CREATE-IoT

European
Large-Scale Pilots
Programme

CROSS FERTILISATION THROUGH ALIGNMENT, SYNCHRONISATION AND EXCHANGES FOR IoT

H2020 – CREATE-IoT Project

Deliverable 03.10

Open Prototyping Workshops

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Author(s)	J. Crouch (FE), I. Papadimitriou (FE)					
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1. EXECUTIVE SUMMARY

1.1 Publishable summary

This document details the work undertaken to deliver a round-table discussion and workshop at the combined Global IoT Summit (GIoTS) and IoT Week conferences in Aarhus (June 2019), in particular the document provides details of the materials discussed and key outputs. The roundtable itself is the deliverable output, numbered D03.10 as part of WP03 (Creation, Innovation and Adoption).

FutureEverything (FE) were tasked with the development and execution of workshops to promote the integration of artistic practice within IoT innovation in Europe, with special emphasis on the Large-Scale Pilots (LSP) programme. In the Description of Works (DoW) these are styled '*Open Prototyping Workshops*'; where *Open Prototyping* refers to the detailed methodology developed for this purpose in deliverable D03.01 (Methodology for integrating ICT and Art). More information about the IoT and the Arts integration developed in the CREATE-IoT Project can be found on the LSPs wiki [12].

In September of 2018, FE successfully delivered a roundtable at Ars Electronica (D03.08): where this methodological approach was exposed to the participants of the largest arts and technology festival in Europe. By contrast, the roundtable and workshop described in this deliverable were designed to expose this arts-practice-led methodology to the business and policy maker attendees of IoT Week - a conference "where innovative tech meets business and society" [1]. In this way the roundtable and workshop in this deliverable were able to emphasise unambiguously what implementation benefits can be expected from utilising the methodology for integrating ICT and Art to a receptive and influential audience.

A critical risk discussed in the revised DoW is concerned with the lack of connection between IoT Art, Science and LSP communities, the roundtable and workshop at the IoT Week conferences provided expert engagement with these communities. To achieve this end FE curated a panel of experts in arts and technology for the roundtable discussion and brought its own expertise in arts and technology practice to the Workshop alongside expertise in user engagement from U4IoT. In each case, the diversity of participants encouraged insightful engagement with the topic.

In order to promote a close and symbiotic relationship between the two IoT LSP CSAs [2], representatives from U4IoT were involved with the development of the workshop materials and given the opportunity to present details of their most recent deliverable report. From the March 11th review report and regarding collaboration with U4IoT, "we expect to see greater collaboration through joint activities such as dissemination/outreach events" [3]. Considerable effort was made to thematically co-ordinate the approaches of the two CSAs in this workshop, in order to present a coherent approach to the issues raised and to demonstrate value.

A proposal and method for the roundtable and workshop were developed by FE (the workshop in collaboration with U4IoT). The roundtable proposal was submitted to and approved by GIoTS as an Industry Forum session.

The workshop proposal was submitted to and approved by IoT Week organisers and allocated in two blocks. The round-table event was conducted in a meeting room of ARoS, a high-profile arts centre in Aarhus, where all GIoTS activity for that day was held.

Key Outputs:

- During the roundtable, key information and insights from D03.01 *A methodology for integration of ICT and Art* were presented to a capacity crowd of IoT developers, scientists and policy makers at GIoTS. An informal register was taken during the course of the event which indicated the audience demographics.
- The roundtable audience consisted of a wide variety of interested stakeholders: academics from a number of universities and ERASMUS students, researchers, delegates in private business, and from regulatory offices (such as OFCOM, Switzerland), and included representatives of the Commission. In terms of international make-up, many of the audience were from Europe, but also in attendance were delegates from India, Korea and Brazil.
- The roundtable panel consisted of invited experts from a diversity of fields each representing different thematic elements of the CREATE-IoT strategy. These experts engaged in vigorous discussion around many aspects of the core theme of activating Trust in IoT through the means of artistic practice.
- A significant portion of the roundtable consisted of discussion prompted by audience questions, generating strong engagement between the audience and panel.
- In the case of the workshop, considerable buy-in from our partner CSA U4IoT was secured. This included active participation in the workshop, and a presentation of the new U4IoT report D03.03 *IoT Adoption Barriers and Recommendations*.

1.2 Non-publishable information

This document is public.

2. INTRODUCTION

The ambition of CREATE-IoT is to stimulate collaboration between IoT initiatives, encourage uptake of IoT within Europe, and support the development of IoT ecosystems based on open technologies and platforms. Work Package 3 (WP03) is tasked with the "combination of ICT and art for stimulating innovation and societal and ethical acceptance" [4].

This report details the actions performed in regard to the amended DoW deliverable: D03.10 *Open Prototyping Workshops.*

In practice, this deliverable was actioned in two discrete sessions. A roundtable discussion with Q&A as part of the GIoTS on Monday, 17th June 2019, a workshop as part of IoT Week on Tuesday June 18th. Delivering the work as part of these two conferences, which ran in parallel in Aarhus over the same week in June, served to guaranteed maximum visibility amongst appropriate stakeholders.

The deliverable had the following objectives:
- Provide an introduction to methods by which artistic practices can be used to interrogate complex issues, exposing social impacts, and to disseminate information and findings.
- Demonstrate and articulate the value of artistic intervention as part of innovation practice and in particular on the debates around Trust.
- Bring together expertise and knowledge sharing in a creative format.
- Collaborate with U4IoT in order to increase synergy between CSA actions.

2.1 Purpose and target group

In the recent review report the activities of WP03 have been emphasised as bringing "a unique and engaging element to the overall LSP programme". However, it is also made clear that at this stage in the timeline, emphasis must be made on practical outputs of the work package. To this end our activities at the combined GIoTS and IoT Week conferences in Aarhus were concerned with practical demonstration and in-depth discussion around the value of IoT in the Arts, delivered to delegates engaged in active research and commercial projects, LSP partners, and policy makers.

The roundtable discussion provided attendees with a practical introduction to the benefits of arts-based methodologies. The roundtable format emphasised the sharing of insights and invited open discussions around the topic, in particular:
- Providing an introduction to the use of artistic practices to interrogate complex issues.
- Demonstrating a focus on using the methodology to address issues of trust in data systems.
- Showcasing the value of knowledge sharing in an open and discursive format.

The workshop made use of art-centred methodologies developed through the CREATE-IoT programme to demonstrate value in problem solving and innovation practice. Here the emphasis was on:
- Engaging workshop participants in *practical* exercises which demonstrate the use of artistic practices in the interrogation of complex issues.
- Demonstrating and articulating the value of artistic intervention as part of innovation practice.
- Demonstrating value of using creative thinking and a creative process for tackling real-world issues.

In order for the activities of CREATE-IoT to truly make a difference in the success and user uptake of IoT technologies in Europe it is vital that opportunities are found to present the proposals, strategies and recommendations of the consortia to core stakeholders. This deliverable takes the Art and IoT elements of WP03 directly to the developers, policy makers and researchers that make up the delegates to the IoT Week conferences.

By presenting and engaging this target group with coherent examples of the methodology we were able to demonstrate practical and creative approaches to examining complex issues of Trust in the sector. The methods used in the workshop were shared with our colleagues from the U4IoT CSA, where they were met with great interest.

2.2 Contributions of partners

FE supplied design expertise in creating the structure of the workshop, developed and implemented the two proposed actions, and used its comprehensive contacts base to curate the membership of the expert panel. These experts were purposely drawn from a variety of sectors relevant to the discussion. This choice acts to qualify the nature of an IoT in the Arts approach, and also to clearly demonstrate the value such a cross-domain approach brings to the interrogation of complex issues. Dr Martin Serrano, one of the roundtable expert panellists, also brought insights and experience drawn from his work with the LSP ACTIVAGE.

The workshop evolved as a collaboration between FE and members of the U4IoT CSA, particularly those involved with the recent U4IoT deliverable D03.03 I*oT Adoption Barriers and Recommendations.* In a series of telcos and email threads, common themes were drawn together from the two CSAs in advance of the workshop. This enabled the workshop facilitators to take a coherent and mutually supportive direction presenting (i) U4IoT research into user adoption issues particular to the Autopilot LSP, and (ii) demonstrating a Case Study of the art research project *Who wants to be a Self Driving car,* by Moovel Labs.

The workshop was facilitated by **Irini Papadimitriou** (FE) and **Jason Crouch** (FE), with the assistance of **Rasoul Habibipour** (Luleå University) and **Wim Vanobberghen** (IMEC).

Key to the success of the events at IoT Week were Gaby Stein and Pedro Ralda, who, in addition to planning expertise, provided on-the-ground support during the conferences. In the case of the GIoTS session, guidance for application was provided by Antonio Skarmeta.

Advance marketing of the event was provided through FE social media and blogs, CREATE-IoT newsletter, and IoT Week website and social media.

BLU supported the organisation of the workshops and disseminated the activities and the results using the networks of SMEs.

ARTS supported the organisation of the workshop and disseminate the results using the connections with the STARTS (Science, Technology and the Arts) community.

2.3 Relations to other activities in the project

Both the roundtable and workshop were informed by the substance of CREATE-IoT deliverable *D03.01 Methodology for Integration of Art and ICT.*

The roundtable method used in CREATE-IoT deliverable *D03.08 Roundtable at Ars Electronica* formed the basis for the method used in the workshop component of this deliverable. This method was finessed through collaboration with our colleagues in U4IoT. It should be noted that the action and documentation of CREATE-IoT *D03.08* has also, in of itself, increased the understanding of key members of the panel in this area of debate.

The roundtable increased visibility of an IoT and Art approach as a valuable and practical methodology at a high-profile event in the international IoT calendar.

The workshop demonstrated practical methods to integrate an IoT and Art approach both to its attendees, but also to the members of U4IoT who took part. Feedback was good, with one attendee describing the workshop as a "great experience".

3. GIOTS AND IoT WEEK 2019 PARTICIPATION

3.1 Introduction

One of the core research and development strands of CREATE-IoT is folding in artistic intervention as part of a rich development process for IoT innovation. FutureEverything in collaboration with our partners in CREATE-IoT have developed systems for integrating arts practice with IoT development. One example, which is codified in Deliverable D03.01, is Open Prototyping, which uses a design methodology to integrate the work of artists with the development of IoT products and services. Open Prototyping is one of a number of methods which embrace artistic practice as a catalyst for new ideas and, perhaps more importantly, a way to critically interrogate the wider contexts of data systems and society.

For the purposes of the activities at the GIoTS and IoT Week conferences, the context explored using these methods was that of *Trust*. Where the notion of Trust is concerned with, but not limited to, areas of security and privacy of user data, interoperability between trusted systems, and mitigation of bias or error in user data.

Using the complementary formats of a roundtable and workshop, the action sought to draw in different conference participants based on their preferred mode of engagement with the topic.

3.2 Roundtable Discussion (GIoTS)

3.2.1 Summary

Table 1: Roundtable summary table

Summary	
Name	**Trust in the IoT**
Date	17th June 2019
Location	GIoTS, ARoS, Aarhus
Nº Participants	30
Expert Panel	• **Jason Crouch (chair)** (FutureEverything Research Associate, CREATE-IoT) • **Irini Papadimitriou** (STARTS Residencies Jury / CD FutureEverything, CREATE-IoT) • **Martin Serrano** (Research Scientist, ACTIVAGE, CREATE-IoT) • **Rosemary Lee** (Artist, PhD Fellow at IT-University of Copenhagen) • **Dimitra Stefanatou** (Arthurs Legal, CREATE-IoT)
Objectives	• To discuss and bring to a new audience the methodological approach that utilises artistic methods in order to engage with issues of trust, transparency and bias in the wider ecology of the IoT • To facilitate a cross-domain, expert-led discussion on the use of arts practice as a methodology to critically interrogate new technology • To discuss the ways in which art and creative practice can ensure vital human factors feed into innovative IoT systems development

An abstract and session proposal were submitted to GIoTS for inclusion in their programme. For reference the abstract is reproduced here:

Roundtable: **Trust in the IoT**

The interconnected nature of today's IoT systems can be challenging to follow even for experts. Complex and obscured data processing methods, combined with commercially sensitive black box hardware can make it problematic to determine where data originates from, how it is processed and who is accountable when things go wrong.

FutureEverything advocates an artist led methodology to reveal, examine and understand these deeper themes within technological innovation. By integrating artistic practice within an innovative development cycle, we can encourage critical thinking around the various impacts of new technologies on the everyday human experience.

This participatory roundtable presents an opportunity to engage with expert practitioners from various domains in a wide-ranging discussion around transparency issues in the IoT. This kind of cross-discipline approach can lead us to a deeper understanding of complex domain wide issues and provide a roadmap to feedback learnings into product and system design. Bridging the gap between human and machine.

The session was approved for inclusion in the GIoTS conference as an "Industry Forum" and described in the programme as a "*roundtable discussion and participatory session with provocations from experts addressing issues around transparency in data systems and the IoT*".

The session ran on Monday 17th June in the ARoS Sky Room, a 25-capacity meeting room on the top floor of the prestigious ARoS Museum.

Figure 1: ARoS Museum. Site of GIoTS sessions on Monday 17th 2019 IoT Week. Photo: Djordje Tomic

The expert panel consisted of:

- **Irini Papadimitriou**, Creative Director of FutureEverything and STARTS Residencies Jury member. Her work focuses on the critical exploration of emerging technologies in the context of society and culture.
- **Dimitra Stefanatou** is a Senior Legal Counsel at Arthur's Legal, and works with CREATE-IoT on key areas of privacy, security and trust. Additionally, she is a member of the specialist task force on Security/Privacy and (Semantic) Interoperability of standardised IoT Platforms.
- **Martin Serrano** is a Research Data Scientist with more than 15 years' experience in industry and applied research. Martin is also a leader on research activities in the ACTIVAGE LSP, and provides standardisation, interoperability and policy advice in CREATE-IoT.
- **Rosemary Lee** is an artist and PhD Fellow at the IT-University of Copenhagen, her area of work investigates the interrelations between technologies and processes of natural science.

The panel was chaired by Dr **Jason Crouch**, artist and Research Associate with FutureEverything.

Each panellist delivered a short talk regarding their particular area of expertise, and how this was relevant to the topic at hand. Following on from introductions, there was a curated conversation around how artistic intervention and practice can effectively address practical issues of trust in the IoT. During the last part of the session, the panel was opened up to questions from the audience.

The roundtable attracted a capacity audience of 25-30 participants, consisting of a wide variety of interested stakeholders: academics from a number of universities and Erasmus, researchers, delegates in private business, and from regulatory offices (such as OFCOM, Switzerland), and included representatives of the EU Commission. In terms of international make-up, many of the audience were from Europe, but also in attendance were conference delegates from India, Korea and Brazil.

3.2.2 Short Talks

For each of the short talks the panellists considered the idea of Trust in the IoT through a different lens. For **Dimitra Stefanatou** *Trust* is defined as "firm belief in the reliability, truth, or ability of someone or something". Within a legal and policy framework, she goes on to say, *Trust* is *highly contextual, depending on the culture of a society, organisation, community etc… Trust creates an impact not only on the adoption of specific regulations, but also on their implementation. The latter is particularly relevant with respect to the notion of appropriateness of organizational measures implemented within the public sector, envisaged under the GDPR.*

The issue of context is one which the roundtable would return to again, as the discussion reinforced the notion that multiple different contexts are often engaged within a single IoT system. This serves as a particularly good demonstration of how an arts practice-based intervention in any given IoT system is well suited to analyse and understand how such complex and nuanced contexts intertwine.

Stefanatou argues that there are already different understandings of how the idea of *Trust* in a law and policy context operates within different national frameworks. She takes the example of the widely different burdens of proof required to demonstrate formal qualifications for a job between different EU member states. Furthermore, different contexts may compete for priority, for example the practical conveniences of an IoT access key system may come into conflict with the legal requirements of data protection enshrined in GDPR; any given employee may prefer to use their regular key than to utilise an app on their personal device.

This is a matter of Trust in government and in business.

Artist **Rosemary Lee** spoke on the perspective of trust and algorithmic media, considering the various ways in which machine generated imagery in particular can compromise ideas of truth and authenticity. She cites as an example the highly realistic images found on the website https://thispersondoesnotexist.com/ [5], which have been generated by a Generative Adversarial Network (GAN)[1].

Here, she argues that, for artists, automated systems bring to the forefront once more the philosophical notion of the "crisis of the author"[2], and in addition new crises around ideas of representation. When we think of systems that generate content, how does the context of our own interpretation change once the authorship of the content is no longer human?

The images that are algorithmically created as part of the "*this person does not exist"* artwork bring into play huge issues of how we understand and trust the veracity of media. These images have no connection to what we might call the real, yet our reading of images is that we expect them to have a direct *symbolic* connection to reality. As is now well known, algorithmically generated images

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[1] *This is a branch of machine learning which pitches one neural network against another, the first or generative network creates example entities based on its training set (in the case above images of fabricated people), then a second or discriminator network evaluates their success.*

[2] *In 1967 philosopher and critic Roland Barthes writes in his paper 'The Death of the Author' [6] that it is no-longer reasonable to examine the intentions of the author of any literary text as part of the process of interrogation of its meaning. Rather, that the meaning of a written text is conjured by the context of the reader and that, once written, the connection between author and text is severed.*

and sounds can feed into fake news and other influential areas of social discourse. This brings to the fore the question "how can we trust our images?".

She cites a paper from theorist Anna Nacher who advocates shifting a focus from purely human intentionality to a machinic hybrid and distributed agency shared with our devices [7]. In short, it is increasingly important to consider how we can trust our digital representation within the Internet of Things. Lee then described her own PhD practice, *Seeing with Machines*, in which she investigates how artists pose questions through and about algorithmic media, and specifically to address autonomy of machines, authorship, the art object and representation and understanding of reality.
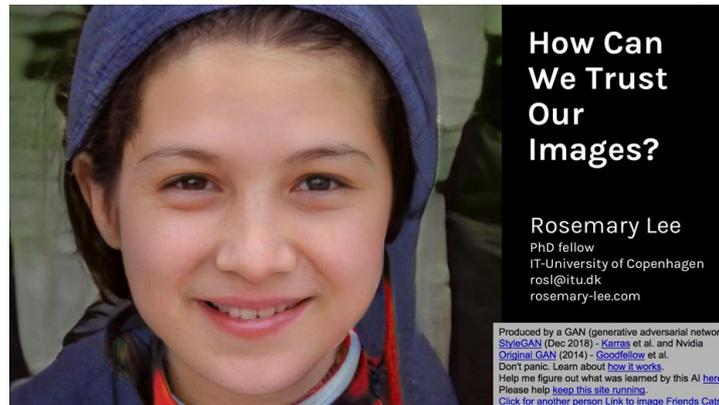

Figure 2: GAN image from the This Person Does Not Exist project used by Rosemary Lee in her presentation. Source: GAN

Finally, **Dr Martin Serrano** discusses Trust as an issue of user learning and acceptance. He argues that trust in IoT systems is different for those generations that grew up surrounded by technology (Gen Y, Z and Millennial) that it is for those who came of age before ubiquitous computing and the Internet (Baby Boomers, Gen X).

In the latter case, there is a learning curve which begins with a lack of trust due to lack of knowledge or preconception. This contrasts with the former, for those for whom technology has always been abundant, where the starting point is an assumed trust (which can be broken).

Figure 3: Trust as a psychology. Slide used in Dr Serrano's presentation.

He raises the issue of the language used to describe relationships between devices: such as a typical message generated when connecting one device to another "do you trust this computer?". This is extended within the IoT sphere to three layers: trust in the device, trust in platforms, and trust in the services provided.

Serrano counters the notion of the untrusted "monster" of automation, data processing and AI, by (re)positioning humans at the centre, activating the IoT system, and in so doing creating trust. He introduces his own research on the *"Function of Trust"*. This he illustrates with a diagram based on a common psychological trust exercise and suggests that there is a direct relationship between increased knowledge of how such systems function, and increased perception and trust in such systems.

Summary of key points:
- Context is a central concept in trust in IoT as a single IoT solution or framework will encompass various contextual situations, each with their own consequences for the overall trust of the system.
- The concept of trust itself is geographically constrained with variations found across each Member State
- The generation of algorithm-created media has profound consequences on trust, more specifically in the confirmation of veracity and authorship
- A generational divide exists in trust from an inherent understanding to a sceptical approach.
- For IoT systems, there are 3 layers (device, platform, services), each of which require their own trust from the user.

3.2.3 Discussion

The discussion and Q&A session covered a wide variety of topics, broadly showcasing how arts practice can effectively be used to interrogate key issues around Trust.

At the beginning of the discussion, the objective was restated for context:

We acknowledge that there are inevitably a number of interrelated issues around Trust in IoT systems that cannot be ignored. We advocate a cross-domain approach to interrogating these concerns as the only way to truly engage with their complexity. In our work we have found that art practice presents a unique and powerful way to do this.

The session began with a question on how can trust be embedded into systems. This was broadly countered by the panel who suggest:
- that trust can only grow from informed and transparent conversation, perhaps triggered by artistic intervention (IP),
- that trust is an objective not a starting point, and that it cannot be embedded - rather it must be built (DS), and
- that trust cannot be pre-determined and "forced" on the user of a system, it can only be discovered through active negotiation and agency (RL).

From this starting point a rich and wide-ranging discussion developed between the panel and audience members. Interesting debates were stimulated in response to the provocations of the panel. For example, a delegate from Korea raised the idea that we cannot trust one system or one component, we must trust the ecosystem: the ecosystem is bound by the contexts of organisation, components, environment, and cultural aspects. Trust, he asserted, is dominated by two processes: Firstly an "agreement" process, which might be some kind of *certification*, secondly an "assurance" process which would require some kind of practical *demonstration*. He signals that this work can be found in the ISO/IEC committee *SC41 Trustworthy Framework for IoT* [8], amongst further work by the National Institute of Standards and Technology (NIST) and the Industrial Internet Consortium (IIC) (Industrial Internet Security Framework (IISF).

3.2.4 Outcomes

The creative nature of the roundtable and the diversity of the panel engineered an environment suitable for a deep and nuanced conversation, which raised complex questions both about practical and standards led approaches, and also conceptual and fundamental issues.

The roundtable discussion itself served as a demonstration of how a creative approach involving diverse stakeholders, including artists, can highlight and interrogate wide ranging issues.

The roundtable discussion cemented how this type of approach can offer methods to signpost both potential solutions and further engagement with users, policy makers and developers.

This discussion brought to the fore the activities of CREATE-IoT WP03 and demonstrated the theoretical and practical use cases for artistic intervention to a new audience of IoT stakeholders.

Figure 4: Dr Martin Serrano speaking at the Round Table: Trust in the IoT Photo: Djordje Tomic

3.3 Workshop (IoT Week)

3.3.1 Summary

Table 2: Workshop summary table

Summary	
Name	**Trust in Invisible Agents**
Date	18th June 2019
Location	IoT Week, Musikhuset, Aarhus
Nº Participants	12
Facilitators	• **Irini Papadimitriou** (STARTS Residencies Jury / CD FutureEverything, CREATE-IoT) • **Jason Crouch** (FutureEverything Research Associate, CREATE-IoT) • **Rasoul Habibipour** (Luleå University, U4IoT) • **Wim Vanobberghen** (IMAC, U4IoT) • **Dimitra Stefanatou** (Arthurs Legal, CREATE-IoT)
Objectives	• To explore the use of artistic methods to engage with issues of trust, transparency and bias in algorithmic and data systems in the IoT • To demonstrate artistic intervention as a wider methodology to critically interrogate new technology • To demonstrate strategies which use art and creative practice to ensure vital human factors feed into innovative IoT systems development • To build relationships with the CSA U4IoT

Workshop: **Trust in Invisible Agents**

The session will use creative group exercises to explore complex issues around trust and transparency in the IoT. The workshop aims to demonstrate artistic intervention as a wider methodology to critically interrogate new technologies, and in particular their societal and cultural impacts.

This workshop seeks to demonstrate strategies which use art and creative practice to ensure vital human factors feed into innovative IoT systems development.

3.3.2 Description

The session ran on Tuesday 18th June in a 35-capacity practice room of the Musikhuset Aarhus. Whilst this location had the benefit of being contained in the same large concert venue as many of the keynote talks and the expo, the smaller rooms were very poorly signposted requiring some improvised signage to assist delegates in their wayfinding.

The method statement indicated that FutureEverything would present a workshop which explored the use of artistic methods to engage with issues of trust, transparency and bias in algorithmic and data systems in the IoT, and that the session would include a presentation by U4IoT in regard to their findings on Adoption Barriers and recommendations to the LSPs.

The workshop team consisted of:
- **Irini Papadimitriou** (STARTS Residencies Jury / CD FutureEverything, CREATE-IoT)
- **Jason Crouch** (FutureEverything Research Associate, CREATE-IoT)
- **Rasoul Habibipour** (Luleå University, U4IoT)
- **Wim Vanobberghen** (IMAC, U4IoT)
- **Dimitra Stefanatou** (Arthurs Legal, CREATE-IoT)

The workshop served to demonstrate how a methodology incorporating art practice might be used to expose and interrogate wide ranging issues around trust (such as transparency, ethics and governance) within projects in the IoT ecosphere.

The workshop was attended by twelve participants during the time allocated. In terms of artists and curators who count technology as part of their art practice the two representatives from FutureEverything were joined by the artist Peter Beyls [9] who came to the workshop as a participant. Other participants included academics, researchers and U4IoT representatives.
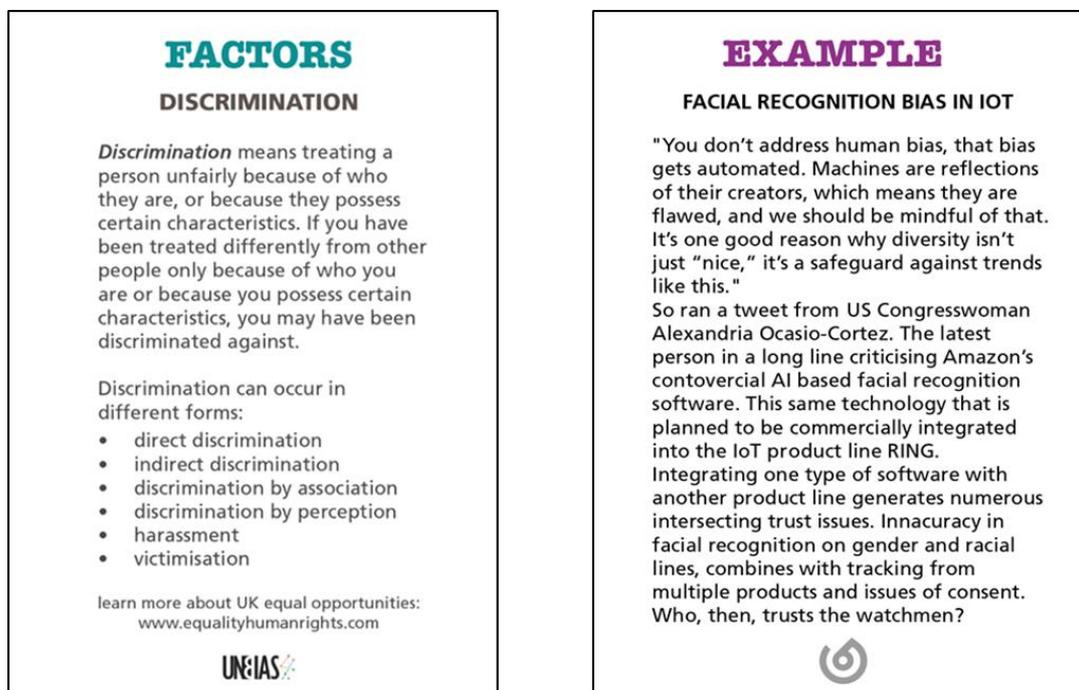

Figure 5: Example Unbias cards. On the left a card from the original pack, on the right a modified card prepared for the IoT Week workshop

Given the limited time that was available in the session the two-part workshop was structured around brief scene setting talks and card-based exercises. In particular, the workshop made used of the *Unbias* awareness cards which "help build awareness of how bias and unfairness can occur

in algorithmic systems, and to reflect on how they themselves might be affected" (These are part of a wider Fairness Toolkit) [10]. These cards are useful prompts to ask difficult or out of band questions within a design framework. FutureEverything made use of both the original card deck and some specialist cards designed for the IoT Week workshop.

Figure 6: Workshop participants Peter Beyls (Artist) and
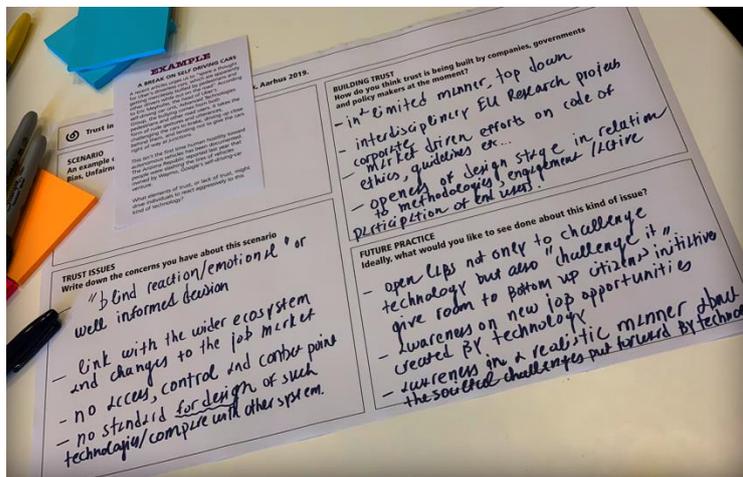*Jan Waeben (Smart City researcher) discussing bias in IoT systems*

Figure 7: Work in progress; workshop card exercise

Rasoul Habibipour presented the results of U4IoT deliverable D03.03 *IoT Adoption Barriers and Recommendations* to the workshop participants.

Figure 8: Rasoul Habibipour presenting on U4IoT findings

This report includes a number of user adoption strategies and recommendations for each of the LSPs. In particular Habibipour discussed the recommendations for the LSP AUTOPILOT; which places value on hands-on demonstration to the users of autonomous vehicles.

To connect the U4IoT report to the CREATE-IoT deliverable, Dr Jason Crouch presented a brief intervention on the art project *Who Wants to be a Self Driving Car*, a project by the art and design collective *Moovel Labs* (see Artist Community Wiki [11]).

Figure 9: Dr Jason Crouch presenting the case study Who Wants to be a SelfDriving Car

This art project allows participants to drive a small go-kart sized vehicle which (broadly speaking) simulates an autonomous car. It achieves this by presenting to its user a real-time VR data visualisation of its surroundings using many of the same types of sensory inputs used by autonomous vehicles. The user controls direction of motion by means of a joystick and is tasked with avoiding large cut-outs of potential obstacles.

This art project not only demonstrates a unique human scale perspective on emergent technologies, it also serves to, at least in part, demystify the technology, and also to engage non-expert users with conceptual and technological ideas around its use. In so doing it also highlights how the approaches of WP03 are also relevant to other relevant programmes, such as the work of U4IoT on user engagement.

3.3.3 Outcomes

The workshop demonstrated in a very practical way how the use of a creative approach to complex issues, combined with a cross-domain demographic, facilitates nuanced discussion. Leading to more comprehensive problem solving and issue resolution.

Participants were engaged by the process and in many cases had not taken part in any similar exercises. By the end of the session participants commented that they could clearly see value added using this approach.

The approach was of particular interest to our colleagues from U4IoT who declared an interest in following up the methodology in further work.

4. CONCLUSIONS

In the first instance Deliverable *D03.10 Open Prototyping Workshops* has been fulfilled. FutureEverything, as representatives of CREATE-IoT, and consortium members from U4IoT have engaged with one of the most focussed IoT conferences in Europe and created a broadly successful event which has made an impact on audience and participants.

As a direct result of the roundtable and workshop a greater number of IoT stakeholders have been exposed to the type of value that can be added to process and product development through the use of methods which integrate ICT and Art. Additionally, during the course of the two sessions it became apparent that attendees were eager to engage with conversation and debate regarding their own domain of expertise, yet that was triggered by a creative intervention and included cross-domain participants.

It is also clear that experts in multiple domains are keen to find ways to engage with debates around important issues such as transparency, trust and ethics. The outputs of CREATE-IoT may well be the solid conceptual toolset that catalyses and directs these debates.

4.1 Contribution to overall picture

It is clear from the reaction of the attendees of these very technically oriented conferences that ICT and Arts presents a unique methodology to improve products, drive innovation and discover ways to explore human and social impacts of new technologies.

4.2 Other conclusions and lessons learned

The workshop delivery method used in this deliverable was structured based on learning from the interactive roundtable held at Ars Electronica in 2018. This kind of robust and participatory method continues to demonstrate good engagement with participants.

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