Materials Processing Institute

1944 - 2019 75 YEARS OF INNOVATION

Application of Industrial Digital Technologies

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PRISM

Overview

1. Introduction to Institute, the PRISM programme and the application of Industrial Digital Technologies
2. Development of Augmented Reality Applications
3. Development of the ThingWorx IIoT platform
4. Big Data and Digital Twin Developments
5. Application of Blockchain Technology

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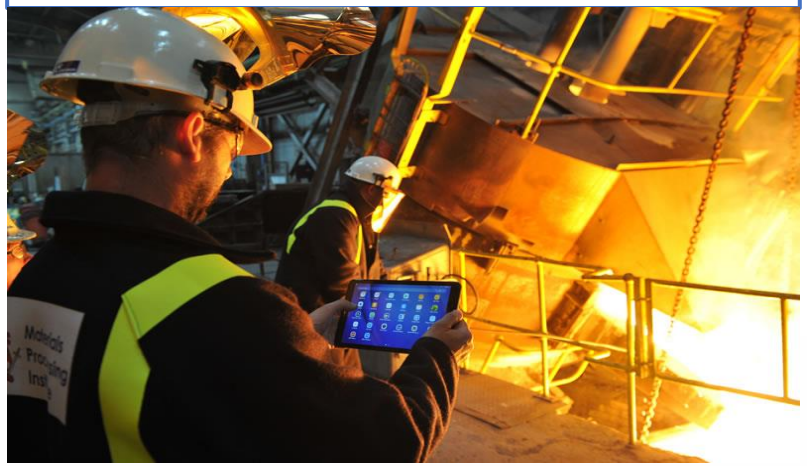
Introduction to the Institute

- The Institute is independent and not-for-profit.
- Developing new technology, process improvements and steel grades.
- Working with the materials sector globally.
- 8:1 return on investment for research projects.



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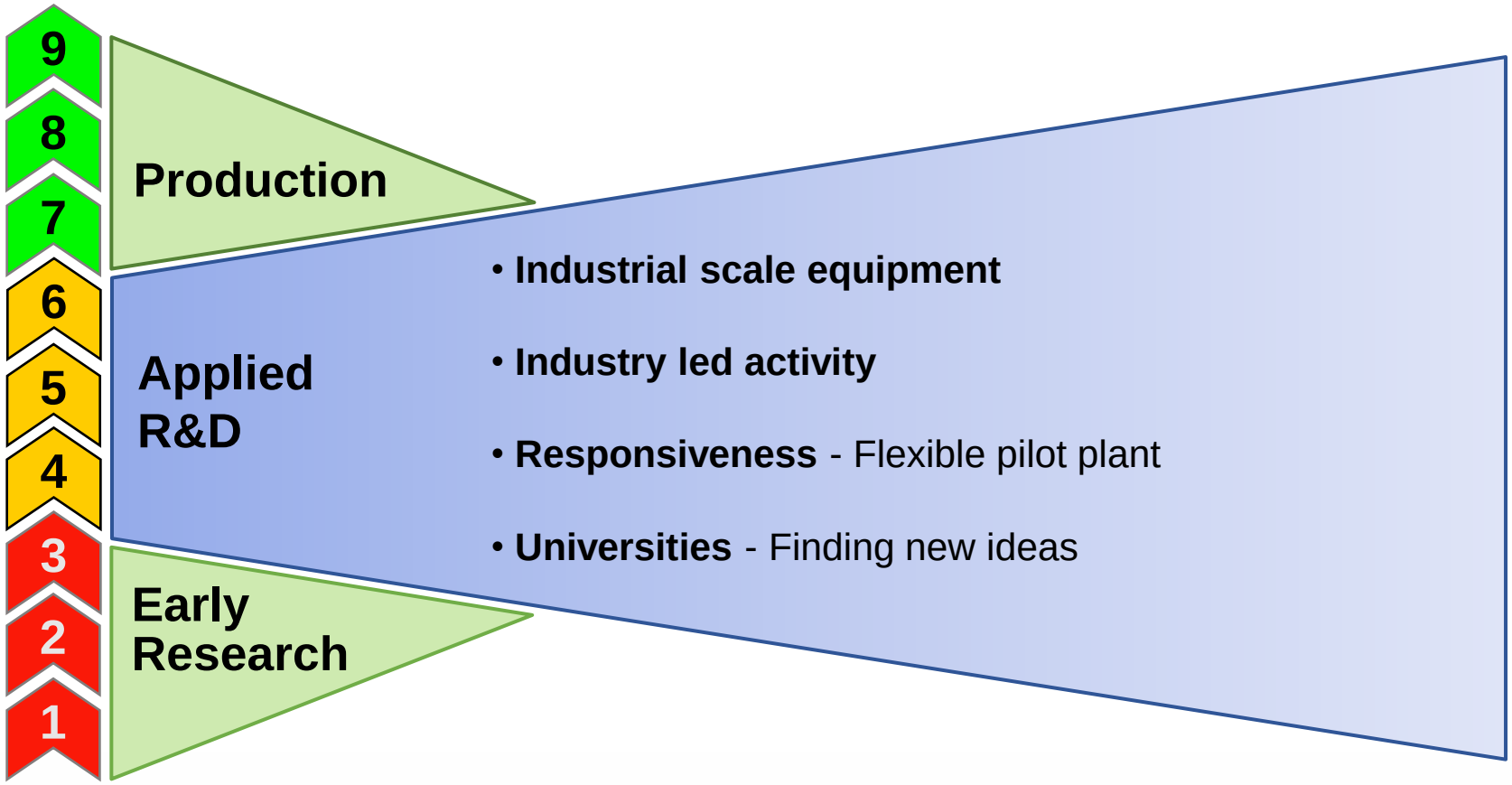
Innovation Landscape



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Services

1. **Research Services**
   - Research programmes
   - Specialist testing, e.g. failure analysis
2. **Consultancy**
   - Technical due diligence
   - Capex due diligence
   - M&A assessment: market or technology
3. **Training**
   - Bespoke, specialist courses
   - Standard Institute courses
4. **Specialist Melting**
5. **Library & Information Services**
   - Patent, IP, literature searches
   - Alerting bulletins

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PRISM - Objectives

1. To enable the Materials Processing Institute to help improve the competitiveness of the ***UK Steel and Metals Sector*** by providing research and innovation services in the areas of:
   - Transition to a Low Carbon Economy
   - Digital Processing
   - Circular Economy in Metals
2. To develop and enhance facilities and capabilities at the ***Materials Processing Institute***, providing underpinning funding for development of sustainable long term revenue. (similar to the *core funding* available for Catapult centres, but more directly linked to innovation project activity).
3. To support ***Government*** aims to achieve net zero by 2050, improve business productivity and competitiveness and level up across the nations and regions of the UK.

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PRISM - Types of Project

Type of Project	Description	Funding Rate (%)
Core	Development of platform technologies, with results fully disseminated. Support dissemination and knowledge transfer.	100
Collaborative	More than one industry partner working together with the Institute. Partners decide collectively what to publish.	50
Private	Potentially only one industry partner. May be completely secret activity.	25

Note:

- Funding rates have been set to ensure state aid compliance, whilst retaining industrial relevance.
- The funding rate relates to the percentage of the costs of the Materials Processing Institute that are paid by the programme. The balance of funding needs to be a cash commitment from the partners.
- All projects must have some ***innovative*** content to be eligible (i.e. qualify for UK R&D tax credit relief).

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PRISM Features & Benefits

The programme has unique features compared to more traditional funding options

Programme Features	Programme Benefits
Projects are relevant to specific partner needs, not tailored to meet a specific call	Accessibility is increased, preparation costs reduced
Reduced red tape leads to faster implementation	Shorter return on investment
Technology Readiness Levels 4 - 7 (demonstration, scale-up & commercialisation)	Revenue from implementation & commercialisation
Applies to the whole UK Metals Sector supply chain	Larger challenges can be addressed, more partners mean lower individual costs
Sharing & dissemination of results according to project agreement	Commercially Confidential

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The Digital Steel Plant

- 7T AC Electric Arc Furnace
- Combined vacuum degassing and ladle furnace
- Continuous casting
  - Billets and mini-slab
  - Up to 20m cast length
  - Suitable as direct mill feed
- Ingot casting: slab, 5T and 5.9T square
- All Data collected in ThingWorx Industrial Internet of Things Platform
- Artificial Intelligence based model to examine data to optimise operational efficiency
- Augmented and Virtual Reality used to analyse and visualise the process

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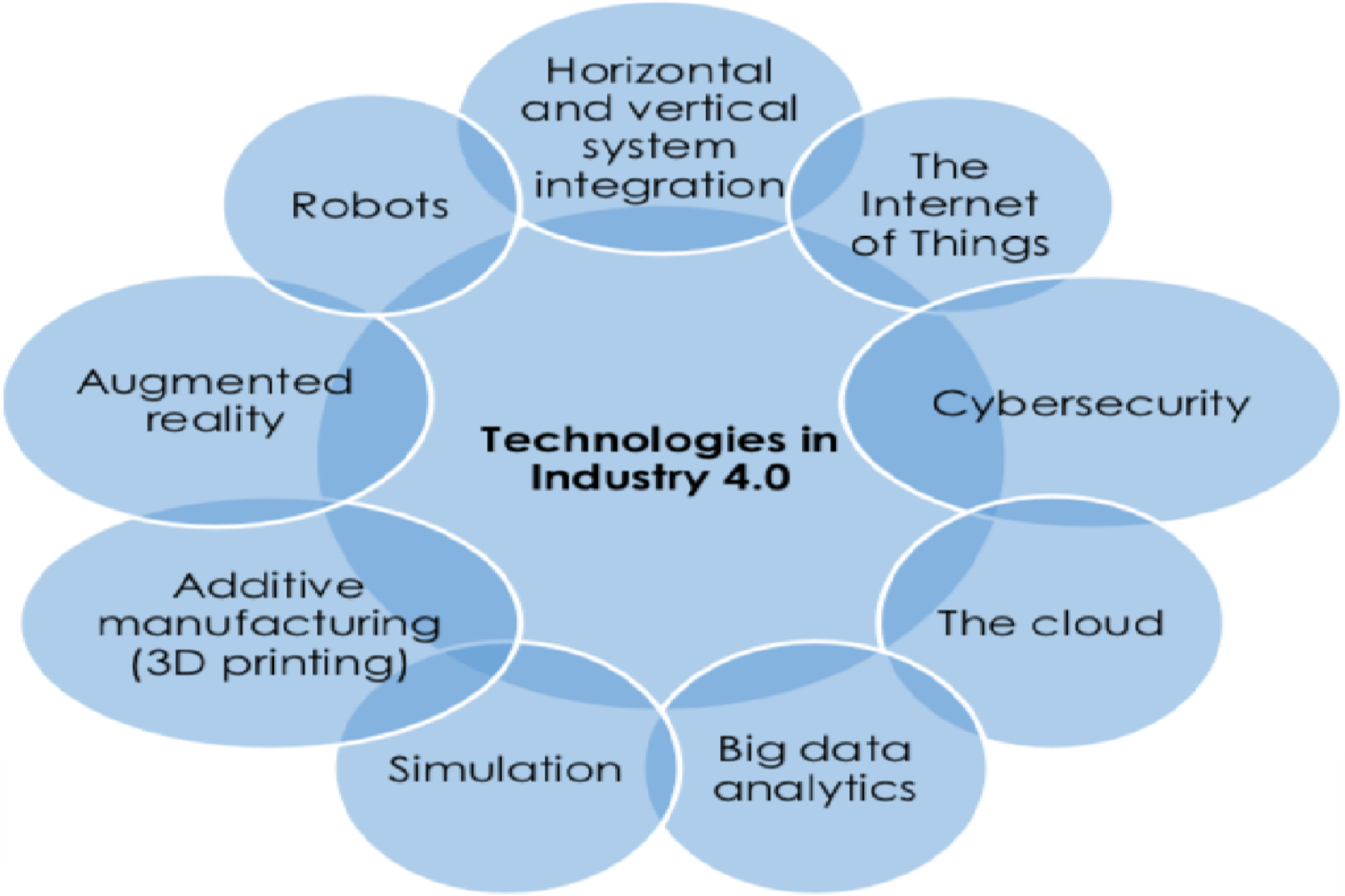
Why apply Industrial Digital Technologies

The UK government commissioned a review on the application of Industrial Digital Technologies led by Jurgen Maier then CEO of Siemen's UK which concluded.

"The work undertaken for the Made Smarter Review found that the positive impact of faster innovation and adoption of IDTs could be as much as £455 billion for UK manufacturing over the next decade, increasing manufacturing sector growth between 1.5 and 3 percent per annum, creating a conservative estimated net gain of 175,000 jobs throughout the economy and reducing CO2 emissions by 4.5 percent.
Overall, from the data and evidence collated, we are confident that industrial productivity can be improved by more than 25 percent by 2025"

Develop expertise in Industrial Digital Technologies



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Why create a demonstrator at the Institute

The UK already has demonstrators for Industry 4.0 at the Catapult centres but these purpose built from the ground up with Industry 4.0 in mind.

Therefore they avoid the issues of legacy equipment, age, multiple data formats etc which will be faced by all process industries (not just Steel) as they attempt to apply Industry 4.0 technologies.

The development of an Industry 4.0 demonstrator at the Institute's Steel Plant will explore the issues involved in retrofitting exiting legacy kit with digital technology.

The Institute firmly believes that understanding the challenges of applying Industry 4.0 to existing plant is a necessity for the Steel and Process Industries if they are to ever going to reap the benefits of Industry 4.0.

The Institute will directly benefit by the application on Industry 4.0 to the Normanton Steel Plant through improved Process Control

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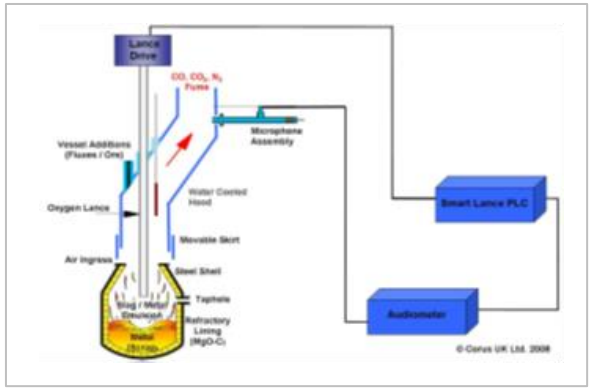
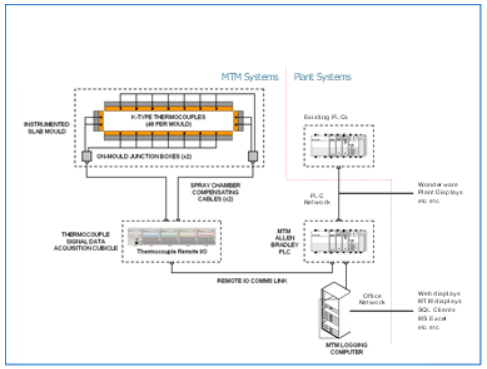
Technology Development

75 year track record in turning new ideas into production scale technology suited to industry's needs, using the expertise of the Institute's process engineers and scientists to drive technology from TRL 3 (ex-university or similar) to 7 (successful demonstration in operations) and beyond.





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Challenges

Legacy equipment : Aging equipment and control systems

Multiple manufactures: Wide range of suppliers, protocols, languages to deal with

Connectivity: How to linking existing systems together

Veracity of Data: Data Validation, what is useful and what isn’t

Data Homogenization: Creation of a local data lake

Visualisation: Augmented or Virtual Reality, Creation of Digital Twins

Data Security: Access to the Cloud and Edge data

Instrumentation: Robustness in hostile environment, lifetime, maintenance, power supply

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Questions

For any questions about the Digital Technology work discussed today please contact

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Or for the wider Prism Programme

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Thank You

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