

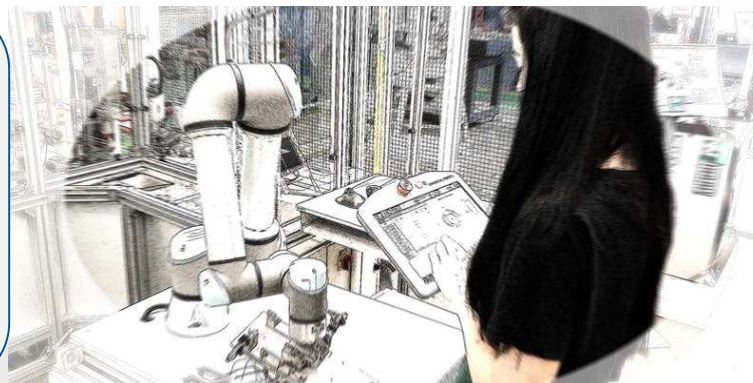
Artificial Intelligence On the Shop Floor



2019 SMECLUSTER EVENT 5



These projects received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 723336 and 825075



**Collective
Intelligence** +
www.smecluster.com

2011 – SMECLUSTER EVENT 1
Cloud Computing & Factory Automation:
Taking Business into the Next Generation

2013 – SMECLUSTER EVENT 2
Take advantage of the Connected Business
Community

2015 – SMECLUSTER EVENT 3
The Connected Business Community 4.0:
Service Based Software Economy

2017 – SMECLUSTER EVENT 4
Pragmatically Stepping into the Twinned Digital
World of 4IR:
The fourth Industrial Revolution

www.smecluster.com



Agenda – SMECluster Event 5

Thurs 17th October 2019 – 9.00am until 4:00pm

Introduction - Welcome and Event Presentation (15 Mins) – Gash Bhullar - SMECluster (09:15 – 09:30)

MORNING - INDUSTRY FOCUS

Session 1 - Industrial Developments and AI systems hitting the shop-floor (09:30 – 11:00)

Keynote Speaker: Kevin Greening - Ford Motor Company

15 minute sessions from:

- Festo - Andy Parker Bates - Challenges for AI Implementation (15 Mins) – Sincere Apologies
- Balluff - Norman Hurley -The future of IO-Link Intelligent Sensors working in an I4.0 environment (15 Mins)
- ABB Limited - Julian Ware - Industrial Robotics, in the Factory of the Future (15 Mins)
- Universal Robots - Jon Dixon - AI Not Just For The Big Guys (15 Mins)
- CBM Wales - Robert Brown - AI enabling Medical Breakthroughs in the Virtual World (15 Mins)
- Siemens - Michal Zlotek - Industrial Artificial Intelligence – Machine Intelligence in Industrial Applications (15 Mins)

Tea / Coffee (11:00 – 11:20)

Session 2 Practical AI Demonstrations with partners (11:20 – 12:20)

Group Briefing - Gash Bhullar (5 mins)

Rotation clockwise with 5 min slots per area:

Groups 1 to 6 Bosch Rexroth, Siemens, Balluff, Universal Robots, Control 2K, STEM / EESW

Session 3 Panel discussion and Feedback from sessions 1 and 2 (12:20 – 12.50)

Lunch– Fully catered menu (12:50 – 13:30)



Agenda – SMECluster Event 5

Thurs 17th October 2019 – 9.00am until 4:00pm

AFTERNOON - KNOWLEDGE CAFE

Session 4 – Product Innovation in the AI domain (13:30 – 14:30)

Several themes have been identified as hot topics for discussion:

- **Emerging and Innovative Technologies - The role of Centres such as IROHMS to shape future developments**
- **Medical Advances - Clear Role of Emerging Technologies incorporating AI**
- **Outcomes from European Research projects including DIGICOR / eFACTORY / FACTLOG**
- **Next Steps to pull together Expertise on AI and sign post to best practice – SMECluster**
- **Urban Mobility - Current Developments and Status Updates – Depending on facilitator**

Tea / Coffee (14:30 – 14:45)

Session 5 – Open Forum (14:45 – 16:00)

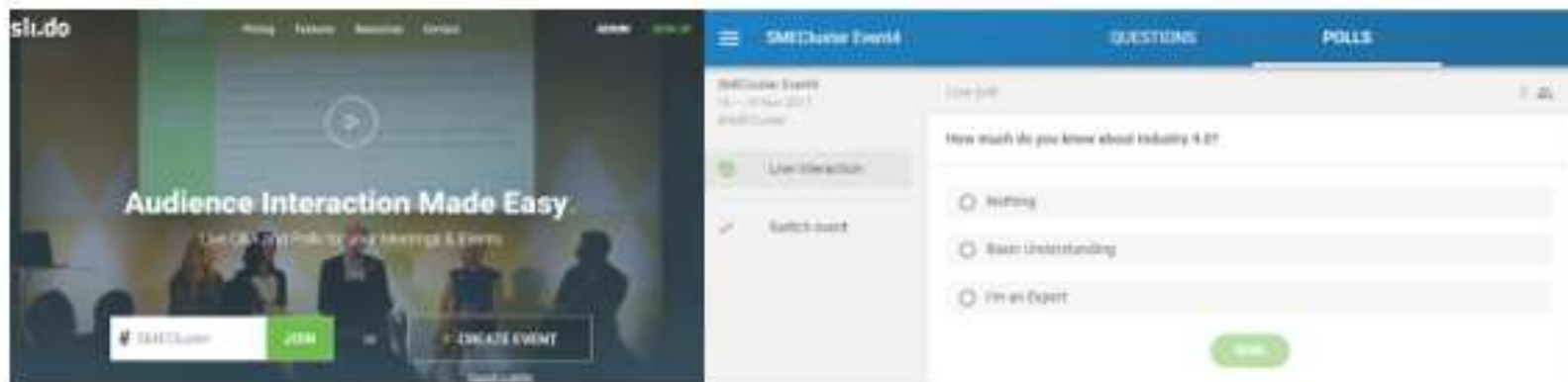
An opportunity to discuss follow-up work, build collaborations, hear from other participants about developing the next steps to bring Artificial Intelligence to the shop floor.

EVENT Close 16:00

Audience Interaction is Vital

www.sli.do or www.slido.com and you can then type the Event Name as **SMECluster5**

You will be presented with a screen where you can type in your questions and if the moderator accepts your question it will appear on the second screen in the conference room when the Slido view is active. There are also Polls too.





PRESENTATIONS



FORD BEP
Global Powertrain
Manufacturing Engineering



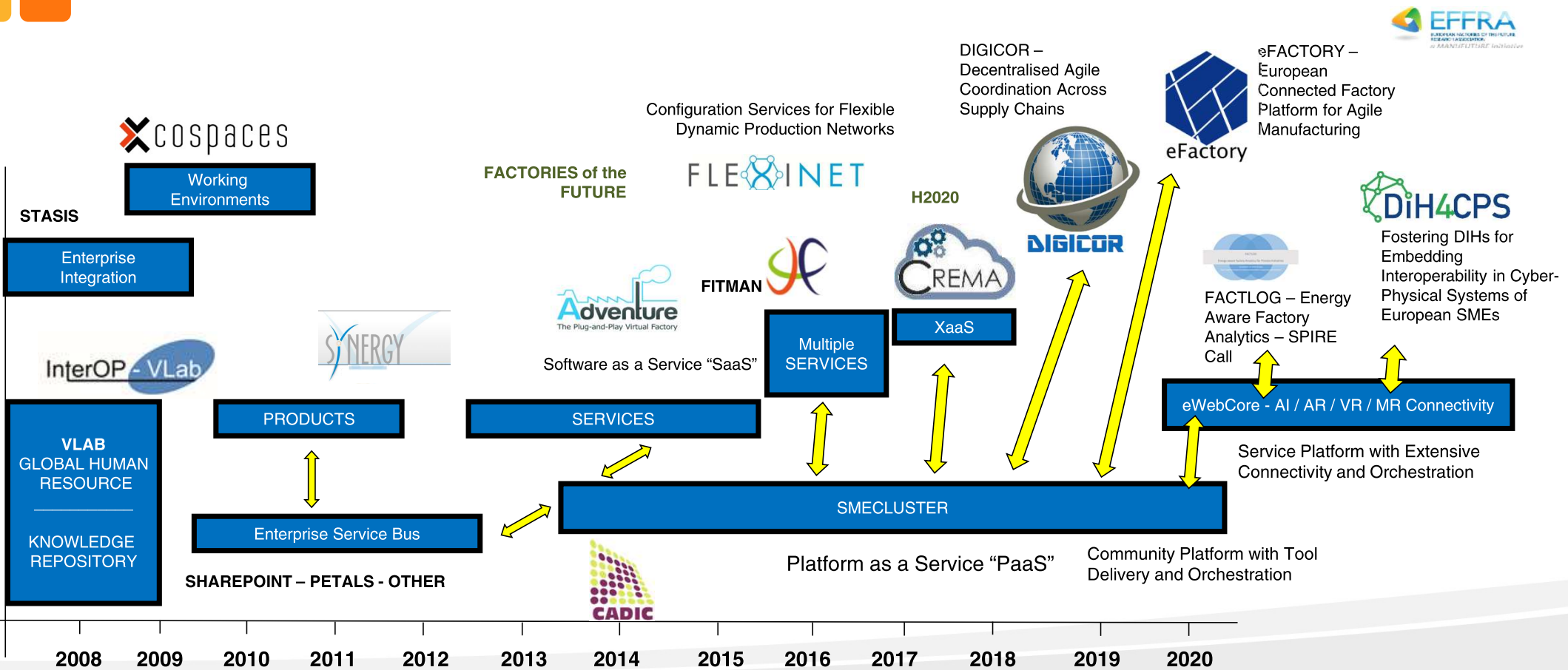
UNIVERSAL ROBOTS

BALLUFF

CBM_

SIEMENS
Ingenuity for life

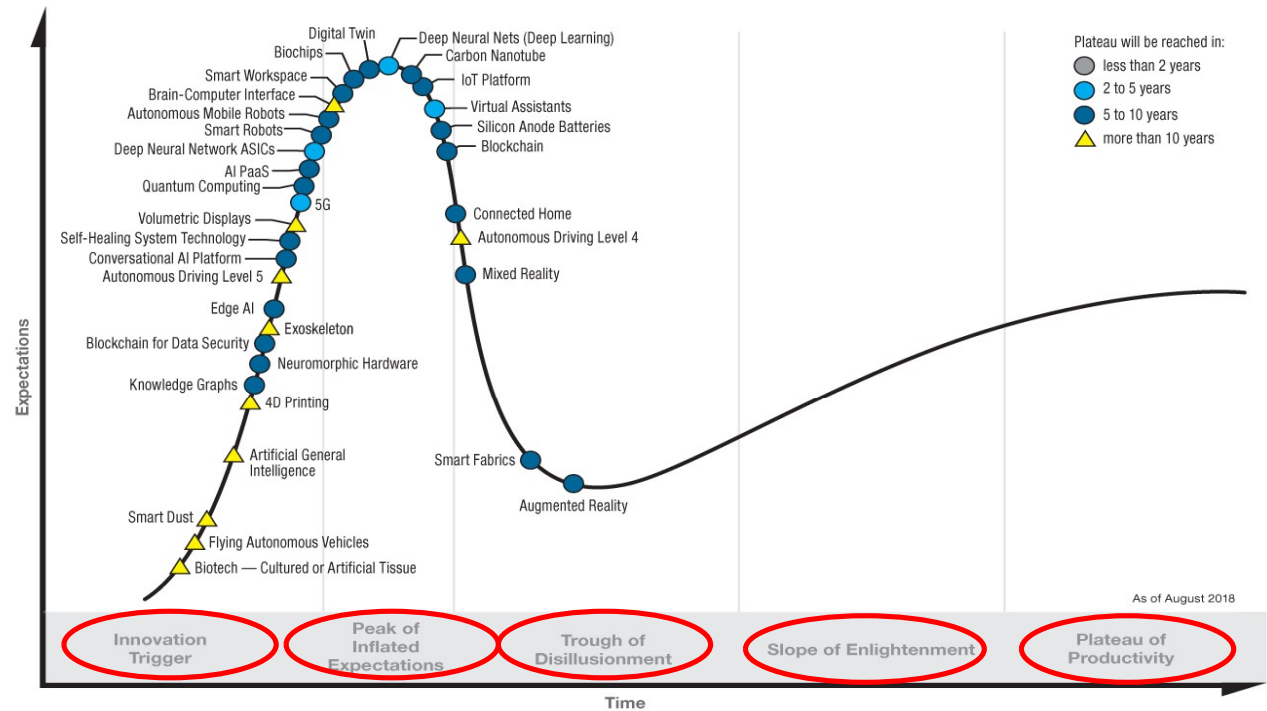
Research to Product Realisation



Hype Cycles

- Every Technology goes through the hype cycle

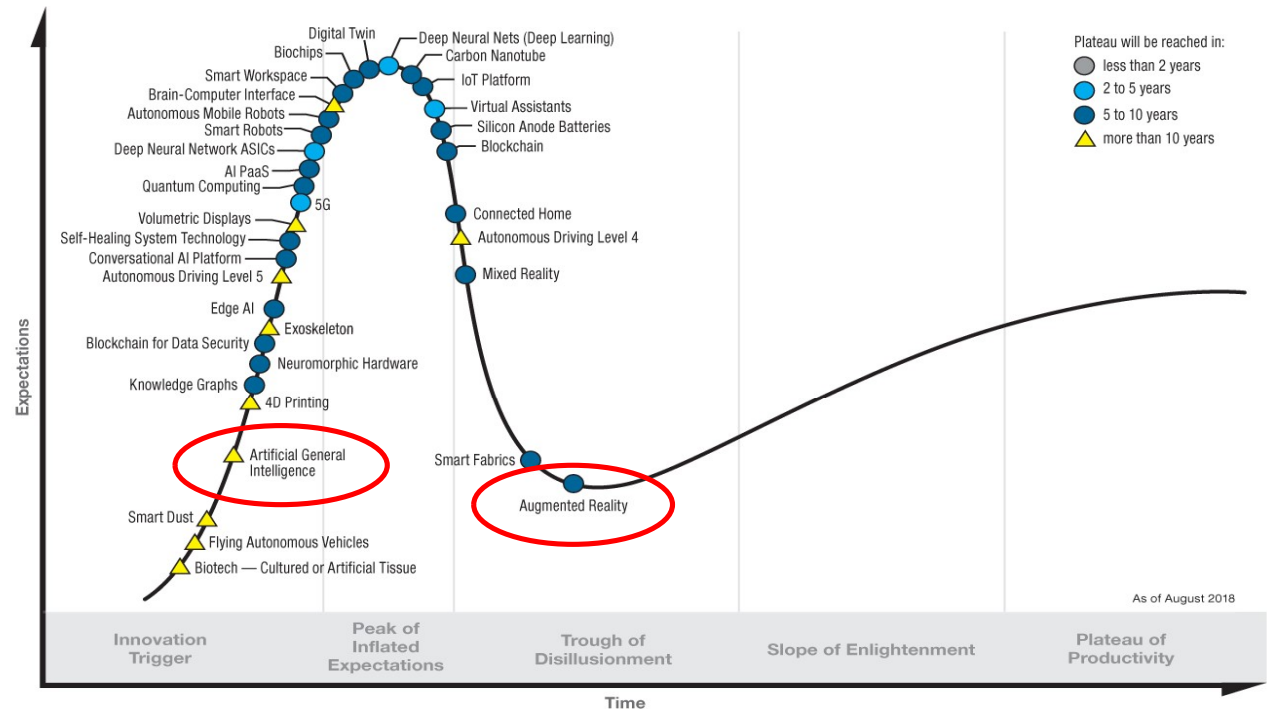
Hype Cycle for Emerging Technologies, 2018



Hype Cycles

- Every Technology goes through the hype cycle
- Augmented Reality was beginning its cycle 10 years ago
- Artificial Intelligence will go through the same cycle

Hype Cycle for Emerging Technologies, 2018



gartner.com/SmarterWithGartner

Source: Gartner (August 2018)
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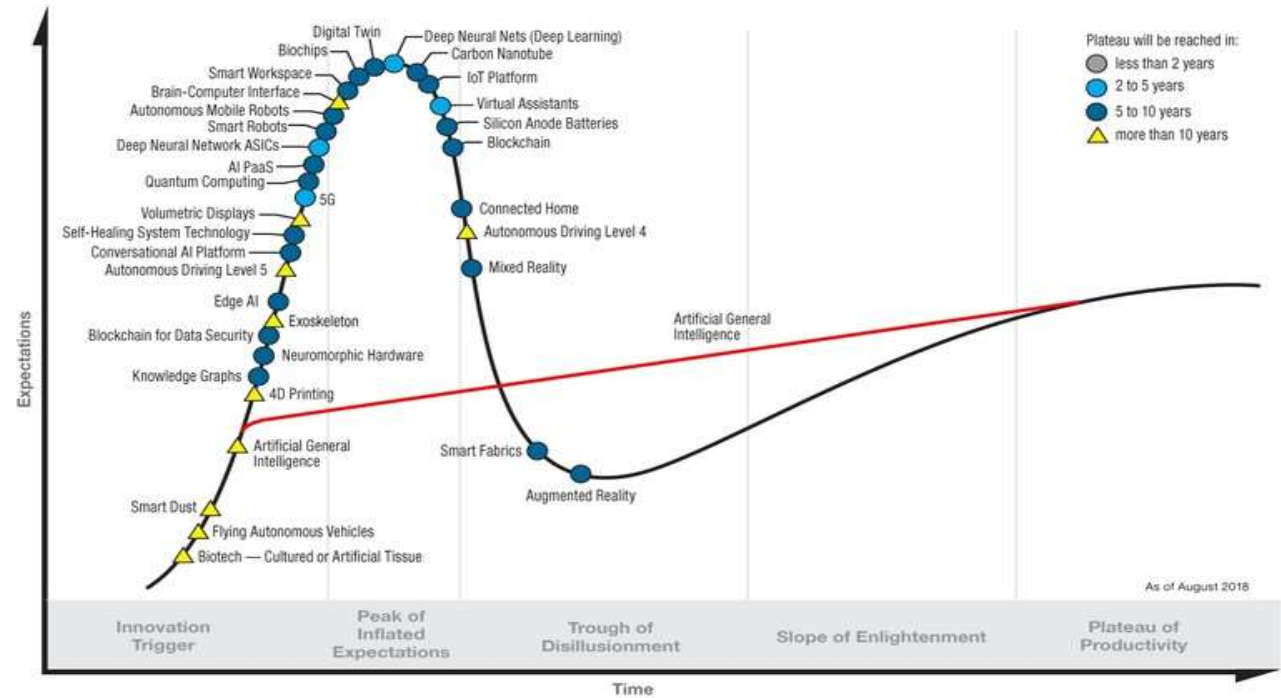


LinkedIn Article

Breaking News...

Finally, the Gartner Hype Cycle is defeated with Artificial Intelligence!

Hype Cycle for Emerging Technologies, 2018



gartner.com/SmarterWithGartner

Source: Gartner (August 2018)
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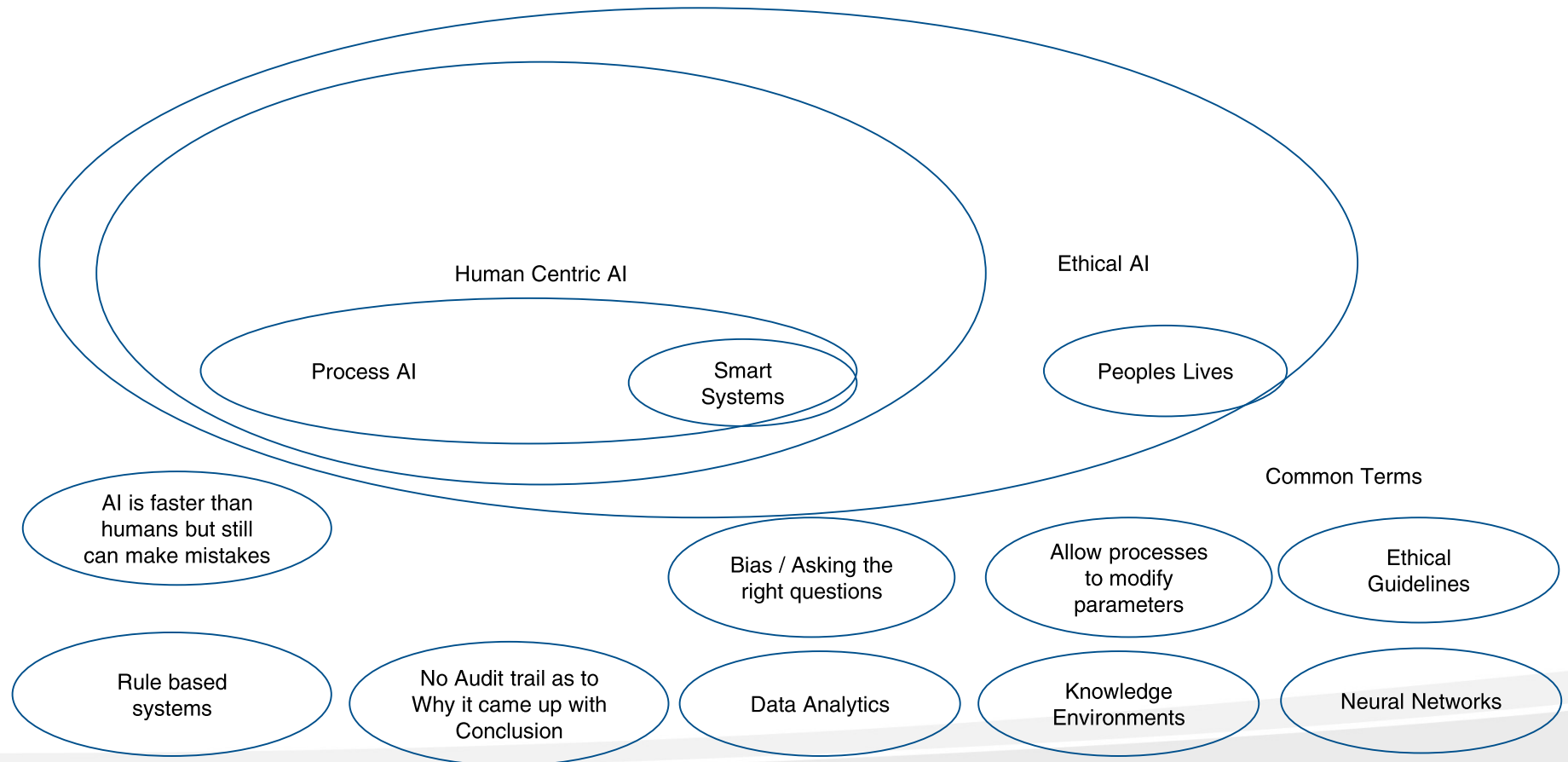




AI Concerns

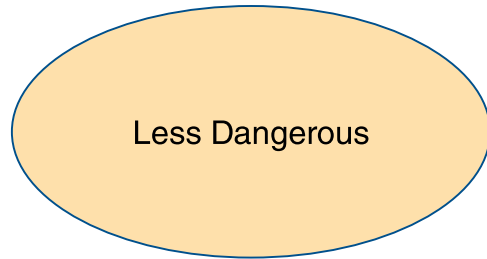
- Difficult to understand the context of the term “Artificial Intelligence” as it is widely used from shop-floor to board room
- Psychology and philosophy increasingly deployed in the science and technology fields and lines of ethics, bias and reality blurring
- In the context of “human interaction” in office application, clinics and call centres, we are too far away from “genuine human emotional response” (you write algorithms to answer questions – not create themselves without a purpose – remember the Microsoft paper clip?)
- In the context of shop floor systems, hardware, firmware, middleware and programming systems will need to be completely overhauled to allow the machines to make decisions based on the information available

Exercise to define AI parameters – TANet Meeting in TANet: Annual General Meeting Loughborough – Wed 20th March 2019



High-level AI Grid – To be detailed

Human in Control



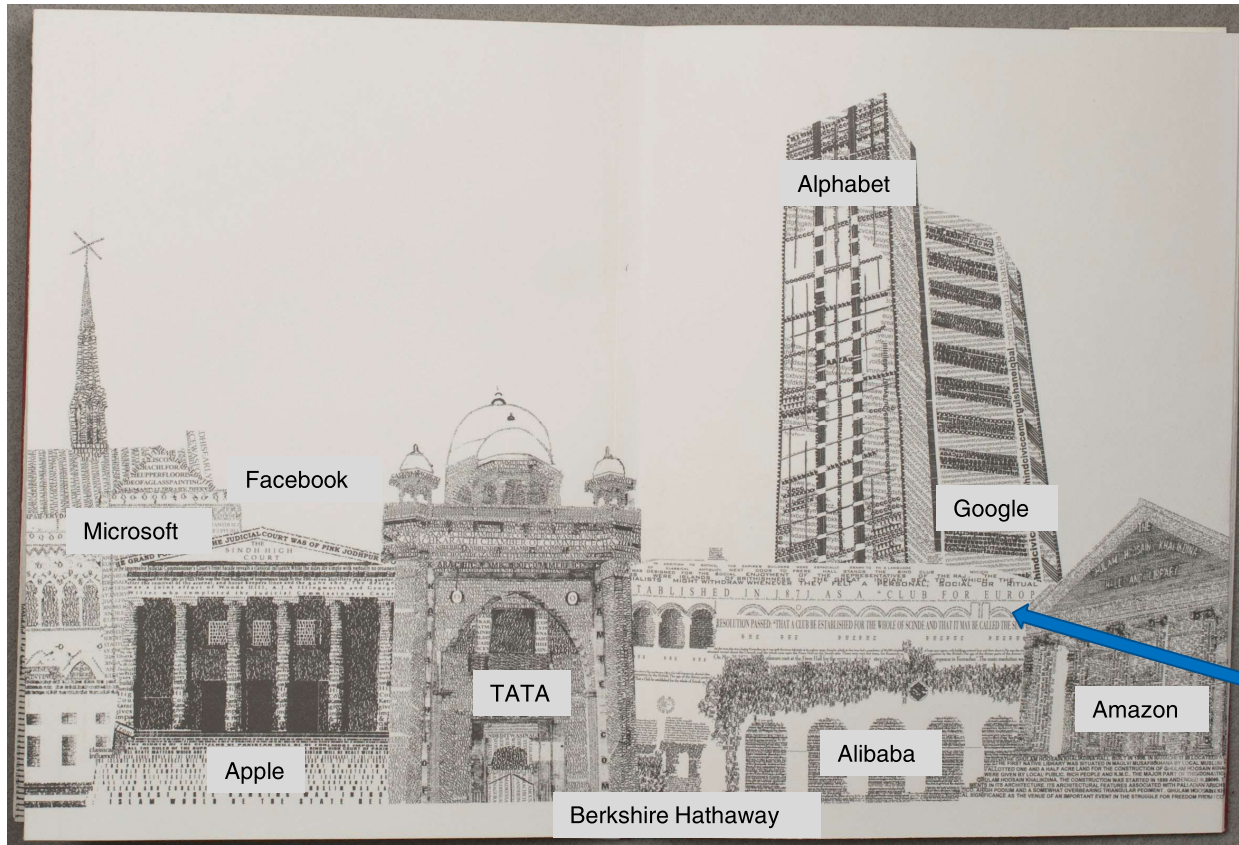
Endangering
Processes

Endangering
Life



AI in Control

Systems are the foundations of our civilisation



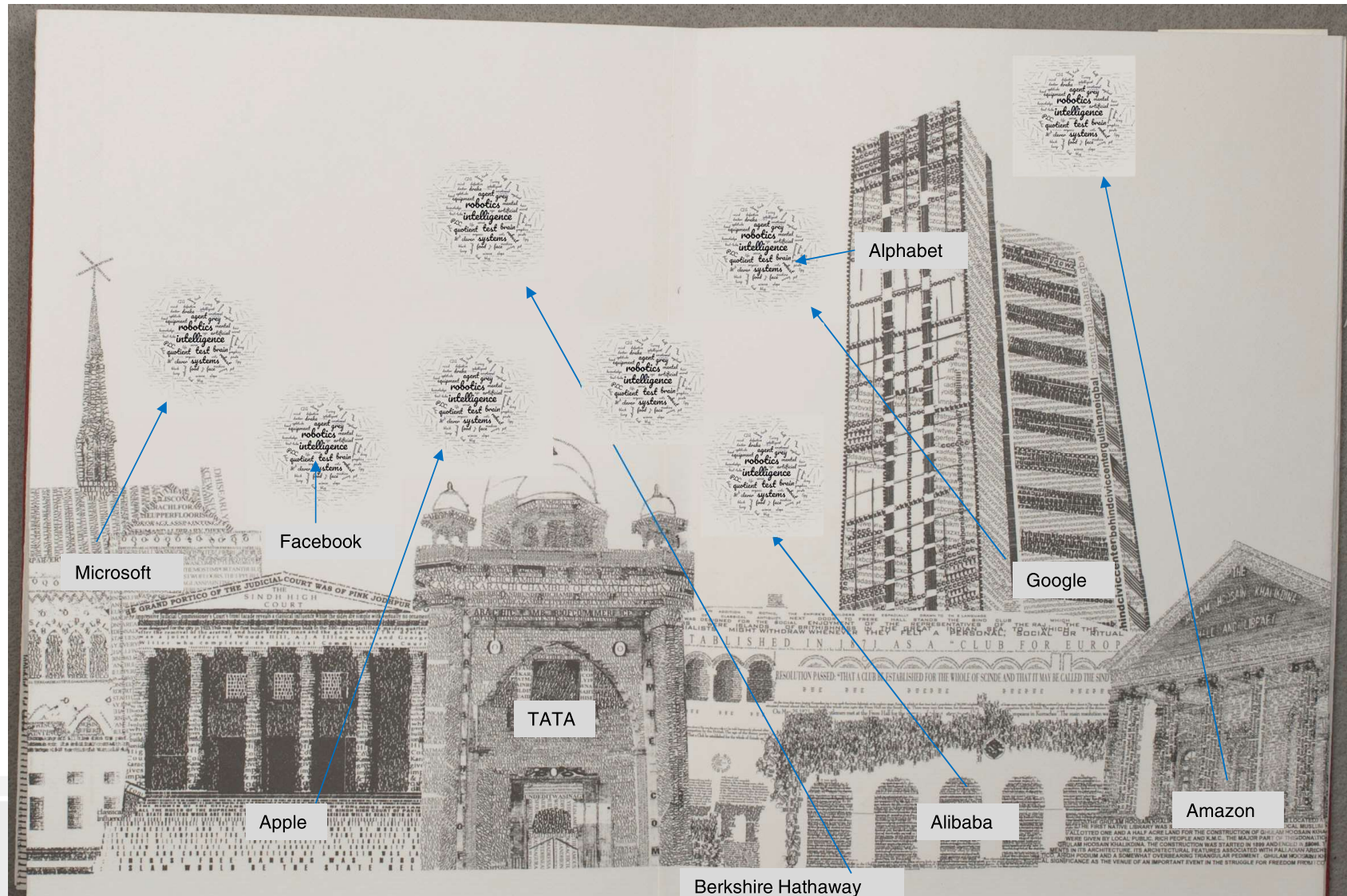
Underpinning all Conglomerate structures are:

- Products
- Services
- Data
- IPR

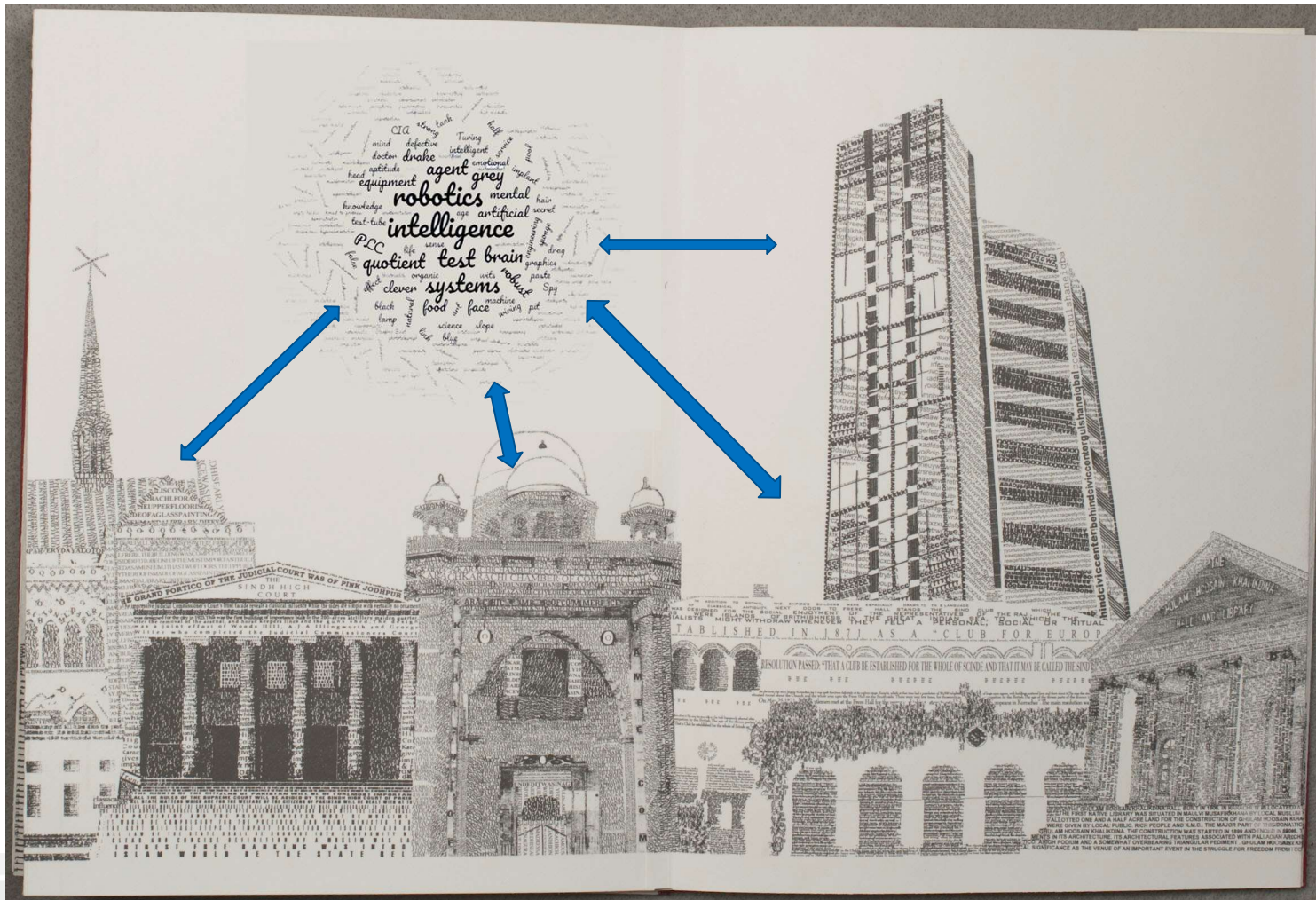
Typographic Art



All major players are turning to cloud systems to store knowledge and algorithms



Who will control the total knowledge of the human race?



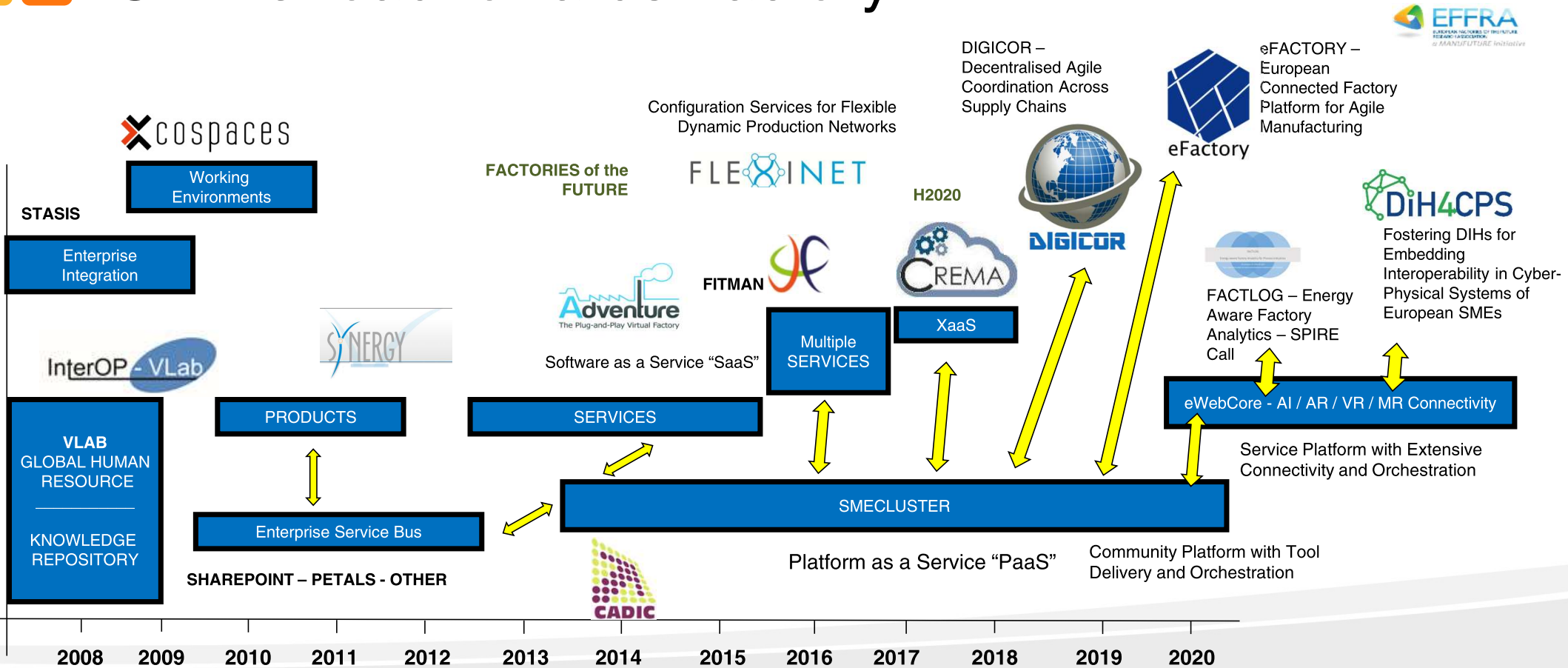


AI in Manufacturing

The benefits of involvement in Research Projects

Simon Osborne (Technical Director), Control 2K

On the road towards Factory AI



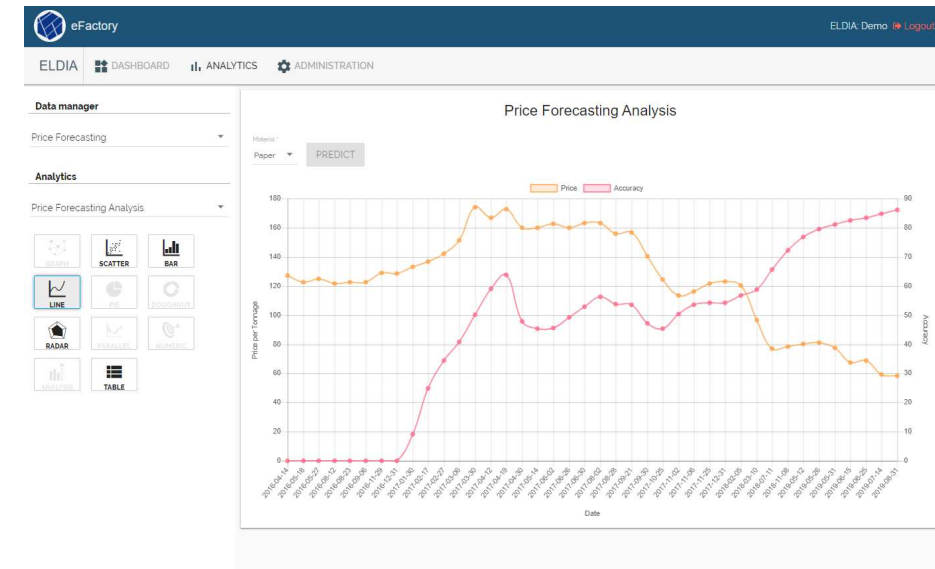
DIGICOR

- Collaborative Manufacturing
 - **Digital twin** of manufacturing processes
 - **Toolstore** offering tools from CREMA, FiWare and any other interoperable platform using
 - SMECluster representing the automotive domain
 - **Industweb as Factory Connector**
 - OPC UA + ISA 95 Semantics



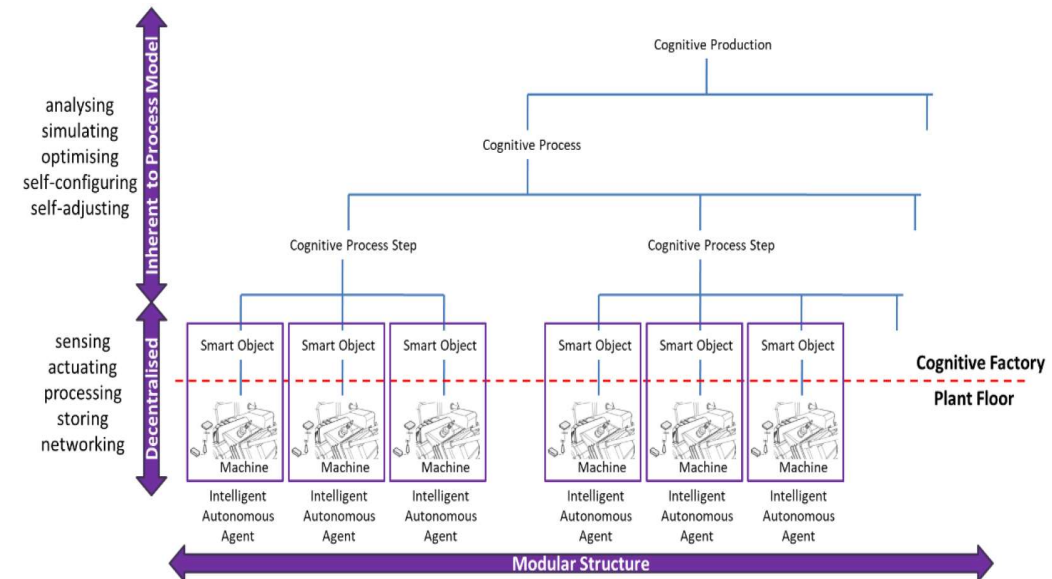
eFactory

- European Connected Factory Platform for Agile Manufacturing
 - Enable users to maximise **connectivity, interoperability** and efficiency across the supply chains
 - Federated **Marketplace**
 - **DataSpine** for interconnectivity between tools and factory data



FACTLOG

- Innovative concept of the Enhanced Cognitive Twin (ECT)
 - The combination of quantitative-driven (**ML + data analytics**) and qualitative-driven approaches
 - Brings together the **computing capacity** of machines and the **human knowledge** and insights

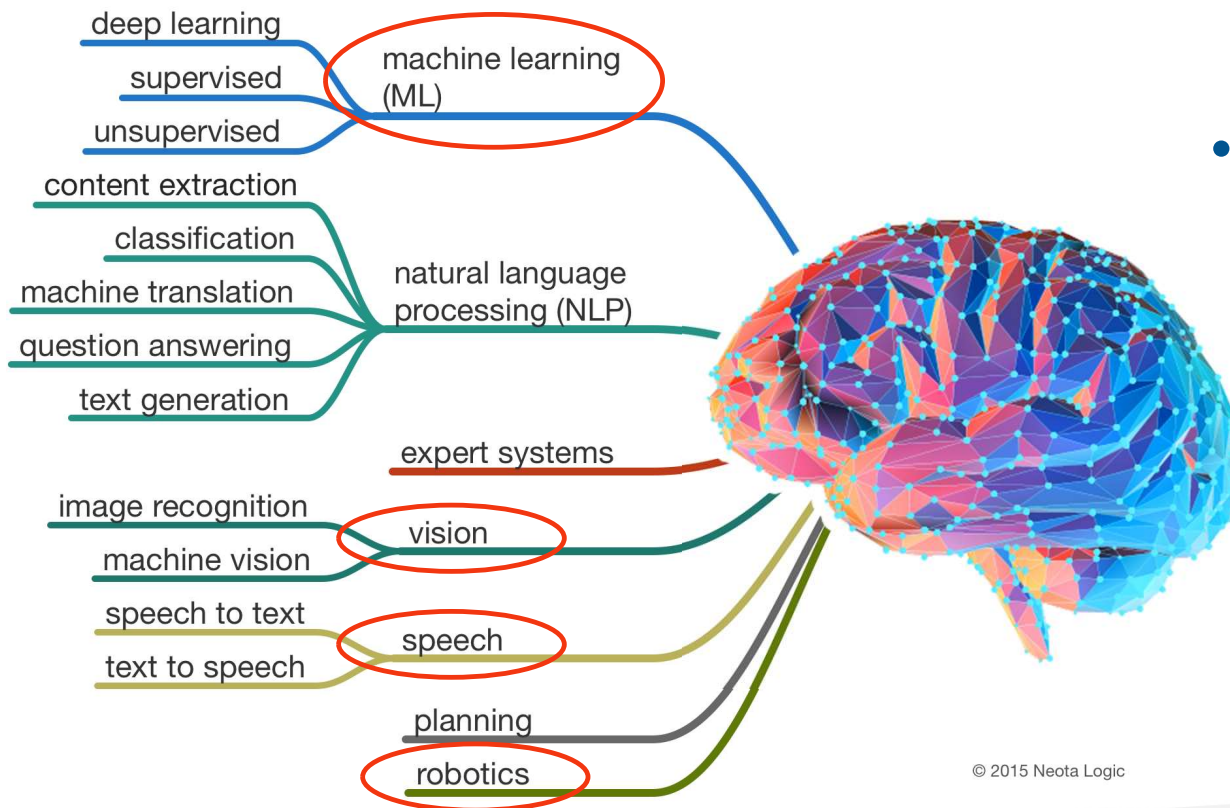


Industreweb Business Case

- Industreweb as Glue between systems
- Links with diverse shop floor data
- Research feeds innovation
 - Supporting new applications
 - Developments in Machine Learning



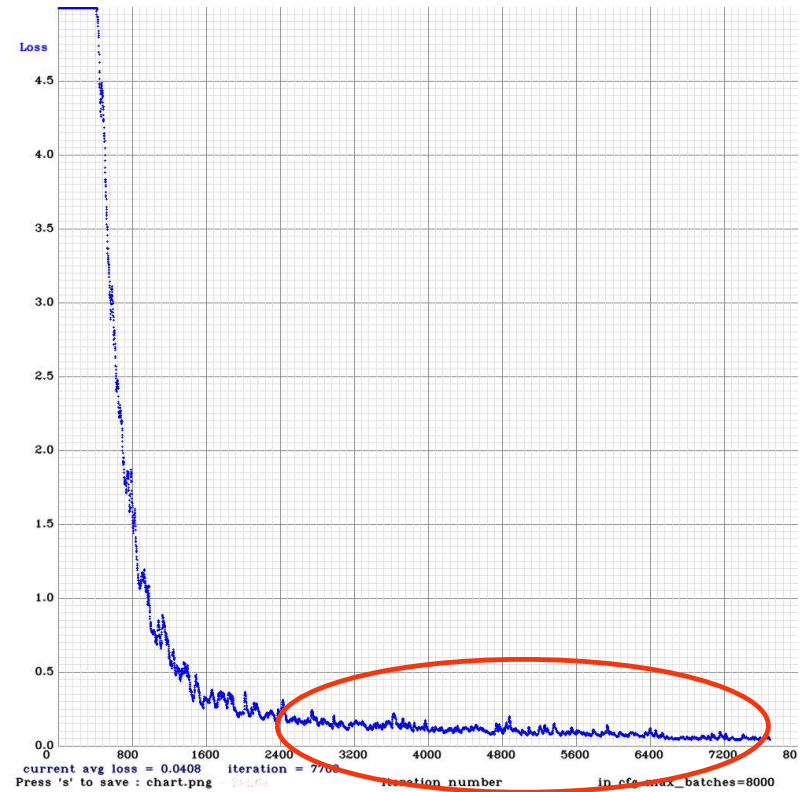
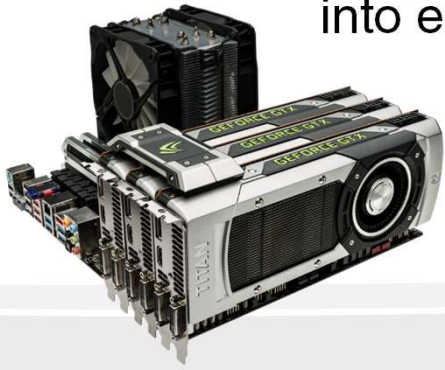
The AI Landscape



- AI Covers a spectrum of disciplines
- Open Source Frameworks make it accessible
 - Machine Learning
 - TensorFlow
 - Caffe
 - Vision
 - Yolo

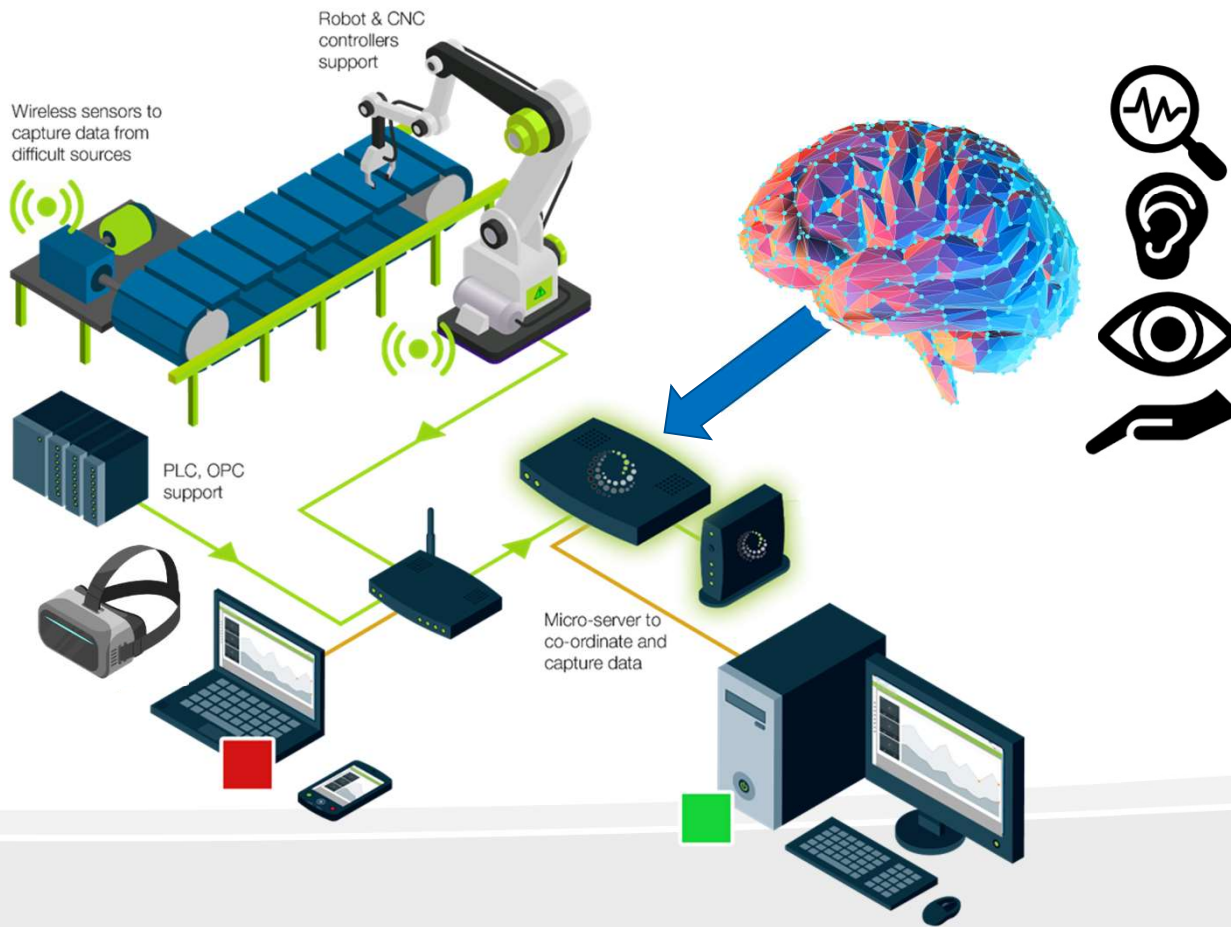
Machine Learning in Practice

- Training
 - Nvidia GPU dependant (CPU's too slow)
 - Training 1-5 days+ dependant on dataset
- Processing
 - **GPU** – fast real-time detection
 - Vision Processing Unit (**VPU**) – integration into edge computing



Batches of 1000

Application of Industweb 4.0



- Interfaced with all sources of data
 - All common sources shop floor data
 - Actively monitoring and acting upon events
- AI providing insight to process
 - Speech Recognition
 - Image Recognition
 - Pressure / Tactile Feedback
 - Analytics / Prediction industrial datasets



In Summary

- Translating AI research into products that solve real customer issues
- Taking a real world approach that recognises the realities of production demands, and influencing factors such as cost, risk and trust
- See our current developments this afternoon & speak to us about participating in research projects

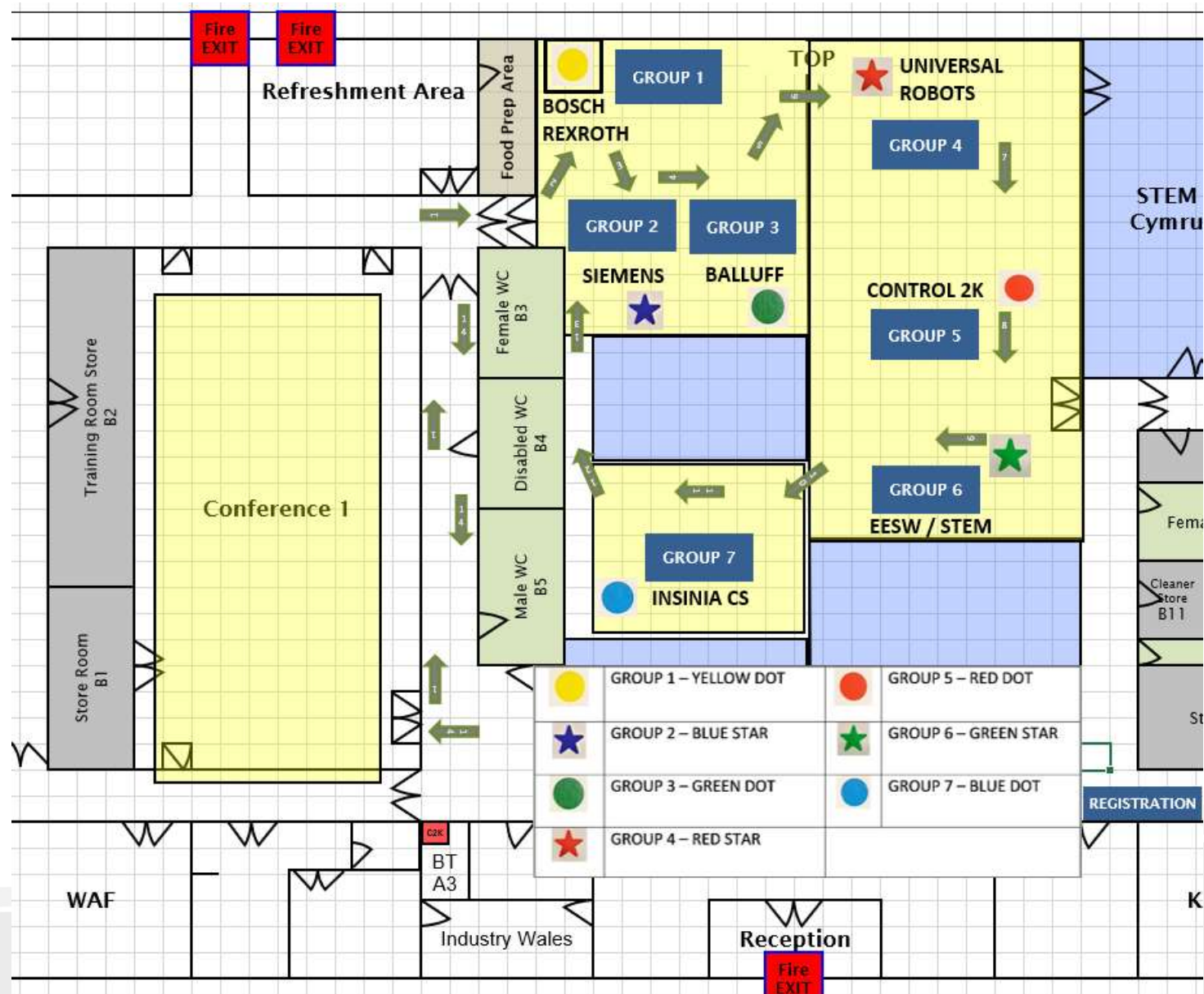


Session 2

Demonstrations

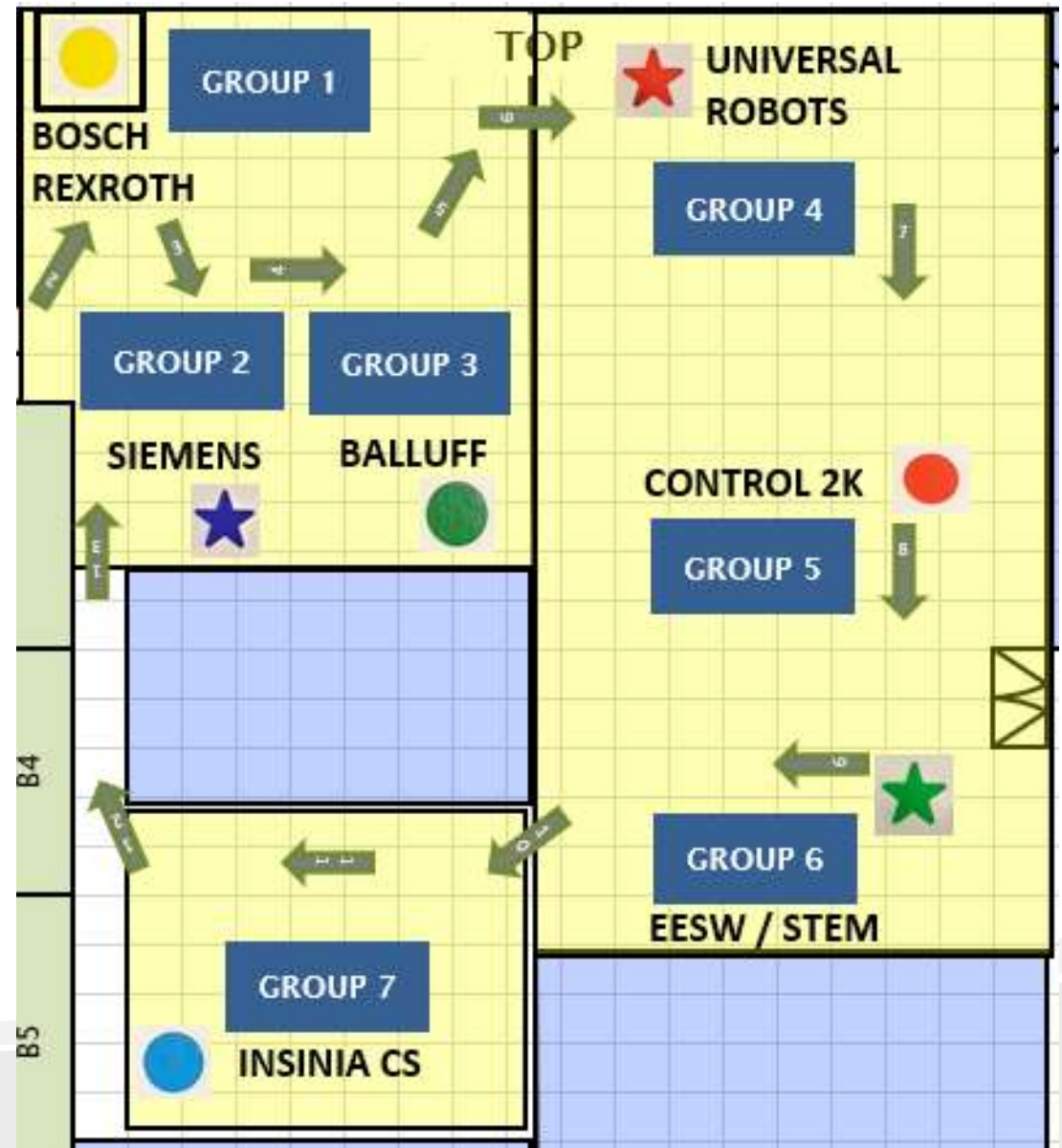
Centre Layout

- Getting your bearings
- Please stick to the time
- Remember you have Lunch break to ask further questions



After Coffee

- Straight after coffee you will hear an “Intelligent Whistle” blow once please move to your allocated group
- The “IW” will blow twice and the group starts
- “IW” blows once... that means 1 minute to go before you must move
- “IW” blows twice... move to next group as quickly as possible





Session 3

**Panel discussion and Feedback from sessions 1 and 2
(12:20 – 12.50)**



Panel Members

- Kevin Greening – Ford Motor Company
- Michal Zlotek - Siemens
- Julian Ware - ABB
- Robert Brown – CBM
- Jon Dixon – UR Robots
- Normal Hurley – Balluff
- Eoin Bailey – Celsa UK
- Mike Gillard – Industry Wales



Session 4

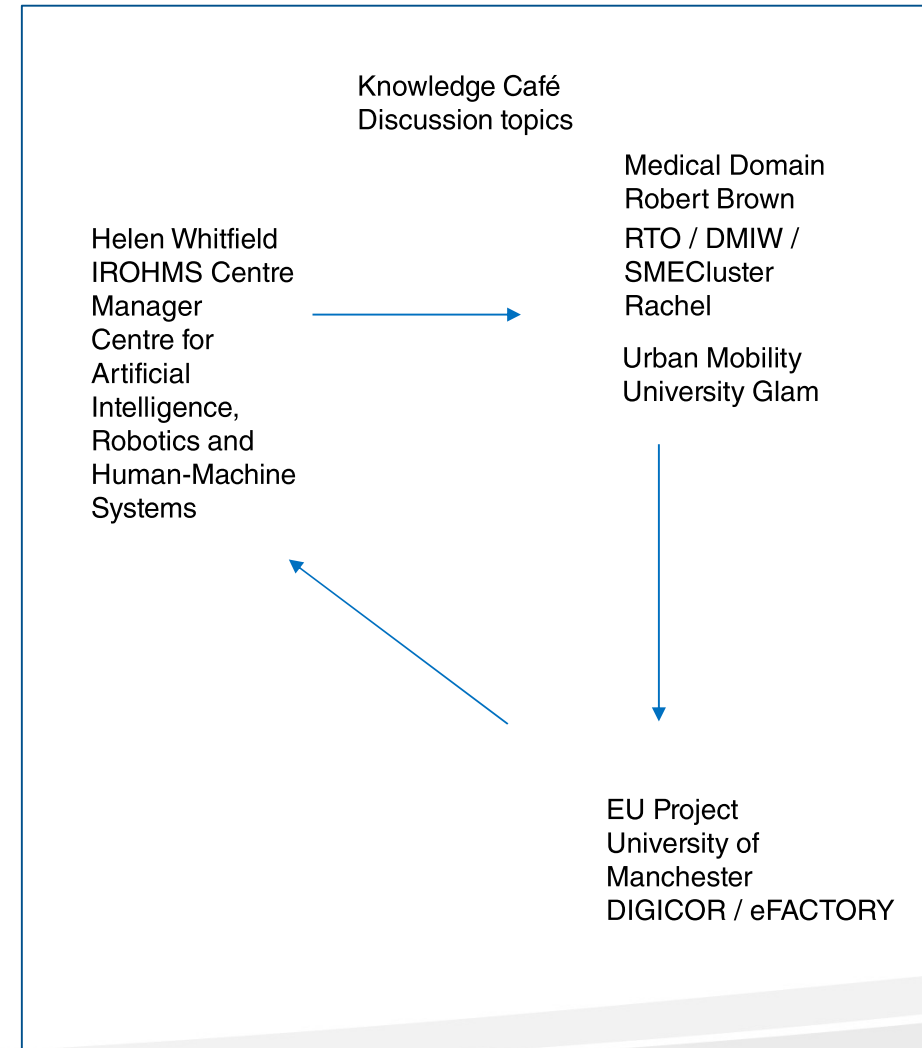
Knowledge Café

Knowledge Café

- Small Discussion Groups to get feedback from the days events and look at the next steps and discuss follow up actions.

Session 5 – Open Forum (14:45 – 16:00)

- After the coffee break, if you feel you want to go back to any of the topic areas you can have a more focused discussion with the facilitator of the group.





“Thank You”

Gurbaksh Bhullar

www.smecluster.com

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Control 2K Limited

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