The Internet of Things shows every sign of rapidly transforming industry.

Gathering, analyzing and sharing of meaningful and actionable data between systems to improve productivity and quality is at the heart of the IIoT.

If we manage to successfully enable and develop the IIoT it will unlock a lot of value. To tackle the complexity involved and to benefit from the opportunity we propose to team up.

Our offer is to put your key technical challenges in this area on our research agenda!
Welcome on behalf of the HTSC
We are about 25 participants!
We only have 90 minutes!
We all have expectations!

We have an opportunity!
We have expressed our interest!
We propose to build a consortium!
We offer to put your technological challenges on our research agenda!

Let’s identify common interest areas for research!
Everybody will get....

- The presented material, meeting minutes, conclusions and a list with all the participant names.
- Notifications of follow up meetings or you will be contacted individually

Sit back and relax....

I don’t think so!
We need a time keeper.
Volunteers?
Goal:

Put your key technical challenges on our research agenda

“Identify and prioritize common research areas, technologies AND/OR cases”
### Workshop IIoT HTSC with contribution from PWC

<table>
<thead>
<tr>
<th>90 [min]</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Business opportunities/implications/challenges/reflections</td>
</tr>
<tr>
<td></td>
<td>IIoT subject introduction (PWC insights)</td>
</tr>
<tr>
<td></td>
<td>Reflect IIoT</td>
</tr>
<tr>
<td>15</td>
<td>IIoT technology (Example &amp; Mapping)</td>
</tr>
<tr>
<td>5</td>
<td>Reflect IIoT technology</td>
</tr>
<tr>
<td></td>
<td>Break - leg stretch</td>
</tr>
<tr>
<td>5</td>
<td>Assignment: divide into 3-4 groups</td>
</tr>
<tr>
<td></td>
<td>Wrap up of conclusions / challenges on map</td>
</tr>
<tr>
<td>5</td>
<td>Reflection on expectations</td>
</tr>
<tr>
<td></td>
<td>Follow-up</td>
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<tr>
<td></td>
<td>Invitations for follow up meetings OR individual contacts</td>
</tr>
</tbody>
</table>

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- All material will be shared with all participants. Requests / remarks / Feedback is appreciated!
A definition


The networking of physical objects through the use of embedded sensors, actuators that can collect or transmit information about the objects. The data amassed from these devices can then be analyzed to optimize products, services, and operations.
The potential: Industrial Internet of Things


Up to $11.1 trillion a year in economic value by 2025

The Internet of Things: Mapping the value beyond the hype [McKinsey]

A gallery of disruptive technologies

Estimated potential economic impact of technologies across sized applications in 2025, $ trillion, annual

1. Mobile Internet
2. Automation of knowledge work
3. Internet of Things
4. Cloud
5. Advanced robotics
6. Autonomous and near-autonomous vehicles
7. Next-generation genomics
8. Energy storage
9. 3-D printing
10. Advanced materials
11. Advanced oil and gas exploration and recovery
12. Renewable energy

SOURCE: McKinsey Global Institute
Notes on sizing: These economic impact estimates are not comprehensive and include potential direct impact of sized applications only. They do not represent GDP or market size (revenue), but rather economic potential, including consumer surplus. The relative sizes of technology categories shown do not constitute a “ranking,” since our sizing is not comprehensive. We do not quantify the split or transfer of surplus among or across companies or consumers, since this would depend on emerging competitive dynamics and business models. Moreover, the estimates are not strictly additive, since some applications and/or value drivers are overlapping across technologies. Finally, they are not fully risk- or probability-adjusted.
5 minutes

Please create two post-it with your NAME and
1) EXPECTATIONS from this MEETING and
2) EXPECTATIONS from the IIoT

So ask yourself......
• What would I like to get out of this meeting?
• How do I expect that the IIoT will influence my Industry?

We will cluster these findings afterwards and share the outcome with you.
15 minutes

Inspirational material....

Wilco de Goeij & Corwin van Heteren (PWC)

Industry 4.0 - The path for competitive advantage
5 minutes

Please write your reflection on two Post-It’s containing your:

1) NAME
2) TAKEAWAY, i.e. business opportunities, risks, implications, challenges

on the wall (one takeaway per post-it)

We will cluster these findings afterwards and share the outcome with you.
15 minutes

Presentation on technologies

High Tech Systems Center
Data Science Center
Center for Wireless Technologies
Faculties
Innovation Labs

We are open to join forces with other universities / institutes as well.
Technology Mapping: Industrial Internet of Things

Optimize fleet management and performance

Ship

- Bearing operation in thruster
- The bridge
- Chief engineer

Recommendation

Fleet manager

Check

Orders

Parts delivery

Repair shop

Warehouse

TU/e

High Tech Systems Center
Technology Mapping: Industrial Internet of Things

IloT chain

Applications

Technologies

Business Models:
- Services
- Logistics
- Manufacturing
- Maintenance
# Technology Mapping: Industrial Internet of Things

**IIoT**

<table>
<thead>
<tr>
<th>Embedded Devices &amp; Analytics</th>
<th>Cloud Infrastructure and Services</th>
<th>Mobility and Visibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>“measure and transmit meaningful data, cheap, non-obtrusive, wireless, energy efficient”</td>
<td>“Connect, collect and manage big data, safe, seamless, transparent to build services”</td>
<td>“Share actionable Data anywhere, any time on demand”</td>
</tr>
</tbody>
</table>

### Sensors & gateway
- Miniature modalities lab on chip system in package mems
- Storage Transfer Harvesting Mgmt

### Energy
- QoS: latency integrity coexistence

### Wireless Comm
- Mesh routing (de)centralised topology simulation optimization

### Wireless Network
- Signal analysis: embedded algorithms recursive least squares, Kalman filtering etc..

### Analytics
- Data storage & mgnt
- Connectivity & interoperability
- Analytics
- Mobility and Visibility
- Reports GUI App design

### Reports
- KPIs on productivity (uptime and throughput) quality safety
- Remote diagnostic and decision support services, i.e. trend analysis fault detection

### Analytics
- Protocols application programming languages interfaces i.e. APIs rest...
- Learning Statistics Predictive modelling Simulations Datamining

### Cloud Infrastructure and Services
- Connectivity & interoperability
- Reports GUI App design

### Mobility and Visibility
- Connectivity & interoperability
IIoT support the transition from .... towards ...

**From**
- Value chains \((2^{n-1}) = \text{linear}\)
- The lab is our world
- Owning
- Incrementally Optimizing
- Rely on human’s to manage
- Decide Global, optimize local
- Product business model
- One time revenue
- Systems

**Towards**
- Value Networks \((n(n-1) = \exp)\)
- The world is our lab
- Using
- Learn and adapt
- Replace or complement human’s to manage
- Decide Local, optimize global
- product+service business model
- Recurring revenues
- Systems of Systems
5 minutes

Please put your TOP 3 TECHNOLOGICAL CHALLENGES with your NAME on 3 separate post-its on the MAP (one challenge per post-it)

We will cluster these findings afterwards and share the outcome with you.
Industrial Internet of Things (IIoT)

We will split up but... not randomly!

IIoT

Mission critical / Enabling technology

Pilot CASE

Embedded Devices & Analytics

Cloud Infrastructure and Services

Mobility and Visibility

Supplier

OEM

Integrator OR service provider

End User
Group assignment

1) We will split up in groups
2) Choose a timekeeper, note taker and pitch presenter
3) Each table will have a facilitator
4) Given the presentations, content on the wall and your personal insights try to agree on a focused area for research.
5) Link business opportunity with MISSION CRITICAL TECHNOLOGY or RELEVANT PILOT CASES to be developed
6) 3 minute pitch (on flipover) of each group

We will cluster these findings afterwards and share the outcome with you.
10 minutes

Presentations Group assignment

3 minute pitch (on flipover) of each group

We will cluster these findings afterwards and share the outcome with you.
5 minutes

Closure and last reflections

All material will be shared with all participants. Requests / remarks / Feedback is appreciated!

Thanks to all for your contribution!