MESA INTERNATIONAL
MANUFACTURING ENTERPRISE SOLUTIONS ASSOCIATION
MESA.ORG

# MES and Industrial Internet


CGI

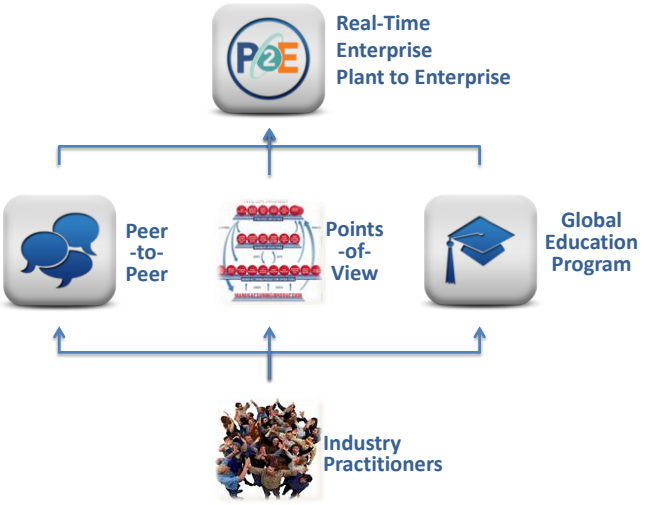
Jan Snoeij
Board Member, MESA International
Principal Consultant, CGI

*Do you know* **MESA**?

## Agenda

- **Introduction**
- Internet of Things
- Big Data
- Smart Factory or Smart Manufacturing
- Closing Remarks

# MESA International




Thought Leadership

Best Practices & Guidebooks

Non-Commercial, Peer Reviewed Content

Standards Application

www.mesa.org



# Cooperation of MESA and Finnish Society of Automation

MESA INTERNATIONAL
Driving Manufacturing Excellence

- Examples of cooperation:
  - Write joint white papers.
  - Produce a joint webcast per year.
  - MESA and FSA equally share participation and access to any research conducted jointly by both organizations.
- FSA's members are offered the opportunity to become an basic individual member of MESA at the discounted rate of $250 per year.

# Introduction


Focus of today:

Smart Factory concept, which is also referred to as:
- Industrial Internet,
- Industrie 4.0
- Industrial Internet of Things



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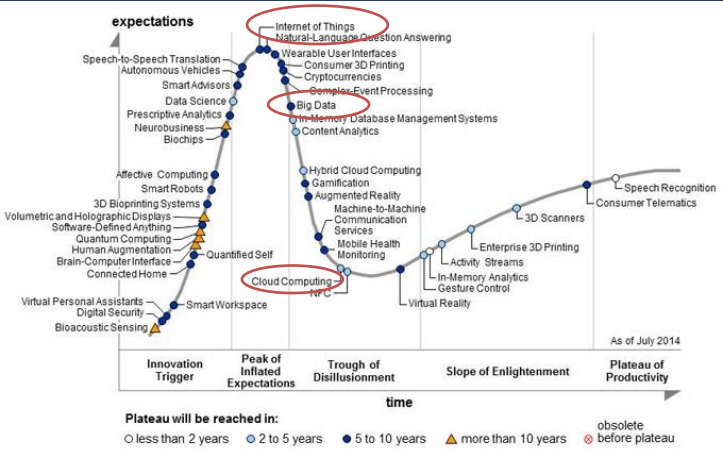
# "Internet of Things"

- Not new!
- In 90-s: Bluetooth introduced
- 'Dreams' like:
  - Refrigerator orders milk and vegetables when nearly empty.
  - Lights automatically switched on when my car is close to my house.
  - …



# Gartner: Internet of Things




**Hype Cycle for Emerging Technologies, 2014**

# What Analysts Are Saying

**(September 2014)**

- "The Internet of Things is becoming a vibrant part of our, our customers' and our partners' business and IT landscape." IoT has the potential to transform industries and the way we live and work.
- The Internet of Things redefines security by expanding the scope of responsibility into new platforms, services and directions. CISOs should focus existing security resources on specific use cases to identify new patterns for IoT security solutions.
- Few organizations will escape the need to connect smart objects with corporate systems and applications. Therefore, IT organizations must master the new skills, tools and architectures required by the IoT.
- The public sector can leverage the Internet of Things to reduce costs, improve delivery of services and engage citizens.

Gartner



# What Analysts Are Saying

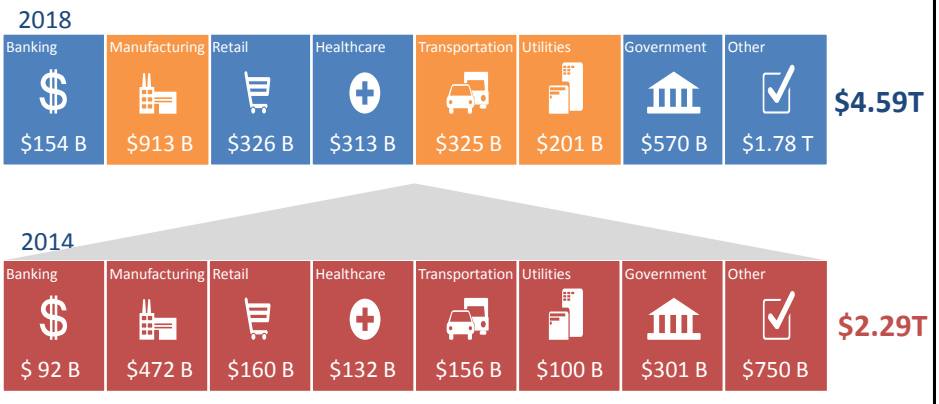
**(September 2014)**

- A transformation is underway that will see the worldwide market for IoT solutions grow from $1.9 trillion in 2013 to $7.1 trillion in 2020.
- Developed regions garner the majority of the IoT market, representing approximately 90% of installed units. Businesses are taking the necessary steps to gain a deeper understanding of IoT and the overall value.
- Technology vendors are evolving their solutions in a supply-driven market that's edging toward becoming a more demand-driven market.

IDC

# Worldwide Internet of Things Revenue Opportunity

Manufacturing/Production related: $1.45 Trillion Opportunity




IDC, Internet of Things Spending Guide by Vertical Market, 2014



# What Analysts Are Saying

(September 2014)

- CIOs will end up operating the infrastructure of the connected world, just as they ended up owning PCs, websites, and smartphones, all of which started as do-it-yourself efforts by the business. As they integrate IoT into the business technology (BT) agenda, CIOs will face challenges spread across the three basic domains of IoT infrastructure. To prepare, CIOs need to coordinate the work of app dev, architecture, infrastructure and operations, and line-of-business teams.
- The buzz around the Internet of Things (IoT) is at fever pitch across the tech community. Many companies that are not traditionally involved in the world of sensors and machine-to-machine (M2M) communications are confused about how to proceed. Decisions around if, when, and how to build a business case for incorporating smart devices, sensor data, and analytics are often delayed because the very "things" that make up the IoT use different communication protocols, messaging formats, and data models.

FORRESTER

# What Analysts Are Saying

**(September 2014)**

*Consumer adoption of network connected technology is on the rise, with 69% of consumers planning to buy an in-home device in the next five years. By the end of next year, a total of about 13% of consumers will own an in-home IoT device such as a thermostat or in-home security camera. Currently, only about 4% of those surveyed own such a device.*

***Accenture Interactive and Acquity Group IoT Study 2014***

*70% of the devices connected to the Internet are vulnerable to some form of hacking. As the "Internet of Things" continues to grow with more appliances and devices connected to the Web, concerns have risen about the increased number of entry points for hackers into the smart home or office.*

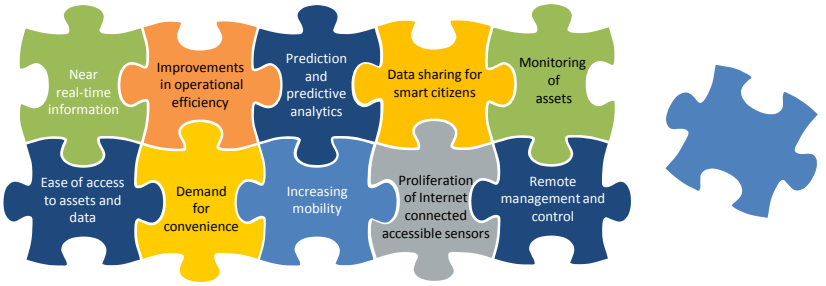
***HP "Internet of Things State of the Union Study " 2014***



# What are the Internet of Things and M2M?


- The Internet of Things (IoT) is a world where smart objects are seamlessly integrated as part of a global network; where smart objects interact without human intervention to deliver new services or improved processes. IoT redefines the way humans and machines interface and the way they interact with the world around them.
- M2M is an enabling technology that delivers Internet of Things to manufacturers and other users. This technology is in general provisioned by the communication providers.

# Drivers for the Internet of Things




The Internet of Things has a crucial role to play in

- Improving organizations' margins, revenues and competitiveness.
- Protecting and monitoring natural resources.
- Making the world a safer and easier place in which to live.



# Typical Challenges

Companies are telling that they ….

- Struggle with the overwhelming possibilities of connected assets
- Want to manage and control assets 24-7
- Have a growing demand for (near) real-time information
- See more assets that are connected to the Internet 24/7
- Are facing security threats and privacy debates
- See new competitors entering their market
- Must increase turnover by developing new business models
- Need to innovate in order to lower costs
- Need information/data to develop new services
- Are facing the challenge of shortening time to market

# IoT in Tomorrow's Smart World

- Fleet management
- Traffic management (jams, fatalities)
- Smart buildings and cities
- Utilities (grid monitoring & management, fault location, smart meters)
- First responders
- Smart cars, trains, planes
- Smart business (logistics, energy use, workforce management)
- Healthcare
- Military
- Agriculture
- Manufacturing



# Example: IoT in Manufacturing

- Airbus aircraft manufacturing
  - Key component are smart(er) tools that:
    - Communicate with a main infrastructure for improving efficiency
    - Communicate with operators and/or other tools for providing situational awereness
  - Resulting in real-time decision making based on local and distributed intelligence in the network.

With this example of automation integration and industrial IoT, production workers can concentrate on the things that add the greatest value in manufacturing.

# Example: Smart Cities

- Integrated public space management (IBOR)
  - Increase safety
  - Improve energy efficiency
  - Optimized management of maintenance
  - Based on technologies and architecture developed for manufacturing!

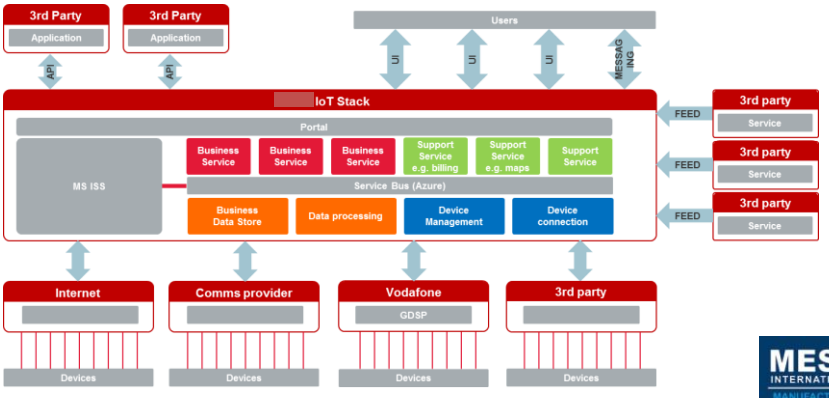



# Example: Smart Cities

To see the animation: http://www.cgi.com/en/video/smart-cities-cgi-ibor-solution

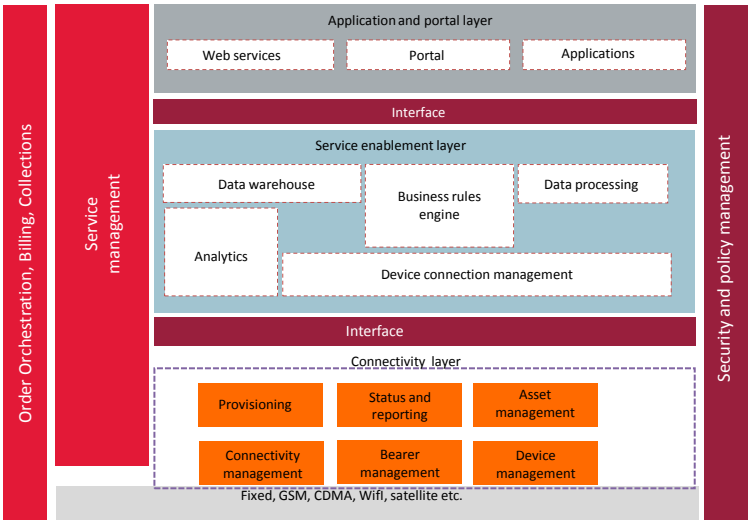
# IoT Platform

A scalable platform with ready to use scalable services and the capability to develop new services with short time to market. This leverages then users' business challenges so they can offer new services to their customers or run a more efficient enterprise. The platform is based on a global enterprise architecture.



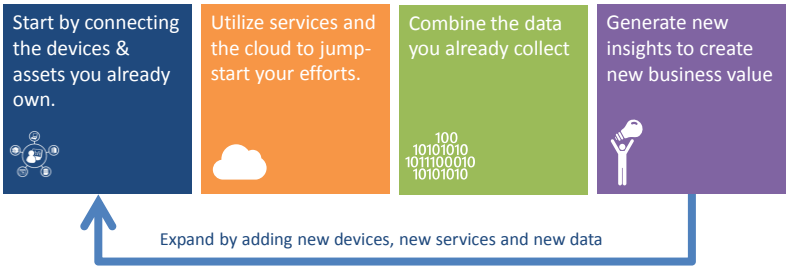



# IoT architecture



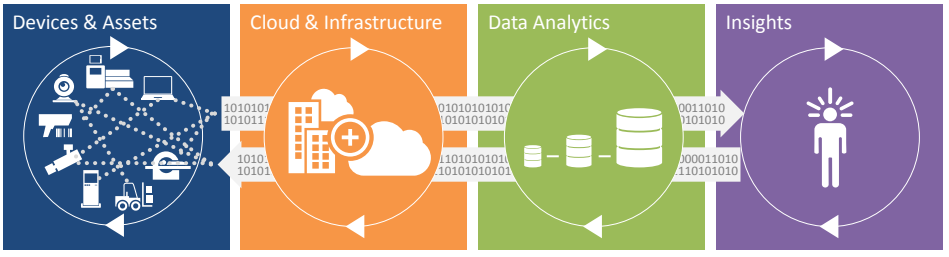
# Pragmatic Approach

- The Internet of Things starts with your things.
  - Build on the infrastructure you already have.
  - Add more devices to the ones you already own.
  - Get more from the data that already exists.






# Unleash the Potential of IoT with Intelligent Systems




- Intelligent systems connect and gather data from devices, sensors, and other corporate/line-of-business assets
  - Facilitate information exchange between devices & assets (M2M)
  - Gather data collected from devices & assets (machine generated data, MGD)
  - Enable this new data to flow across an enterprise infrastructure and the cloud, including back-end systems, line-of-business applications, and services

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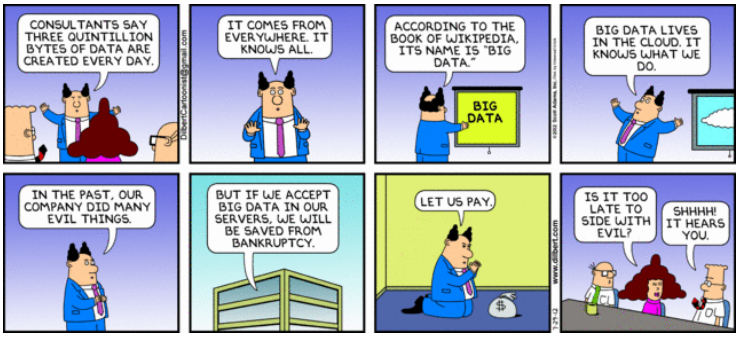
# Big Data

- More data from intelligent devices.
- But we have already that many data.
- What more (value) can we add?



# Big Data

- Massive sets of
  - Structured and unstructured data
  - Coming at a velocity, variety and volume
  - That traditional solutions cannot process.
- Big data analytics provide
  - Next generation statistical analysis
  - Visualization tools
  - To handle these structured and unstructured data
  - Generating **real-time** alerts
  - Triggering actions where necessary



# Metrics that Matter Revisited (2010)*

- Characteristics of Business Movers:
  - Direct relations (link) between **business** and **operational** metrics
  - Rapid feedback of operational metrics to those who 'make the difference' (shop floor and management)
- Supported by:
  - Automatic capture of data for metrics
  - Appropriate IT to provide reliable and consistent feedback frequently and quickly
- Top performers all have at least these characteristics!
  - To **become** a top performer, a company needs significant improvement on the mentioned characteristics and support them.
  - To **stay** in top quartile ranking, these characteristics must continuously be maintained and improved.

* From OPC and MES Day 2013

# MESA Metrics Research 2014

Scope of the research

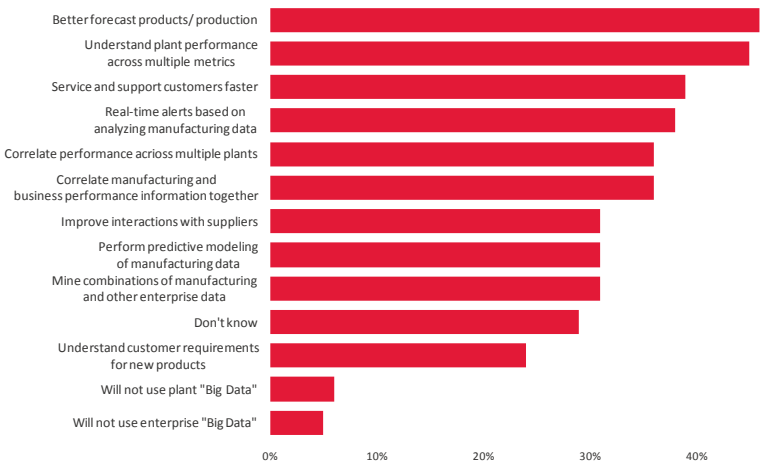
- Improvements in financial and operational metrics.
- Key relationships between operational and financial metrics.
- Key relationships between metrics and software use
- Role based performance dashboards
- **Anticipated Impacts of Emerging Technologies**
  - Cloud based software
  - Mobile technologies
  - **Big Data technologies**
- Best Practices for Metrics Program Success



# Expected Impact from Big Data

- Big Data is a current buzz-term sometimes slightly misleading.
- Many manufacturers have big or even huge amounts of data flowing throughout their organizations.
- However: "Data rich, but information poor."
- Big data concepts are still both in an early stage and broad.
- Results still unsure for manufacturing, but there seems to be significant potential .

# Expected Use of Big Data



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# Smart Factory – Smart Manufacturing

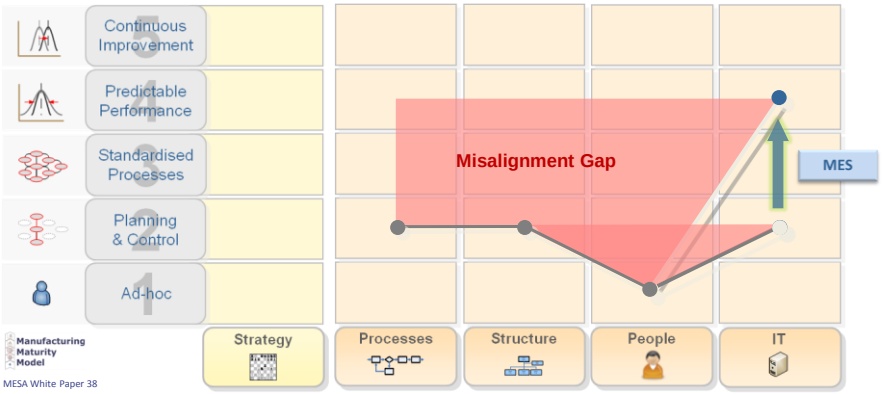
- In the past:
  - Technology was often a restricting factor.
- Today:
  - Technology is an enabler.
  - Maybe even a prerequisite.
- But also needed:
  - Good processes
  - Excellent organization and governance
  - Extremely capable people


"We've found the key to productivity. It's Fred, down in the shop. He makes the stuff."



# It is Not only about Technology

**"Bridging the Gap"?!**



# It is about Process Capabilities

| | Best-in-Class | Average | Laggards |
|---|---|---|---|
| Process | Standardize processes across the enterprise for optimizing manufacturing operations | | |
| | 64% | 37% | 30% |
| | Standardize measurements of KPIs across enterprise | | |
| | 68% | 58% | 51% |
| | Standardize processes for response to adverse events | | |
| | 64% | 51% | 19% |



| Definition of Maturity Class | Mean Class Performance |
|---|---|
| **Best-in-Class: Top 20%** of aggregate performance scorers | • 94% Success with New Product Introductions<br>• 89% OEE<br>• 94% On Time and Complete Shipments<br>• +6% Operating Margin vs. Corporate Plan |
| **Industry Average: Middle 50%** of aggregate performance scorers | • 78% Success with New Product Introductions<br>• 82% OEE<br>• 90% On Time and Complete Shipments<br>• +2% Operating Margin vs. Corporate Plan |
| **Laggard: Bottom 30%** of aggregate performance scorers | • 49% Success with New Product Introductions<br>• 74% OEE<br>• 86% On Time and Complete Shipments<br>• -3% Operating Margin vs. Corporate Plan |



Best-in-Class
- Standardize across the enterprise
- Focus at perfect order delivery and new product introduction



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# Closing Remarks

- Internet of Things, Industrial Internet, ...

  ... Technology is more powerful than ever before!

- Best-in-class: Successful perfect order delivery and new product introduction by standardization!
- In manufacturing, it not about IT and/or technology, it is about process capabilities.
- Technology and MES are prerequisites, enablers ...

  ... but people make the difference!



# MESA Education Program

Certificate of Awareness (CoA)

- Location: Tampere (Sokos Hotel Ilves)
- Dates: October 14 – 15, 2014
- Instructor: Jan Snoeij

- A few seats still available.
- Interested?
  - Ask: Antti Varis (Delta-Enterprise)

# Any Questions