D4.9

Report about the final event

ICT Policy, Research and Innovation for a Smart Society

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Abstract: The 2nd Annual Transatlantic Symposium on ICT and Policy "Leveraging People, Technology, and Information for a Smart and Connected Society" was held on June 18-19, 2018 at the Wilson Center in Washington, DC, USA. This two-day event included keynotes, panel discussions, and interactive workshops to facilitate knowledge exchange with leading EU-US experts, convening leaders in government, academia, and industry around the theme of leveraging people, technology, and information for a smart and connected society. The event built on the success of the 1st Transatlantic Symposium on ICT Technology and Policy, held in Minneapolis, MN, USA on June 19 and 20, 2017. Hosts for the event were the Wilson Center's Science and Technology Innovation Program and the PICASSO Project. The event was sponsored by the European Commission, the US National Science Foundation, and the Mississippi State University. The Symposium attracted 90 participants on site and 380 online viewers, about 42% from the EU and 58% from the US, with a gender share of 63% men and 37% women. It was also the final event of the PICASSO Project.

Keywords: 5G; Big Data; IoT/CPS; EU; USA; Conference; Smart Cities; Smart transports.

Disclaimer

The PICASSO Project

The aim of the 30-months PICASSO Project is (1) to reinforce EU-US collaboration in ICT research and innovation focusing on the pre-competitive research in key enabling technologies related to societal challenges - 5G Networks, Big Data, Internet of Things and Cyber-physical Systems, and (2) to support the EU-US ICT policy dialogue by contributions related to e.g. privacy, security, internet governance, interoperability, ethics.

PICASSO is oriented to industrial needs, provides a forum for ICT communities and involves 24 EU and US prominent specialists in the three technology-oriented ICT Expert Groups and an ICT Policy Expert Group, working closely together to identify policy gaps in the technology domains and to take measures to stimulate the policy dialogue in these areas. A synergy between experts in ICT policies and in ICT technologies is a unique feature of PICASSO.

A number of analyses will be accomplished, as well as related publications, that will for a major part be made public and contribute to the project's outreach. Dedicated communication and dissemination material will be prepared that should support the operational work and widespread dissemination though different channels (website, social media, publications…). The outreach campaign will also include 30+ events, success stories, factsheets, info sessions and webinars.

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Acronyms and Definitions

Acronyms	Defined as
BDVA	Big Data Value Association
CPS	Cyber-physical Systems
EC	European Commission
EG	Expert Group
EU	European Union
FoF	Factory of the Future
IoT	Internet of Things
IMS	Intelligent Manufacturing Systems
NIST	National Institute of Standards and Technology
NGI	Next Generation Internet
NSF	National Science Foundation

1. Executive Summary

The 2nd Annual Transatlantic Symposium on ICT and Policy "Leveraging People, Technology, and Information for a Smart and Connected Society" was held on June 18-19, 2018 at the Wilson Center in Washington, DC, USA. This two-day event included keynotes, panel discussions, and interactive workshops to facilitate knowledge exchange with leading EU-US experts, convening leaders in government, academia, and industry around the theme of leveraging people, technology, and information for a smart and connected society.

This 2nd Symposium explored several key ICT topics for EU-US cooperation, including current and future mutual strategic research priorities and orientations as well as cross-cutting policy issues. Speakers addressed key topic areas critical to global ICT innovation and collaboration: **Cybersecurity, Big Data, Cyber-physical Systems and Internet of Things (IoT)**, **Artificial Intelligence**, **5G and Beyond, Autonomous Systems, along with Policy issues of g**lobal concern, such as privacy, security, standardization, and spectrum. In addition, cross-cutting topics, such as expanding support for citizen science initiatives, the future of ICT development and its impact on society were explored.

The 20+ speakers and panelists included program directors from NSF, industry representatives such as the General Manager for Global Security Strategy at Microsoft, the Director of Strategic Partnership at Uber Technologies and many others; researchers from the University of Minnesota, MIT, Berkeley, and leading European Universities; the leaders of European initiatives such as Big Data Value Association, FIWARE, Cyberwatching.eu, AEGIS, and members of ICANN board of directors; and the leaders of PICASSO Expert Groups in 5G, IoT/CPS, Big Data and Policy.

A plenary session format was adopted, with only three breakout sessions organized only in the second day, to allow experts to explore specific topics – CPS/IoT, Big Data, and 5G – in greater technical depth. Hosts for the event were the Wilson Center's Science and Technology Innovation Program and the PICASSO project. The event was sponsored by the European Commission, US National Science Foundation, and Mississippi State University. The Symposium attracted 90 participants on site and 380 online viewers, about 42% from the EU and 58% from the US, with a gender share of 63% men and 37% women. The event built on the success of the first Transatlantic Symposium on ICT Technology and Policy (held in Minneapolis, MN, USA on June 19th and 20th, 2017) and was the final event of the PICASSO project.

The present document intends to summarize the key messages highlighted by the speakers for each session. A video of the Symposium and list of sessions are available on the PICASSO website, the Wilson Center website and YouTube[1]. The presentations given at the event have been made available for download on a dedicated PICASSO webpage. For a complete list of speakers, you can refer to the Symposium agenda, in annex.

[1] https://www.wilsoncenter.org/event/2nd-annual-transatlantic-symposium-ict-and-policy
https://www.youtube.com/watch?list=PLzM1iiQhVrdEBVrorAUayaDTl88g-Nd52&time_continue=4&v=pUNEiIs-8OU

2. Opening Remarks and Keynote Speeches

The opening remarks by **Peter Fatelnig**, Minister-Counsellor for Digital Economy Policy, Delegation of the European Union to the United States of America, focused on the ongoing initiatives aimed at further reinforcing the EU Digital Single Markets, and how EU-US cooperation shall be sought in this direction. In particular, the attention was drawn on the need of a transatlantic mutual perspective, to allow companies to duly cooperate. In particular, the talk shed light on the three main current priorities on which the EU is working to strengthen the Digital Single Market, by enumerating the various specific initiatives connected to them: Personal data protection; Cybersecurity; Artificial Intelligence.

For the US side, **Dawn Tilbury**, head of the Engineering Directorate of the National Science Foundation, presented the current NSF internationalization strategy and existing initiatives supporting this strategy, such as ACCELNET, IRES, PIRE, or MULTIPLIERS, mostly based on networks and multipliers. The discussion was then directed on the most urging questions raised by technological developments, and namely on how to build a human-technology partnership and rewrite the role of human labor in a new and changed economy, driven by combination of AI, machine learning, IoT, robotics. Finally, NSF strategy aims at including under-represented minorities (*NSF includes*), and at promoting new models of research and innovation, notably through interdisciplinary research (*Convergence Accelerators).*

3. Sessions' key messages and outcomes

Every session was designed to cover and present any chosen issue through a *transatlantic* and multi-stakeholder perspective, that is, by reflecting any different approach or perspective related either to the different EU and US frameworks, or to different sectors (public; private; academia, etc.). For each Symposium session, the key messages conveyed are reported below; for a more thorough and detailed look at the symposium content, we refer you instead to the full recording of the event, available on YouTube[2]. For a complete list of speakers, you can refer to the Symposium agenda, in annex.

Monday, June 18th, 2018

Privacy policy

New laws, technologies and levels of public attention have raised the stakes and uncertainties regarding privacy. This panel brought together policy and industry experts to discuss constraints and opportunities for joint research, new challenges for joint research into "compliance by design" and prospects for coordinated policy responses. Here the main points highlighted:

- Privacy and data flow issues have become inherently international issues, since – as concerns data management – any consideration based on national and geographical boundaries has become meaningless in the internet economy. Boundaries are now progressively blurring also between the physical and the technological world, which will pose new challenges to privacy protection approaches.
- The session has explored the dimension of *privacy* as a human right, as it is meant in the EU, and the global impact of the recently approved GDPR regulation. Other EU and US provisions have been explained, such as the EU e-privacy regulation proposal – on the responsibility of legal persons – and the transition towards the Cloud Act.

[2] https://www.wilsoncenter.org/event/2nd-annual-transatlantic-symposium-ict-and-policy
https://www.youtube.com/watch?list=PLzM1iiQhVrdEBVrorAUayaDTl88g-Nd52&time_continue=4&v=pUNEiIs-8OU

- The relationship between technology and society is important to shape the future of research orientations. This is true for the boundaries that the policy and legal framework sets to engineers and technology developments, as well as for the needs and requirements expressed by citizens. In order to be effective in protecting human rights, policy requirements shall be set at the principle level, and not a case by case level; a case by case level would be easily escaped through technological alternatives.
- However, the awareness on the actual value of data is still very low: there is a very large difference between the value of data information (e.g. for Google), and the price that individuals attribute on it, and this arbitrage is at the basis of big platform thriving. Which shall be the role of governments on this? These are the dimensions where we can build transatlantic cooperation.

Cyber-Physical Systems (CPS) and the Internet of Things (IoT) with a Focus on Smart Energy Systems

This panel aimed at discussing the state of the art and technology gaps in Cyber-physical Systems in general and in the transition to smart energy systems that CPS and the Internet of Things (IoT) are enabling, taking into consideration cyber resiliency, IoT security and critical infrastructures, and broader disciplinary and domain connections. A few leading questions were shared, in order to orient the discussion:

- Which are the pros and cons, opportunities and challenges as concerns bottom-up (researcher-driven) *versus* top-down (policy-driven) collaboration models?
- Are regional and international priorities, as related to smart energy, well aligned or conflicting?
- Which are the differences between the EU and US in terms of industry engagement in smart society initiatives (including for smart energy)? And what binds us together, in order to build on the work started in PICASSO?
- Which is the balance to be found between autonomy and human-in-the-loop systems, and at which extent we choose one or the other approach?

Here the main points highlighted:

- One of the current research challenges is related to design and operate Cyber-physical Systems of Systems (CPSoS), i.e. systems that consist of many subsystems with some autonomy, change their structure over time, operate under changing demands and available resources, and must react to faults and unplanned situations. These systems are operated by humans with the support of computerized systems and to provide the right information and the right amount of decision support is a challenging issue. The complexity of CPSoS also concerns their management and control, since these activities are not performed in a completely centralized or top-down manner, under a common authority, but there is autonomy at a lower level, which from the one hand brings robustness to the system, but from the other makes it show unexpected behavior due to the interactions.
- The comparison on current EU and US priorities for CPS and IoT were highlighted. Correspondences are strong, as well as the perception of the future needs. However, in this field it appears that EU-US cooperation can most probably be conducted preferably at low TRL levels in contrast to technology development for markets on which there is strong competition. Light weight" cooperation modalities, such as transatlantic workshops and the synchronization of funding programs and joint experimentations, as well as the strengthening of central contact points, coordinators and facilitators of EU-US actions seem to be more realistic than coordinated funding programs. A selection of key topics was presented, which provide potential for joint R&D: Closing the loop in IoT-enabled Cyber-physical Systems; Integration, Interoperability, Flexibility and Reconfiguration; Model-based Systems Engineering; Trust, (Cyber-)security, Robustness, Resilience, and Dependability; Autonomy and Human-in-the-loop (this one is considered the most promising one for EU-US cooperation); Situational Awareness, Diagnostics and Prognostics.
- The panel presented successful models in the domain, such as the EU FIWARE initiative, which

resulted from a technology support program but now has developed into an open innovation ecosystem, composed of modular and interoperable smart applications that are able to support several vertical markets using IoT technologies, allowing the right level of data to be accessed for further exploitation by companies. FIWARE can provide a basis for the new data economy and the creation of innovative business models. FIWARE is now used all over the world, with cooperation going on with NIST, but also with Canada, or South America, and more.

- The field of smart power grids for smart energy represents one the most promising application areas where tackling the above-mentioned challenges can make a difference, enabling the transformation of the energy system to a decentralized system with many producers of power from renewables. Control goals comprise: ensuring power balance; the maintenance of operating limits (of generators or tie-lines); regulation of frequency or of voltage, as well as transient stability. In this context, a number of challenges and opportunities exist which are connected to large and varying uncertainties and intermittencies; disparate network and regulation structures in the gas and electricity infrastructures, as well as multiple and conflicting decision-making mechanisms, where local and market objectives and global outcomes may be in conflict. Also, across different energy types, additional interdependencies are being brought to the surface which have not been addressed so far. For example, the progressive addition of a green component will impact on the interaction of other types of infrastructures, e.g. gas networks. There is the need to exploit these interdependencies in a beneficial way in order to make all the system more resilient.
- Big data in technical systems does not necessarily mean good or meaningful data, but the quality of data is essential for machine learning purposes. Protection against manipulated data is an important challenge to secure the reliable operation of large-scale systems.
- From NSF, current research priorities in the field of Distributed Energy Management were presented, such as for example: Networked control systems; learning, and adaptive systems.

Strengthen Cyber Resiliency and IoT Security – Cybersecurity, Cyber Resilience, and Critical Infrastructure

This panel discussed raising concerns regarding the cybersecurity – protection, detection and recovery – which are relevant in a world where IoT devices are spreading in both public and private spaces. The panel will discuss how from the software industry perspective resilience and security are built in the products; the US governmental perspective, through the cyber resilience initiatives; a broader discussion too look at the utility and CIP perspective; and finally a EU perspective, looking at the impact on the Member States.

Here the main points highlighted:

- Similar concerns as the ones debated for CPSoS were mentioned regarding IoT technology. IoT devices are spreading all over, in both public and private spaces, however this is not reflected in a proportional scale up from the manageability and cybersecurity perspective point of view. The way we build systems today has reached a high level of complexity, and expose us to huge vulnerability, and this is true at the global level.
- A part of the debate was dedicated to the presentation of three EU funded cybersecurity projects – Cyberwatching; EUNITY; AEGIS. Two key points are highlighted, which shall orientate research and actions: i) predictive and preventive approach shall be used, including security by design and by default, and also users and customers shall be educated in this sense; ii) investments are needed to develop advanced IT practitioners' competences and skills. Besides these aspects, comments from the audience stressed further and confirmed that awareness and education on cybersecurity on a wider scale is essential.
- Internet was not designed taking security into account, and grew into what we can now call a chaotic and vulnerable environment, where devices are not recognized with clear ownership, ID, or checked

for their armful potential – both in the private and public spaces. We do not know whether these devices are already corrupted but have already malware inside and are connecting data. The NIST cybersecurity framework is working in this direction, in order to foresee certification and verification mechanisms (also called "attestation) for any device connecting to the network, and make manufacturers responsible for this. These mechanisms can include security update verifications, or enforce recovery mechanisms, and device makers shall be responsible for this.

Big Data Research & Innovation and Workforce Development

This session focused on needs and collaboration opportunities on Smart Cities, Smart Health and Data Science Workforce and Data Literacy. Here the main points highlighted:

- The discussion on Big Data focused especially on ecosystem enablers. The panel discussed the needed partnerships between government, enterprises and NGOs to foster big data ecosystem, services, research approaches (e.g. the *forth paradigm era*) and economy. The development of professional skills and specialized curricula is the first precondition to fully exploit big data value, and current academic institutions are not capable to supply the needed skill combination. New crosscutting and transdisciplinary academic courses have to be created for this purpose, and important potential collaboration areas between the US and the EU can be foreseen for this purpose. A number of existing initiatives have been presented by representatives of the US Big Data Innovation Hub, such as datathons and challenges, to solve specific challenges (e.g. the "national transportation data challenge"), or to promote women involvement in data science. Similarly, from the EU, the Big Data Value Association presented the Digital skills and jobs coalition, which also includes actions aimed at fully capture the economic and social value that can be distilled from data. What is targeted is not only a highly specialized set of digital skills, concerning developers and engineers, but also a more general digital literacy set of skills, that shall be owned by every citizen.
- The debate focused on the specific needs, in terms of data management, of the healthcare sector. This sector has specific peculiarity, because the "customer" – that is, the patient – has not decisional power, nor is the one who pays. Health is a policy-driven market, not a consumer driven market; and from a consumer point of view, health is not a service market but a trust market – choices are done not out of experience, but out of trust. The trustable evolution of technologies is therefore crucial for this area. This implies the capacity of policy makers to make informed choices, as well as the creation of a law and policy framework ensuring the needed liability.

Tuesday, June 19th, 2018

5G and Beyond

The panel focused on the EU and US dialogue on research opportunities, challenges and perspective for 5G and beyond, and started with an introduction of the PICASSO 5G group. Here the main points highlighted:

- In Finland, a 6Genesis Flagship was granted to pioneer 5G beyond and 6G research, including THz communications and Edge intelligences, which constitute very important topics for future technological developments.
- Health side effects of mmWave technologies were presented as a urgent issue to explore, since agreement or sufficient experimental evidence is not yet available about it, but RF heating might impose health problems.
- Even in this area, the skill dimension is relevant, since it appears that talents are moving away from Engineer school, to favour more and more softer subjects, with comprehensive training on mathematics and physics.
- In terms of possible mutual collaboration topics, the following were presented by Nokia: NR-based V2X system at the mmWave, Air-to-ground communications, Physical layer deep learning, mmWave system deployment strategy and 5G above 52.6 GHz & THz communications.
- From the US side, NSF introduced a number of prominent programs, such as the Platform for Advanced Wireless, stressing on the principle that on this topic, EU-US collaboration would be more easily established through single city or single communities' projects, whereas it remains rather challenging to set up bilateral agreement in big multi-disciplinary project.
- The discussion shifted then towards whether it would be more beneficial having general versus specialized testbeds/testbeds with a clear purpose. Testbeds were considered as important in order to provide researchers a real-world environment for testing their theories as well as give researchers opportunities to motivate local community or city to rethink and open new market. As an example, the Oulu testbed was mentioned, which is built for testing micro operator.
- The final discussion related to the best shape collaboration mechanisms should take in order to support, highlighting how PPP mechanisms, that work well in the EU, would not be functional in the US.

Future of Autonomous Systems

This panel discussed potential and concerns connected to the fast development of autonomous transportation systems, and in particular of Unmanned Aerial Systems (UAS) and autonomous ground vehicles. Major technological and policy obstacles must be tackled for a full potential – in terms, for example, of efficiency and safety – to be realized. Here the main points highlighted:

- Unmanned aerial systems are expected to bring important revenues in the future, and to be applied to many sectors (law enforcement, telecoms, forest fire, borders, coastguards, earth observation, and others). The main enabler of these technologies is the development in the sensors' and robot's area. Major issues concerning unmanned aircraft, concern certification and security. One of the aspects needing further studying and new ways to be developed, is Unmanned Traffic Management (UTM). New ways to manage traffic need to be studied and considered, especially through a decentralized approach. Regarding the security and control of all these platform, new ways need to be considered, such as, for example, the use of drones. All this raises a number of policy challenges. For the present, the following challenges shall be integrated: identification and tracking over people; autonomous flights; certification processes re-imagined; multiple vehicle per operator; commercial expansion; software design assurance process. For the future, challenges comprise full-scale delivery; hybrid design; certification processes; data ownership, migration, consumption; privacy; mixed traffic; V2V, V2I, V2x.
- From the Raspet Flight Research Laboratory, the Federal UAS research priorities were presented, as well as other initiatives, such as the DHS Common UAS Test site. The objective of this last activity was to demonstrate which technological system would work best in a given scenario (flood; secret service; war, etc.), refining the awareness on the best feature combination needed.
- In matter of ground vehicles, the main open issue regards AI development, which has direct consequences on safety, as well as on the capacity to manage congestion problems – with direct effect on reducing emissions. The current industry focus is currently on car-to-car communication. One big criticality, however, depends on the fact that the car market is a global market, and it will be difficult to agree on global standards, as well as to guarantee that all country can count on the needed infrastructure (e.g. wireless communication infrastructure). Other aspects of technological development in matter of ground vehicles concerns the infotainment sector, and choices related to the level of driving automation, with different technologies currently being developed.
- The last speech focused on ongoing autonomous technology research within Uber. Research efforts are directed towards autonomous technologies, for economic reasons, since it has been estimated that savings connected to reduced crashes – including augmented efficiency for people and removed congestion – amounts to about 1.4 trillion dollars. Since most of crashes are results of human errors, the focus is primarily on safety. Another key reflection point is about making a more efficient use of resources, based on the fact that items such as cars remain parked for 90% of their life time.
  Barriers to transition towards fully autonomous vehicle comprise: i) different legislation frameworks between different states; ii) variety of different types of technologies on which companies are investing (and consequently different standards); iii) consumer acceptance; iv) delivery mechanisms for autonomous technologies (in the case of Uber, there is no need for investments); v) dealing with fatalities connected to the transition to autonomous vehicle will be a challenge, which is why technologies shall be as safe as possible.
  Underlying values to this transition comprise: i) change in the perception of car ownership, towards a vision of sharing and automation; ii) greener and safer cities; iii) affordable and accessible transportation; iv) accessibility and inclusion, for people with mobility issues, normally experiencing problems in accessing transportation; v) understanding what *disruption* means in the transport sector.

Other open and connected issues are: i) workforce development programs; ii) the setting of technological standards and protocols for data exchange: unlike the aerospace sector – where authorities have the mandate to regulate – in the automotive sector no neutral body has the mandate to do the same, so that companies do that themselves. However, there is the need for a certification body for cars, since manufacturers will be held liable for accidents. Iii) ethical and perception issues: one pedestrian death caused by an autonomous vehicle is perceived by society worst by a factor of more than hundred of a traditional death, since the alleged objective of technology is to save lives.

The final part of the event was divided into three breakout sessions, one for each PICASSO Expert Group. The following text summarizes the conclusions drawn after each discussion. All session's moderators were partners of the PICASSO project.

Breakout session on CPS/IoT

This section focused on Autonomous Cyber-physical Systems - research agenda and cooperation options.

Findings include:

- Collaboration requires trust, and trust can be built via light cooperation models, such as workshops or exchanges on R&D priorities.
- Collaboration between the EU and US is subject to structural challenges, related to the difference between funding mechanisms on both sides, and of industry/academia relations.
- Collaboration in this sector is easier to pursue concerning fundamental research, rather than industry-driven research and innovation.
- Testbeds are potential focal points for collaboration: smart cities, autonomous vehicles

Ideas for overcoming the barriers include:

- Nongovernmental associations, such as AIOTI (The Alliance for the Internet of Things Innovation) and IIC (Industrial Internet Consortium) can act as facilitators for collaboration.
- Agencies such as FAA, DARPA, etc. are open for collaboration and shall be further activated and involved.
- Carefully consider points of contact, inter-agencies coordination, organizations as "match-makers" for collaborations

Breakout session on Big Data

This well-attended and lively session discussed a range of issues linked by a common connection to data analytics and involving ethics, privacy and domain-specific considerations. Among the main elements were the following.

- *Why has health not experienced a full-blown data revolution?* Among the 'generic' impediments to the absorption and innovative exploitation of any disruptive technology are some of particular relevance to the processing of data in health contexts. These include regulatory barriers arising from e.g. the conflict between health technology-specific concerns rooted in patient safety and medical efficacy on one side and data-orientated (esp. privacy) concerns on the other. This is complicated by the need to apply and adapt economic regulation of key data service providers, and issues of data 'ownership' (in terms of both governance of use and reuse and appropriation of returns). In addition, the 'culture clash' between healthcare and ICT-related business models is exacerbated by issues of trust and cost; some of these would resolve themselves if a critical mass of adoption could take place within a short period of time, but would fail to attain take-off if the pace of adoption was too slow enough.

  Another factor was felt to be the uniquely distributed nature of healthcare value chains, with separated payers, providers and patients. If the role of health policy is factored in, the outcome is more likely to be a set of policy-defined markets than policy to improve the functioning of existing markets (e.g. compliance as a service, cyberinsurance). To these factors can be added the influence of technological factors including health apps (developer and platform players), the value of real-world evidence, wearables and m-consulting, which alter relationships as well a knowledge.

  Traditionally, health care has been modelled in terms of a set of discrete choices; by providers, insurance companies, patients, etc. The influence of data is felt not only in the form of better, faster and potentially more complete information for these decisions, but also in a remapping of who gets to decide what. In addition to the 'hard' data of sensors, tests, etc. data-intensive health is also affected by social network communications (e.g. electronic word of mouth) that repeat and interpret 'seed' information from science or experience or add unobservable amounts of opinion (both interested and

random). Other technologies that have yet to be fully applied include blockchain (to reinforce the trustworthiness and accessibility of shared records and create stronger cause-effect linkages of use in medical assessment) and new regulations like GDPR (especially in relation to the right to erasure).

- *Artificial intelligence/machine learning and data analytics.* A shorter discussion explored the degree to which 'data' provided and adequate framework for tackling ethical or ethics-related (e.g. legal and regulatory) issues. It was generally agreed that the processing of data and their use to inform decisions (hence further data) was of vital significance, but that there were serious challenges in understanding and controlling the operations of even deterministic algorithms let alone stochastic or 'learning' algorithms. Part of this is bound up with the evolution of knowledge; data analytics applied by scientists to test hypotheses and assess decisions is not the same as the tacit translation of observed regularities into routine decisions by 'unthinking' programs – in particular, it may be impossible to make the programmer into a moral agent if s/he cannot observe, foresee or control what the program learns. One rather abstract application of this perspective came during a discussion of the ethics of using genetic data – particularly in stratified medicine contexts, in which the DNA itself serves as source code, but its expression – which cannot be predicted from the genome alone - determines the outcomes of interest. The group discussed, but did not reach consensus, the utility of a right to explanation of automated decisions and of encouraging (as an architectural standard or coding requirement) \ some form of 'explicability'. This is related to accountability (which is a human-to-human linkage intended to make governance coherent and ethically consistent) but is machine-to-human or even more complex in the case of e.g. deep learning. A final topic of this part of the discussion was a consideration of whether liability would serve as a useful regulatory device and, if so, whether the trigger should be specific coding practices or applications, tortious outcomes or some combination; and whether an asymmetric standard (e.g. strict liability) or a relative one (least-cost-avoider, relative negligence, due diligence) would be more appropriate.

- *Data and Transport*. A second sector-specific discussion concerned the sharing and use of (flow-related) data in metropolitan and transport contexts. The applications with ethical content may be linked to a shared commitment to reducing traffic fatalities, whether by reducing speed variance at the system level or dealing with distracted drivers at the micro level. These topics were explored in November 2017 at the National Transportation Data Challenge (bit.ly/NTDCdocs), which had sessions on (*inter alia*) distracted driving, autonomous vehicles, weather/ emergency response, and bicycle/pedestrian safety. In the context of autonomous vehicles (on their own and – more challengingly – sharing space with human-operated vehicles, it is necessary to use data both to understand swarm behaviors and to detect and manage variations form 'normal human behavior'. The US side has been actively exploring collaboration opportunities in terms of projects, joint funding, curriculum development, etc. These have not thus far extended to transatlantic collaborations, which therefore represent untapped potential.

- *Data literacy.* A final topic concerned the skills necessary to understand, avoid and mitigate ethical issues as they come up during data-intensification. The first point of departure is data literacy; systems that run on data depend for their functioning on the understanding and choice behavior of the humans who use or are used by such systems – and thus on their understanding of what data are and what choices that affect or use data imply for themselves and others. Beyond this phenomenological level, there are issues of the ethics of data use in e-Science; this will separate into things that use 'real data' (empirical studies, experiments, simulations) and theory. To prepare for this, we must also consider how to teach e-Scientists about data and data ethics (what to teach and how). At a deeper level, this also means paying greater attention to a curriculum that reinforces fact- and observation-(which may not be factual) based critical thinking. Ultimately, in addition to 'pure' science and

teaching, this will inform guidelines (like the UK government's data ethics guidelines for civil servants) and infrastructures like the National Analytics Capability.

Breakout session on 5G and beyond

This section focused on discussing future wireless communications at carrier frequencies beyond 100 GHz with respect to both enabling technology and spectrum policy aspects. In particular, it started with sharing opinions and the state-of-the-art information on Terahertz communications.
Major points of agreements include:

- All agreed on the fact that Terahertz communications might be an interesting topic for EU-US collaboration considering the 10-year time-span. However, a potential issue regards the hardware side, i.e., RF IC, since high frequency RF IC is a sensitive component and export restriction can be easily applied.
- Four themes, and 2 major collaboration models were considered sensible for continuation, and in particular:

Proposed collaboration themes:

- Connecting the last billions in unserved areas (ultra large terrestrial cells – technology; economical study on incentives by governments for rural connectivity; areal/satellite communications for broadband access in oceans);
- Ad-hoc premises networks, e.g. for regional niche markets as farms (technology development and standardization)
- mmWave technology (at carrier frequencies beyond 100 GHz; mmWave deployment strategies; mmWave V2X);
- Spectrum farming & harmonization.

Technologies have been chosen taking into account: technologies for un(der)served niche markets yet with strong societal impact; and strategic technologies that are far from market entry

Proposed funding models:

- US PAWR model and EC project model (one eval panel)
- ERC model, with each side funding its part (one eval panel; academics receive funds; serious industry contributions are expected)

This requires efforts for the coordination of the calls.

Final remarks

The event closure included some forward-looking statements from Anne Bowser, from the Wilson Center, US; Svetlana Klessova, PICASSO Project Coordinator from Inno TSF, France; Tariq Samad, from the Technological Leadership Institute of the University of Minnesota, US; and Jean-Yves Roger, the EU Project Officer responsible for the PICASSO project. Other voices from the PICASSO project joined, completing the vision proposed.

Tariq Samad drew the attention on the human dimension of technology, which is going to be more and more important, as the level of autonomy we are achieving is growing. The share of different and multidisciplinary perspective is important and valuable at this stage.

Anne Bowser raised a question on the possible limits of governmental decision on policy and standards. Is governmental policy and standards coordination and decision still valuable and relevant, or at which extent shall these decisions be left to industry? To this point, Jonathan Cave replied that the policy level is indeed very important, especially to be able to support the cooperation level.

Maarten Botterman pointed out how on the ICT field, more than in other fields, is even more apparent that challenge have to be conceived and tackled with a global scope.

Haydn Thompson drew the attention on AI, as a current major hype topic. Strategies are being done and requested all across Europe, with major governmental and EU activities going on. With a look towards the

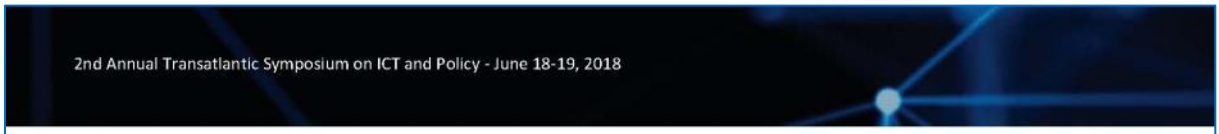
future, any EU-US cooperation activity on ICT can take the opportunity to link in with those activity, and in particular, early next year, with a greater understanding on the upcoming Framework Programme *Horizon Europe*, we will be able to outline opportunities for collaboration.

Svetlana Klessova remarked how industrial non-funded cooperation remains very important for technological advancements. She also stresses the increasing importance of the skills and competence dimension, as aspects to be incorporated into future project, to ensure impact and completeness of vision.

Jean-Yves Roger stressed the importance of envisioning AI advancement incorporating a human-centric approach.

In particular, the suggestion of a 3rd Annual Transatlantic Symposium, was offered by the conference chair and co-chairs, and warmly welcomed by participants to the closing discussion, including by the European Commission. A number of future and upcoming major international ICT events were mentioned, for example the EC ICT Conference 2018, that will be held in Vienna on 4-6 December 2018 – as a stage where bringing the legacy of PICASSO and envisioning future steps after the project end.

Annex – Agenda and Speaker List



2nd Annual Transatlantic Symposium on ICT and Policy

Leveraging People, Technology, and Information for a Smart and Connected Society

Woodrow Wilson International Center for Scholars, Washington, DC, USA

June 18-19, 2018

Agenda

Monday, June 18th, 2018

9:00 a.m. – 9:30 a.m.	Coffee and registration
9:30 a.m. – 9.50 a.m.	**Wilson Center welcome** **PICASSO Project welcome:** Svetlana Klessova, Project Coordinator, inno TSD, France
9:50 a.m. – 10:10 a.m.	**Welcome address:** The European Digital Single Market - is it complete or quo vadis?, Peter Fatelnig, Minister-Counsellor for Digital Economy Policy, Delegation of the European Union to the United States of America
10:10 a.m. – 10:40 a.m.	**Opening Keynote:** Dawn Tilbury, Head, NSF Engineering Directorate, National Science Foundation, US
10:40 a.m. – 11:00 a.m.	Coffee Break
11:00 a.m. – 12:30 p.m.	Plenary Panel: **Transatlantic issues in privacy policy: Laws (GDPR, the CLOUD Act) and implementation (optimising compliance, effectiveness and burdens)** New laws, technologies and levels of public attention have raised the stakes and uncertainties regarding privacy; this panel will bring together policy and industry experts to discuss constraints and opportunities for joint research, new challenges for joint research into 'compliance by design' and prospects for coordinated policy responses. **Moderator:** Jonathan Cave, GNKS, University of Warwick, Alan Turing Institute and UK Regulatory Policy Committee, United Kingdom **Panelists:** **EU/Internet governance perspective:** Maarten Botterman, GNKS, The Netherlands, and ICANN Board of Directors **Global/Civil society perspective:** Avri Doria, Association for Progressive Communications (Researcher), and ICANN Board of Directors **US/Policy and industry perspective:** Glenn Ricart, Founder and CTO, US Ignite, US **US/Legal and policy perspective**: Dan Caprio, The Providence Group, US, and AEGIS project representative

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12:30 p.m. – 1:30 p.m.	Lunch
1:30 p.m. – 3:00 p.m.	Plenary Panel: **Cyber-Physical Systems (CPS) and the Internet of Things (IoT) with a Focus on Smart Energy Systems**. This panel will discuss the state of the art and technology gaps in the transition to smart energy systems that CPS/IoT are enabling. **Chairs**: Sebastian Engell, TU Dortmund, Germany Tariq Samad, Technological Leadership Institute, University of Minnesota, US **Moderator**: Tariq Samad, Technological Leadership Institute, University of Minnesota, US **Panelists:** **Academia Perspective (EU):** Sebastian Engell, TU Dortmund, Germany **Academia Perspective (US):** Anuradha Annaswamy, Massachusetts Institute of Technology, US **Industry Perspective (EU):** Jose Gonzalez, InterInnov, Spain, FIWARE Mundus **Government Perspective (US):** Kishan Baheti, National Science Foundation, US
3:00 p.m. – 3:20 p.m.	Coffee Break
3:20 p.m. – 4:30 p.m.	Plenary Panel: **What We Must Do to Strengthen Cyber Resiliency and IoT Security**. Representatives from government, including NIST, and industry, including Microsoft, will discuss cyber security, cyber resilience, and critical infrastructure. *Traditional interactions between people and technology are often managed in an environment that consists of known devices and known software. For a world of IoT devices spreading all over in both public and private spaces, this doesn't scale from manageability and cybersecurity perspectives. Protection, detection and recovery of IoT systems must be automated. Yet, not all device makers including small and medium businesses know how to accomplish this throughout IoT products life cycle. We need to consider how policies, standards and technical solutions can help address IoT security and resiliency challenges. This panel is designed to have experts from both private and public sectors to share their perspectives on how to help raise public awareness, invest in policy and standard development, support cross sector collaboration to address long term IoT security and cyber resiliency both at the regional and global levels.* **Chair**: Jing de Jong-Chen, general manager of global cybersecurity strategy, Microsoft; vice president of Trusted Computing Group, US **Panelists:** **Cyber Resiliency Considerations for the Engineering of Trustworthy Secure Systems**: Ron Ross, Fellow and the Author of newly released NIST Special publication of SP 800-160 , US **Securing Europe's IoT Devices and Services:** Claudio Caimi, Hewlett-Packard Entreprise (HPE), Italy, representative of AEGIS initiative **Enhancing Cyber Resilience Through Industry Collaboration and Trusted Computing:** Jing de Jong-Chen, general manager of global

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	cybersecurity strategy, Microsoft; vice president of Trusted Computing Group, US **European NIS Directive and CIP services home-grown in Europe:** Nicholas Ferguson, TRUST-IT, Italy, coordinator of CYBERWATCHING.EU initiative
4:30 p.m. – 6:00 p.m.	Plenary Panel on partnerships on **Big Data Research & Innovation and Workforce Development**. This will focus on needs and collaboration opportunities on Smart Cities, Smart Health and Data Science Workforce and Data Literacy. **Moderator:** Lea Shanley, South Big Data Innovation Hub, US **Panelists:** **Big Data Hub-BDVA-PICASSO Big Data PPP Workshop/Smart Health:** Lea Shanley, University of North Carolina-Chapel Hill/Co-Executive Director, South Big Data Innovation Hub, US **What Big Data will bring for Healthcare:** Pantelis Aggelidis, President of the Board of Directors of Alexander Innovation Zone, Vidavo Technology, Greece **Smart Cities/Transportation:** Meredith Lee, UC-Berkeley/Executive Director, West Big Data Innovation Hub, US **Intelligent Transport and Digital Skills**: Andreas Metzger, Paluno, Germany / Big Data Value Association, EU **Data Literacy and Workforce:** Catherine Cramer, Columbia University Data Science Institute/Northeast Big Data Hub, US
6:00 – 8:00 pm	Evening reception sponsored by Mississippi State University

Tuesday, June 19th, 2018

9:00 a.m. – 10:30 a.m.	Plenary panel: **5G and Beyond**. This panel will focus on a dialogue between EU and US peers on research opportunities, challenges and perspective EU-US collaboration for 5G and beyond. **Chair and moderator**: Gerhard Fettweis, Vodafone Chair Professor at TU Dresden, Germany **Panelists** **An Academia representative from EU side:** Matti Latva-aho, Professor University of Oulu, Finland **An Academia representative from US side:** Ted Rappaport, Professor NYU Wireless, US **An Industry representative from US side:** Amitava Ghosh, Nokia Fellow and Head of Radio Interface Group, Small Cell Research at Nokia Bell Labs, US **NSF Program Director:** David Corman, US
10:30 a.m. – 10:50 a.m.	Coffee Break
10:50 a.m. – 12:20 p.m.	Plenary Panel on the **Future of Autonomous Systems**

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	Chairs: David Shaw, Professor, Vice President for Research and Economic Development, Mississippi State University, US Haydn Thompson, CEO, THHINK Group (UK, NL, Aus, JP). Autonomous transportation systems have the potential to change every aspect of human life, and have captured the imagination of academics, industry, and the general public like few other technological developments. Unmanned aerial systems (UAS) research ranges from package delivery to remote persistent observations. Autonomous ground vehicles open up opportunities for more efficient public transportation, trucking, as well as safer transport for individuals. Both systems have the potential to revolutionize transportation of goods and services; however, major technological and policy obstacles must be addressed if their potential is to be realized. Two panels, one on each system, will focus on the research needs and collaborative opportunities **Panelists:** **Unmanned Aircraft:** Al Savvaris, Centre of Autonomous and Cyber-Physical Systems Cranfield University, United Kingdom Dallas Brooks, Raspet Flight Research Laboratory Mississippi State University, US **Autonomous Ground Vehicles**: Haydn Thompson, CEO, THHINK Group, EU Malcom Glenn, Director of Strategic Partnerships, Uber Technologies, US
12:20 p.m. – 1:20 p.m.	Lunch
1:20 p.m. – 2:50 p.m. (breakout sessions)	Three Breakout Sessions: **CPS/IoT, Big Data, and 5G**. These sessions will allow experts to explore specific topics in greater technical depth, and/or discuss relevant policy aspects: **Breakout session 1 (CPS/IoT)** will focus on Autonomous Cyber-physical Systems - research agenda and cooperation options **Moderators:** Tariq Samad, Technological Leadership Institute, University of Minnesota, US and Sebastian Engell, Professor TU Dortmund, Germany **Breakout session 2 (Big Data)** will focus on joint programs to identify "data ethics" as ground rules for the development and exploitation of Big Data **Moderator:** Jonathan Cave, GNKS, University of Warwick, Alan Turing Institute and UK Regulatory Policy Committee, United Kingdom **Breakout session 3 (5G and beyond)** will focus on discussing future wireless communications at carrier frequencies beyond 100 GHz with respect to both enabling technology and spectrum policy aspects **Moderator:** Gerhard Fettweis, Vodafone Chair Professor at TU Dresden, Germany
2:50 p.m. – 3:20 p.m.	Coffee Break
3:20 p.m. – 4:20 p.m.	Report Back from breakouts and discussion with the audience
4:20 p.m. – 4:50 p.m.	**Forward Looking Statement & Closing Remarks** Anne Bowser, The Wilson Center, US Svetlana Klessova, inno TSD, France - PICASSO Project Coordinator Tariq Samad, Technological Leadership Institute, University of Minnesota, US

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