Future Landscape for NDT in the UK

Exploitation Strategy for Production Capability

BINDT ASNT Training Day
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Overview

- Problem Statement
- Technology Readiness Levels (TRLs)
- The KTN Report
- Problem
- Worked examples
- Short & long term proposals
- Audience feedback & discussions
Technology Readiness Levels (TRLs)

<table>
<thead>
<tr>
<th>TRL Levels</th>
<th>Activity</th>
<th>TRL Description</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Technology Assessment &amp; Proving</td>
<td>Basic principles observed and reported.</td>
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<tr>
<td>2</td>
<td>Pre-Production</td>
<td>Technology concept formulated</td>
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<tr>
<td>3</td>
<td>Technology Assessment &amp; Proving</td>
<td>Proof of concept</td>
</tr>
<tr>
<td>4</td>
<td>Production Ramp-up</td>
<td>Partial system demonstrated in laboratory environment</td>
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<td>5</td>
<td>Pre-Production</td>
<td>Component and/or partial system validation in a relevant environment</td>
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<td>6</td>
<td>Production Ramp-up</td>
<td>System prototype demonstrated in a relevant environment</td>
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<td>7</td>
<td>Production Ramp-up</td>
<td>System prototype demonstration in an operational environment</td>
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<tr>
<td>8</td>
<td>Production Ramp-up</td>
<td>Actual system completed and service qualified through test and demonstration</td>
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<tr>
<td>9</td>
<td>Production Ramp-up</td>
<td>Actual system proven through successful operation</td>
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**EPSRC Funded, e.g. RCNDE, Universities**
- 25-50% Gearing

**Innovate UK, Welsh, EU**
- e.g. AxRCs/RTOs
- 50% Gearing

**Industry Users & Equipment manufacturers**
- Limited Gearing
- Expensive
- Bespoke to 1 customer
Summary

Problem Statement (KTN Report)

The report recommended the following high level actions:

- Strengthen business engagement and education
- Attract and up-skill new entrants to solve the demographic gap and deliver advanced NDT solutions
- Maintain and extend the existing joined-up R&D portfolio (Technology Readiness Level - TRL 1 to 3)
- Enable a step change in the speed of technology transfer into wider business sectors (TRL 3 to 6)
- TRL 6+ not addressed.
Schematic of an Ideal World

External organisation:
- Manage the project
- Design the solution
- Prototype the solution

Productionise via Turnkey integrator

Train End Users

Inspection by Level 2s or Automation

Idea

Who do we go to???

- Develop NDE technologies such as:
  - mini x-ray for confined spaces
  - Hot corrosion cracking Ni alloys
  - How to NDT ALM/composites etc
  - finding smaller defects,
  - material characterisation
- Automation of NDT systems
- Auto evaluation of NDT data
- POD exercises/ENIQ Panel/Validation
- NDT Modelling
- Exploit & collaborate partner IP
- Collaborate with AxRCs e.g. Industry 4.0
- Write grant proposals for Innovate UK funding etc to help Industry
Example – Mini X-ray detector

Work with UK equipment OEMs to create a generic system, e.g. 8mm maximum diameter.

• Industry Users pay for their specific application, e.g. inside an engine, or gas pipe.
• Body of expertise engages supply chain to build a system, create calibration blocks, validates it, trains operators and warranty repairs etc.
Example – SRAS turnkey system

*Technology Readiness Levels (TRLs)*

**Work with UK Industry users to determine what metals need their texture mapped.**

Create a prototype scanner for some specific applications.

Body of expertise engages supply chain to build a system, create calibration blocks, validates it, trains operators and warranty repairs etc.

*Industry Users pay for an “off-the-shelf” TRL ready 9 machine.*
Example – on-wing solution

Industry user pays 100% to have a full “kit” including:
- Test blocks
- Bespoke phased array probes
- Manipulator
- Flaw detector
- Customer training & support
- Warranty
- Validation
- Technical justification/data card
Way Forward 1/2

- Create an NDT Leadership Forum:
  - Established with support of Government.
  - Voice of NDT industry
  - Led by Industry, co-ordinating across sectors, supply chain, academia, Government and funders
  - Create strategy
Composites Leadership Model

Example of existing model

**Working Groups**
- Technology
- Workforce
- Sustainability
- Regs, Codes & Standards

**HOW**
- **Lead Industry Group**
  - Automotive: Develop: Technologies and supply chains to capture immediate market opportunities.
  - Construction: Diversify: Enable UK industry to take advantage of opportunity in other sectors.
  - Other Sectors: Deliver / Develop / Diversify

**OUTPUTS**
- Industry sector and common capability requirements converted into delivery plans through existing funding mechanisms and specific asks via Sector Deal
- Acceleration of cross sectoral knowledge transfer to improve supply chain capabilities, in technologies and skills
- Increased supply chain productivity through earlier exploitation and deployment of disruptive technologies and greater use of automation via Ind 4.0

Groups currently established

Industry support required to establish further sector groups
Way Forward 2/2

- Create an NDT Technology Taskforce:
  - Led by Industry, co-ordinating across sectors, supply chain, academia, Government and funders
  - Operate with pace to improve existing NDT infrastructure in UK, and consider alternative ideas and concepts.
Scenarios

Map a list of options & preferences in a scoring matrix to help select way(s) forward.....?

Taskforce of industrial companies decide.
Timeline

July 2019
Technology Taskforce created for:
* Away day 1 – what does Industry want?
* Innovate UK Engagement – the art of the possible?
* Away day 2 – Industry presents this to existing network AxRCs, RTOs & Equipment manufacturers
* Away day 3 – The above network presents how they’d like to solve this
* Away day 4 – Industry decides what it wants

November 2019
* Concept agreed
* Letters of intent signed

September 2019
* Early Government talks

January 2020
* Short term strategy implemented
* Contracts, joint venture agreements etc being formulated.
* Government funding requested.
* Resources assigned to work strategy

January 2021
* Longer term strategy implemented & funded
Conclusions

- TRL 6+ developments too slow, costly and under resourced

So......

- KTN Report Update?
- We need the Leadership Forum to gain Government support
- We need a Technology Taskforce
- Taskforce should look at an interim strategy v. long term strategy
Further information?

Please email

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