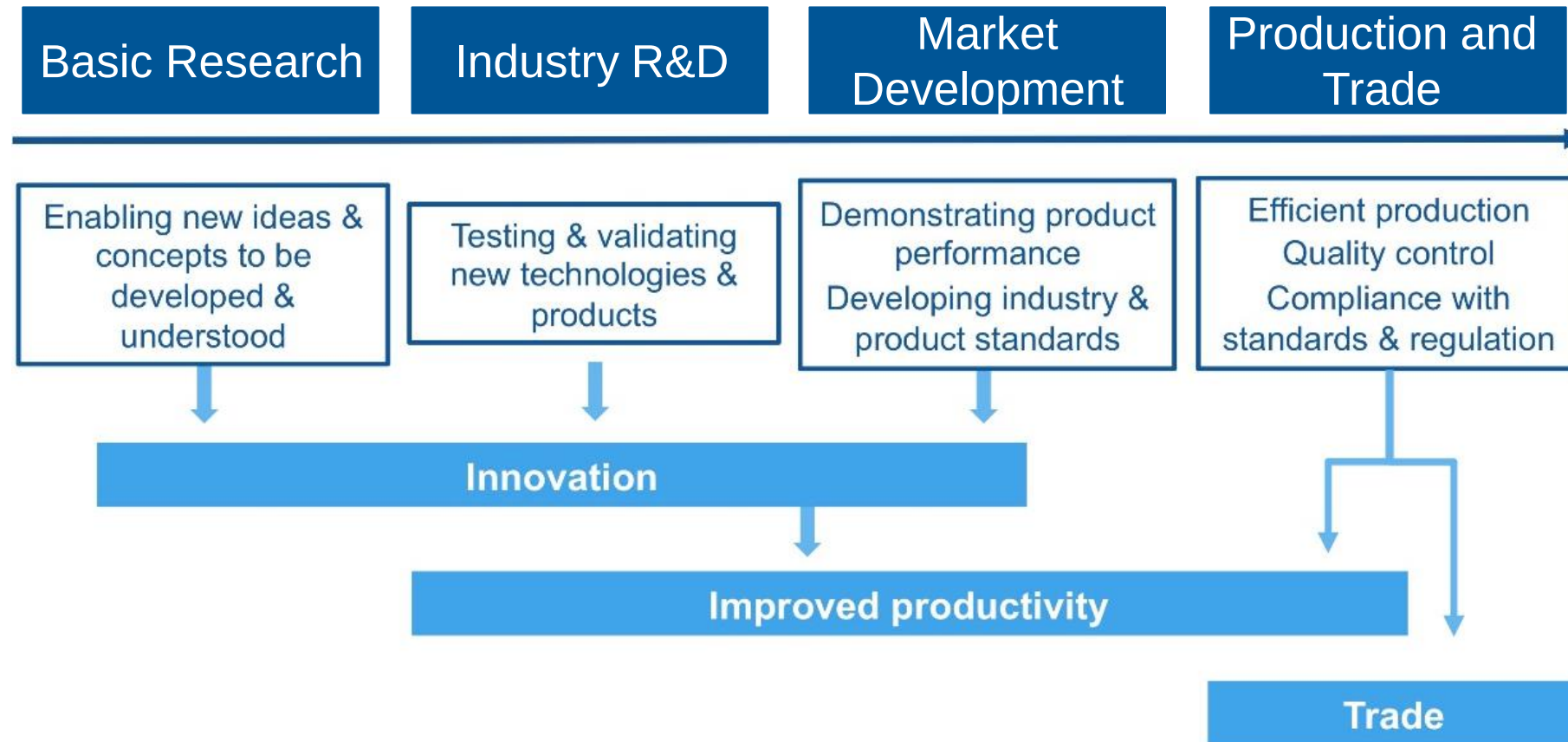


Strategies in Materials Characterisation to Accelerate Innovation

Prof Fernando Castro
Head of Science – Materials Metrology

“In average, new materials take
10 to 20 years from discovery to commercialisation”

Creating impact from science and engineering



Measurement tools and techniques support
the whole innovation life cycle

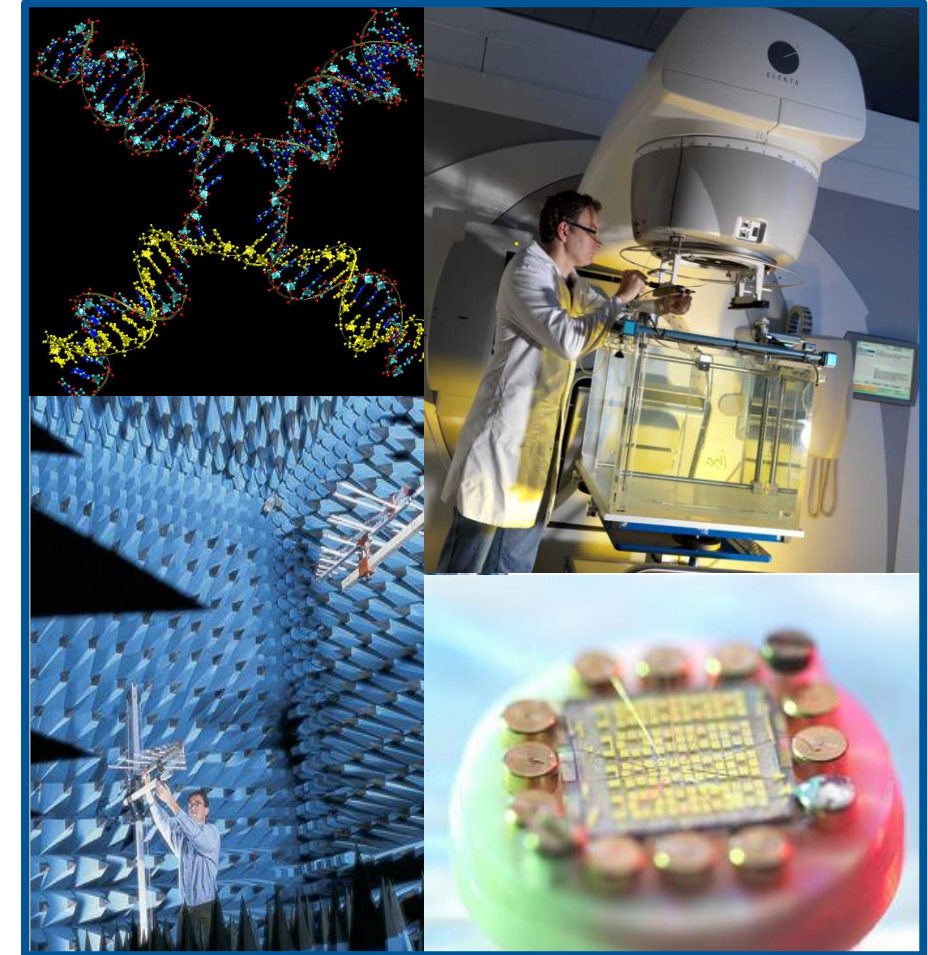
National Physical Laboratory

providing confidence in measurements since 1900

- UK's National Measurement Institute
- 500+ Graduate/PhD scientists – multidisciplinary
- Network of >2000 companies and >80 universities
- 370 laboratories and engineering centres



**36,000 m²
national
laboratory**



Develop & disseminate UK's measurement standards, ensure they are internationally accepted

Multidisciplinary R&D and technical services for public and private sector

Knowledge transfer, and advice between industry government and academia

Role of standards



The Role of Standardisation in Support of Emerging Technologies in the UK

Final Report

BEIS Research Paper Number 2022/004

“28.4% of UK productivity growth attributed to standards”*

“Two-thirds of Standards make detailed references to measurement and testing procedures”

* The Economic Contribution of Standards to the UK Economy, 2015”

But standards development is slow

The “gap”

Increasing pace of
innovation

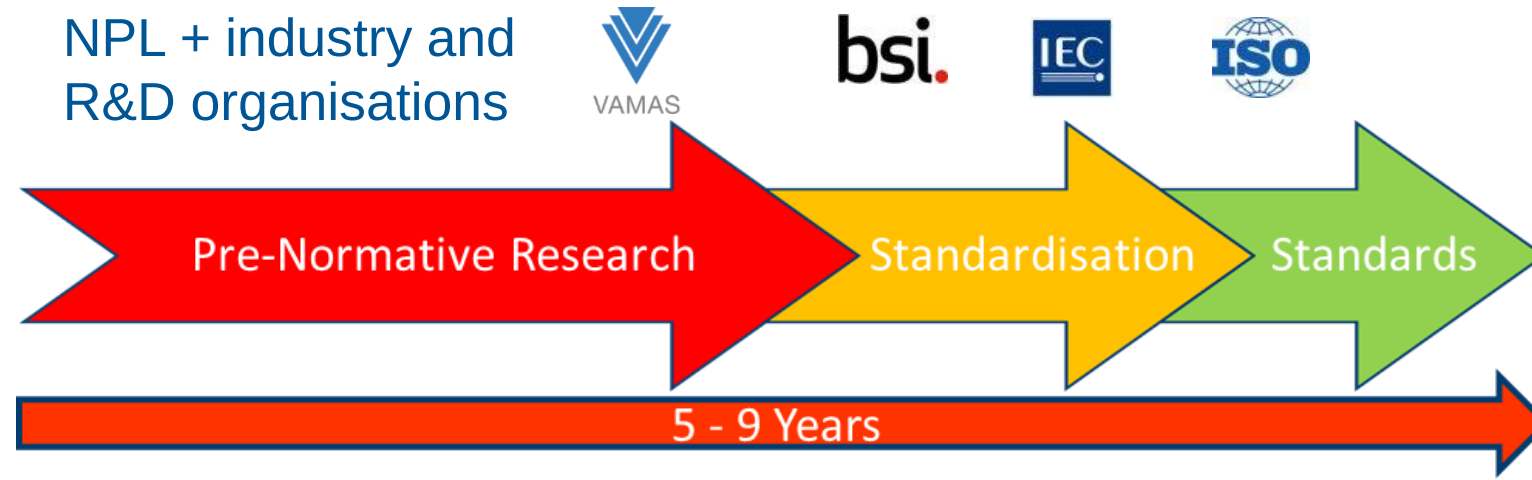
+

Long time for standards
development

Increasing gap between need
and availability of standards

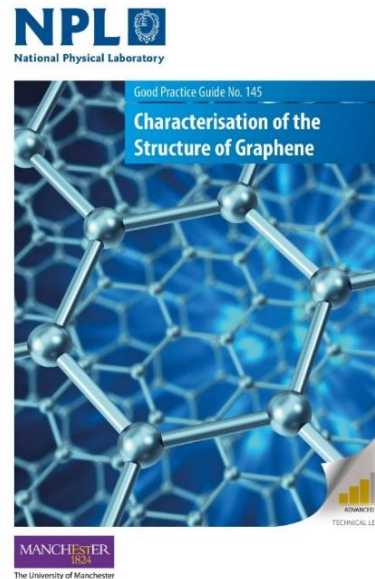


Pre-normative research helps accelerate innovation



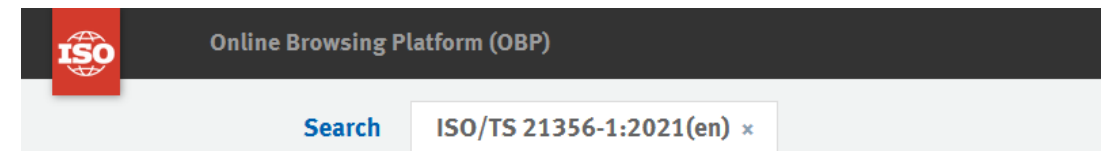
Competitive advantage

- Provides industry with early access to best practice
- Minimise risk that other countries impose their standards on your company



2017

Example



ISO/TS 21356-1:2021(en) Nanotechnologies — Structural characterization of graphene — Part 1:

2021

VAMAS

(Versailles Project on Advanced Materials and Standards)

Intergovernmental organisation established in 1982 following a G7 Economic Summit

To promote world trade by innovation and adoption of advanced materials through international collaborations that provide the technical basis for harmonization of measurement methods, leading to **best practice, reference materials and standards**

www.vamas.org

Participation is free

16 technical areas currently active with participation from >60 countries

Major trends for Materials Metrology

Measurement at the frontiers

- ❑ **Multiple scales**
 - ❑ From very large to very small
 - ❑ Ultra-fast to long term changes
 - ❑ Increase resolution and sensitivity
- ❑ **Complex environments**
 - ❑ Real-world
 - ❑ Harsh
 - ❑ Rapidly changing

Smart and interconnected measurement

- ❑ **Materials complexity**
 - ❑ Single parameter insufficient to qualify materials
 - ❑ Hybrid metrology (multi-method)
- ❑ **Digitalisation**
 - ❑ Materials informatics
 - ❑ Digital/Virtual Testing (validated multiscale modelling)

Final remarks

- ❑ High quality materials characterisation provides confidence to accelerate innovation
- ❑ We can't improve what we can't measure
- ❑ Materials data quality is critical – requires reliable and reproducible measurement methods

Thank you



Department for
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& Industrial Strategy

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