"The Internet of Things: Impacting Scientific Data and Information Flows"

Friday, Dec. 9th, 2016
9:00 am - 5:00 pm EST
National Academies of Sciences, Engineering & Medicine
Keck Center, 500 Fifth St., NW, Room 100
Washington DC

AGENDA

Welcome and Opening Remarks

9:05 - 9:15 am

Marcie Granahan, *Executive Director, NFAIS*
Amanda J. Wilson, *Chair, CENDI, Director, National Transportation Library, DOT*

Introduction: **Amanda J. Wilson**, *Chair, CENDI, Director, National Transportation Library, DOT*

Opening Plenary: Landscape: Cyber Physical Systems, Where Are We Now?

9:15 - 10:00 am

Christopher Greer, Director of the Smart Grid and Cyber Physical Systems Program Office and National Coordinator for Smart Grid Interoperability, NIST

An overview of current developments in Cyber Physical Systems - including the Internet of Things, Smart Cities, Intelligent Transportation, Smart Grid, and more - and discuss implications for scientific and technical information flows.

Policy Implications: Policy, Standards, and Ethical Issues Associated with the IOT.

Francine Berman, *Chair, Research Data Alliance / US*

Larry John, *Principal Analyst, ANSER, NIST Framework for Cyber-Physical Systems Data Interoperability Subcommittee*

10:00 - 11:00 am

With the development of the IoT comes the potential for major questions and challenges to our legal, policy, and standards regimes. Ethics, privacy, security and intellectual property as well as other

issues need to be examined in terms of how science and scientific communication is impacted. This session will examine these issues and lay out the questions.

11:00 - 11:15 am

Break and Networking Opportunity

11:15 am – 11:45 pm

Special Topical Talk – IoT and Accounting for Everything

Andrew Maffei, *Senior Information Systems Specialist, Woods Hole Oceanographic Institution*

Andrew Maffei will address the possibility of applying the underlying principles found in double entry bookkeeping to the collection, organization, indexing, and analysis of scientific data and metadata, especially with regard to the vast amounts and integration of the wide variety of data and metadata associated with IoT applications.

Case Studies Part I

- Building Technology Research
  Teja Kuruganti, Ph.D, *Senior R&D Staff, Modeling and Simulation Group, Computational Sciences and Engineering Division, Oak Ridge National Laboratory*

11:45 – 12:40 pm

- Smart Grid –
  Peter L. Fuhr, Ph.D., *Distinguished Scientist at Oak Ridge National Laboratory and Director for the Unmanned Aerial Systems (UAS) Research Laboratory*

This is Part I of a two part series looking at case studies of the impact of the IoT on different research communities. The first speaker in Part I will focus on IoT applied to building technology research and integration and will look at the impact of advanced sensors and controls in improving energy efficiency and grid-responsiveness of buildings. Our second speaker will look at a Case Study of Chattanooga, Tennessee, in IoT sensing, the data needs and wants, and implications for future smart cities…with of course drones thrown into the mix.

12:40 pm – 1:40 pm

Lunch (to be provided)

Case Studies Part II

1:40 pm – 2:50 pm

- Environmental & Geo Sciences
  Grace Agnew, *Associate University Librarian for Digital Library Systems, Rutgers University Libraries (RUL)*

- Precision Medicine
  Eric Clark, *Data Scientist, University of Vermont, Department of Surgery*

- Transportation
  Tim Schmidt, *IT Strategic Advisor for the Turner-Fairbank Highway Research Center, Federal Highway Administration, Department of Transportation*

This session is Part II of the series of case studies. Our first speaker in the earth sciences will discussion strategies to support the discovery, preservation and reuse of very large science data of data streamed continuously from 800+ instruments on seven platform arrays by the Ocean Observatories Initiative, a multi-institution, National Science Foundation-funded initiative to monitor the status and health of the Atlantic and Pacific Oceans. Our second speaker will talk to how the Internet of Things is being brought to bear on questions of health and illness includes sensors, both wearable and environmental. Data from sensors, properly integrated and analyzed, can be used to tease out subtle but significant changes in health indicators, including gait, to aid in the diagnosis and treatment response of patients. Our final speaker will address the IOT used in transportation research. He will discuss how relevant new and evolving technological and process solutions can solve cross-discipline challenges and fill gaps to support a highly innovative and efficient surface

transportation research environment.

Impact on the Supply Chain: Libraries and Publishing

2:50 pm – 3:50 pm

David Worlock, Co-Chair, Outsell Executive Programs, Outsell, Inc.

We are moving from an age of data scarcity and proprietary content curated and owned to an age of data profusion where much data is open and some data has greater quality than others. As roles change amongst the players in the information marketplace, researchers become (self) publishers and librarians create OA (Open Access) university presses and traditional publishers build research and scholarly communications tools and solutions. And yet data quality control, data mining rights, and the battle for comprehensive coverage from sensor- based sourcing continue to cause difficulties for researchers and research users.

Andreas Orphanides, Associate Head, User Experience, North Carolina State University (NCSU) Libraries

The Internet of Things is undergoing a transition from an academic curiosity to a nearly universal presence in our day-to-day lives. In this presentation, I'll examine the effects, both positive and negative, that the IoT age is likely to have on the practice of librarianship as IoT emerges into the mainstream. In the first part of the presentation I'll discuss how ubiquitous connectivity will affect libraries in terms of their day-to-day operations, in particular with respect to the management of library spaces, services, and collections. Secondly, I'll explore the influence that the Internet of Things will have on matters underpinning the very philosophy of librarianship, including the principles of universal access, knowledge discovery, and intellectual freedom. I'll conclude with a few words on how librarians, researchers, and policymakers can help society get the most, and make the most, out of the Internet of Things.

3:50 – 4:00 pm

Break and Networking Opportunity

*Introduction: **Larry Lannom**, Director of Information Services and Vice President at the Corporation for National Research Initiatives (CNRI)*

Where Are We Going In The Future?

4:00 - 4:45 pm

George Strawn, *Board Director, Board on Research Data and Information, NAS*

Examining the gradual evolution of the Internet of Things (IoT) through discussion of the future of the Internet of Computers (IoC), the developing characteristics of the IoT, the cyber-physical systems that will layer on top of it, and the related opportunities and challenges, such as the interoperability of heterogeneous data and cyber-physical security.

4:45- 5:00 pm

Wrap Up and Adjournment
Bonnie C. Carroll*, Executive Director, CENDI*

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