13 March 2018

ERF workshop on Inspection and Maintenance

Inspection & maintenance robotics – Deployments and future needs

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euRobotics TG on Maintenance and Inspection Robotics

Started in 2014

Led by Ekkehard Zwicker, GE Inspection Robotics, until Oct 2016

Now led by Aksel A. Transeth, SINTEF, in cooperation with Ekkehard Zwicker

Ca 120 members

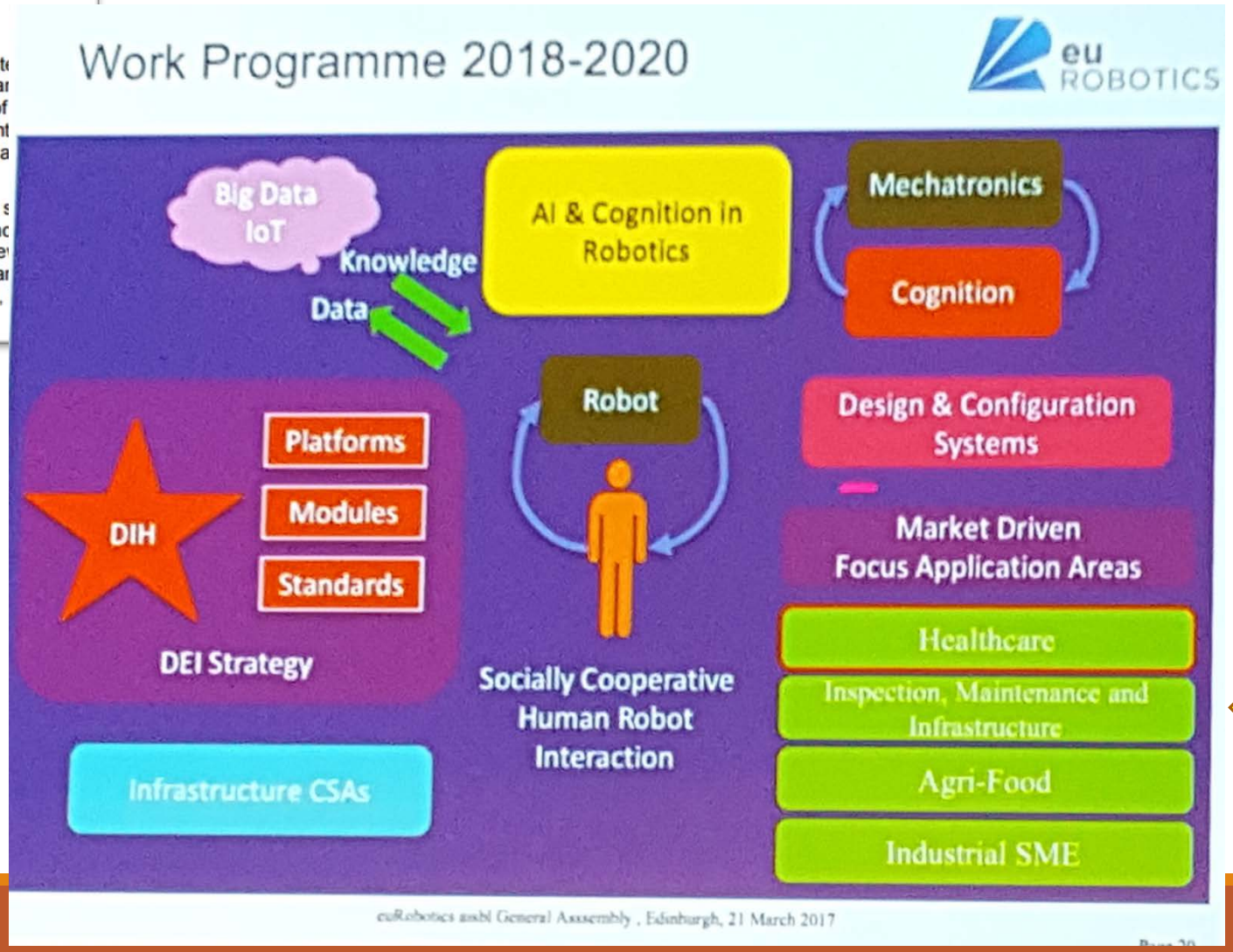
Goal and scope: To influence and to drive the research, development and operative deployment of robotics in the domain of maintenance and inspection of process plants such as oil&gas facilities, power stations or chemical plants by connecting the stakeholders from research and industry.

2.6.3. Sub-Domain Inspection and Maintenance

2.6.3.1 Sub-Domain Overview

Robotics provides significant advantages over current methods of inspection and mainte
for example 24/7 working, and have the ability to operate in hazardous, harsh ar
environments. The utility and energy domains have begun to explore the potential of
technology. There is an emerging trend for these industries to include robot based maint
and inspection within their forward planning. However there is currently no wide scale a
or validation of this technology.

The lack of wide scale adoption can be attributed to a number of different factors, s
insufficient availability of robust technical solutions and the concern of implementing innc
without track record. At the root lies a disconnect between the robot technology being de
for this industry and the requirements of the users. This is due to an insufficient understar
what challenges are being faced by asset owners for inspection and maintenance tasks,
basic requirements that drive their needs for robotic technology uptake.



AGENDA

14:00-14:05: Introduction (E. Zwicker, A. Transeth)

14:05-15:05: Successful commercial deployments and future needs from the industry.

- Jürgen Moors, BASF
- James Kells, Rolls Royce
- Anders Røyrøy, Statoil
- Russel Brown, Chevron
- Carlos Enrique Sabido Ponce, ROSEN
- Tjibbe Bouma, Quasset
- Håkon Kjerkreit, KVS Technologies
- Ekkehard Zwicker, GE inspection robotics

15:05-15:25: Moderated workshop discussion. Golden questions:

- What are the main gaps hindering deployments of I&M robotics operationally beyond on a case-by-case basis?
- How can we learn from areas where robotics is deployed operationally today?

15:25-15:30: Summary and conclusions

Summary of workshop discussion

Introduction by Ekkehard Zwicker

Thoughts from my side …

- May be we are talking too much about technology gaps …
- May be technology gaps are used as an excuse not to deploy robotics …
- May be we are thinking too theoretical and not practical enough …
- Looks as we just have to do it, even if it is far away from being perfect
  - Starting simple, or even better trivial, helps to understand robotics practically
  - A practical understanding helps to focus and to see further applications
  - Future developments are most efficiently driven by practical experience

Golden questions for discussion

- Q1: What are the main gaps hindering deployments of I&M robotics operationally beyond on a case-by-case basis?
- Q2: How can we learn from areas where robotics is deployed operationally today?

In the subsequent slides we summarize the discussions during the workshop.

Discussion moderator: Ekkehard Zwicker

Minutes by: Aksel A. Transeth

Summary of discussion (I)

Technology gaps

Better 3D depth perception.

Quality of video. E.g., to a 4K system. Such systems are available, but perhaps not deployed. Also, pictures (in addition to video) can give very good info

Laser scanning system on a crawler. Ongoing work on this.

Power and operational life span. Dependent on cable.

Summary of discussion (II)

Business gaps

Trust in solutions. How far can we go outside our comfort zones to use the solutions. How to build trust in solutions?

Too busy in operations? Not time to test new solutions.

Budget can be a major blocker. Need to do traditional inspection in addition to testing new systems in order to be able to compare results from robotized solutions with conventional methods. How to finance initial deployments? First solutions: R&D dept takes cost of testing, while business unit pays for traditional inspection.

Blocking point can be at the operations-side. They are open for experiments, but need do to it in a safe environment. In Brazil, 1% of oil & gas activity needs to be spent on R&D. Could there be a "1 % of operations"-alternative to test new solutions? What to do to help a tech push?

Collaboration between end-users that normally compete – to put financing together. E.g., Chevron is heading down this route.

Summary of discussion (III)

Regulatory gaps

A robot system probably needs to perform better than a human to be accepted. What is "good enough"? And how to achieve this.

- Compliance to standards. E.g, API requires visual inspection. How to then move on to automatic inspection (e.g., image analysis)? The standards are not fit-for-purpose when it comes to robotics.

Need to manage expectations of what can be achieved in the first iterations. If expectations are not met then this can inhibit further activity.

Summary of discussion (IV)

One end user can only test a limited number of robot solutions and services. The industry needs to work together and share experiences in order to build trust in solutions, facilitate development and accelerate deployments of new I&M robot-based services.

Need to get robotics into the hands of the service operators in order to push robots into operations.

Are technology gaps being used as an excuse not to deploy robotics?