eama
Engineering and Machinery Alliance

Submission from the
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Agricultural Engineers Association
British Automation and Robot Association
British Compressed Air Society
British Fluid Power Association
British Paper Machinery Suppliers Association
British Plastics Federation
British Turned Part Manufacturers Association
Gambica
Gauge and Toolmakers Association
Manufacturing Technologies Association
Printing Industry Confederation
Processing and Packaging Machinery Association
UK Industrial Vision Association

UK Digital Strategy

The Alliance's 13 trade associations represent 1,900+ companies, mostly in mechanical and electronic engineering, with sales of £9+ billion into the main supply chains (including automotive, aerospace, food, medicine, pharmaceutical, defence, oil and gas, offshore wind etc.), providing equipment, components and services.

1. Background

1. The main, initial focus of the Government's Digital Strategy has been to help improve the 'UK Citizen's' experience of government in all its forms, whether as services or at the ballot box, nationally, regionally or locally.
2. As the strategy has developed, further consideration is being given as to how the UK economy could and should benefit in other areas.
3. For example, the recently published (15 January 2016) Ecorys UK report "*Digital Skills for the UK Economy*" takes a much wider view, working up broad case studies across five sectors and referring specifically to manufacturing, including the UKCES report "*Sector Insights: skills and performance challenges in the advanced manufacturing sector*" (June 2015).
4. Clearly, the UK's Digital Strategy should also help data user industries make the most of their digital opportunities and not the least of these should be the engineering companies providing the hardware and software that facilitate the use of digital technologies.
5. The engineering sector has deployed digital technologies since the 1970s (automation and robotics) to revolutionise process control of ever more complex production systems as the capacity of microprocessors expanded rapidly (Moore's Law).
6. To scale this, manufacturing stores more new data annually than government and banking combined according to IDC/McKinsey Global Institute analysis, 2010 petabytes:
    a. Manufacturing 1,812
    b. Government 911
    c. Banking 773
    d. Retail 424
7. Mass data has already revolutionised service sectors such as retail and travel and shows and the potential in manufacturing is massive.
8. Some countries are very much alive to the fact, e.g.:
    a. The German government is investing €200 million to further research across government, academia and business into Industrie 4.0 (digitised manufacturing)
    b. The Obama administration announced its intention to set up an Innovation Institute for Digital Manufacturing and Design as part of its $200 million investment in three manufacturing institutes.
9. So are some companies (viz Bosch and Siemens in Germany and in the USA GE as the "digitised industrial company").

2. The potential

In manufacturing, unprecedented access to data and analytics through digital based technologies provides two big prizes:

1. It will enable all manufacturers to operate more:
    a. Cost effectively, cutting waste
    b. Efficiently, reducing errors
    c. Sustainably, designing products for recycling and the circular economy
    d. Safely, reducing accidents.
2. Original Equipment Manufacturers (OEMs) with complex supply chains will be able to manage their suppliers so precisely they will be able to offer mass customisation – the manufacturer's ultimate goal making a batch size of one profitable.

3. The process

1. In this latter scenario raw materials communicate wirelessly with machines as products are 'in charge' of their own manufacture through intelligent control systems.
2. This is no longer just a hypothetical vision; it's being implemented in some factories now.
3. It relies on high precision industrial automation and motion control systems.
4. Newer manufacturing related processes such as additive manufacturing, industrial screen printing (for interactive products) and predictive maintenance are digital-based and therefore part of the overall system vision.
5. Individual supply chain companies, large and small, work independently but in real time and in tandem thanks to the digitised manufacturing management system. Competition is increasingly systems based with all members reliant on each other for success.

4. Example wider UK benefits

1. The benefits of digitised manufacturing include the freedom to design products based on mass observed/analysed experience to meet circular economy objectives (sustainability) with lower associated industrial emissions.
2. It will also create new types of well-paid jobs in manufacturing.
3. Lower emissions and new jobs will in some cases mean that certain manufacturing plants can be sited in or much closer to residential neighbourhoods reducing the distance that workers have to travel in their daily commute and in doing so contribute to the lower carbon economy the UK wishes to become.

5. Next steps

1. Putting aside for a moment the obvious international competitiveness issues, there is a danger that unless there's some clear direction to the way the UK picks up the challenge, companies' currently diffuse efforts won't be brought together to spark off each other and their practical experience could all too easily be dedicated to various individual technology initiatives (e.g. additive manufacturing)
2. Engaging cross-functional and cross-sectoral stakeholders will help ensure that technical risks and opportunities for innovation are usefully defined so that the key underpinning issues are addressed at both at high-level and individual technology level,e.g.:
    a. training resources dispersed, but need to provide the skills to design, implement and manage such integrated systems. Needs to be addressed at all education levels.
    b. Investment options new technology and small tech start-ups
    c. security at all levels; systems and infrastructure capabilities and capacities, nationally and internationally
    d. generating collaboration between large OEMs and their supply chain companies (SMEs) and academia as well as between supply chain companies themselves
    e. data sovereignty – ensuring that data critical to UK business success is processed and stored with transparency and integrity
    f. import and export risks
3. Once a supplier is part of the systematised integrated supply chain using these technologies it will be that much more difficult for their competitors to break in and pick up their business, but the investment in automation, process excellence and process control required is much higher than UK firms have tended to make in the past, so a culture shift may well be required.
4. Demonstrators are a logical way to move perception, understanding and practice. They will enable firms to collaborate and plan so that they harness the flexibility, precision and connectivity in optimised 'bite' size chunks in the changeover and then continuing into the future as they successfully add new offerings.

5. After companies have made such investments to meet specific standards it will be important that governments of all EU Member States have rigorous and transparent market surveillance systems checking that all products on the market claiming to meet the same standards do in fact do exactly that (with evidence accordingly).
6. EAMA members are keen to widen member companies' awareness of the opportunities available to them to expand their offerings and capabilities as well as their profitability thanks to the greater precision that can be achieved with digitised operations and therefore politely ask to be informed of any initiatives that come out of the Digital Strategy.