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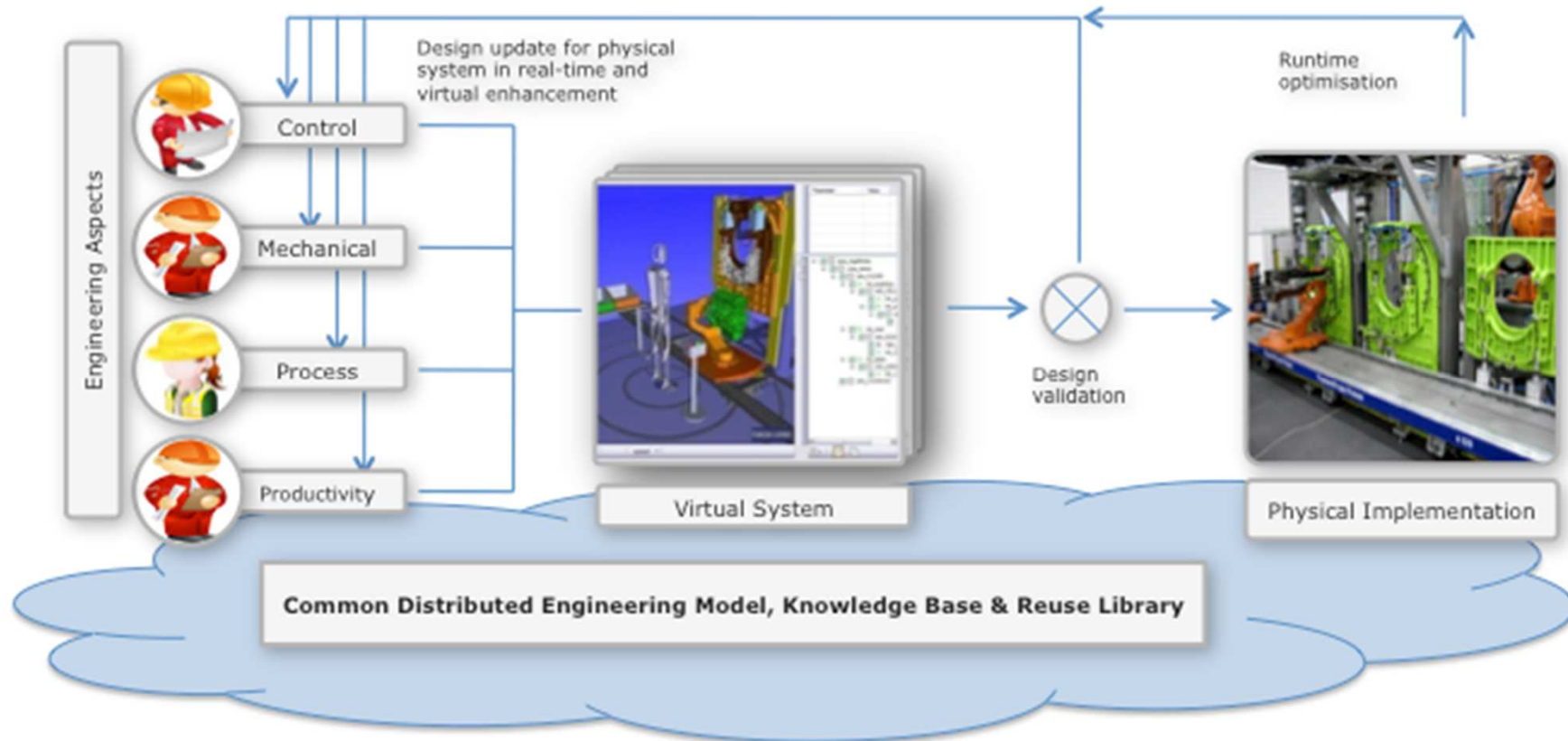
Knowledge Driven Configurable Manufacturing (KDCM)

Flexible & Reconfigurable Manufacturing Systems
EP/K018191/1   April 2013 to March 2018

Robert Harrison, Automation Systems, Warwick
Andy West, Embedded Intelligence, Loughborough

EPSRC
Pioneering research and skills

Fully Distributed Systems

invotec

HSSMI
HIGH SPEED SUSTAINABLE MANUFACTURING INSTITUTE

GE Aviation

Ford

JAGUAR
LAND ROVER

Embracing Industry 4.0, 30 November 2015
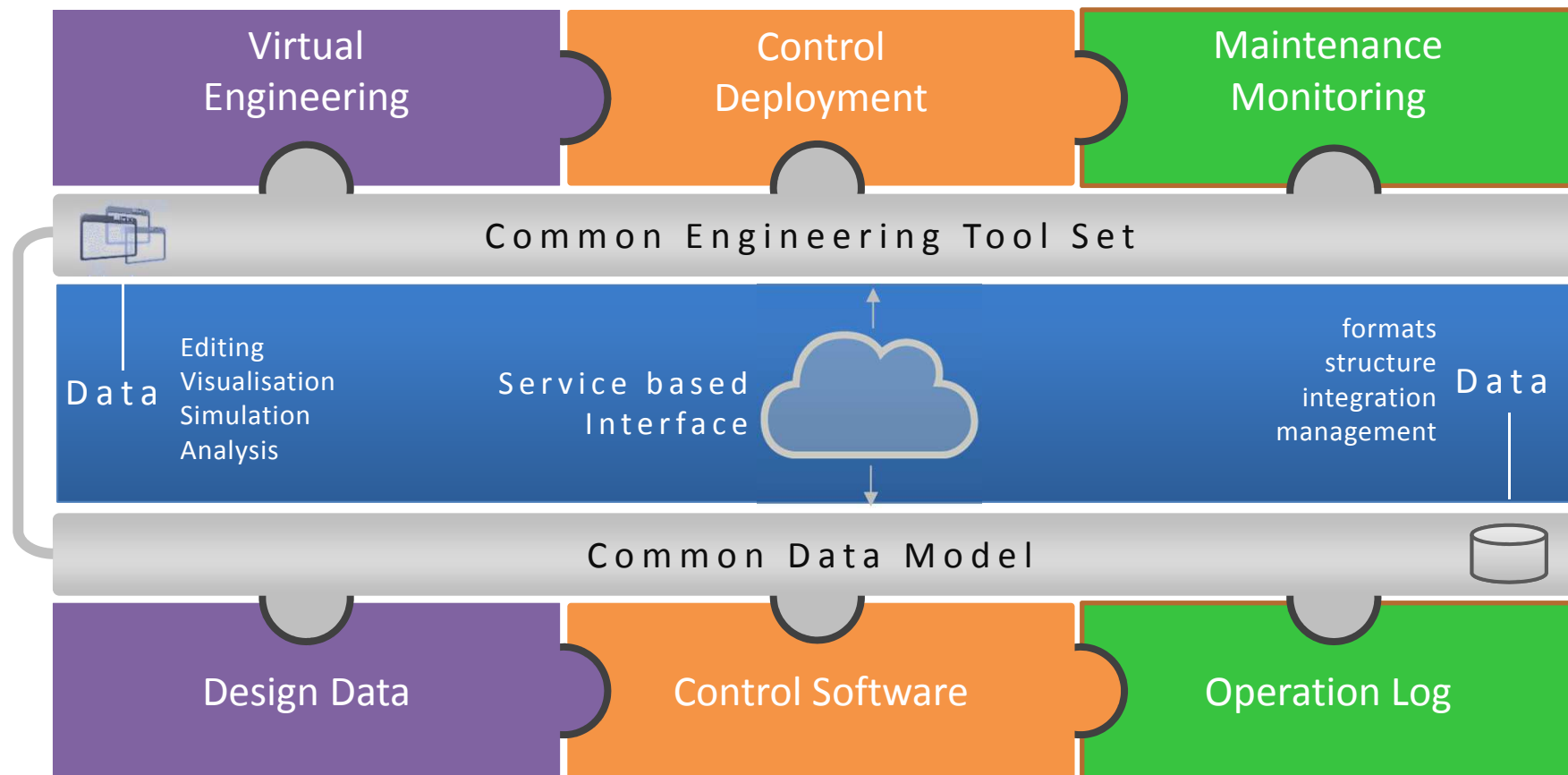
Aim – Digital Automation Lifecycle Support

Current problems are poor validation, retention of knowledge, reuse, agility

- *Real and virtual representations aligned throughout the lifecycle*
- *Component-based modular reconfigurable systems*
- *Knowledge captured within the system drives future design optimisation*

Objectives

- Improve the reuse of manufacturing systems from both design and physical perspectives.

- Reduce the time and cost to deploy and commission such systems.

- Improve the retention of knowledge and lessons learned as systems iteratively evolve.

- Enhance the provision of system lifecycle support.

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KDCM Lifecycle Environment

Design   Build   Operate

| Virtual Engineering | Control Deployment | Maintenance Monitoring |

Common Engineering Tool Set

Data

Editing
Visualisation
Simulation
Analysis

Service based Interface

formats
structure
integration
management

Data

Common Data Model

| Design Data | Control Software | Operation Log |

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Project Impact

- **KDCM VueOne lightweight toolset**
  - Integrated virtual process planning and automation deployment
  - Closing the digital loop via OPC-UA and Web services
  - Phased use by industry

- **Alignment and application with industry at scale**
  - Multi PLC/IIoT platform deployment
  - Aligned to user standards
  - Lifecycle value demonstrated

- **Embedded intelligence within the product**
  - Traceability, automation decision support, analysis services

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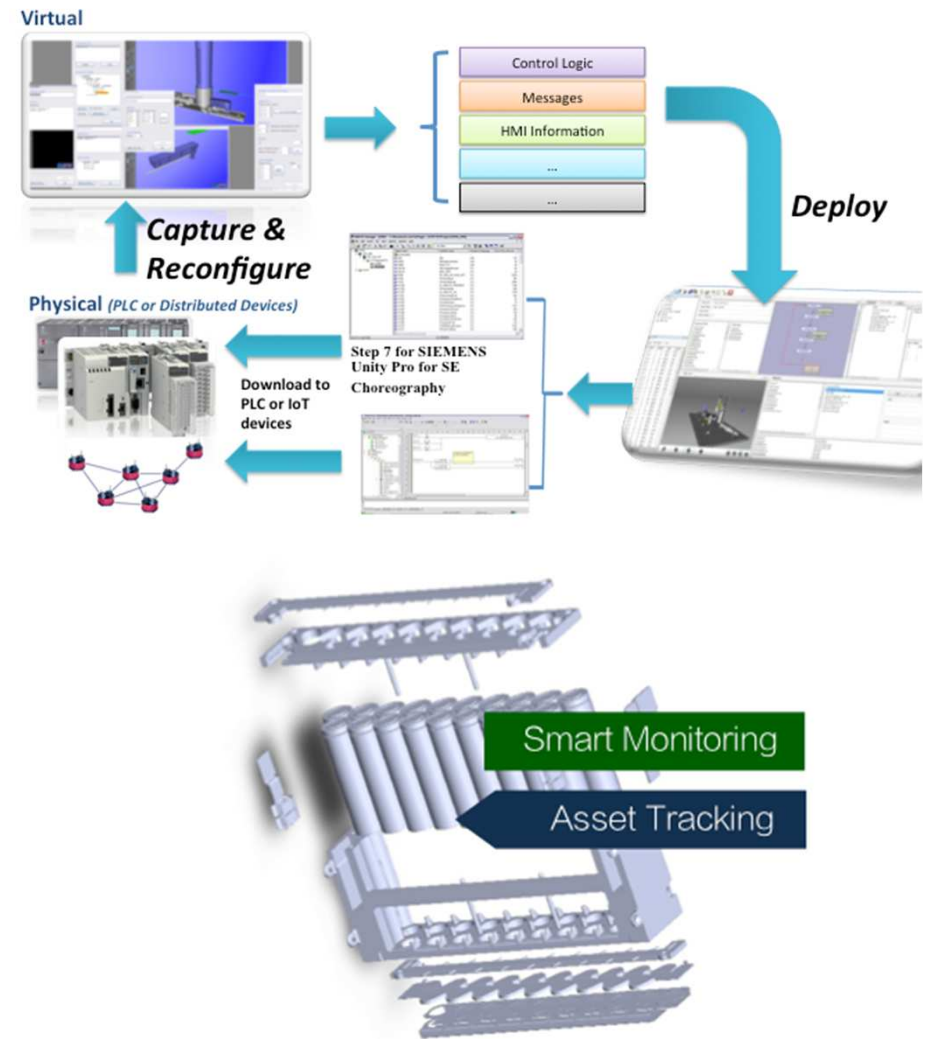
Future challenges & opportunities

- **Technical progression**
  - Web-based KDCM environment
  - Mobile KDCM applications
  - Service-oriented engineering

- **Need to validate at scale with the supply chain**
  - WMG full-scale autonomous systems
  - WMG-located HVEMS and AMPLIFII pilot lines for automated battery and electric motor assembly

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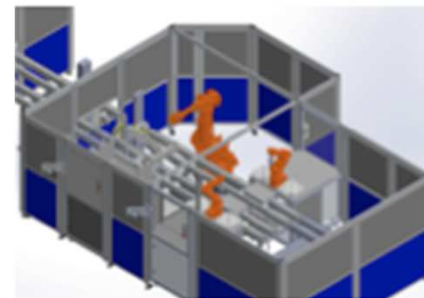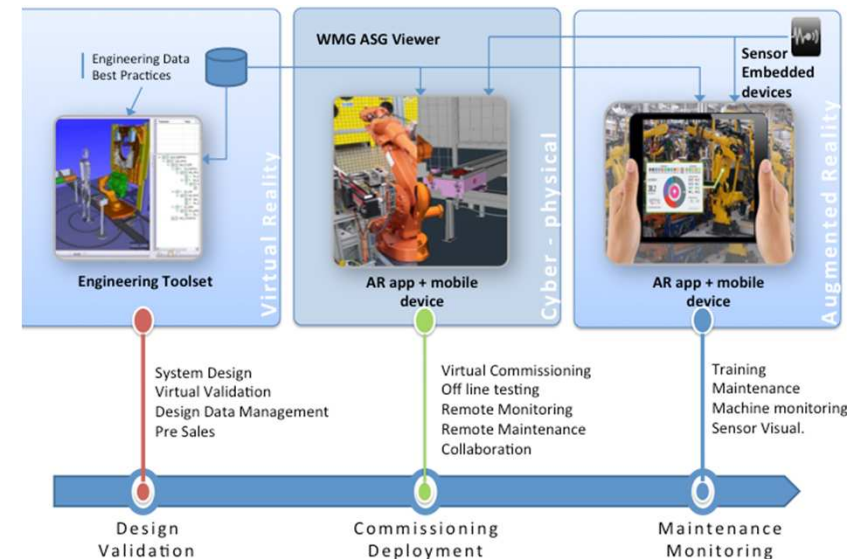
Thank you

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