industrial internet CONSORTIUM

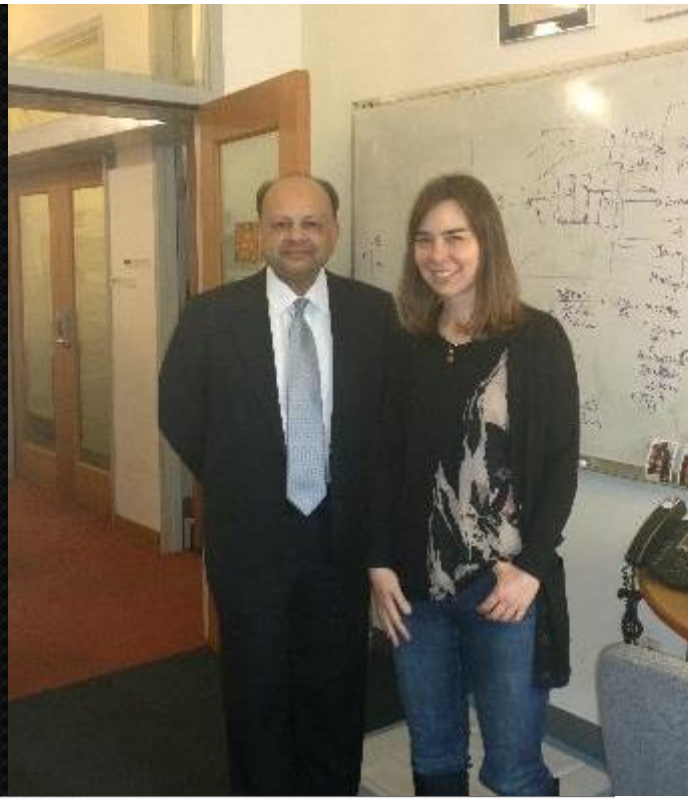
LARGE SCALE TEST BEDS

http://bit.ly/MIT-IOT

Discussion of work-in-progress

Test Beds	● Healthcare, Smart Cities, Transportation, Robotics, Manufacturing, Farming
Q&A	● Dr Shoumen Datta, Senior Vice President, IIC [datta@iiconsortium.org]
REF	● http://bit.ly/MIT-IOT ● http://bit.ly/SMART-CT ● http://bit.ly/SCPPP-04 ● http://bit.ly/RE-VIEW-IOT

Professor Dina Katabi (MIT) presenting RF Reflection to President Obama (White House Demo, 4 August 2015)



President Obama invites MIT entrepreneurs to give demo at the White House http://bit.ly/President-Obama-with-Dina-Katabi

http://newsoffice.mit.edu/2015/president-obama-meets-mit-entrepreneurs-white-house-demo-day-0806

Summary – http://bit.ly/RE-VIEW-IOT ● http://bit.ly/MIT-IOT

Transportation – $20 million ITS proposal to US DoT – Rank #1 (rumor) / did not receive funds
Discussions about autonomous transportation as a segment in smart cities

Smart Cities – US NIST GCTC 2015 – City of Oakland, CA – Seismic Infrastructure Monitoring (SIM)

Smart Cities – EU H2020 – ICT IoT / Societal Challenges / Mobility / Smart Living – in progress
IIC members and Cities - Bordeaux, Santander, Genova, Cork – Japan / S. Korea

Healthcare – IIC members Harvard Medical School, MIT, JHU APL and U Washington, UNT, PIH
Discussions with Fujitsu, Toshiba, Hitachi, TCS (University of Pisa, WinMedical)

Manufacturing – Advanced cyber-manufacturing / distributed manufacturing-on-demand at the edge
Discussions with OSTP, NITRD, NSF, Georgia Institute of Technology, Rolls Royce, GE

IIC Interest – Energy, Precision Farming, Software Innovation, Medical Device Interoperability

Large Scale test beds are only one of the many activities within IIC. There are several industry working groups (WG) focused on reference architecture as well as several other IIC member funded small scale test beds.

industrial internet CONSORTIUM **Reference Architecture** ● http://bit.ly/IIRA-IIC

Asset Efficiency Testbed

Example of IIC Member-Funded Small Scale Test Bed

Fast Facts

LEAD MEMBERS:	Infosys
SUPPORTING MEMBERS:	Bosch, GE, IBM, Intel, PTC
MARKET SEGMENT:	High Tech, Industrial Manufacturing, Discrete and Process Manufacturing, Automotive, Aerospace, and other segments with high value fixed/moving assets
CHALLENGE:	A recent study on maturity of Asset Efficiency from Infosys and the Institute for Industrial Management (FIR) at Aachen University revealed that 85 percent of manufacturing companies globally are aware of asset efficiency, but only 15 percent have implemented it at a systematic level. Current challenges include lack of instrumentation of the assets, missing real-time data analytics, lack of context due to missing information from other systems, and lack of a holistic focus with other aspects of efficiency like energy, utilization, operations, and serviceability
GOAL:	To collect asset information efficiently and accurately in real-time and run analytics to make the right decisions
FEATURES:	Study of an asset - Failure mode analysis prediction using engineering knowledge - Mapping and modelling of the asset accordingly - Development of a platform stack for real-time data collection from the asset and overall system and data analytics
COMMERCIAL BENEFITS:	Improvement in asset life - Asset utilization and ROI by reducing the downtime of valuable assets - Maximizing production and predictable delivery of service

The Testbed

Many industries have assets that are critical to their business processes. Availability and efficiency of these assets directly impact service and business. Using predictive analytics, the **Asset Efficiency Testbed** aims to collect real-time asset information efficiently and accurately and run analytics to make the right decisions in terms of operations, maintenance, overhaul and asset replacement. **Infosys**, a member of the Industrial Internet Consortium, is leading this project, with contribution from Consortium members **Bosch**, **GE**, **IBM**, **Intel** and **PTC**.

Asset Efficiency is a vertical testbed, making it possible for the testbed to be applied to multiple solutions. The testbed will launch in two phases. In the first phase, the testbed will be created for a moving solution, in this case, aircraft landing gear. The focus of this phase will be on the creation of stack and the integration of technologies. In the second phase, the testbed will address fixed assets, like chillers, with the goals of finalizing the architecture and opening up the interfaces.

The Asset Efficiency Testbed monitors, controls and optimizes the assets holistically taking into consideration operational, energy, maintenance, service, and information efficiency and enhance their performance utilization. The Asset Efficiency Testbed offers numerous benefits including: Condition Monitoring that helps in determining an optimal maintenance schedule, the reduction in downtime thus improving overall productivity of assets, reduction in capital and operational expenditures, and efficient energy utilization.

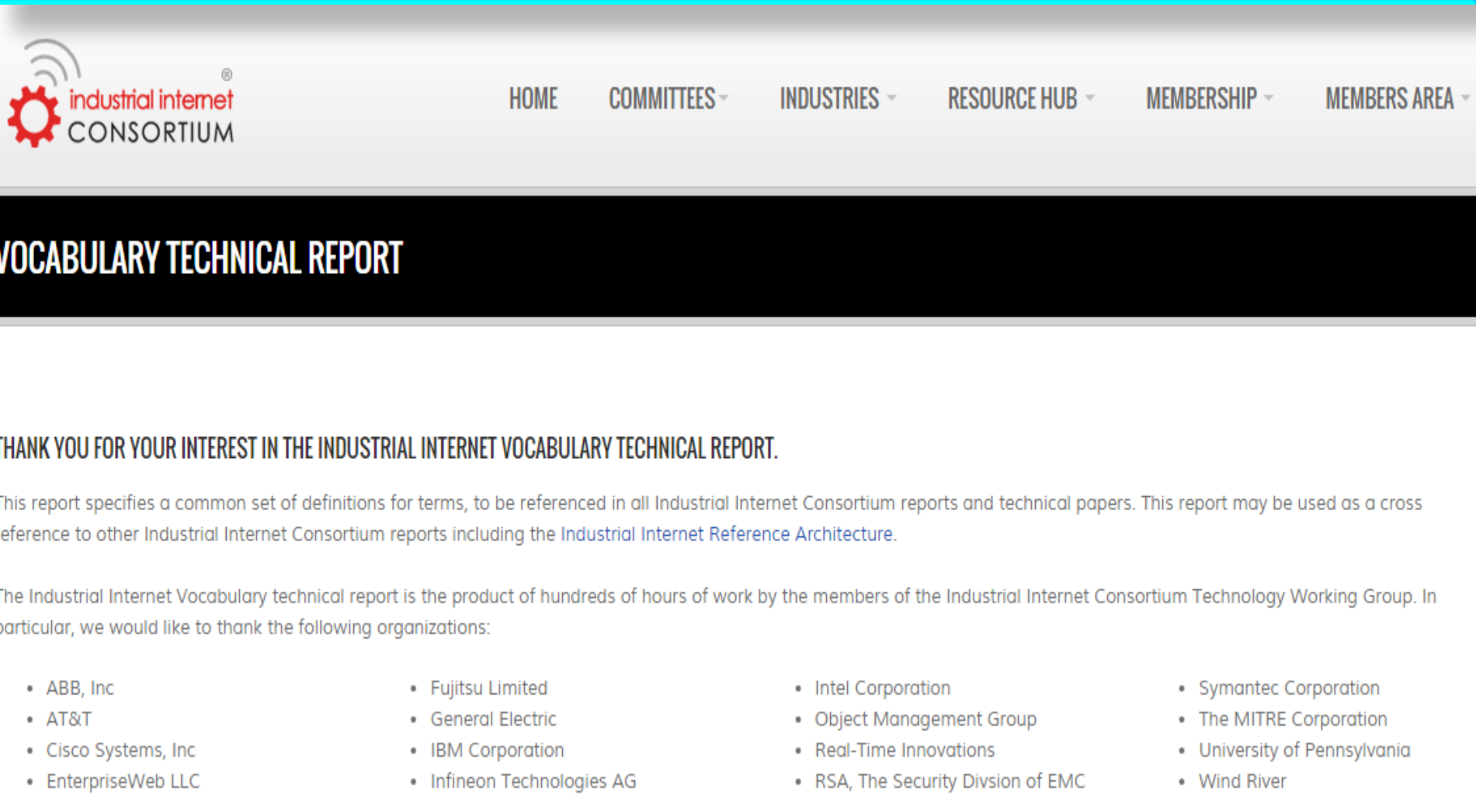
Jayraj Nair, Head - IoT Practice, Infosys

Testbed In Action

Asset Efficiency and Aircraft Landing Gear

The Aircraft Landing Gear use case stems from challenges to enhance flight safety and reduce operational and maintenance costs. The current practice of scheduled maintenance increases the cost of maintenance steeply, especially in the case of an aircraft operating beyond its designed service life. Hence organizations need to adopt Conditon-based Maintenance (CBM) which is possible only with an effective health monitoring system. This aircraft landing gear use case, which is based on the Asset Efficiency Testbed, enables automatic detection, diagnosis, prognosis, and mitigation of adverse events arising from component failures; ensures flight safety and reduction in the overall operational and maintenance costs.

Large Scale test beds are only one of the many activities within IIC. There are several industry working groups focused on reference architecture as well as technical reports and IIC member funded small scale test beds.



Public Private Partnerships (PPP) for Large Scale Test Beds

Test bed funding opportunities from national and regional governments and PPP coalitions which may include global academia, industry, organizations and one or more governments

Pursuit of Global PPP

Select Areas

Transportation

Manufacturing

Smart Cities

Healthcare

Farming

Security

Data

http://bit.ly/RE-VIEW-IOT

Who is eligible to participate ● Large Scale Pilots & Test Beds

Members of the Industrial Internet Consortium (IIC), corporations, government agencies, academics and non-profit organizations are eligible to participate but eligibility criteria may be decided by funding industries / agencies in US, EU, APAC.

STEPS – What is your idea? Do you have qualified HR? Discuss

Page 2 ● Prepared by Dr Shoumen Datta as a guide for IIC members. Please read announcement. NEXT STEPS

● If you are interested to be a part of an IIC coalition to apply for US government funding, contact Mr Michael Lee (lee@iiconsortium.org) Director of Test Beds or Ms Lynne Canavan, Vice President of IIC or datta@iiconsortium.org

● Please attach [1] summary idea of your interest (half page or 1 page) [2] Resume (CV) of one or more academically qualified individuals in your organization who is/are capable of executing your proposed idea (albeit, partially)

● For-profit corporations (IIC members) may be a part of a funding coalition as a sub-contractor to the eligible PI

Work in Progress ● Emerging Test Bed Ideas and Funding

Summary of potential funding opportunities – http://bit.ly/US-FUNDING-EU-H2020

What are we pursuing?

What are we thinking?

What are you thinking?

http://bit.ly/RE-VIEW-IOT

Guide to Select US Calls

	WWW.GRANTS.GOV	DESCRIPTION OF OPPORTUNITY
2	13-543	Smart and Connected Health
3	14-519	Expeditions in Computing
4	14-520	Software Infrastructure for Sustained Innovation
5	14-596	Information and Intelligent Systems (IIS): Core Programs Updated to 15-574
6	14-597	Computer and Network Systems (CNS): Core Programs
7	14-598	Computing and Communication Foundations (CCF): Core Programs 15-573
8	14-599	Secure and Trustworthy Cyberspace
9	15-505	National Robotics Initiative
10	15-515	Algorithms in the Field
11	15-537	STEM + Computing Partnerships
12	15-549	Cybersecurity Innovation for Cyberinfrastructure
13	15-553	Software Infrastructure for Sustained Innovation - S2I2
14	15-565	Consortium for Advanced Manufacturing Foresights
15	APS-386-14-000002	Quality Data for Decision Making (QDDM)
16	BAA-RQKM-2014-0020	AFRL/RXM Manufacturing Technology Open BAA
17	FHWA-2013-0048	Accelerated Innovation Deployment (AID) Demonstration
18	ONR-15-FOA-0002	Science, Technology, Engineering & Mathematics Education, Outreach, and
19	ONR-BAA-15-0009	FY16 Communications and Networks Discovery and Invention
20	PA-14-154	Early Stage Development of Technologies in Biomedical Computing, Informatics,
21	PA-14-155	Early Stage Development of Technologies in Biomedical Computing, Informatics,
22	PA-14-157	Early Stage Development of Technologies in Biomedical Computing, Informatics,
23	PA-14-180	mHealth Tools for Underserved Populations with Chronic Conditions to Promote
24	PA-14-181	mHealth Tools for Underserved Populations with Chronic Conditions to Promote
25	PAR-13-169	Academic-Industrial Partnerships for Translation of in vivo Imaging Systems for
26	PAR-14-088	Direct Phase II SBIR Grants to Support Biomedical Technology Development
27	PAR-14-118	Technologies for Healthy Independent Living (R01)
28	PAR-14-228	NIH Science Education Partnership Award (SEPA) (R25)
29	PAR-15-031	NIBIB Quantum Program: Technological Innovation to Solve a Major Medical or
30	PD-12-8084	Computational and Data-Enabled Science and Engineering
31	RFA-EB-15-002	Pediatric Research using Integrated Sensor Monitoring Systems (PRISMS): Sensor
32	W911NF-13-R-0001	United States Army Research Institute for the Behavioral and Social Sciences Bro

http://bit.ly/US-FUNDING-EU-H2020

13-543

Read Grant	General Topic	Funding Agency	Closing Date	Funding Scope	Program
Use this link 13-543	Smart and Connected Health	US NSF	December 10, 2015	70,000 upto ears	$15 - $20 million

Content	Digital health infrastructure integration with data/decisions using sensors, robotics and networks.
Eligibility	• Universities and Colleges - Universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in, the US acting on behalf of their faculty members. Such organizations also are referred to as academic institutions. • Non-profit, non-academic organizations: Independent museums, observatories, research labs, professional societies and similar organizations in the U.S. associated with educational or research activities.
Comment	This is a broad topic that embraces multiple sub-topics in health related areas under NIH guidelines as well as NSF directorate of computer, information science and engineering. It can include healthcare platforms, device integration, robotic tools in clinical settings and remote monitoring data in point of care diagnostic apps or preventive healthcare.

15-505

Read Grant	General Topic	Funding Agency	Closing Date	Funding	Program
Use this link 15-505	Robotics and co-robots	US NSF National Robotics Initiative	December 3, 2015 thereafter annually	Small – up to $1 million total over 1-3 years	$30-$50 million

Content	The primary purposes of the National Robotics Initiative (NRI) are to provide leadership in research fundamental to the development of the next generation of robots and co-robots, to advance the capability and usability of such systems and artifacts, and to encourage existing and new communities to focus on innovative application areas where robots collaborate productively with humans. The NRI looks to stimulate partnering arrangements necessary to create next-generation operational systems in such areas as manufacturing, space and undersea exploration, healthcare and rehabilitation, military and homeland security, civil and environmental infrastructure protection, food production, processing, and distribution, assistive devices for improving independence and quality of life, and safer driving. It covers the entire life cycle from fundamental research and development to industry manufacturing and deployment. Methods for the establishment and infusion of robotics in educational curricula and research to gain a better understanding of the long term social, behavioral and economic implications of co-robots across all areas of human activity are important parts of this initiative. The scope of the application domains perceived as worthy and viable adopters of this technology include robotic systems that serve as co-workers, co-inhabitants, co-explorers, and co-defenders.
Eligibility	All / any ● NSF Grant Proposal Guide Chapter 1 Section E Page 14 - http://bit.ly/NSF-GPG
Comment	Broad spectrum application of robotics. Open call repeats annually. Coalition critical.

Read Grant	General Topic	Funding Agency	Closing Date	Funding	Program
Use this link	Manufacturing	US DoD AFRL	White Papers by June 24, 2019	From $100K to $10 million over 1-5 years	$46.5 million

Content	Air Force Research Laboratory, Materials & Manufacturing Directorate is soliciting white papers and potentially technical and cost proposals under this announcement that supports the needs of its manufacturing and technology mission. Manufacturing technologies that focus on strengthening defense manufacturing capabilities through discovery of new manufacturing capabilities and efficiencies and transitioning capability to the factory floor are of interest. Manufacturing technology interests are presented in 2 contexts - manufacturing technology competencies & application needs. http://bit.ly/BAA-RQKM-2014-0020 **Primary Point of Contact.:** Melissa Prickett, Contract Negotiator Melissa.Prickett@us.af.mil Phone: (937) 713-9907 **Secondary Point of Contact:** P. S. Strader, Contracting Officer pamela.strader@us.af.mil Phone: (937) 713-9919
Eligibility	Unrestricted to any US organization (but no foreign entities)
Comment	Very broad scope. Applications start with a four page white paper innovation proposal.

PA-14-155

Read Grant	General Topic	Funding Agency	Closing Date	Funding	Program
Use this link	Biomedical Computing, Informatics and Big Data	US HHS NIH	Expires May 8, 2017 Annual applications	Project specific (no ceiling)	R01

Content	Development of a broad base of innovative technologies in biomedical computing, informatics, and Big Data Science. It is expected that this research and development is conducted in the context of important biomedical and behavioral research problems. As such, applications are intended to develop enabling technologies that could apply to most NIH Institutes and Centers and range from basic biomedicine to research in all relevant organ systems and diseases. Themes of research include collaborative environments; data integration; analysis and modeling methodologies; and novel computer science and statistical approaches. New opportunities are also emerging as large and complex data sets are becoming increasingly available to the researchers.
Eligibility	Unrestricted
Comment	This is an unrestricted (global) R01 with no funding ceiling (project specific budget). http://grants.nih.gov/grants/funding/r01.htm

Other Federal, State, Local Opportunities – Open Exploration

http://bit.ly/RE-VIEW-IOT

Pursuit of Global Collaborations

Select Areas

Transportation

Manufacturing

Smart Cities

Healthcare

Security

Farming

Data

EU – Horizon 2020

IoT

ICT

Societal Change

Smart Cities and Communities

Mobility for Growth (Transport)

Healthcare for Elderly & Well-Being

http://bit.ly/RE-VIEW-IOT

Opportunities in Europe ● EU and National Governments

- Identify focus areas
- Engage Coalition Partners
- Liaise with Deployment Sites
- Explore global sister/partnerships
- Create proposal, review and submit

- For EU funding opportunities explore http://bit.ly/H2020-Call-for-Proposals & http://bit.ly/H2020-Reports-in-brief

See http://bit.ly/H2020-ICT Calls http://bit.ly/H2020-ICT-Proposals and http://bit.ly/H2020-Legal-Funding-Guidelines

http://bit.ly/EU-ICT-2016-2017-DRAFT ● http://bit.ly/IIC-TB-eoi http://bit.ly/RE-VIEW-IOT

IIC is building coalitions for EU HORIZON 2020 OPPORTUNITIES

Conditions for the Information and Communication

Opening date(s), deadline(s), indicative budget(s):[28]

Topics (Type of Action)	Budgets (EUR million)	
	2016	2017
OPEN 16 DEC 2015 ● CLOSE 12 APR 2016		
ICT1 (RIA)	19.00	
ICT1 (CSA)	1.00	
ICT2 (RIA)	12.00	
ICT2 (IA)	8.00	
ICT3 (RIA)	17.00	
ICT3 (CSA)	1.50	
ICT6 (RIA)	35.00	
ICT6 (IA)	10.00	
ICT10 (RIA)	31.00	
ICT13 (RIA)	25.00	
ICT14 (IA)	27.00	
ICT15 (IA)	25.00	
ICT17 (CSA)	5.00	
ICT18 (RIA)	8.00	
ICT18 (CSA)	1.00	
ICT21 (IA)	14.00	
ICT22 (IA)	20.00	
ICT22 (RIA)	11.00	
ICT24 (IA)	12.00	
ICT25 (RIA)	15.00	
ICT25 (IA)	15.00	
ICT26 (RIA)	24.00	
ICT26 (IA)	18.00	
ICT29 (RIA)	40.00	
ICT29 (IA)	23.00	
ICT29 (CSA)	3.00	
ICT33 (CSA)	4.00	
ICT35 (RIA)	7.00	

OPEN 20 APR 2016 ● CLOSE 20 SEP 2016		
ICT4 (IA)		24.50
ICT4 (CSA)		1.00
ICT7 (RIA)		100.00
ICT7 (CSA)		3.00
ICT8 (IA)		40.00
ICT8 (RIA)		5.00
ICT9 (RIA)		18.00
ICT19 (IA)		38.00
ICT19 (CSA)		1.00

http://bit.ly/SCPPP-04

http://bit.ly/EU-ICT-2016-2017-DRAFT

IIC focus on ICT and IoT for EU HORIZON 2020 OPPORTUNITIES

Opening: 14 Dec 2016			
ICT5 (RIA)		24.00	25 Apr 2017
ICT5 (CSA)		2.00	
ICT11 (IA)		9.00	
ICT11 (CSA)		1.00	
ICT14 (IA)		27.00	
ICT15 (IA)		25.00	
ICT16 (RIA)		31.00	

ICT17 (RIA)		2.00
ICT20 (RIA)		17.00
ICT23 (RIA)		10.00
ICT23 (IA)		2.00
ICT25 (RIA)		15.00
ICT25 (IA)		19.00
ICT27 (RIA)		28.00
ICT27 (IA)		11.00
ICT27 (COFUND-PCP)		7.00
ICT28 (CSA)		5.00
ICT30 (RIA)		41.00
ICT30 (IA)		43.00
ICT30 (CSA)		3.00
ICT31 (RIA)		19.00
ICT31 (IA)		3.00
ICT31 (CSA)		1.00
ICT32 (IA)		10.00
ICT32 (CSA)		2.00

http://bit.ly/SCPPP-04

http://bit.ly/EU-ICT-2016-2017-DRAFT

Form Coalitions Far in Advance of EU Calls

Conditions for the EU-Japan Joint Call

Opening date(s), deadline(s), indicative budget(s):[30]

Topics (Type of Action)	Budgets (EUR million)
DEADLINE: 19 JANUARY 2016	2016
Opening: 20 Oct 2015	
EUJ1 - 2016 (RIA)	3.00
EUJ2 - 2016 (RIA)	2.70
EUJ3 - 2016 (RIA)	1.30
Overall indicative budget	7.00

http://bit.ly/EU-ICT-2016-2017-DRAFT

Conditions for the EU-South Korea Joint Call

Opening date(s), deadline(s), indicative budget(s):[31]

Topics (Type of Action)	Budgets (EUR million)
DEADLINE: 19 JANUARY 2016	2016
Opening: 20 Oct 2015	
EUK1 - 2016 (RIA)	3.00
EUK2 - 2016 (RIA)	1.50
EUK3 - 2016 (RIA)	1.50
Overall indicative budget	6.00

http://bit.ly/SCPPP-04

http://bit.ly/EU-ICT-2016-2017-DRAFT

IIC is building global coalitions for large scale test bed projects

Conditions for the EU-Brazil Joint Call

http://bit.ly/IIC-TB-eoi

Opening date(s), deadline(s), indicative budget(s):[29]

Topics (Type of Action)	Budgets (EUR million)	Deadlines
	2017	
Opening: 20 Sep 2016		
EUB1- 2017 (RIA)	2.50	14 Mar 2017
EUB2 - 2017 (RIA)	4.50	
Overall indicative budget	7.00	

http://bit.ly/SCPPP-04

http://bit.ly/EU-ICT-2016-2017-DRAFT

IoT calls at H2020 WP 2016/2017

IoT Focus Area (Deadlines: April 2016)

- Large scale pilots (1 project per pilot)
  - Smart Living environments for ageing well (20M€)
  - Smart Farming and Food Security (30 M€)
  - Wearables (15M€)
  - Smart Cities (15M€)
  - Autonomous vehicles (20M€)
- Horizontal activities (4.5M€, 4-5 projects)
  - Coordination and Support Actions (Governance, Trust, Security, Ethics, Responsable Research and Innovation)
- R&I on integration and platforms (35M€, 5-7 projets)
  - Open, easy to use horizontal IoT plateform

- Factory of the Future
  - Digital Automation (51 M€, 6-7 projects)
  - ICT Innovation for Manufacturing SMEs (32M€, 4 projects)
- International Collaboration Activities
  - EU-Brasil
    - IoT Pilots (environmental monitoring, smart water, smart energy, smart assisted living, smart manufacturing) (4.5M€, 3 projetcs)
  - EU-Japan
    - IoT, Cloud, big data in smart cities (2.75M€, 2 projects)
  - EU-Korea
    - Horizontal IoT platform (smart city, manufacturing, healthcare, logistics) (1,5M€, 1 project)
- Responsibility and Creativity
  - Responsible ICT related research (7M€, 3-5 projects)
  - Synergies between artists, creative people and technologists (3M€, 1 project)

Societal challenges

- Smart Cities and Communities SCC 01 (60M€ in 2016, 70M€ in 2017, 12-18M€ per project)
  - Smart buildings, Energy efficency, ecologic districts, electromobiliy
  - 3 « lighthouse » cities ; 3+ « follower » cities
  - Strong city involment required
  - Deployment of mature technologies (TRL >=7)
- SC1-PM-14–2016: EU-Japan cooperation on Novel ICT Robotics based solutions for active and healthy ageing at home or in care facilities (5M€, 2 projects)
- MG-5.2-2017. Innovative ICT solutions for future logistics operations (10M€, 2-3 projects)
- MG-6.1-2016. Innovative concepts, systems and services towards 'mobility as a service' (25M€, 5-8 projects)
- MG-7.3-2017. The Port of the future (37M€, 10-12 projects)

IIC Large Scale Test Beds – work in progress

HEALTHCARE ●

SMART CITIES ●

TRANSPORTATION ●

MANUFACTURING ●

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

In progress, under planning, brainstorming

HEALTHCARE ● http://bit.ly/HIP-HIP-HIP

SMART CITIES ●

TRANSPORTATION ●

MANUFACTURING ●

HEALTHCARE ● http://bit.ly/HIP-HIP-HIP

Grand Challenge Healthcare (GCH) http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

- It is an umbrella term for healthcare test beds IIC may pursue

HIP - abbreviation for Healthcare Integrated Intelligent Platforms

- Concept for healthcare test beds related to data integration

GCH may include HIP test bed(s) such as ICE as well as other test beds:

- Device and Imaging
- Data and Analytics
- Precision Medicine
- Wearables
- Security → http://bit.ly/SECURITY-HIT-NIST
- Other → http://www.openice.info/2015/07/24/three-days-with-intel-edison.html

Healthcare Test Bed Opportunities – Criteria for Participation

Expertise and ability to contribute technical components and/or qualified human resources to work as a part of the team to execute specific work tasks related to:

[a] creating tools to extract & integrate data from medical devices and equipment

[b] understanding the quintessential role of security and privacy in medical data

[c] depth of expertise in real-time data distribution service from many sources

[d] familiarity with platform (PaaS), data (DaaS) and analytics as a service (AaaS)

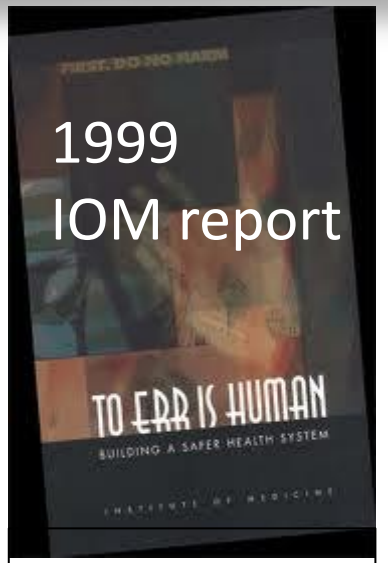
[e] development of software, API generation, testing and evaluation

[f] familiarity with the healthcare industry and/or prior experience

http://bit.ly/HIP-HIP-HIP

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

● 2010 ● OIG HHS bad hospital care deaths about 180,000 patients in Medicare alone in a year



98,000
deaths due to error

Patient Safety 2013
Exploring Quality of Care in the U.S.

How Many Die From Medical Mistakes in U.S. Hospitals?

A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care

John T. James, PhD

210,000 – 440,000 deaths

Medical Devices - stand alone equipment, not patient-centric

Philips Intellivue Series Monitors

GE Solar 8000x / Dash 4/5000

Dräger Apollo / EvitaXL / V500

Nonin Bluetooth OnyxII 9650 / WristOx 3150

Oridion Capnostream20

Ivy 450C

Nellcor N-595

Masimo Radical-7

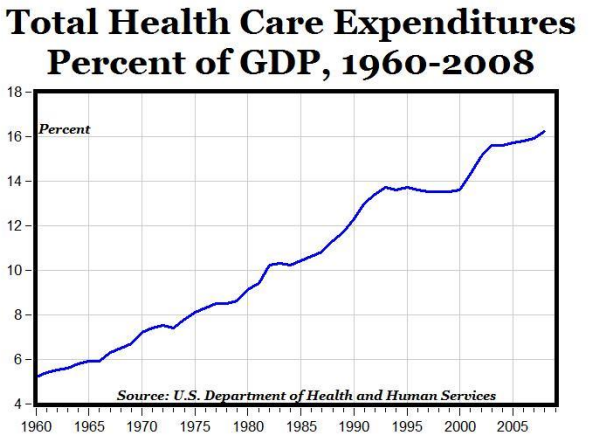
Leading causes of death in the USA

1. 597,689 Heart Disease
2. 574,743 Cancer
3. 138,080 Chronic lower respiratory diseases
4. 129,476 Stroke
5. 120,859 Accidents
6. 83,494 Alzheimer's disease
7. 69,071 Diabetes
8. 56,979 Influenza &Pneumonia
9. 47,112 Kidney diseases
10. 41,149 Suicide

www.cdc.gov/nchs/fastats/deaths.htm

Third Leading cause of death in the USA ?

1. 597,689 Heart Disease
2. 574,743 Cancer
3. ***Deaths Due to Medical Errors (210,000 to 440,000)***
4. 138,080 Chronic lower respiratory diseases
5. 129,476 Stroke
6. 120,859 Accidents
7. 83,494 Alzheimer's disease
8. 69,071 Diabetes
9. 56,979 Influenza &Pneumonia
10. 47,112 Kidney diseases
11. 41,149 Suicide



Equivalent to at least one 747 airplane crash every day

OpenICE Test Bed

Now available to IIC Members

Integrated Clinical Environment

WWW.MDPNP.ORG

www.openice.info

Serial

OpenICE Device-Adapter

Any java-capable computer running OpenICE Device Adapter

Serial

OpenICE Device-Adapter

Ethernet Network

http://bit.ly/OPEN-ICE-ON-GOOGLE-GLASS

Any java-capable computer running OpenICE Supervisor

OpenICE Device Simulator

OpenICE Device Simulator running on any computer on the network

www.openice.info/demo.html

IIC MEMBERS

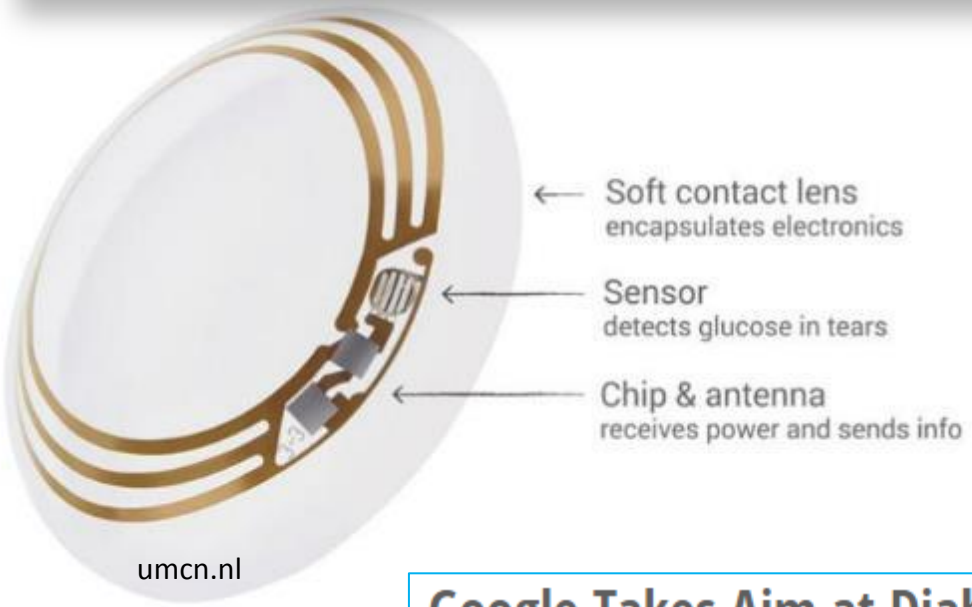
Shoumen Datta, Gary Gottlieb and Julian Goldman

Platforms with Intelligence ?

Device, Data, Diagnostics

The Quest for Convergence of Platform and Interoperable Standards

DIABETES – The next medical IoT Focus



umcn.nl

Google, DexCom to Make Glucose Monitoring Devices for Diabetes Patients

by Robin Sinha , 13 August 2015

Soon after the announcement of its new CEO Sundar Pichai and a holding company called Alphabet, the Google Life Sciences team has teamed up with a healthcare firm DexCom to build blood glucose monitoring devices for diabetes patients that are smaller and less expensive than current technologies.

Google Takes Aim at Diabetes with Big Data, Internet of Things

By **Jennifer Bresnick** on August 31, 2015

SANOFI

HARVARD MEDICAL SCHOOL

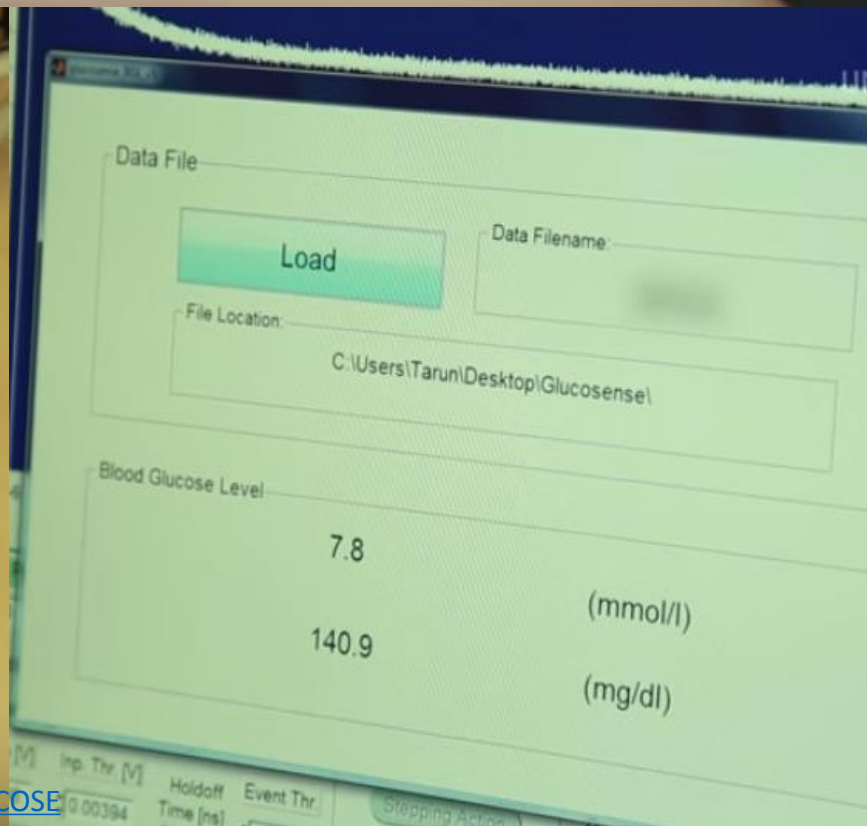
ABOUT HMS | EDUCATION

Joslin Diabetes Center

Freshly revitalized after Google's much-discussed reorganization under the **Alphabet** umbrella, the tech giant's life science team is once again **planning to tackle diabetes** with the help of big data analytics and innovative Internet of Things technologies.

With the formation of a new partnership that enlists the aid of the Joslin Diabetes Center and Sanofi, a multinational pharmaceutical developer, Google hopes to reduce the burden of Type 1 and Type 2 diabetes on both patients and providers.

BLOOD-FREE NON-INVASIVE BLOOD GLUCOSE



Professor Gin Jose, University of Leeds ● http://bit.ly/BLOOD-FREE-BLOOD-GLUCOSE

BLOOD-FREE NON-INVASIVE BLOOD HEMOGLOBIN ??

Laser excitation of oxy-hemoglobin generates highly specific resonance (Raman spectra) which could be exploited in the development of non-invasive tool to determine hemoglobin.

This statement is made by the author. It is merely a suggestion.

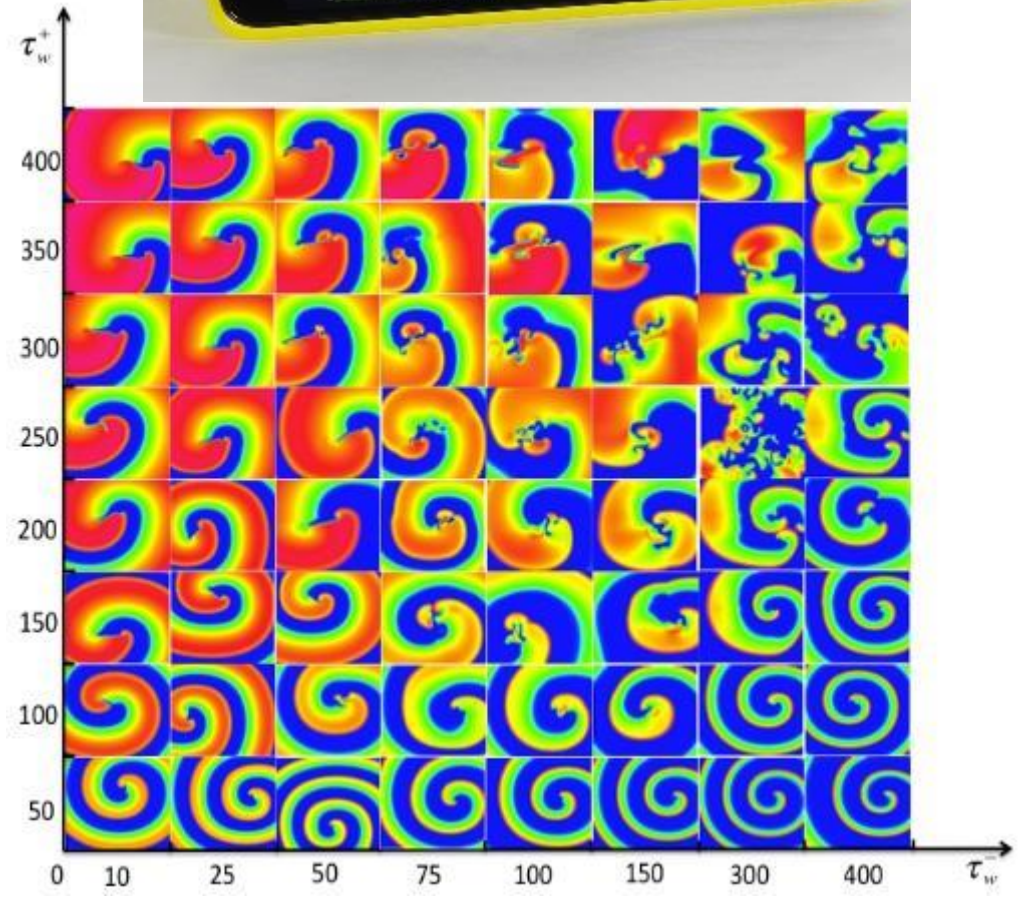
Wrig Nanosystems, a medical technology startup company which develops and markets a hemoglobin measurement device, has attracted financial interest from different investors in the product. The company has made an investment of up to 15 cr to commercialise and further develop the product and Avendus Wealth Management acted as the advisor to Wrig on this deal.

The list of investors includes Flipkart co-founders Sachin and Binny Bansal, Malvinder and Shivinder Singh (former Ranbaxy and Fortis promoters), Gurpreet Singh (Round Glass Partners) and others.

Dr Leslie Saxon, University of Southern California

PHONE ECG DETECTS IRREGULAR HEARTBEAT

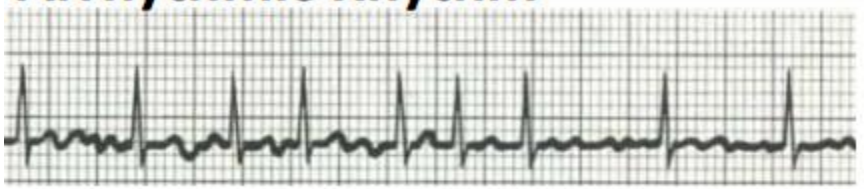
CARDIAC ARRHYTHMIA DIAGNOSIS & REPORTING CARDIOLOGIST-in-a-POCKET



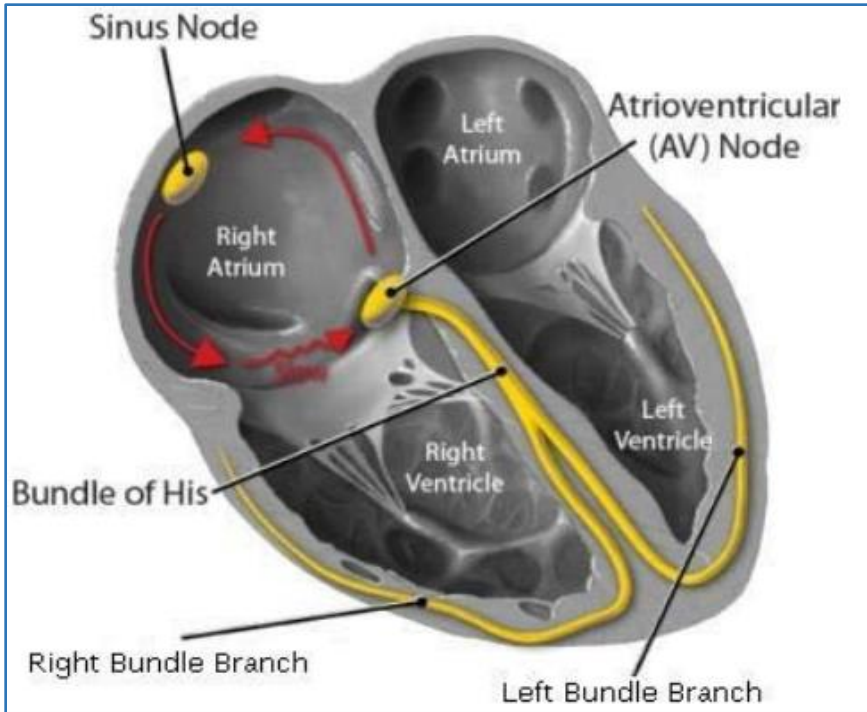
Normal Sinus Rhythm

Circular pathways in the heart conduction system is a common cause of arrhythmias

Arrhythmic Rhythm



www.seas.upenn.edu/sunfest/docs/slides/MALAMASPETER.pdf



Samsung's NeuroLogica digital X-ray system

DISRUPTION

By Emily Wasserman

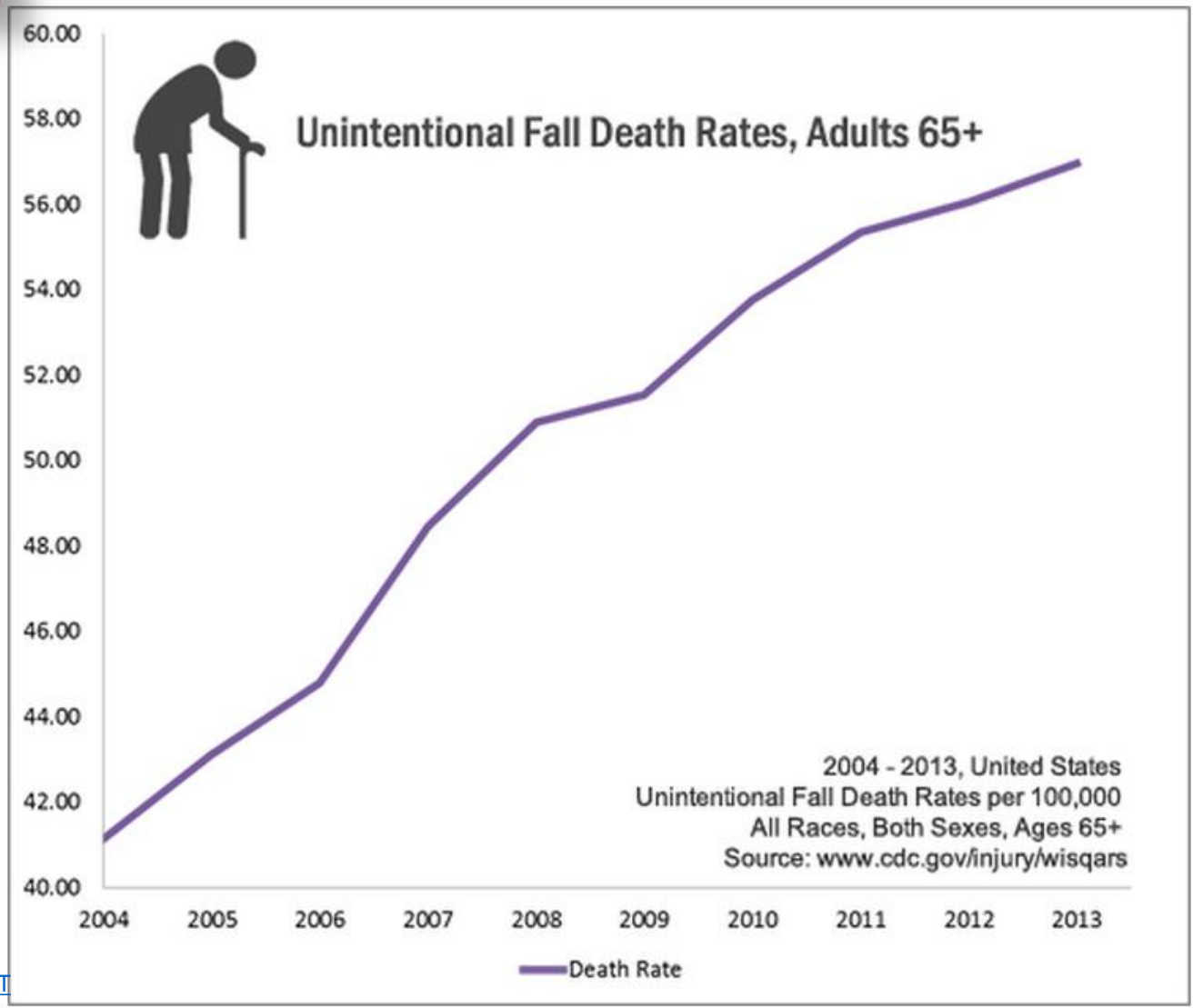
Samsung's NeuroLogica unit snagged an FDA OK for its digital radiography system, giving the company a boost as it aims for a top spot in the medical device imaging market.

Samsung's GC85A system--Courtesy of Samsung

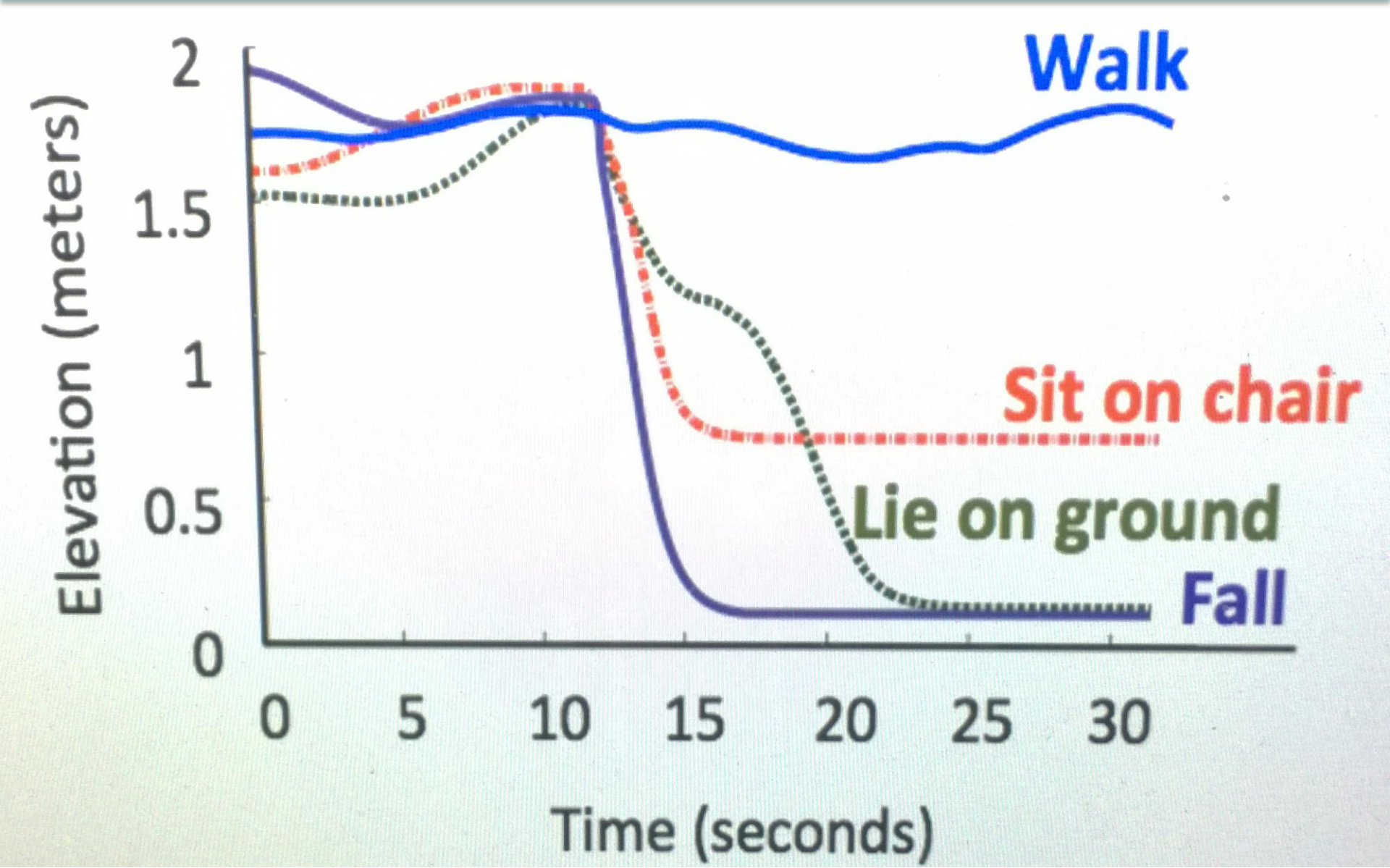
The devicemaker's GC85A ceiling digital X-ray system adds to its expanding suite of products, which includes its mobile digital GM60A, the U-arm digital GU60A and the ceiling digital GC80. The device includes wireless, lightweight detectors, a portable grid, and smart features that allow operators to position the entire system with one touch and work with compatible Samsung equipment, the company said in a statement.

"The Samsung GC85A represents NeuroLogica's latest commitment to introducing user- and patient-centric innovation to healthcare to provide fast, easy and accurate diagnoses," David Webster, NeuroLogica's chief marketing officer and VP of global sales, said in a statement. "The system's superior image quality and ease of control will enable users to experience a new level of efficiency with a DR system designed for streamlined operation."

2.5 million falls 2013
734,000 hospitalized
25,500 died from fall
$34 billion direct cost



Fall Detection – Wire less, Sensor less, Without Wearables



RF Reflection Data - Professor Dina Katabi, Wireless Center, CSAIL, MIT ● IIC Member

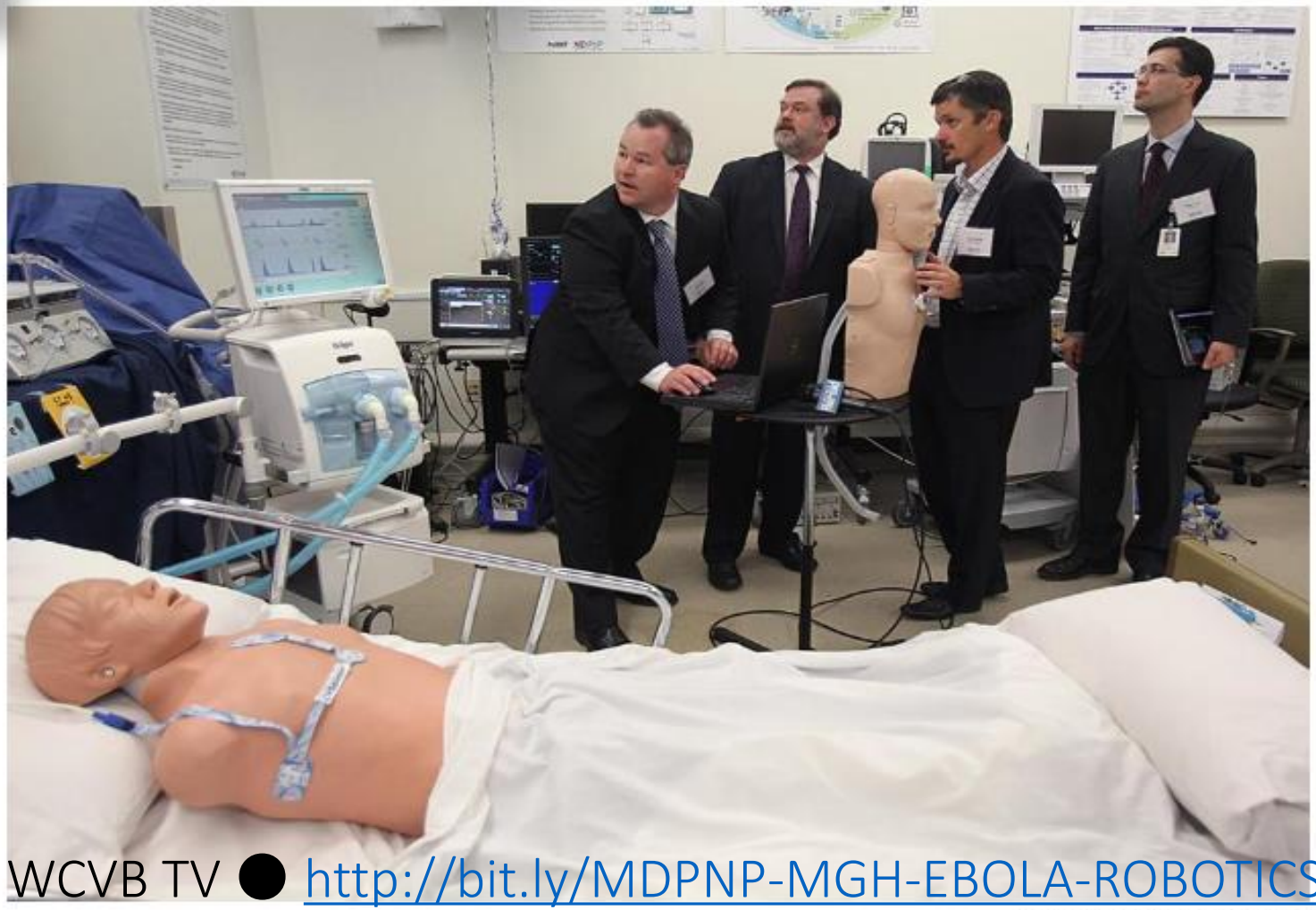
Need for Integrated Healthcare Platforms?

Ebola spurs rethinking of devices at MGH

By Carolyn Y. Johnson

| GLOBE STAFF NOVEMBER 07, 2014

You cannot buy a TV without a remote. You cannot buy a medical device with a remote. Dr Julian M Goldman (MGH/HMS) MD PnP



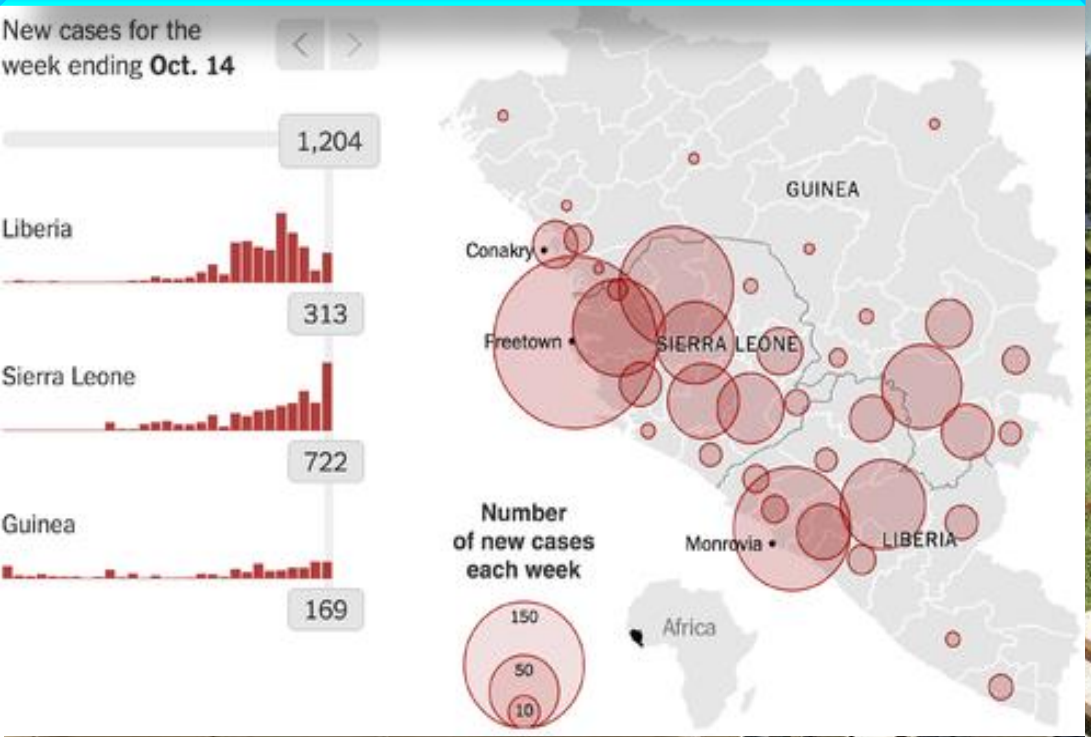
WCVB TV ● http://bit.ly/MDPNP-MGH-EBOLA-ROBOTICS

SUZANNE KREITER/GLOBE STAFF

Health officials demonstrated treating an Ebola patient remotely in a mock ICU. Pictured, left to right: Eric Lynn, Julian M. Goldman, Brian Russell, and Dave Arney.

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

Robotics Community Responds to Safety of Ebola Workers



Bill and Gerry Brinton of Charles Creek Winery pose with Sonoma Valley Hospital (SVH, CA) CEO Kelly Mather to display the “Lisa” aka the Germ-Zapping Robot manufactured by Xenex (pulsed xenon UV disinfection technology to rapidly reduce germ loads). The Brintons donated the robot to the hospital (SVH).

www.nytimes.com/2014/10/23/science/scientists-consider-repurposing-robots-for-ebola.html?ref=technology

Robotic Tools in Infectious Diseases Management
Need for Medical Device Interoperability Platform

www.gereports.com/post/104422691785/hospital-hack-a-thon-attacks-ebola-with-robots

EBOLA COLLABORATORS

IIC MEMBERS

PARTNERS HEALTHCARE
FOUNDED BY BRIGHAM AND WOMEN'S HOSPITAL AND MASSACHUSETTS GENERAL HOSPITAL

MD PnP
Getting Connected for Patient Safety

MGH 1811

HARVARD MEDICAL SCHOOL

smiths medical
bringing technology to life

Lyntek

FDA
Center for Devices and Radiological Health

FCC
FEDERAL COMMUNICATIONS COMMISSION
USA

IEEE

DOCBOX

Zephyr

COVIDIEN

GE Healthcare

RESPIRATORY MOTION INC.
INSPIRED INNOVATION

TATRC

intel

WPI

PHILIPS

Dräger

IIC MEMBER
industrial internet CONSORTIUM

MD PnP MedTech Hackathon Open Medical Device and Data Integration Platforms to Support the Management of Ebola

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

FDA – Friend or Foe?

Will FDA drown medical device interoperability in conventional pool of regulatory roadblocks?

☑ Yes ? ☒ No ?

Dr. Shuren received his B.S. and M.D. degrees from Northwestern University under its Honors Program in Medical Education. He completed his medical internship at Beth Israel Hospital in Boston, his neurology residency at Tufts New England Medical Center, and a fellowship in behavioral neurology and neuropsychology at the University of Florida. He received his J.D. from the University of Michigan.

Participation of the US FDA CDRH was a powerful incentive for medical device manufacturers to explore innovative medical technology solutions, especially those benefiting from interoperability between manufacturers

DEPARTMENT OF HEALTH & HUMAN SERVICES

Food and Drug Administration
10903 New Hampshire Avenue
Room 5447, Building 66
Silver Spring, MD 20993-0002

November 3, 2014

Julian M. Goldman, MD
Director, Medical Device Interoperability Program
65 Landsdowne Street
Cambridge, MA 02139

Dear Dr. Goldman,

Thank you for reaching out to the Center for Devices and Radiological Health (CDRH) via our Emergency Preparedness/Operations and Medical Countermeasures (EMCM) Program.

We understand that The Medical Device "Plug-and-Play" (MD PnP) Interoperability Program, under your coordination, has been asked by the White House Office of Science and Technology Program to mobilize resources among medical device manufacturers and the clinical community, so as to design and demonstrate proof of concept for an interoperable platform that would enable critical care of Ebola-infected patients in an isolation environment with reduced exposure to health care workers.

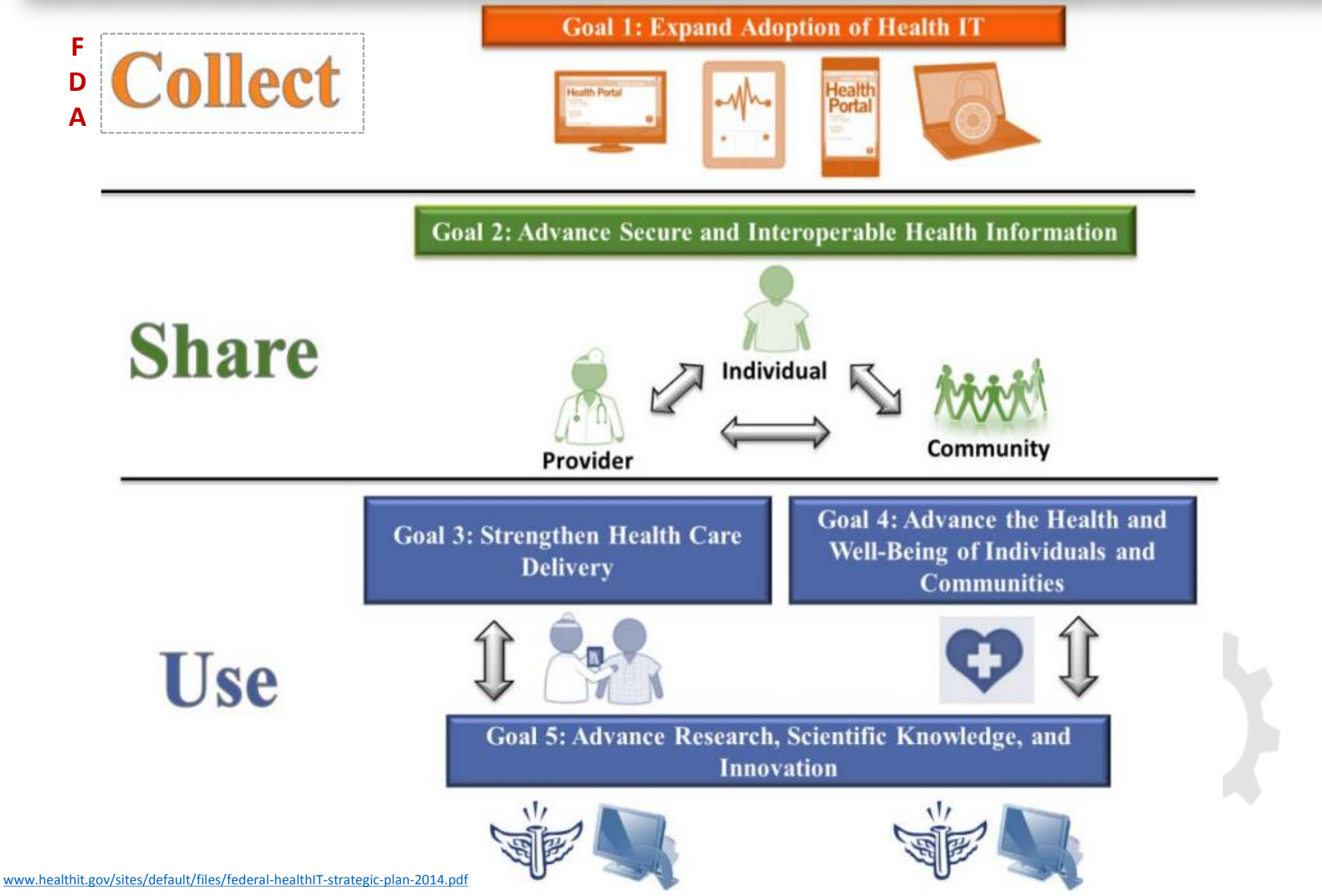
FDA recognizes the importance of implementing strategies that minimize direct exposure of clinical personnel to patients infected with Ebola virus. We understand that MDPNP, along with its collaborators, are developing potential approaches that would include comprehensive data access and potential remote control of medical devices in the isolation environment, thereby reducing the risk of healthcare worker exposure to the virus.

CDRH recognizes the importance of these efforts and is ready and willing to collaborate with you, the clinical community and your industry partners to demonstrate the potential of this technology in serving this particular public health emergency. We are eager to observe the demonstration taking place Friday November 7th for OSTP, and we look forward to participating in the development of next steps with MDPNP and your medical device partners so as to do our part in enabling advancement of technology that can protect our healthcare workers who put themselves on the front line to promote the public health mission.

Sincerely,

Jeffrey Shuren, M.D., J.D.
Director
Center for Devices and
Radiological Health

US Federal HIT Goals from the ONC, US HHS



www.healthit.gov/sites/default/files/federal-healthIT-strategic-plan-2014.pdf

National Science Foundation
WHERE DISCOVERIES BEGIN

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MEDICAL
DEVICE
SECURITY

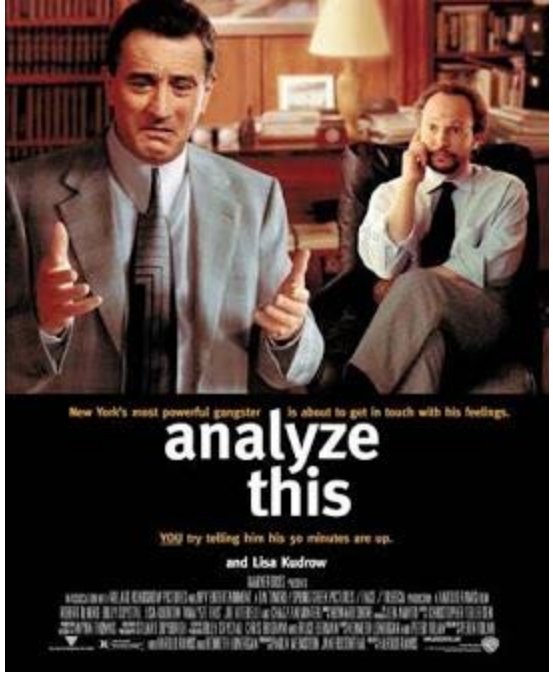
IIC MEMBERS
UPENN
INTEL

Press Release 15-096

A partnership to secure and protect the emerging Internet of Things

National Science Foundation and Intel Corporation team to improve the security and privacy of computing systems that interact with the physical world using a new cooperative research model

Researchers will adapt smart alarm research to detect and react to attacks on medical devices. 28 August 2015



PAY-PER-ANALYTICS

Samsung, UCSF Partner to Accelerate New Innovations in Preventive Health Technology

Pair Will Work to Validate Promising New Sensors and Analytics for Next-Generation Digital Health Solutions

Healthcare coalition under exploration, formation, discussion

- Dr Julian Goldman – Massachusetts General Hospital – www.mdpnp.org (icealliance.org) ● http://bit.ly/ICE-IOT
- Professor Dina Katabi – Massachusetts Institute of Technology – Wireless Lab, MIT
- Dr Gary Gottlieb – Former CEO, Partners; CEO, Partners in Health (www.pih.org)
- Dr Atul Gawande – Professor of Surgery, Harvard Medical School (www.ariadnelabs.org)
- Dr Stan Ashley – Chief Medical Officer, BWH, Harvard Medical School (http://bit.ly/STAN-ASHLEY-BWH-HMS)
- Dr Pietro Valdastri – Professor of Mechanical Engineering, Vanderbilt University (STORM)
- Dr Prashant Jain – DOTRI (Los Alamos National Lab) http://bit.ly/EMG-BioFeedback
- Dr Ashis Banerjee – University of Washington https://sites.google.com/site/ashisbanerjee/
- Dr Gin Jose – University of Leeds http://bit.ly/BLOOD-FREE-BLOOD-GLUCOSE
- Dr Ram Dantu – University of North Texas http://www.cse.unt.edu/~rdantu/
- Please review ● http://bit.ly/US-FUNDING-EU-H2020 ● http://bit.ly/IIC-TB-eoi ● http://bit.ly/RE-VIEW-IOT
- Security – http://bit.ly/SECURITY-HIT-NIST ●Further contact → Dr Shoumen Datta ● datta@iiconsortium.org
- Other – http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT ● http://bit.ly/IOT-HIT-DOD

In progress, under planning, brainstorming

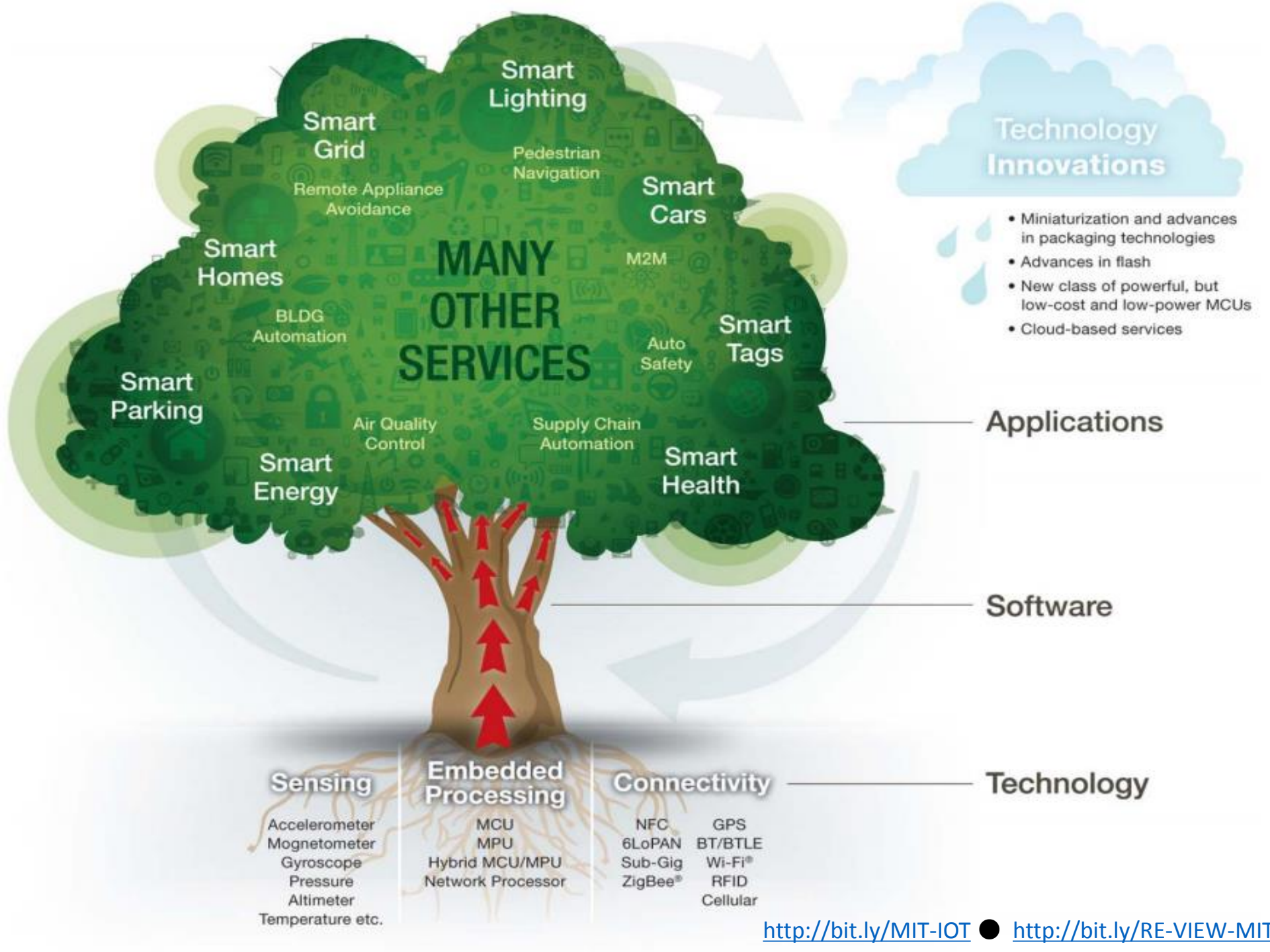
HEALTHCARE

SMART CITIES ● http://bit.ly/SMART-CT **&** http://bit.ly/SCPPP-04

TRANSPORTATION

MANUFACTURING

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT



http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

Have we scratched the surface, yet?

NO

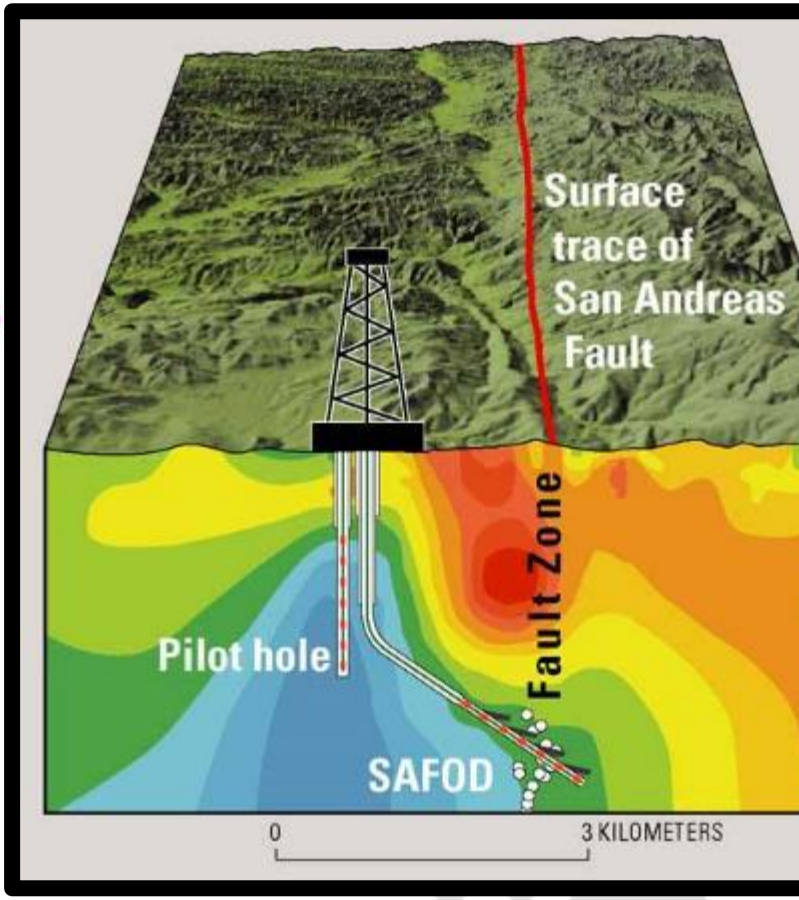
SMART CITIES ● http://bit.ly/GLOBAL-SIM-CITIES

Seismic and Infrastructure Monitoring

Buildings

Bridges and Roads

Water/Sewer

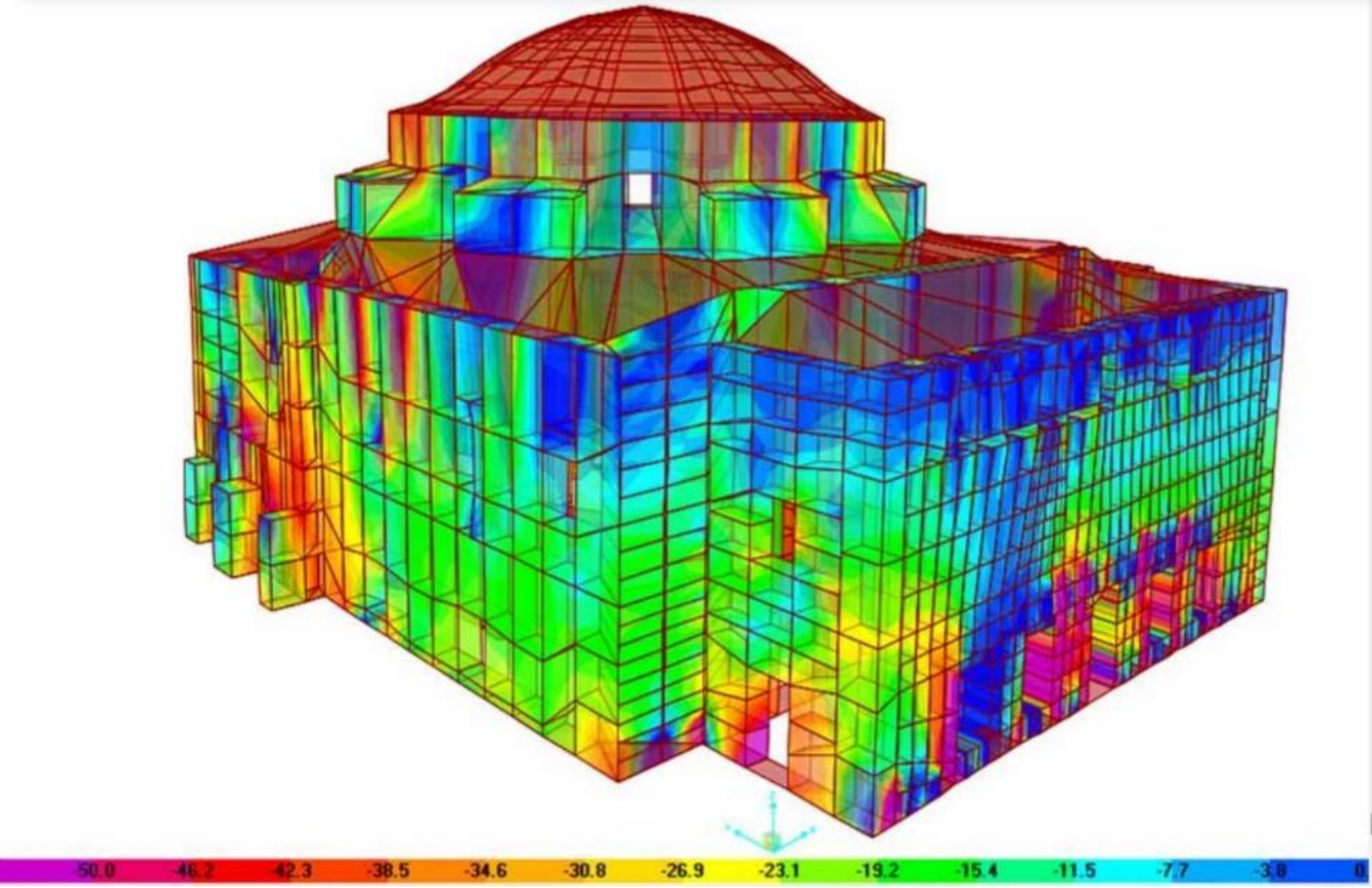


Critical Infrastructure Monitoring (CIM)

EU Critical Infrastructure Protection DRS-15-2015 ● August 27, 2015 ● Funding €82M
http://bit.ly/H2020-INFRASTRUCTURE

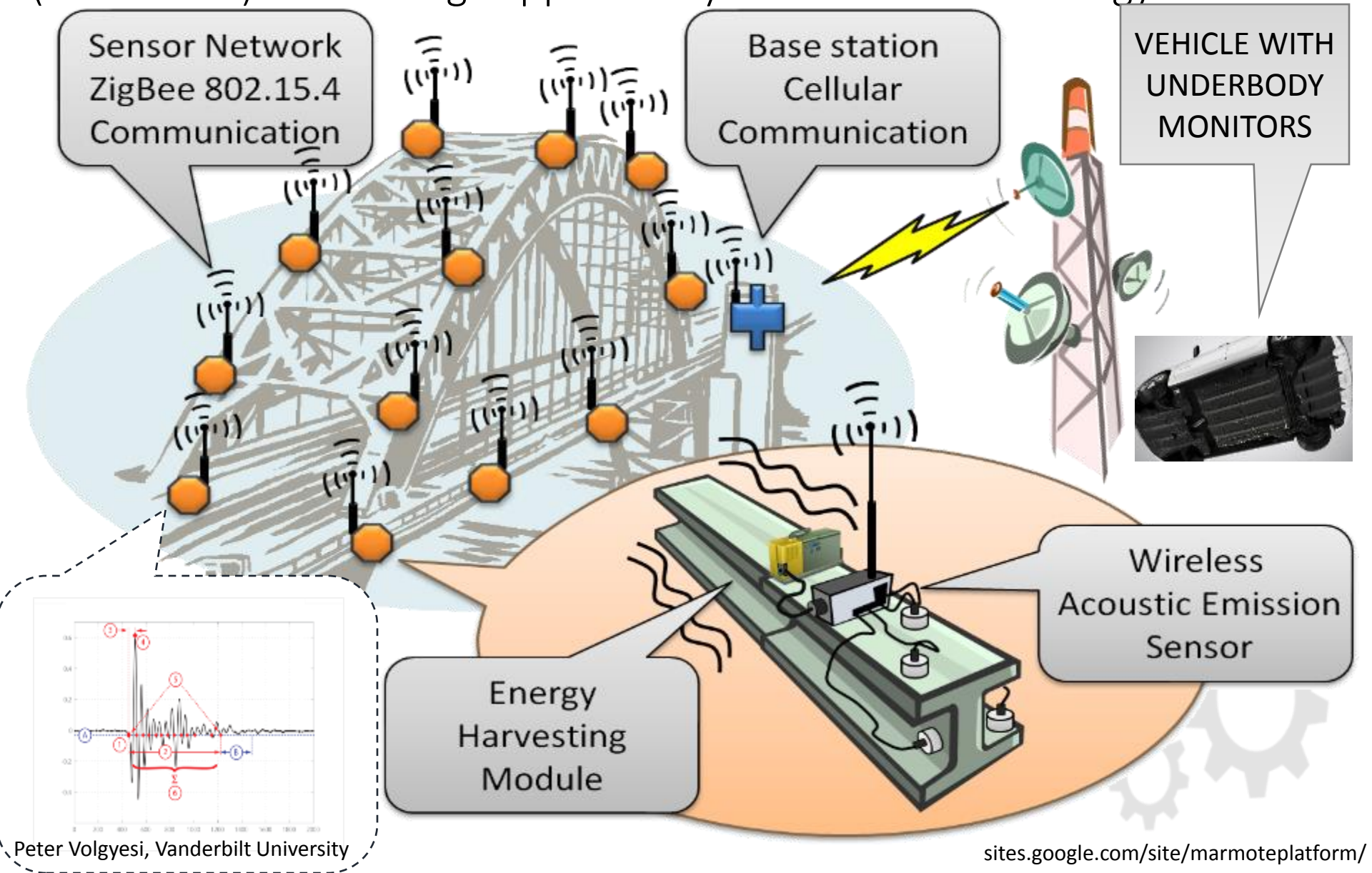
EU Critical Infrastructure Protection DRS-03-2015 ● August 27, 2015 ● Funding €50M
http://bit.ly/H2020-ICT-INFRASTRUCTURE

CIM – Hagia Sophia – Axial Stress (North-West)



DATA COLLECTION FROM INFRASTRUCTURE – BRIDGES & OTHER MAJOR CRITICAL STRUCTURES

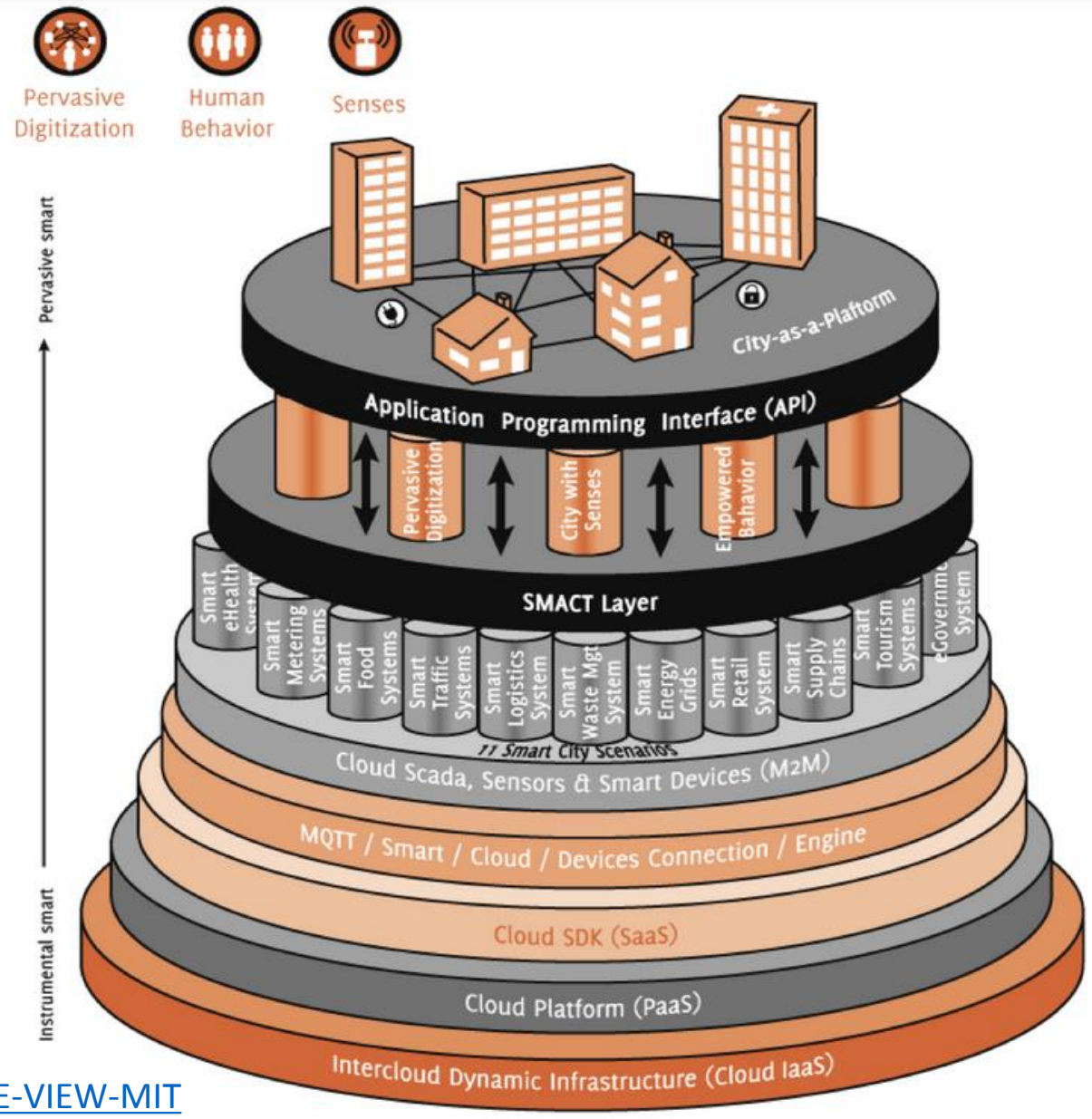
Autonomous vibration (accel-erometers), stress (strain gauges) & cracks (AE sensors) monitoring supported by vibration-based energy harvester



Peter Volgyesi, Vanderbilt University

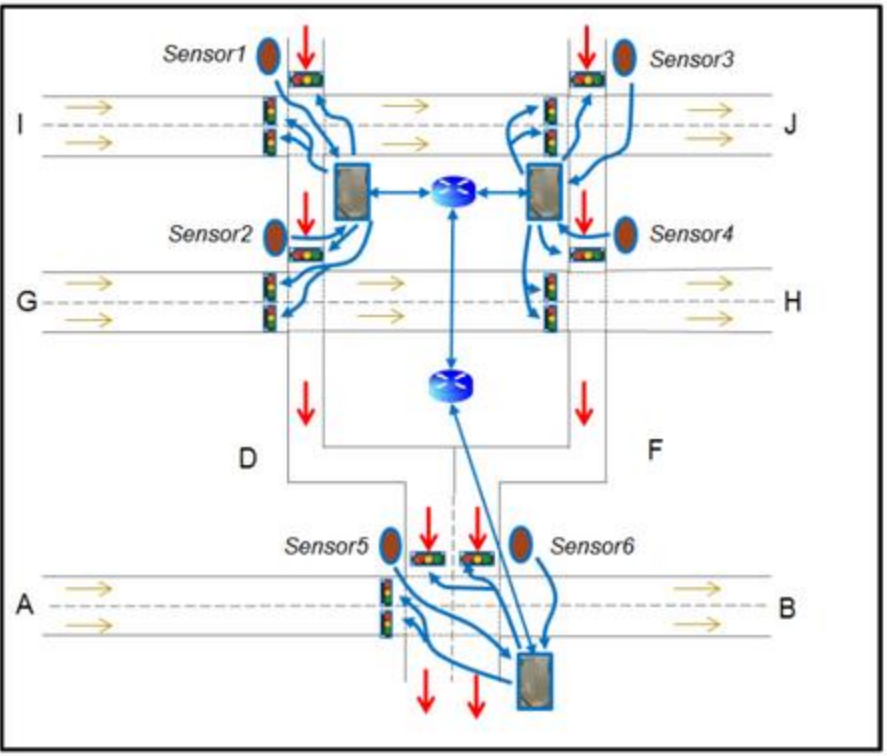
sites.google.com/site/marmoteplatform/

SMART PLATFORMS ARE KEY TO CONNECTIVITY



http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

CONNECT DATA and ANALYTICS for EMERGENCY VEHICLE TRAFFIC



- Emergency vehicles need to get through (North-South)
- Significant traffic across (East-West)
- Each intersection is controlled by traffic lights
- Sensors are deployed on vertical streets
- Arbitrary number of controllers can be added, assigning them to sensors and lights and providing control algorithm.
- Arbitrary attacks can be inserted between controllers and their inputs/outputs.
- Simulation ends: last emergency vehicle reaches destination.
- Metrics: emergency vehicle latency vs. overall road occupancy

CONNECT DATA, ANALYTICS and EXECUTION for “Sense and Response”

Robots, Robotics and Automation in Emergency Management Systems

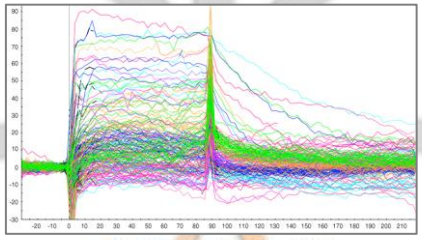
DATA and ANALYTICS for EMERGENCY & RESILIENCY MANAGEMENT

Sensor Data

Incident Data

Communications Network Data

Infrastructure



Data Fusion and Sense-Making Platform

Algorithms Modelling & Simulation

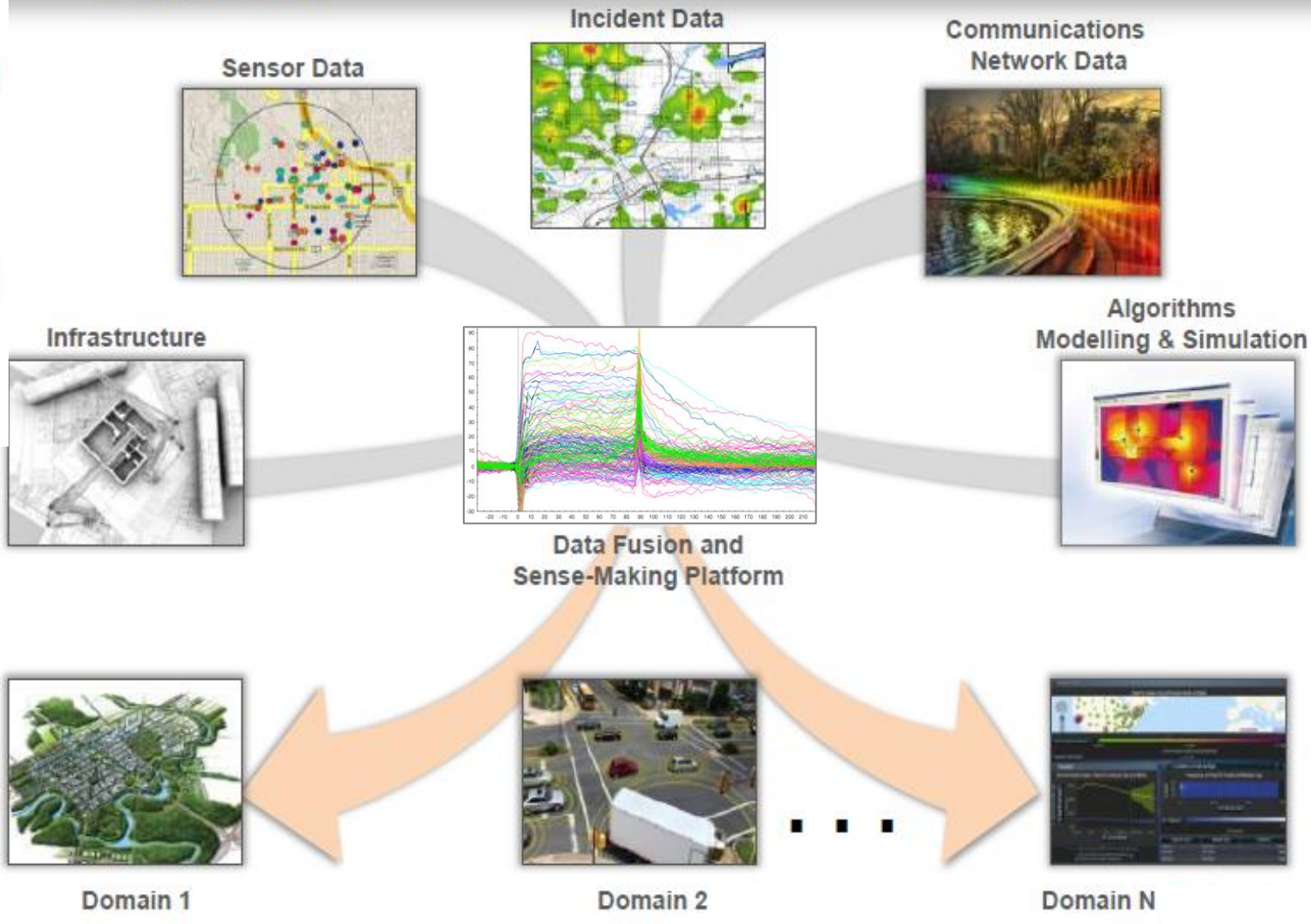
Domain 1

Domain 2

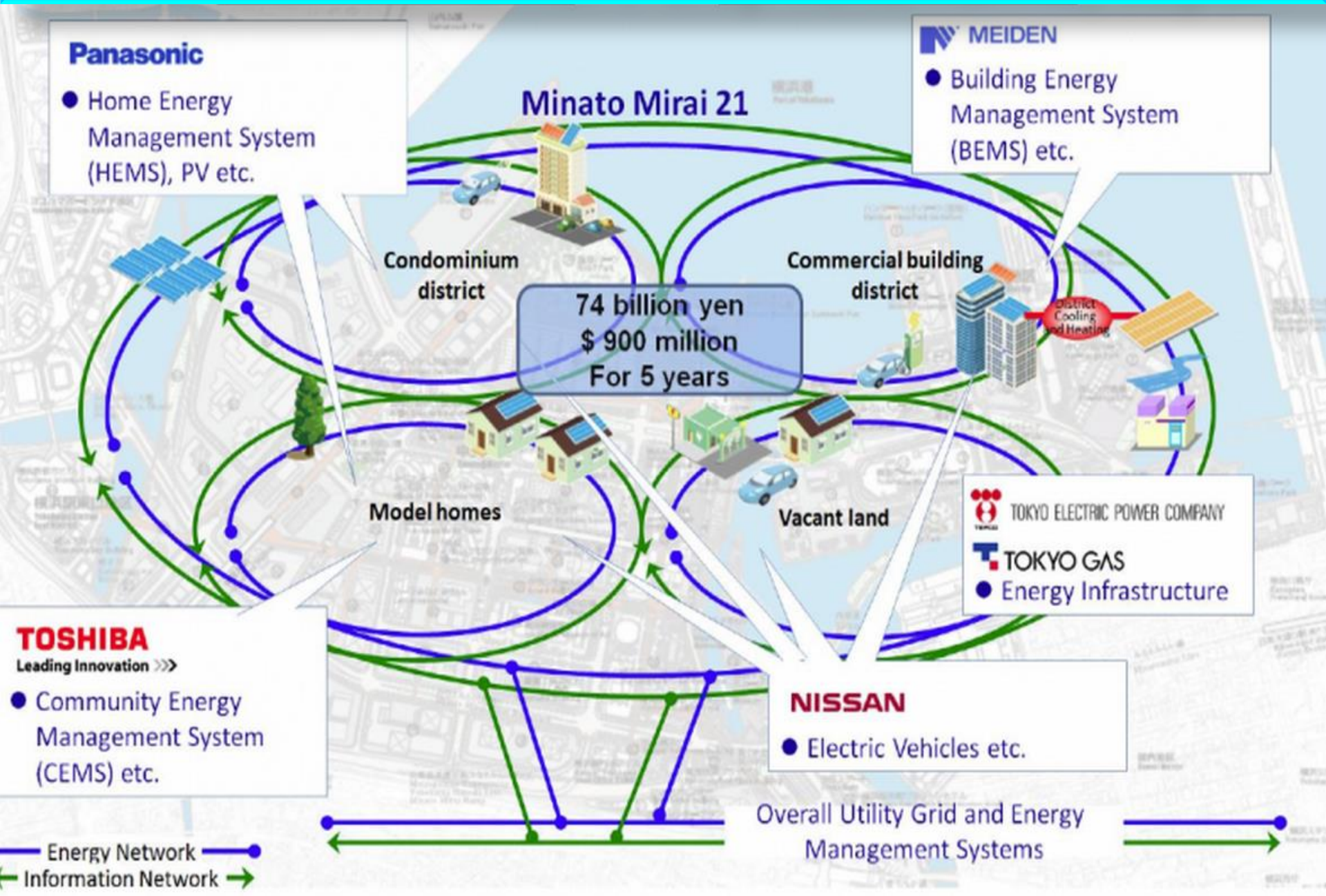
Domain N

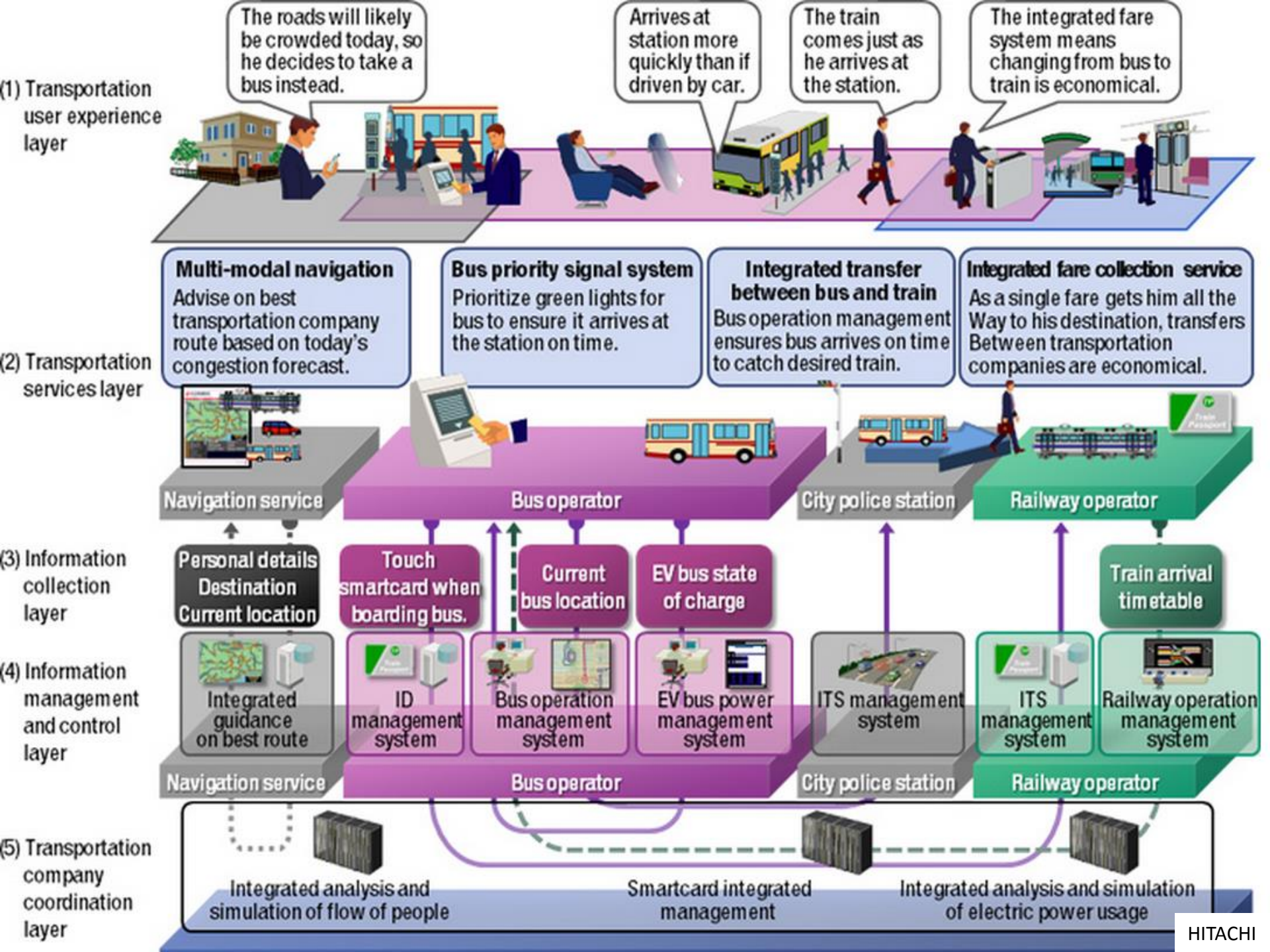
Data, Message, Alert Dashboard for Communities & City Managers

Smart Nation Singapore in pursuit of data fusion



Coalition for Smart City Yokohama, Japan




(1) Transportation user experience layer
The roads will likely be crowded today, so he decides to take a bus instead.
Arrives at station more quickly than if driven by car.
The train comes just as he arrives at the station.
The integrated fare system means changing from bus to train is economical.
(2) Transportation services layer
Multi-modal navigation
Advise on best transportation company route based on today's congestion forecast.
Bus priority signal system
Prioritize green lights for bus to ensure it arrives at the station on time.
Integrated transfer between bus and train
Bus operation management ensures bus arrives on time to catch desired train.
Integrated fare collection service
As a single fare gets him all the Way to his destination, transfers Between transportation companies are economical.
Navigation service
Bus operator
City police station
Railway operator
(3) Information collection layer
Personal details Destination Current location
Touch smartcard when boarding bus.
Current bus location
EV bus state of charge
Train arrival timetable
(4) Information management and control layer
Integrated guidance on best route
ID management system
Bus operation management system
EV bus power management system
ITS management system
ITS management system
Railway operation management system
Navigation service
Bus operator
City police station
Railway operator
(5) Transportation company coordination layer
Integrated analysis and simulation of flow of people
Smartcard integrated management
Integrated analysis and simulation of electric power usage

HITACHI

A SMARTER PLANET begins with SMART CITIES

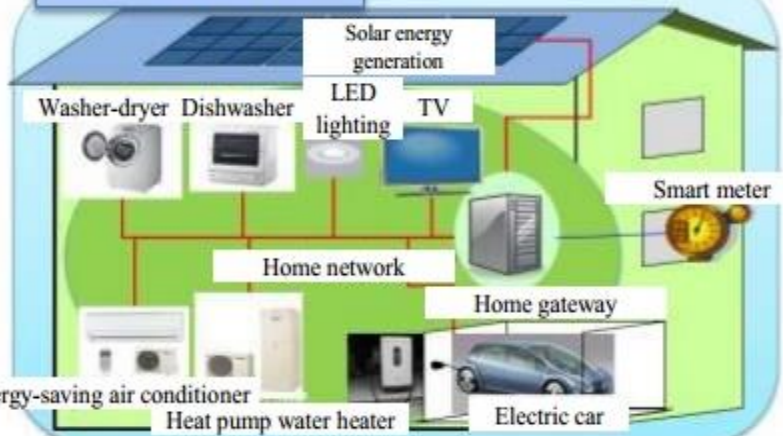
Control center

Control center that optimizes supply and demand of energy for the region

A new transport infrastructure integrated with the energy network

Drastically lowering carbon emissions and providing solutions for traffic accidents and traffic jams, by exchanging information between EVs and electric buses.

Smart houses



Electric bus (to be changed into streetcars in the future)

Electric buses with replacement-type batteries. Multiple buses will be connected to become a streetcar in the future.

METI
Ministry of Economy, Trade and Industry

IIC Global Smart Cities Initiative ● http://bit.ly/SCPPP-04

IIC GLOBAL
SMART CITY
COALITION
http://bit.ly/SCPPP-04

Smart Living
Smart Farming
Wearables
Reference Zones
Autonomous Transportation
Water Management for Resilient Cities

EU Large Scale IoT Deployment Pilots

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2016	2017	
Opening: 15 Dec 2015			
IoT1 - 2016 (IA)	100.00 [44]		12 Apr 2016
IoT2 - 2016 (CSA)	4.00 [45]		
Opening: 20 Apr 2016			
IoT3 - 2017 (RIA)		35.00 [46]	20 Sep 2016
Overall indicative budget	104.00	35.00	

http://bit.ly/EU-ICT-2016-2017-DRAFT

Smart Living
Smart Farming
Wearables
Reference Zones
Autonomous Transportation
Water Management for Resilient Cities

EU Large Scale IoT Deployment Pilots

IIC
EU SMART CITY
COALITION
http://bit.ly/SCPPP-04

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Overall indicative budget	104.00	35.00	

http://bit.ly/EU-ICT-2016-2017-DRAFT

IoT calls under ICT H2020 WP 2016-2017

IoT Focus Area (Deadlines: April 2016)

- Large scale pilots (1 project per pilot)
  - Smart Living environments for ageing well (20M€)
  - Smart Farming and Food Security (30 M€)
  - Wearables (15M€)
  - Smart Cities (15M€)
  - Autonomous vehicles (20M€)
- Horizontal activities (4.5M€, 4-5 projects)
  - Coordination and Support Actions (Governance, Trust, Security, Ethics, Responsable Research and Innovation)
- R&I on integration and platforms (35M€, 5-7 projets)
  - Open, easy to use horizontal IoT plateform

IIC
EU SMART CITY
COALITION
http://bit.ly/SCPPP-04

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

IoT calls under ICT H2020 WP 2016-2017

- **Factory of the Future**
  - Digital Automation (51 M€, 6-7 projects)
  - ICT Innovation for Manufacturing SMEs (32M€, 4 projects)
- **International Collaboration Activities**
  - EU-Brasil
    - IoT Pilots (environmental monitoring, smart water, smart energy, smart assisted living, smart manufacturing) (4.5M€, 3 projetcs)
  - EU-Japan
    - IoT, Cloud, big data in smart cities (2.75M€, 2 projects)
  - EU-Korea
    - Horizontal IoT platform (smart city, manufacturing, healthcare, logistics) (1,5M€, 1 project)
- **Responsibility and Creativity**
  - Responsible ICT related research (7M€, 3-5 projects)
  - Synergies between artists, creative people and technologists (3M€, 1 project)

Societal Challenges calls under H2020 WP 2016-2017 (are separate from the ICT IoT H2020 calls)

- Smart Cities and Communities SCC 01 (60M€ in 2016, 70M€ in 2017, 12-18M€ per project)
  - Smart buildings, Energy efficency, ecologic districts, electromobiliy
  - 3 « lighthouse » cities ; 3+ « follower » cities
  - Strong city involment required
  - Deployment of mature technologies (TRL >=7)

Bordeaux, France

- SC1-PM-14–2016: EU-Japan cooperation on Novel ICT Robotics based solutions for active and healthy ageing at home or in care facilities (5M€, 2 projects)
- MG-5.2-2017. Innovative ICT solutions for future logistics operations (10M€, 2-3 projects)
- MG-6.1-2016. Innovative concepts, systems and services towards 'mobility as a service' (25M€, 5-8 projects)
- MG-7.3-2017. The Port of the future (37M€, 10-12 projects)

NIST WHITE HOUSE Global Cities Team Challenge June 1, 2015

Dr Sokwoo Rhee speaks (fmr Presidential Innovation Fellow, GCTC Lead, Associate Director NIST US Department of Commerce) Seated front L to R – Mr Bert Koenders, Foreign Minister of The Netherlands; Dr Willie May, Undersecretary of US Department of Commerce; Her Majesty Queen Maxima of The Royal Kingdom of Netherlands, King Willem-Alexander of The Netherlands

IIC is a member of the NIST GCTC 2016 - 2017

IIC EU coalition for Smart Cities is in progress in partnership with CEA LETI (Grenoble, France), INSIGHT NUIG (Galway, Ireland) KEDGE Business School (Bordeaux, France), EMC (Cork, Ireland), City of Santander (Spain), City of Tel Aviv (Israel), City of Bordeaux (France). Global member cities and IIC member companies are invited to join the coalition. http://bit.ly/SCPPP-04

SERS ● NIST Global Cities Team Challenge (June 1, DC)

Smart Emergency Response System

To connect cyber-physical technologies with humans in the loop to save lives, rescue people, and attend to their critical needs when disaster strikes.


Queen Maxima of Netherlands at GCTC

IIC INTEREST ● PRECISION FARMING / AGRICULTURE

IoT and IIoT in agriculture is a part of the broad fabric of the Smarter Planet movement which catalyzed the “farm to fork” and “seed to mouth” scenarios. Major farm equipment manufacturers are leading the charge in this domain by introducing sophisticated data communication with farming equipment (eg John Deere). In this vein, we wish to include and integrate NASA SMAP data.

Precision Farming attempts to synthesize the data relevant to users (farmers) in an accessible visualization template which can connect to or may be in addition to on-board data and analytics.

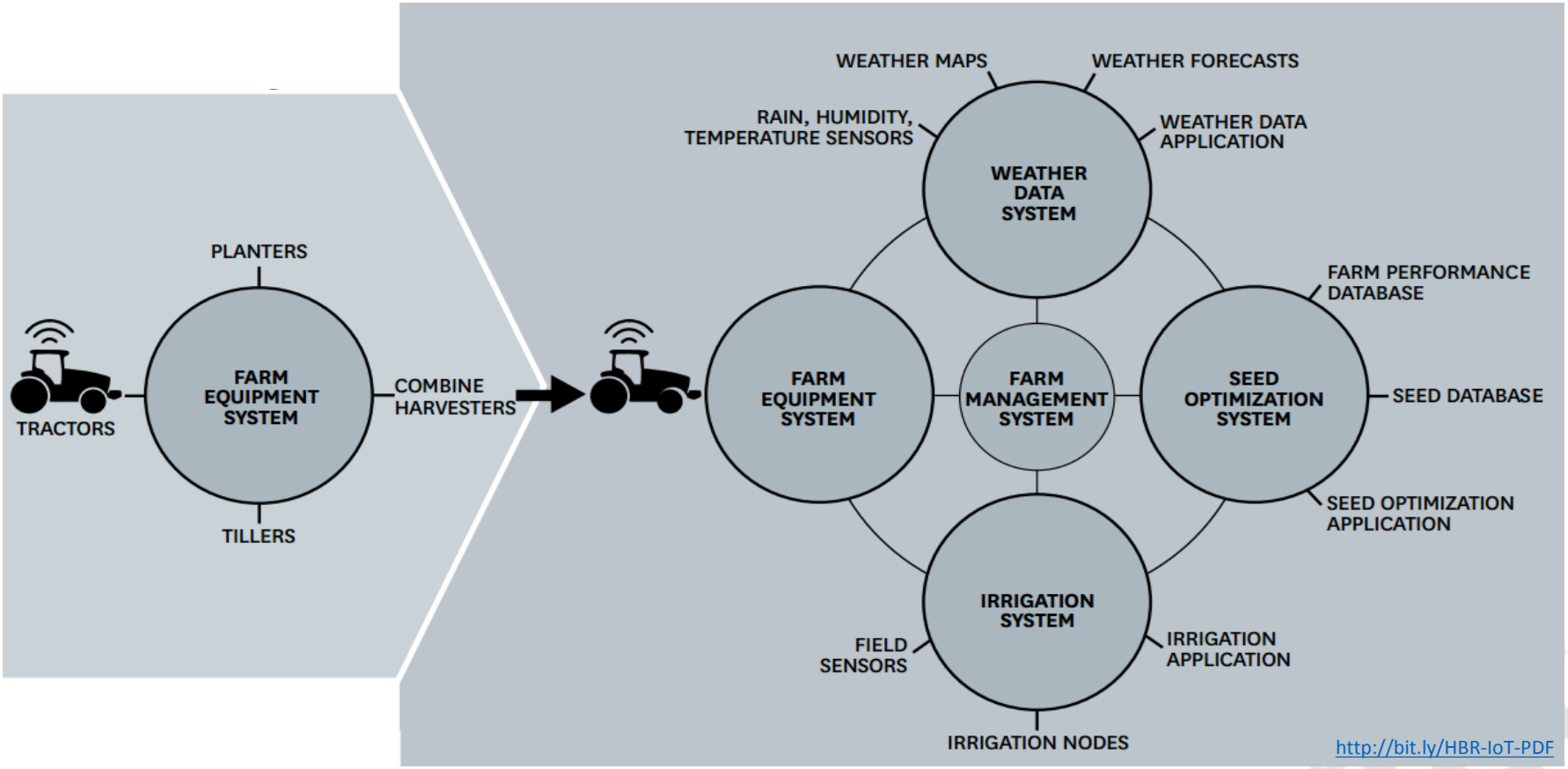
For a preview, please explore “Internet of Systems” under the Smart Cities section – see page 3 (please download the PDF which is at the bottom of the list here http://bit.ly/MIT-IOT)

Would you like to join this coalition and contribute to the precision farming test bed initiative?

US Department of Agriculture - NIFA ● September 30, 2015 ● Funding $116M

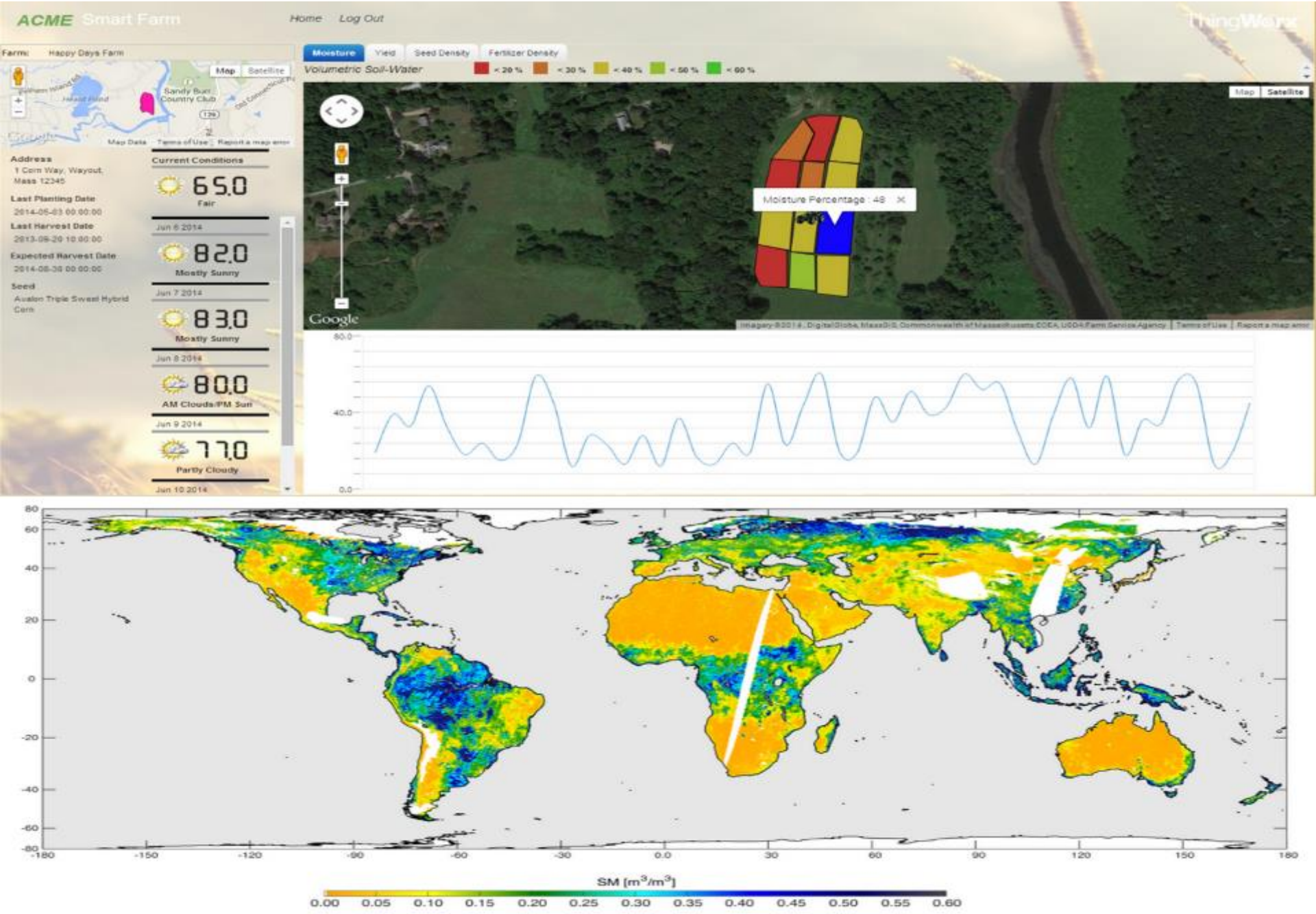
http://bit.ly/SMART-CT ● http://bit.ly/PRECISION-FARMING ● http://smap.jpl.nasa.gov/

SMART FARMING ● CLASSICAL SYSTEM OF SYSTEMS



http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

http://bit.ly/SMART-CT & http://bit.ly/SCPPP-04



High-resolution global soil moisture map from SMAP's combined radar and radiometer instruments, acquired between May 4 and May 11, 2015, during SMAP's commissioning phase. The map has a resolution of 5.6 miles (9 kilometers).

Credits: NASA/JPL-Caltech/GSFC

FEW NSF AWARDS

2015 NSF Food-Energy-Water (FEW) Awards

Nada Assaf-Anid, New York Institute of Technology: Food, Energy and Water Nexus in Sustainable Cities

David Ebert, Purdue University: Technology and Information Fusion Needs to Address the Food, Energy, Water Systems (FEWS) Nexus Challenges

Mekonnen Gebremichael, University of California-Los Angeles: Toward Food, Energy and Water Security in California under Changing Conditions: the Nexus Perspective

G.W. Holtgrieve, University of Washington: Workshop to explore the nexus between food, energy and water in a large international river system

Elena Irwin, Ohio State University: Workshop on Migration, Climate Change and the Resilience of Regional Food, Water, and Energy Systems

Catherine Kling, Iowa State University: Coupling Economic Models with Agronomic, Hydrologic, and Bioenergy Models for Sustainable Food, Energy, and Water Systems

Gregory Lowry, Carnegie-Mellon University: Workshop to Identify Opportunities and Challenges for Nanotechnology to Optimize and Unify Food, Energy and Water Systems

Richard McNider, University of Alabama-Huntsville: Planned Migration as a Strategy to Sustain Agricultural Production

Fernando Miralles-Wilhelm, University of Maryland: Development and Application of Analytical Tools in Support of Food-Energy-Water Nexus Planning

Joshua Newell, University of Michigan: "Scaling Up" Urban Agriculture to Mitigate Food-Energy-Water Impacts

Matthew Platz, University of Hawaii: Closing the Human Phosphorus Cycle

Matthew Potts, University of California-Berkeley: Developing Intelligent Food, Energy, and Water Systems (DIFEWS)

Mary Rezac, Kansas State University: Water- and Energy-efficient Food Production: Solutions for America's Bread Basket

John Sabo, Arizona State University: Food-Energy-Water infrastructure systems, engineering solutions and institutions

Darlene Schuster, American Institute of Chemical Engineers: Food-Energy-Water Nexus Workshop to Develop System Approaches and Sustainability Metrics for Evaluation

Shashi Shekhar, University of Minnesota: A Workshop to identify interdisciplinary Data Science approaches and challenges to enhance understanding of Interactions of Food Systems and Water Systems

James Stone, South Dakota School of Mines and Technology: A sustainable rural framework workshop for the upper Great Plains

http://nsf.gov/news/news_summ.jsp?cntn_id=135642

SMART CITY VISION ● Ideas less familiar ● http://bit.ly/SMART-CT

EU Smart City Public Private Partnership IIC coalition in progress in the EU ● http://bit.ly/SCPPP-04

Transitioning the digital supply chain from concept to practice in the context of the networked society in the Smart City vision may add business value and catalyze economic growth. Can we modularize, synthesize and converge these crucial components in the Smart City vision? Certain elements of this vision may not be deployable in large scale pilots and may not be amenable for funding by pragmatic agencies.

Can IoT connectivity of the industrial internet of things and data analytics help in the systemic implementation of vendor managed inventory? How will the logistics and inventory of spare parts adapt to the diffusion of dMODE (distributed manufacturing on demand at the edge) made possible by 3D printing of components at the point of consumption? We must ask these questions and dare to suggest exploratory pathways.

This modus operandi of "grand vision coupled with modular deployability" is not only for Smart Cities but also for future smart planning of new cities. We want to introduce the concepts of entity level modeling of components that make up the urban landscape (buildings, occupancy, sewer, water, utilities, parking space, pavement width, park areas, school zones) to help future architects to create smart cities from scratch.

In our approach we combine the principles of concurrent engineering with late stage (delayed) differentiation and modularity to enable variant configuration in order to meet community preferences (and agility helps us to adjust to funding agency guidelines for these proposals).

IIC Large Scale Test Beds – US Government Funding

HEALTHCARE

SMART CITIES

TRANSPORTATION ● http://bit.ly/DOT-DOT-DOT

MANUFACTURING

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

TRANSPORTATION ● http://bit.ly/DOT-DOT-DOT

ENTERPRISE WEB
MICROSOFT
VERISIGN
GALOIS
ARADA
MIT
NI
RTI
TECHMAHINDRA
CYBERLIGHTNING
VANDERBILT UNIVERSITY

Large Scale Test Beds – US Government Funding

- **DID NOT RECEIVE FUNDING**

TRANSPORTATION

- http://bit.ly/DOT-DOT-DOT
- Proposal submitted (~$20 million)
- US Department of Transportation
- Intelligent Transport Systems

IIC Transportation Grand Challenge

On March 27, 2015 we submitted the first major test bed proposal for grant funding from the IIC coalition to the US Department of Transportation in the area of Intelligent Transport Systems (ITS) under the US DoT domain of connected vehicles (CVRIA).

This submission is a subset of what we planned in our original attempt to deploy semi-autonomous freight transportation (SAFTI). We did not succeed the first time with this idea. US DoT guidelines excluded autonomous transportation from the scope of funding in the ITS focused deployment.

Hence, we are trying again. This time we are planning to create a business focused coalition and invite US DoT to participate in a pre-competitive collaboration which will advocate standards and interoperabilities necessary to deploy software defined vehicles (SDV) which includes any/all semi-autonomous vehicles. Would you like to join this coalition and contribute to SDV?

Please send your comments and criticisms to Dr Shoumen Datta ● datta@iiconsortium.org

IIC Transportation Grand Challenge – Revisiting Autonomous

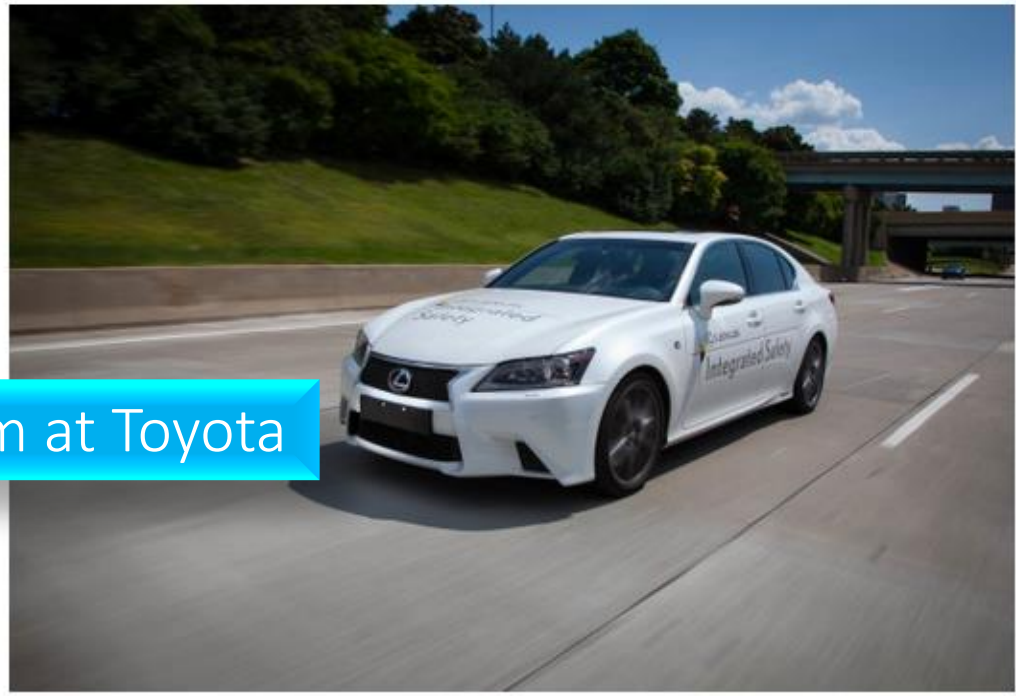
We aim to extent the concept of SAFTI to form a broad spectrum coalition, globally (US, EMEA, APAC).

Imagine a semi-autonomous freight transportation scenario where we address risk of autonomy by creating a phased “first mile and last mile” approach. In this modus operandi, a semi-autonomous freight vehicle will be driven by a human operator from an urban location to a local transfer point on a highway. Vehicle engages the “auto pilot” for the highway segment and arrives at the periphery of an urban destination (last mile) where it is navigated by a human operator to its final location.

In another scenario, your autonomous-capable vehicle is at your home. You are out of home. Your pre-teen daughter needs a ride to her ballet class. You ask your daughter to sit in the vehicle. You log on to your car app and “drive” the car on your smart phone or laptop from your home to the location of her ballet class. Your smart phone alerts you when your daughter is seated in the car after her class. You drive her back to home from the comfort of your office chair or hotel room or airport lounge.

TOYOTA FINALLY GETS SERIOUS ABOUT SELF-DRIVING CARS

Guess who's running the program at Toyota



Last year, Toyota showed off a car that can stay in its lane and a safe distance from other cars on the highway. Now it's talking about more advance research. TOYOTA

TOYOTA HAS JOINED the race to build a self-driving car.

The Japanese automaker announced it's dropping $50 million in the next five years to establish research centers with both Stanford and MIT, to work on artificial intelligence and autonomous driving technology. 4 SEP 2015

www.wired.com/2015/09/toyota-enters-self-driving-car-race

What we are thinking – Transportation PPP Exploration

At this time the wish list of potential partners are (as it states) a “wish list” based on competency:

Tata	US Department of Transportation
National Instruments	MIT (How, Frazzoli)
Volvo Trucks	Government of The Netherlands
Ford	Instituto de Biomecánica de Valencia
Jaguar-Land-Rover	Loughborough University (C Dickerson)
Navistar	Arada Systems
Mahindra	UMICH (Edwin Olson)
Caterpillar	RTI
Intel	Bosch

For a breakthrough in manufacturing we must adopt an integrated DIM view

HEALTHCARE

SMART CITIES

TRANSPORTATION

MANUFACTURING

MANUFACTURING 5.0

http://bit.ly/DIM-GAP-Design-Innovation-Manufacturing

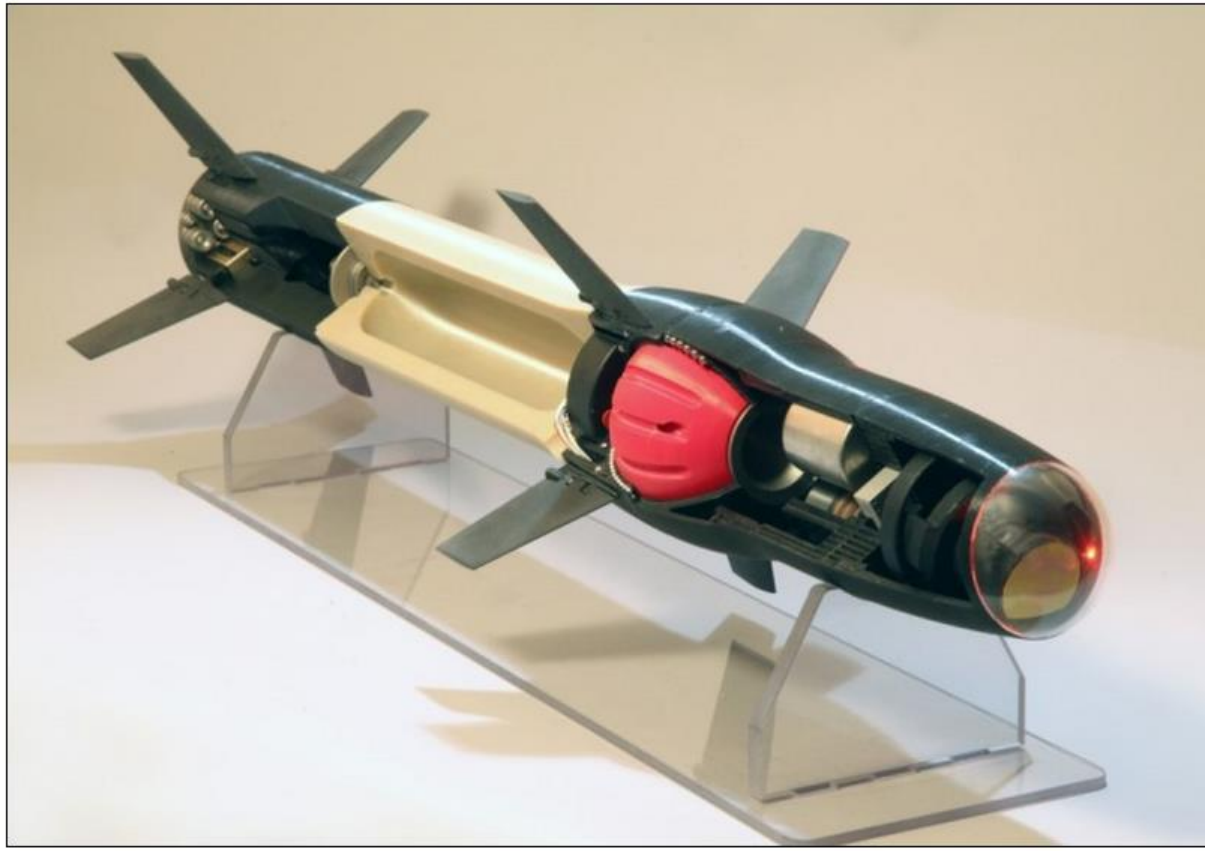
Coalescing a DIM (Design, Innovation, Manufacturing) ecosystem is essential for the US economy. The conventional skills gap is rather a training gap. We lack structured bi-directional education exchanges between academia and industry. We need hybrid courses in colleges and online.

In progress, under planning, brainstorming – Manufacturing 5.0

One idea (among a few IIC members) was to explore the domain of modular robotics using the tools of 3D/SLS to create self-organizing self-assembly of structures that may yield increasingly complex entities. We are thinking about high throughput 3D/SLS/DMLS in creating objects at the point of consumption (http://bit.ly/Drone-on-Demand) and high value MRO using high throughput dMODE (distributed Manufacturing On Demand at the Edge). Transmission of the instruction set raises the issue of cybersecurity. The science involved is key to material genome (http://bit.ly/WH-MGI-2014) and there is an inevitable convergence with business and supply chain management (http://bit.ly/WHITE-HOUSE-TALKS-SUPPLY-CHAIN). We are brainstorming advanced cyber MANUFACTURING 5.0 as a frontier testbed.

PRINT – A – MISSILE

RAYTHEON RESEARCH POINTS TO 3-D PRINTING FOR TOMORROW'S TECHNOLOGY



A cutaway model showing the printable components of a small missile.

PRINT – A – SATELLITE

DR NATALYA BRIKNER

MIT-born satellite propulsion system maker Accion Systems raises $2M

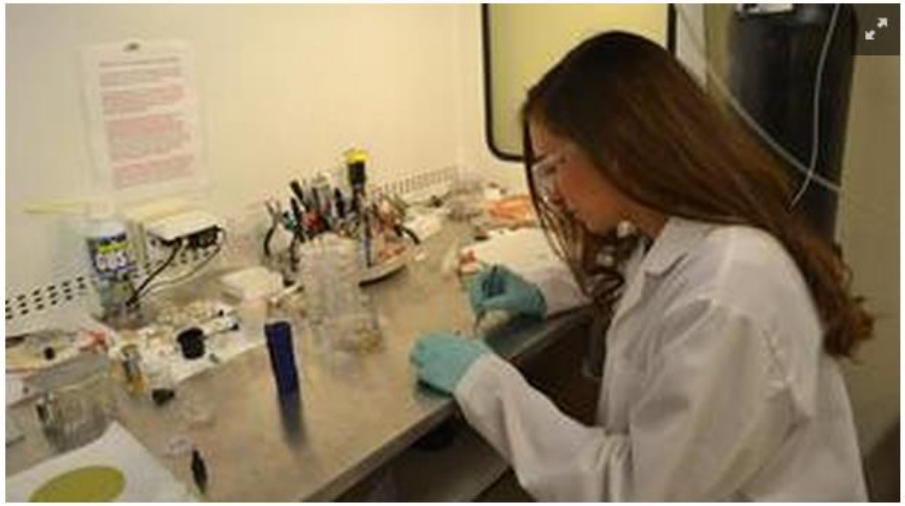
Jan 5, 2015, 10:51am EST

Sara Castellanos
Boston Business Journal

Accion Systems Inc., a Cambridge-based maker of electric propulsion systems for satellites, has raised $2 million in seed funding to accelerate product development and employee hiring.

The lead investor in the round was FF Science, a seed-stage investment firm that spun out of Silicon Valley's Founders Fund last year.

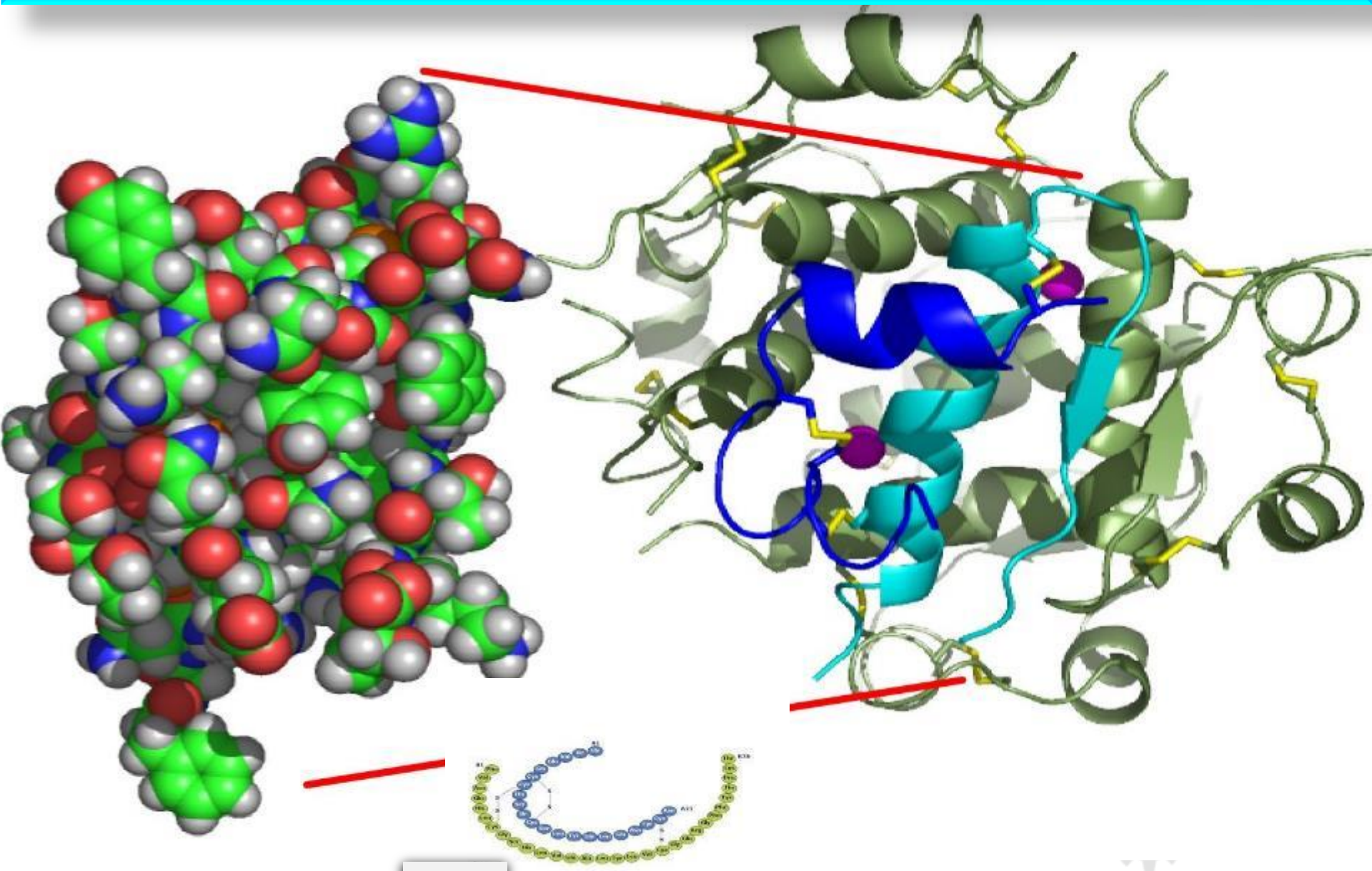
The startup, born out of MIT, is developing liquid ion sources for micro-propulsion systems in satellites. The propulsion systems could one day be used in small satellites to provide constant earth imagery, track the growth of corn crops to better predict their yields, to better monitor natural disasters, or to provide global Internet coverage, said founder and CEO Natalya Brikner in a previous interview.



Natalya Brikner, a Ph.D. student at MIT, is founder and CEO of Cambridge-based Accion... more

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT www.bbc.com/news/world-asia-india-33473694

PRINT – A – PROTEIN ?



INSULIN

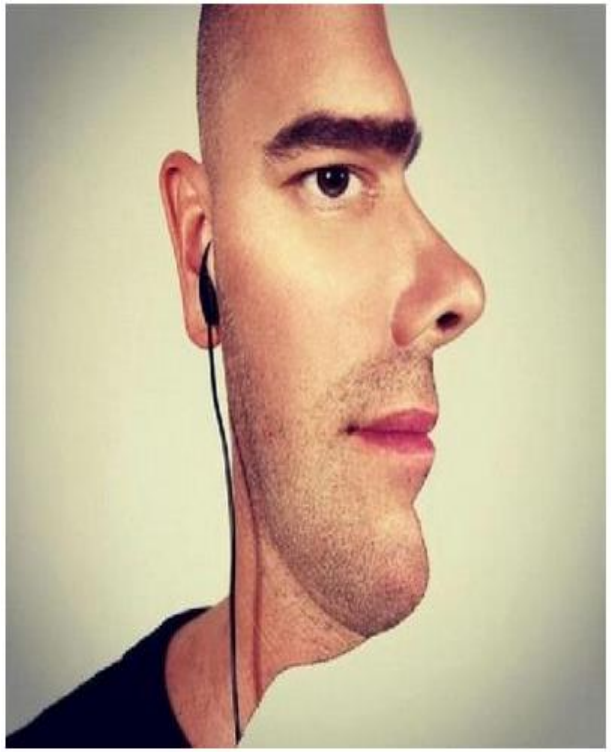
Internet of Systems ● Moving beyond IoT

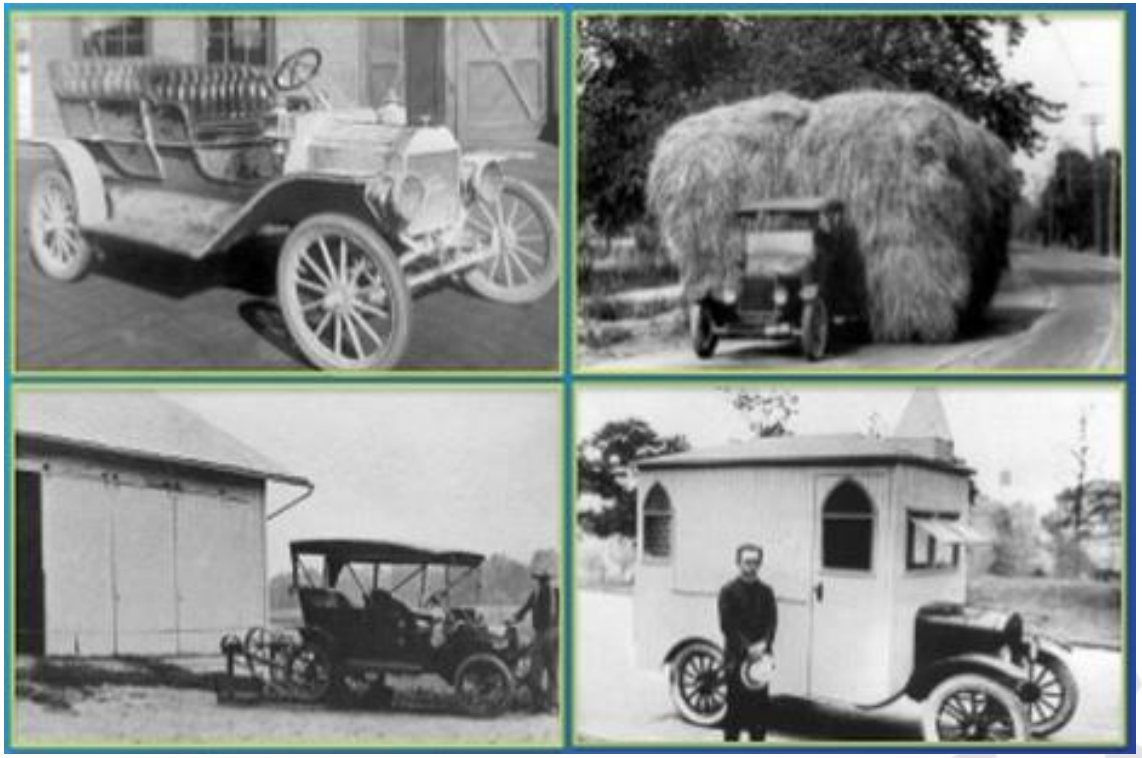
- Vision, Mission and Opportunities
  https://hbr.org/2014/11/setting-standards-for-the-internet-of-things

- Grand Challenges
  - ☑ Transportation (Logistics and Autonomy)
  - ☑ Smart Cities and Resilient Communities
  - ☑ Healthcare and Independent Living
  - ☑ Manufacturing and Supply Chain

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

Can you fuel IIC large scale test bed innovation?





The Ford Model T Mobile Flour Mill-on-Wheels

The Ford Model T Mobile Church-on-Demand

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

Yes, you can!

Can foreign companies receive US Government R&D funds? Yes, keep IP.

Pushing the Bar on Low-Cost Solar Technology: The Advanced Research Projects Agency – Energy (ARPA-E)'s Micro-scale Optimized Solar-cell Arrays with Integrated Concentration (MOSAIC) Program is announcing $24 million for 11 projects in seven states across the country to develop innovative solar technologies to double the amount of energy each solar panel can produce from the sun, while reducing costs and the space required to generate solar energy. http://bit.ly/ARPA-E-MOSAIC http://bit.ly/MOSAIC-PROJECTS

- **California Institute of Technology** (Pasadena, CA) **-** *Micro-Optical Tandem Luminescent Solar Concentrator*
- **Glint Photonics, Inc.** (Burlingame, CA) - *Stationary Wide-Angle Concentrator PV System*
- **Palo Alto Research Center** (Palo Alto, CA) - *Micro-Chiplet Printer for MOSAIC*
- **Massachusetts Institute of Technology** (Cambridge, MA) - *Integrated Micro-Optical Concentrator Photovoltaics with Lateral Multijunction Cells*
- **Massachusetts Institute of Technology** (Cambridge, MA) **-** *Wafer-Level Integrated Concentrating Photovoltaics*
- **Panasonic Boston Laboratory (**Newton, MA) **-** *Low Profile CPV Panel with Sun Tracking for Rooftop Installation*
- **University of Rochester (**Rochester, NY) **-** *Planar Light Guide Concentrated Photovoltaics*
- **Semprius, Inc. (**Durham, NC) **-** *Micro-Scale Ultra-High Efficiency CPV/Diffuse Hybrid Arrays Using Transfer Printing*
- **The Pennsylvania State University** (University Park, PA) **-** *Wide-Angle Planar Microtracking Microcell CPV*
- **Texas A&M University Engineering Experiment Station** (College Station, TX) **-** *Waveguiding Solar Concentrator*
- **Sharp Laboratories of America** (Camas, WA) - *A High-Efficiency Flat Plate PV with Integrated Micro-PV atop a 1-Sun Panel*

Suggestions ?

http://bit.ly/MIT-IOT ● http://bit.ly/RE-VIEW-MIT

industrial internet CONSORTIUM

Internet of Systems

The Next Tsunami

Smart Cities

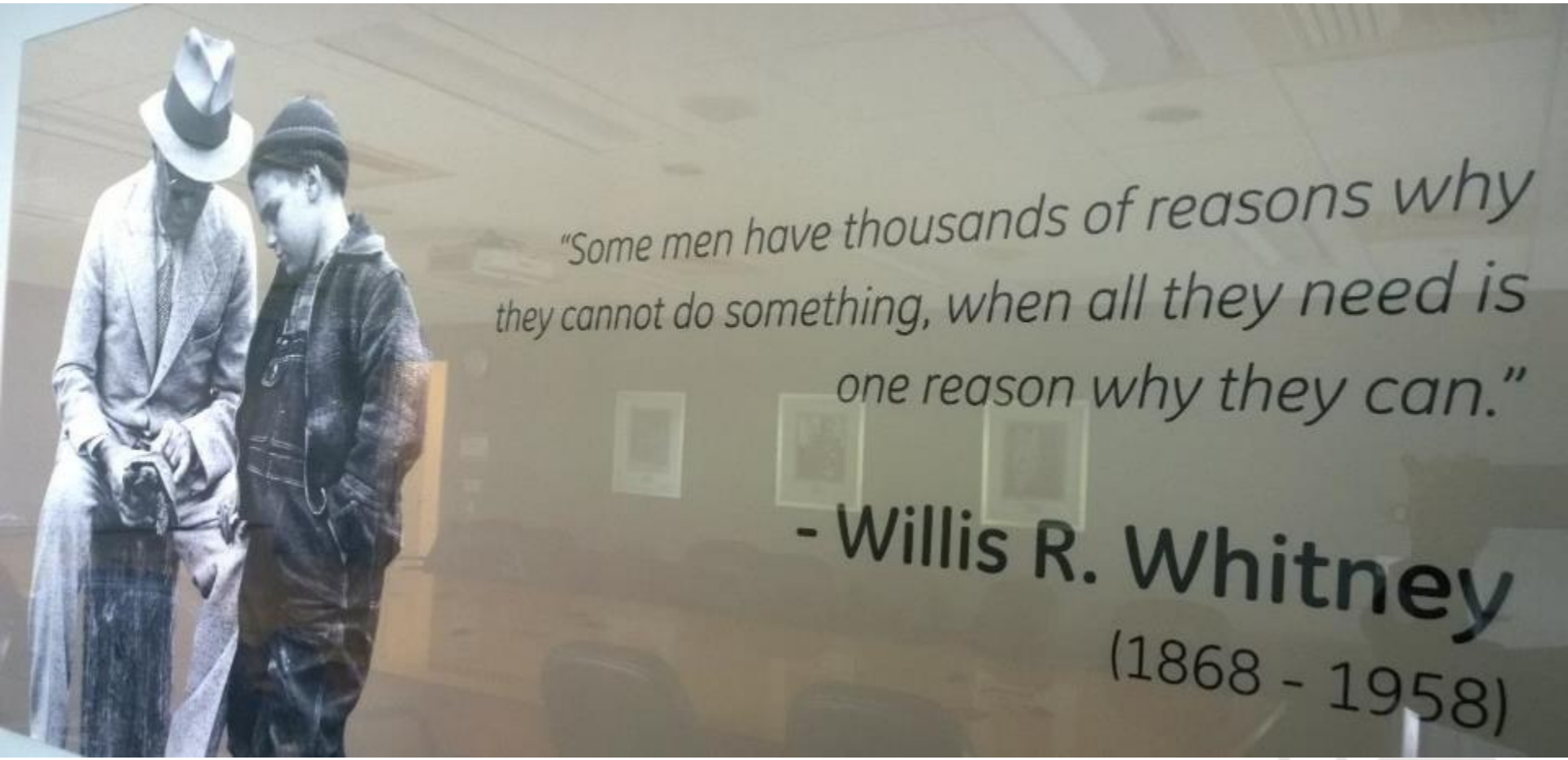
Challenges are like music – silent – unless performed.

This is the true joy in life, being used for a purpose you consider a mighty one, the being a force of nature rather than a feverish, selfish clod of ailments and grievances complaining that the world won't devote itself to making you happy.

Quote from George Bernard Shaw "Man and Superman" in the Epistle Dedicatory to Arthur Bingham Walkley (1903)

George Bernard Shaw (1856–1950), Anglo-Irish playwright, critic. Quote from Bernard Shaw: Collected Plays with their Prefaces (volume 2) edited by Dan H. Laurence (1971)

Pursuit of Ideas ● http://bit.ly/IIC-NY-PHOTO



Dr Shoumen Palit Austin Datta ● datta@iiconsortium.org ● shoumen@mit.edu