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What is the Internet of Things, and Why Should We Care?

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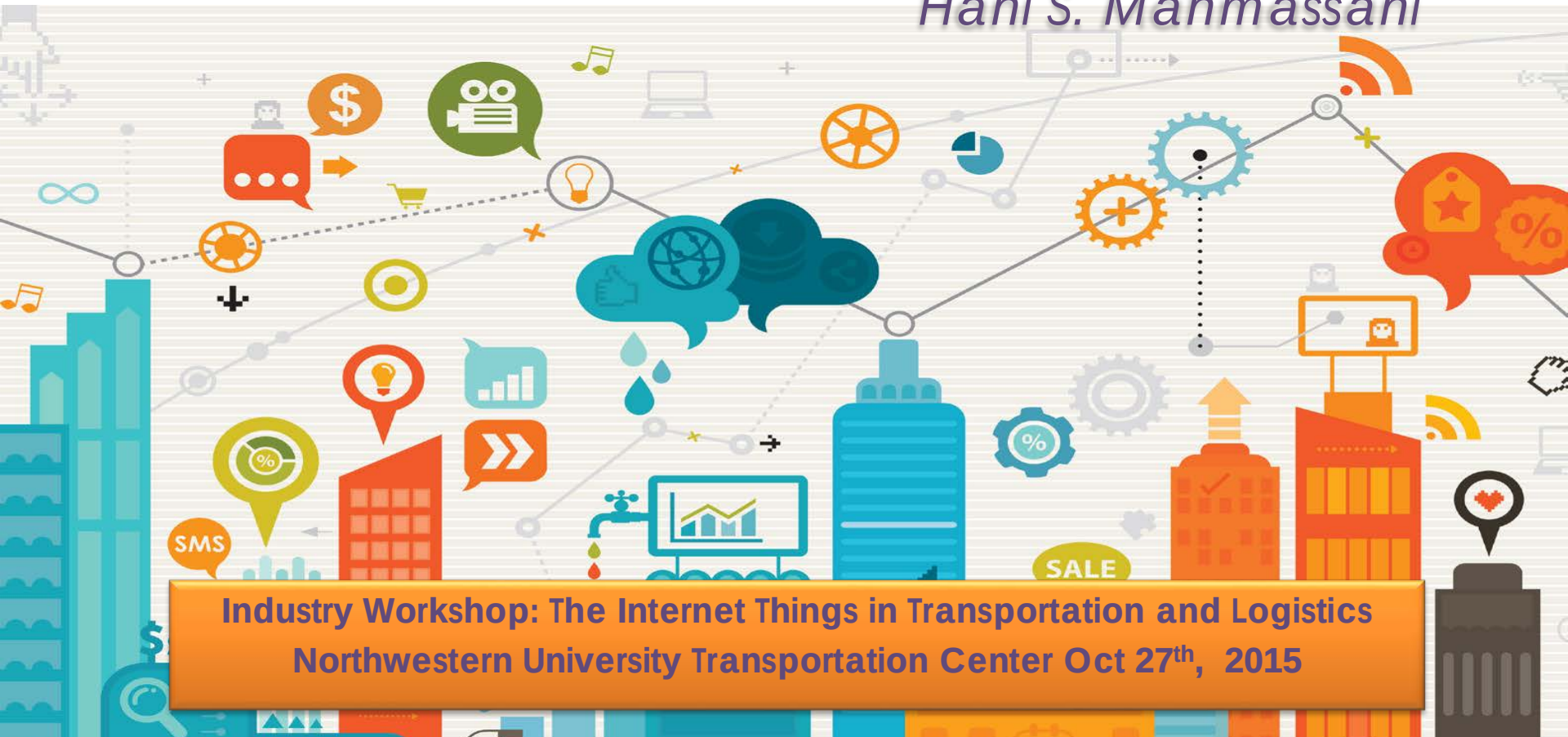


Industry Workshop: The Internet Things in Transportation and Logistics
Northwestern University Transportation Center Oct 27th, 2015

Early vision: *Ubiquitous Computing*

In 1991 Mark Weiser, then of Xerox PARC, envisioned

…”a world in which objects of all kinds could sense, communicate, analyze, and act or react to people and other machines autonomously”

The basic principle

By connecting more devices,

- Enable more complete view of interacting machines, devices and systems
- Enable better prediction, and more effective interventions
- Enable entirely new views and wider range of interventions/opportunities

Technologies Enabling the Internet of Things

Technology	Definition	Examples
Sensors	A device that generates an electronic signal from a physical condition or event	The cost of an accelerometer has fallen to 40 cents from $2 in 2006.[2] Similar trends have made other types of sensors small, inexpensive, and robust enough to create information from everything from fetal heartbeats via conductive fabric in the mother's clothing to jet engines roaring at 35,000 feet.[3]
Networks	A mechanism for communicating an electronic signal	Wireless networking technologies can deliver bandwidths of 300 megabits per second (Mbps) to 1 gigabit per second (Gbps) with near-ubiquitous coverage[4]
Standards	Commonly accepted prohibitions or prescriptions for action	Technology standards for interoperability, we could see bodies related to
Augmented intelligence	Analytical tools that improve the ability to describe, predict, and exploit relationships among phenomena	Processes can now be unstructured (for algorithms might substitute for human cognitions.
Augmented behavior	Technologies and techniques that improve compliance with prescribed action	***Machine-to-machine*** interfaces are removing reliably fallible human intervention into otherwise optimized processes. Insights into human cognitive biases are making prescriptions for action based on augmented intelligence more effective and reliable.[6]

Source: Deloitte analysis.

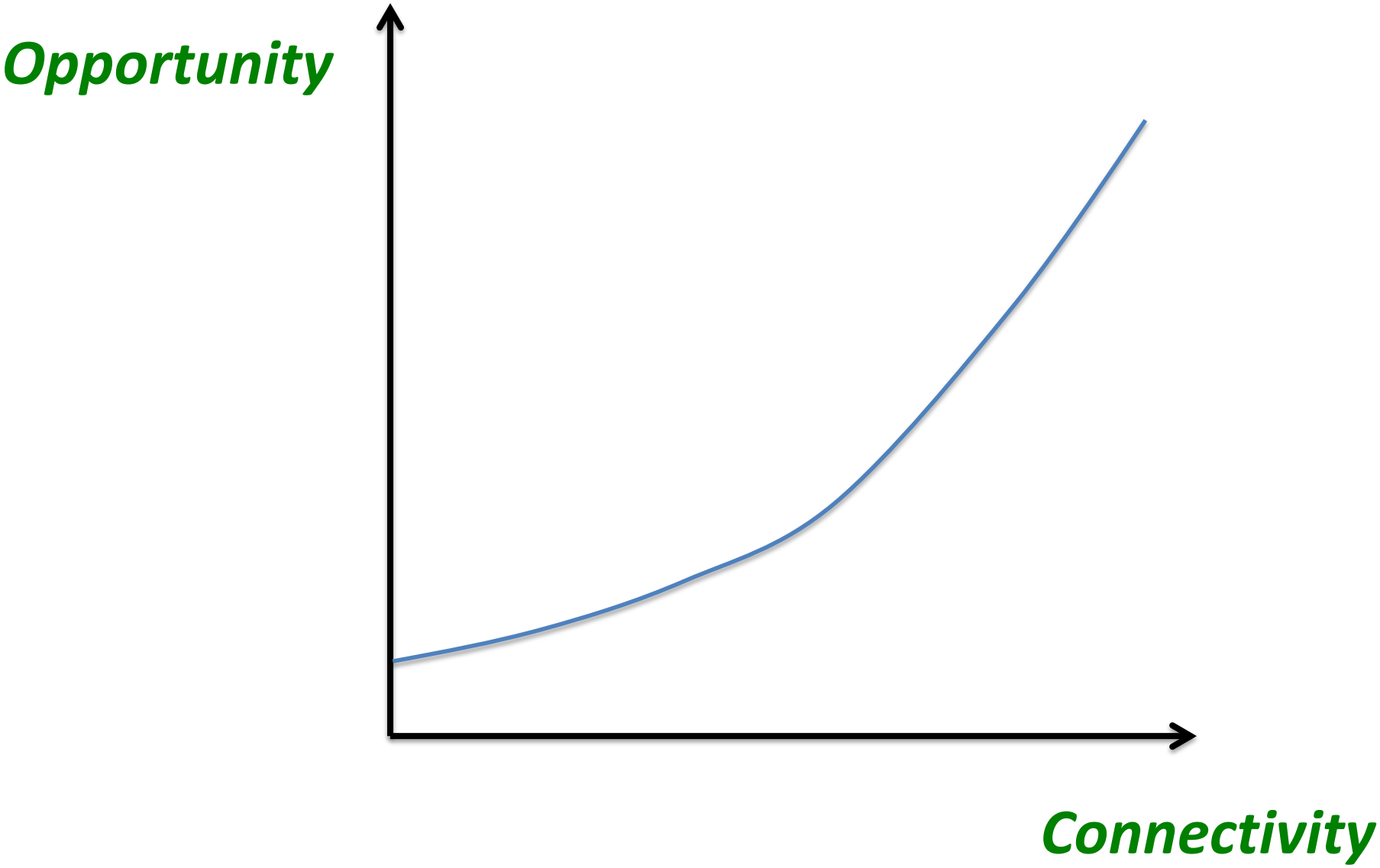
Smaller, cheaper, ubiquitous

Inter-operability

Analytics
Prediction

Control Actions/
Interventions

BIG DATA

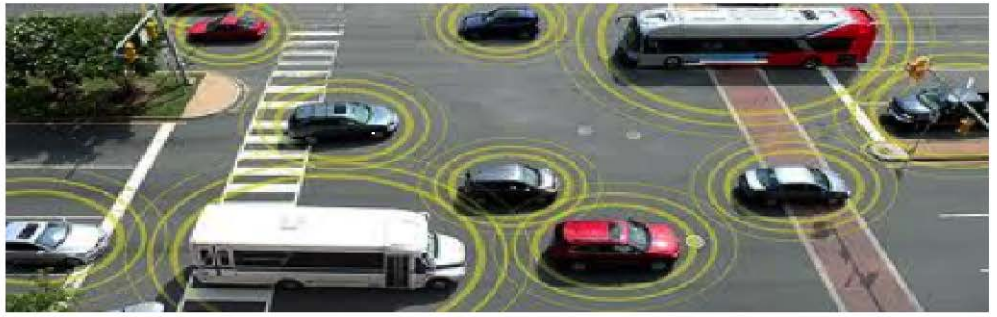

Opportunity
Connectivity

In Transportation

Personal travel– connected traveler

SEAMLESS CONNECTIVITY

TRANSPORTATION DELIVERS PHYSICAL MOBILITY IN A VIRTUALLY CONNECTED MOBILE ENVIRONMENT



Places user at center of web of connectivity, and always-on, always-aware devices and services, reduces friction in pursuit of daily activity patterns.

IoT and the City: Complex Urban Operations

In Transportation

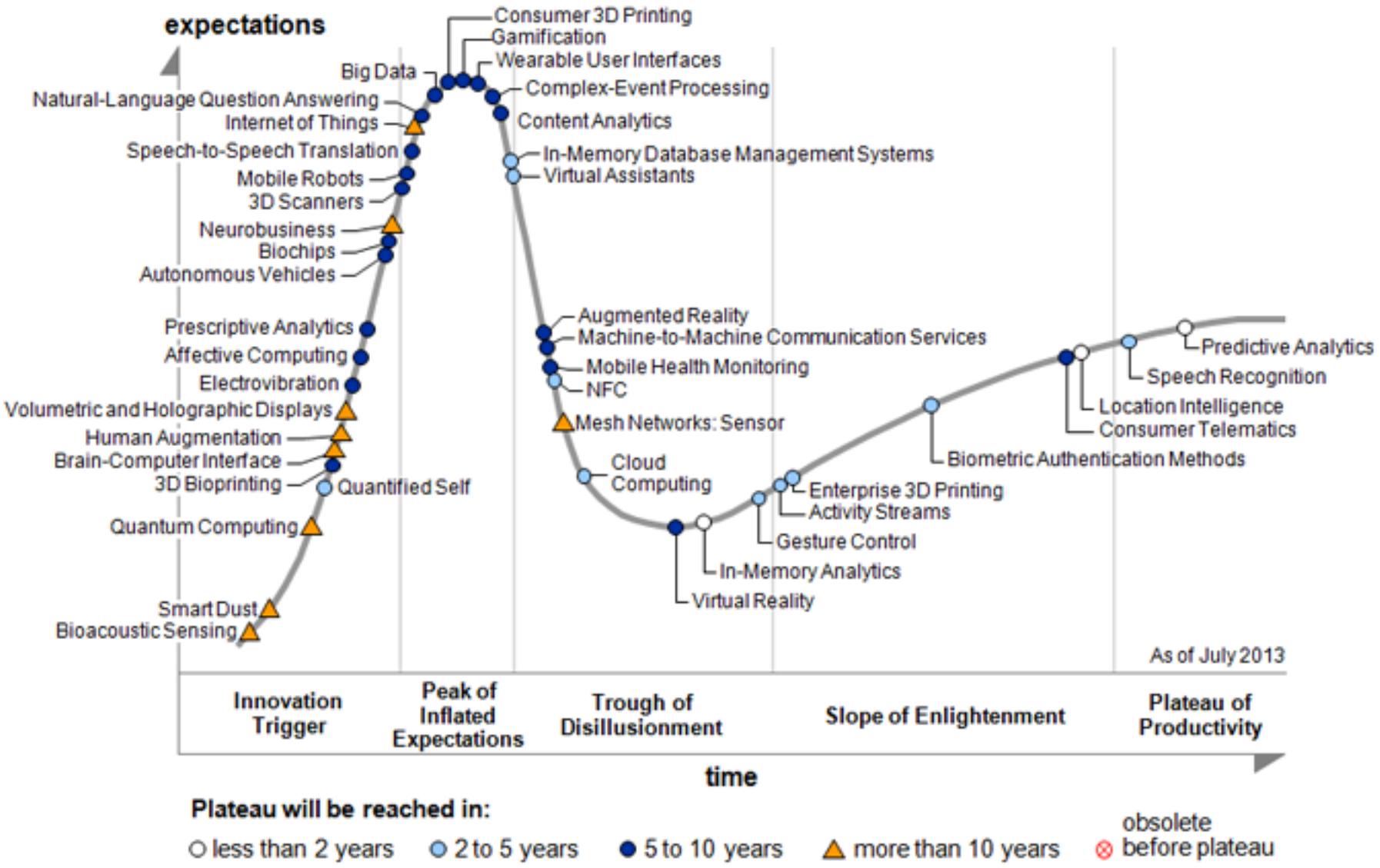
Logistics and manufacturing– connected factories, inventories, distribution centers, components, packages, vehicles, drivers, dispatchers and customers

- Enable more complete view of entire system
- Integrating production, inventory, distribution processes and decisions
- Supports business intelligence and various value-enhancing analytics.

Gartner's Hype Cycle fo Emerging Technologies, 2015

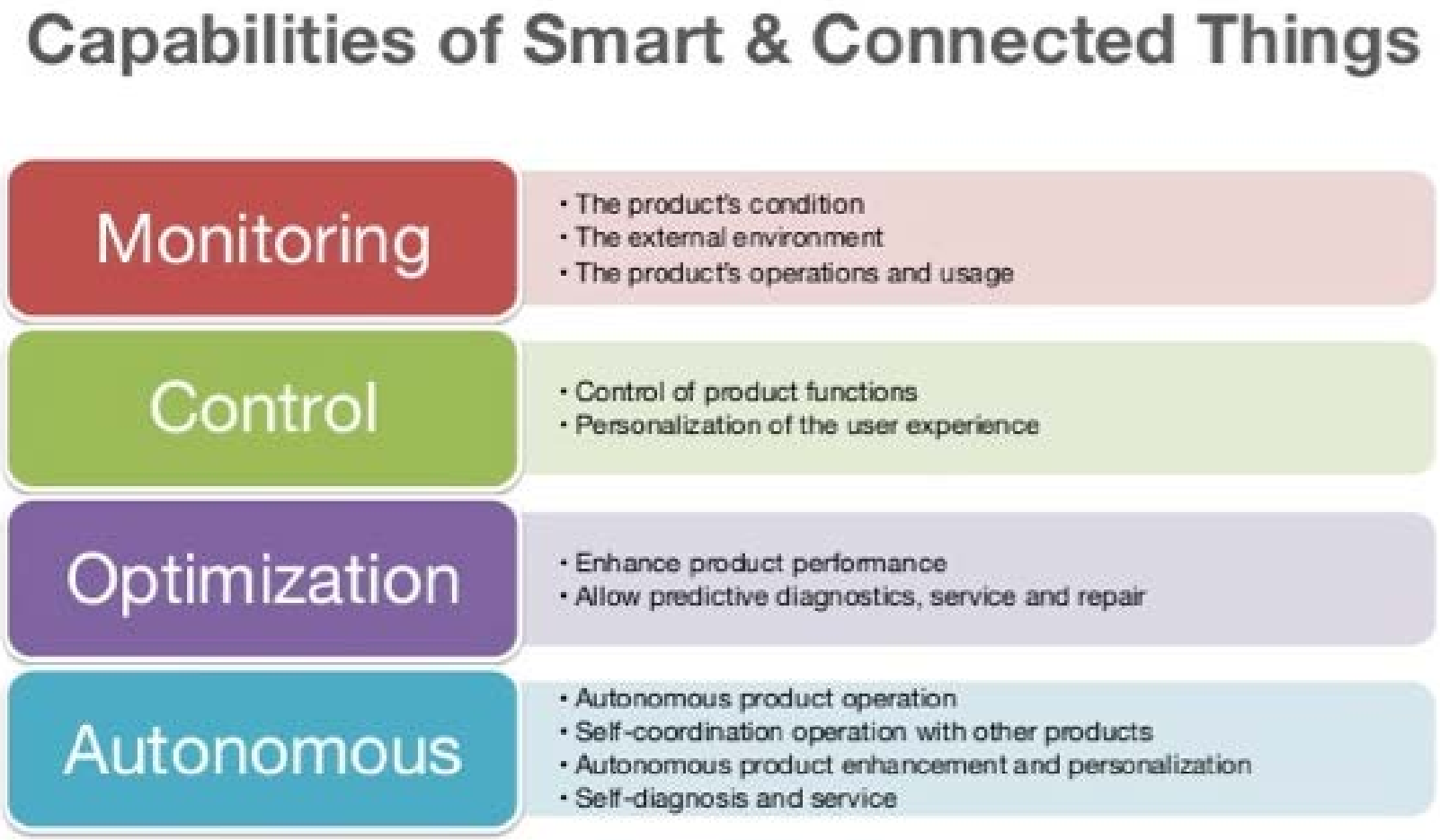
Source: Gartner (August 2015)

Gartner's Hype Cycle fo Emerging Technologies, 2013

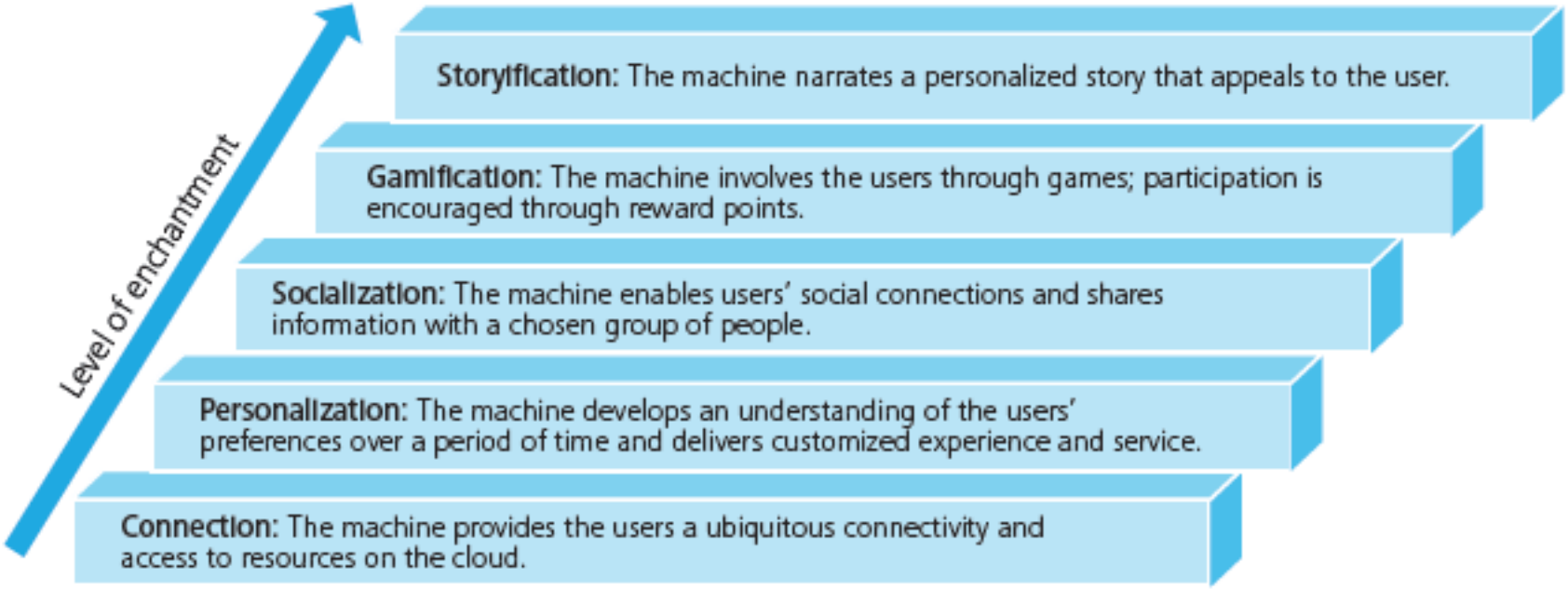


Source: Gartner (August 2013)

Sources of value-added



Can Your IoT Device Do This?



Source: David Rose, *Enchanted Objects: Design, Human Desire, and the Internet of Things* (New York: Simon & Schuster, 2014).

Graphic: Deloitte University Press | DUPress.com

IoT and Mobility: Opportunities

FOR INDIVIDUAL USERS

- Enhanced User Experience
- Telemobility
- Connected Life

FOR SYSTEM OPERATORS

- Greater efficiencies
- Smart Cities

FOR THIRD PARTIES

- *UNBOUNDED OPPORTUNITIES!*

Key takeaways

1. Connectivity and IoT increase opportunity for user, system, and third parties.
2. The more we connect, the more we integrate different sectors (sources of data), the greater the potential.
3. Transportation and mobility industries undergoing major disruptive influences: technology, players, concepts.
4. Biggest hurdles on system aspects, public sector side.
5. IoT is on top of hype cycle; the key to avoiding the *trough of disillusionment* is to develop smaller-scale, manageable, specific implementations to “show the money”.
6. Many challenges ahead, and many more opportunities

Key Questions

1. Architecture: will a dominant IoT platform emerge, applicable across different domains (hence dramatically increasing opportunity)? More likely to see smaller impact, big publicity value throughout.
2. Who leads in this process? The device side (manufacturers of devices), system integrators on the data side, analytics and app developers? Is there a role for public policy?
3. How open should IoT data platform be? Make room for Innovation and entrepreneurial zeal? Cyber fears to allay.