approach involves a number of disciplines coming together but each working independently and primarily with their own frame of reference and methods. Hunt and Shackley (1999) call this the

'science of interaction' well, it is productive and allows problems to be looked at from different perspectives. So, as Petts et al (2008:596) suggest "it should not be seen as failed interdisciplinarity. Interdisciplinarity involves occupying the spaces between disciplines to build new knowledge (Sands, 1993). It is a synthesis of knowledge whereby our understanding whereby disciplines can co-exist in a particular context but retains their boundaries. When it works is modified in the interplay with other perspective. Hunt and Shackley (1999) call this the 'science of integration' whereby coherence between the knowledges that are produced by different disciplines is sought (Lau and Pasquini, 2008). Transdisciplinarity (or pluridisciplinarity) creates a cross-road in which different disciplines intersect, problematise and challenge each other (Sands, 1993). It transcends, re-negotiates and re-draws traditional disciplinary boundaries (Petts et al, 2008). Hunt and Shackley (1999) call it the 'science of hybridisation'. Trans-disciplinary approaches involve organisation of knowledge around complex subjects, or real world problems, rather than disciplines. Such approaches are more likely to produce outcomes which are more than the sum of different parts. One of its positive by-products is a greater awareness and reflection on one's own particular disciplinary knowledge.

The role of Thermal Energy Storage to increase the renewable fraction in energy supply networks and buildings (Dr Ana Lazaro)

Thermal energy storage systems (TES) cover a central role in the strategies to reduce energy consumption due to heating, cooling and domestic hot water demands, increasing the efficiency of the energy systems in which they are integrated and the potential utilization of new RES. Although TES themselves do not save final energy, they are able to "move" heat and cold in space and time, correcting the mismatch between supply and demand allowing: a) energy conservation by exploiting new RES; b) peak shavings both in electric grids and DH grids; c) power conservation by reducing the required power of energy conversion machines; d) reduced GHG emissions. Thermal Energy can be stored in form of sensible heat, latent heat and chemical reaction. Despite this, the most commonly used method remains based on sensible heat, the latent heat storages, based on the employment of phase change materials (PCM), and are an attractive solution, because they provide higher storage density and smaller temperature difference between the absorbed and the released heat than sensible heat storage.

Building as a power plant (Dr Mohammad Royapoor)

The UK Government wishes to support flexibility in the electricity system, since greenhouse gas emissions reduction targets are expected to result in greater use of renewables and greater electricity demand (through electrification of heat and transport loads), both of which impact on the way the electricity grid will operate in the future. Demand response programs typically involve very large demand centres, co-ordinated by National Grid. In this instance we are interested in much smaller loads (which could be grouped together), which could offer services to the local Distribution Network Operator. Buildings can provide significant Demand Side Response capabilities given the nature of the thermal and electrical properties of buildings. This may be particularly useful in urban areas, where the electricity grid may be under greater strain in the future. Buildings could operate individually, or coordinate with other sites and assets in urban areas to form a Virtual Power Plant.

The Urban Sciences Building, equipped with hundreds of sensors, can measure energy supply and demand. The building incorporates photovoltaic generation and large scale grid-connected battery storage. These two technologies can respond to local network needs for services (e.g. peak-shaving), and also act as a power source for the building in case of loss of mains power (i.e. islanded operation). The building is therefore ideal to study, due to the types of load and generation in the building.

The role of Communication Protocols as Enablers in IoT Systems and Applications (Dr Francisco Falcone)

The advent of Smart Cities and Smart Regions demands highly interactive context aware environments, capable of gathering large volumes of data as well as potential tele-control of multiple devices, within an IoT framework. In this context, wireless communication systems play a fundamental role in providing such interactive capabilities, due to inherent ubiquity as well as large degrees of adaptation to user dynamics and demands. In this presentation, an overview of communication systems employed in order to enable IoT systems and applications is provided. Requirements, planning guidelines, challenges and real deployment designs are presented, providing a comprehensive description.

Digital civics and Urban Observatory (Dr Jennine Jonczyk)

The urban observatory at Newcastle, is the largest open access IoT sensing network, with 3600 sensors over 62 parameters, and over a billion observations. The network enables us to use the city as a lab and facilitates evidence based decision making.

The participants learn how the observatory was built and challenges it faced. Through an observational walk, the participants get first-hand experience of using sensors. They consider practical issues of obtaining representative measurements, power and communication options that face any smart city installation.



Figure 2 Photograph of summer school participants at the CISCO 'smart street' as part of an observational walk around the city with handheld urban observatory sensors.

How to run a decision theatre and a socio-informatics tools for co-creation (Dr Claire Walsh)

Successful decisions require the consensus of a wide range of stakeholders with frequently differing backgrounds and priorities. This session is to allow participants to explore their own communication skills and resources and tools they can use to bring their research to other audiences, in an engaging way. A range of socio-informatics tools is explored including session with Casper Hewett, who runs a discussion based workshop.

Communication skills workshop (Dr Claire Walsh, Dr Casper Hewett, Cap-a-Pie theatre company)

Cap-a-Pie work with researchers to co-create at every stage of the research process. They provide participatory creative workshops for academics and as part of research projects and can work with partners to produce theatre workshops and productions to disseminate research findings. Cap-a-pie work with delegates to explore different ways of presenting their work, using their experiences from the summer school.



Figure 3: One group's performance with Cap-a-pie.

Mini Projects

To ensure learning outcomes, we wanted to make sure that participants were active learners and had the opportunity to practice the skills they had learnt. **Project work** provides an opportunity to progress team working and communication skills across participants from different disciplines, to share skills and ideas.

There were two subject options given to the participants: **urban sensors and urban observatory data** or **energy data from Urban Science Building**.

The participants spent 2 hours working on data on Wednesday afternoon and took their learning into Thursday's theatre production with Cap-a-pie and the discussion workshop.

Participants

The table 2 below shows the attendees of the Summer school and their associated Institution and discipline. The participants ranged from Master and PhD students to Post-doctoral researchers.

The interdisciplinarity of the course material worked well as participants ranged from different disciplines which allowed the participants to hear and see things from an alternative view points during discussions.

First Name	Family name	Country	Organisation
Tatiana Luz	Pasquel Garcia	Belgium	VITO
Dario	Masucci	Italy	Universita Roma Tre
Andrea	Bartolini	Italy	Universita Politecnica delle Marche
Aneta Maria	Strzalka	Germany	Stuttgart University of Applied Sciences
Martina	Botticelli	Italy	Marche Polytechnic University
Hannah	Jachim	Austria	Individual

Maria Maddalena	Tortorella	Italy	CNR-IMAA, Tito Scalo
Saveria	Teston	Italy	CertiMaC - Building Materials Testing Laboratory
Maryam	Zirak	Germany	Stuttgart University of Applied Sciences

Table 1 Summer school program

Anonymous feedback was received from 5 of the participants, after the summer school and has been compiled into a spreadsheet in Appendix 1.

Verbal feedback from participants, in the closing session was very positive and the interdisciplinarity of the participants was described as very valuable and gave them alternative view points during discussions.

Some participants said the small numbers of participants made them feel more able to participate in discussions.

Summer school organization

Communication

EERA/UERA & Newcastle (NCL)

- The summer school delivery was assigned to Newcastle University in a joint EERA-UERA JP meeting in 2016.
- The course overview was presented to EERA and UERA at a JP meeting in Bologna 2017 and during UERA General assembly (January 2018)
- During the organization of the course, NCL had Skype meetings with UERA every 6-8 weeks.
- Internal communication occurred at least monthly, or more frequently, as required.

External communication with potential participants

- A webpage with an overview of the programme was set up and this page also facilitated bookings.
- Core university support staff dealt with all aspects of booking enquiries and logistics. Technical questions relating to course material was dealt with by summer school academic organiser.
- Marketing material – flyers were designed in-house at Newcastle University and used to promote the summer school via social media such as twitter. EERA and UERA networks also received the flyers and web links through business as usual news in 2017 and 2018.

Accommodation and the day by day organisation

Hotel rooms were reserved at a nearby hotel, with a discounted rate for participants, 10 month prior to the event. Participants were required to pay for accommodation themselves to reduce risk to Newcastle University.

Budget - cost

Not-for-profit summer school budgets were set to cover costs only and to offer the lowest price possible to participants. The total cost of the event were 8000€ *without* integrating in-kind time from University of Newcastle estimated at 17 working days (9000€). UERA participated with a budget of 7500€.

Lessons learnt from academic organizer & Conclusion

The first summer school of 2018 ran very well, and recommendations for the next summer school are:

- The 2018 programme was not finalized until May 2018. We would recommend finalizing it and freezing it much earlier.
- We did not start proper promotion till after programme was finalized. Promotion needs to start much earlier. We would recommend 6 months prior to the course.
- Summer school promotion needs to be through JP meetings and through EERA and UERA newsletters. Although promotion was done it was not enough spread in the community. Social media was good at promoting registration to non-members.
- We reserved hotel rooms for summer school but delegates had to book and pay them directly, which reduced the risk to the university.
- Group of 20 would be recommended but to keep the small group feeling, where delegates felt comfortable to share, we recommend small (3-4) group work.
- We recommend building in many discussion sessions where participants can share their experiences from their own research.
- Very valuable having participants with different backgrounds, when running a interdisciplinarity programme, as the participants can support each other.
- The evening programme is highly recommended and allowed the participants to continue their discussions, whilst seeing a new city.
- We kept the programme varied in styles of learning to prevent fatigue, as material was very intense. This proved effective.



Figure 3: Participants at Tyne Bar, experiencing a typical English pub, on the banks of the River Tyne.

Appendix 1 Feedback questionnaire

Overall content of Course	Good	Good	Good	Good	Excelent
Relevance of the Course to your work	Good	Excellent	Excellent	Fair	Good
Did the course deal with an appropriate amount of material (in terms of breadth of content and level of detail) for the time available?	Excellent	Good	Good	Excellent	Good
How well did the Course fulfil its objectives?	Good	Excellent	Good	Good	Excellent
Were the screen presentations clear and legible?	Good	Excellent	Good	Excellent	Excellent
Any further comments				The course was good but the topics could have been a little more broad.	
Were you given enough opportunity for questions/group discussions?	Excellent	Excellent	Excellent	Excellent	Good
Standard of IT equipment (if appropriate)	Good	Excellent	Good	Excellent	Excellent
Administration	Excellent	Excellent	Excellent	Excellent	Excellent
Which topic do you think will be most useful?		All topics were very interesting but the most useful, because very relevant to my research field, is "The rule of communication protocols as enablers in IoT systems and Applications".	Integration of competences: working in groups to analyse data and define a common ground	Sensors use in cities	To me all. Storage thermal, building as power plant, sensors and communication, communication skills.
Was there anything else you would have liked to have seen covered?		I would be interested in the aspect of data analysis, and analytics, of the information acquired by sensors. Furthermore the algorithms and the control logics used to achieve the buildings efficient management.	More time to better understand the innovation (and the related pros and cons) in the USB (and in general in the Positive District) and in the city.	Less technical points of view e.g. of a sociologist, geographer, urban planner etc.	
Were enough practical examples given?		I think so. I found the city tour very interesting to see with our eyes the sensors network and we could visit the "flooding testbed".	The practical examples should be explained in most exhaustive way, giving time for discussion. The games were very useful to give voice to the different points of view.	Yes	I wish we had more.
How could we improve this Course?		During the courses we had a lot of details, sometimes spending less time on the overall view and on the	I think that the answers could give some advises to improve the	Specify who the target group is on the website with the course description.	

		interdependence between topics. So I would give a little more time to the high level information. In my opinion, the inherent part of public speech could be compressed a bit	Course. Anyway: thank you very much for your work!!	If the aim is to create a truly interdisciplinary summer school, the lecturers should be interdisciplinary as well.	
Likelihood of recommending this Course to colleagues/friends?	maybe	Yes	Yes	Yes	Yes
If you would recommend this Course please give your reasons. We would hope to use your recommendations when promoting this Course in the future.		It was a very formative experience, both from human and academic point of view. I had the fortune to meet very prepared teachers and very helpful to the dialogue. The small number of participants allowed the creation of an almost familiar environment without neglecting the importance of scientific aspects. The heterogeneity of the audience professionalism has allowed me to approach the smart cities theme from different points of view that I underestimated before.		Good networking opportunity, meet lovely people, explore Newcastle, gain interdisciplinary insights	It gives a good opportunity to get familiar with different aspects of smart city. Innovative communication skills New contact persons in this topic.
How did you hear about the Course?	Email/Post	Other	Email/Post	Other	
Please state where if you selected Website or Other on previous question.		Via colleague	I'm member of UERA		A friend