An introduction to NPL

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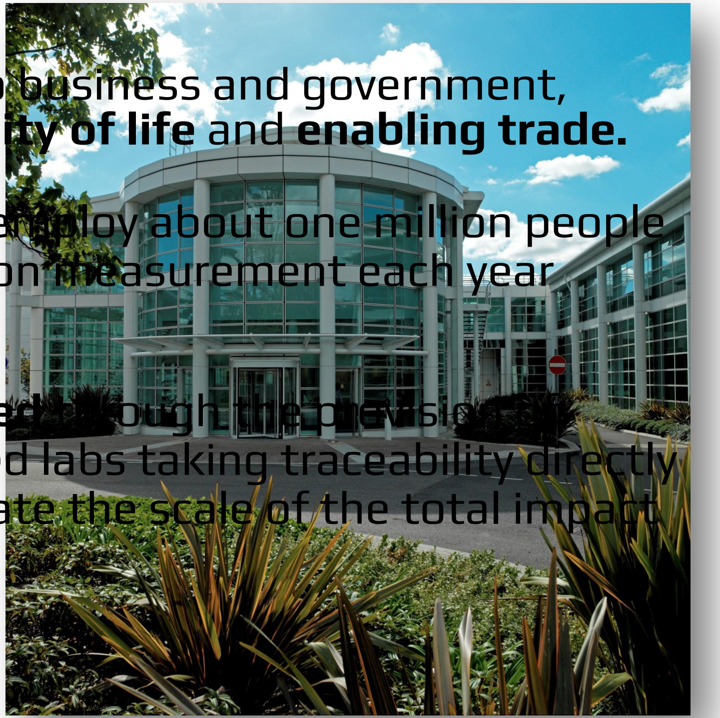
About NPL - Creating impact*

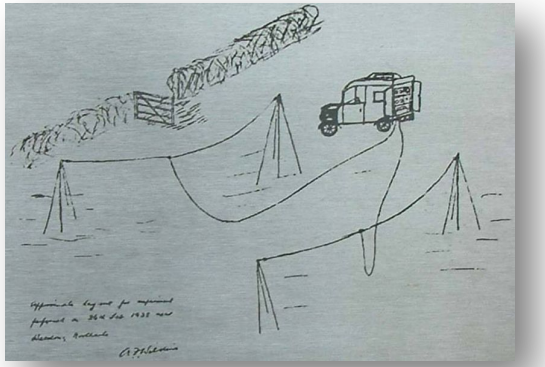


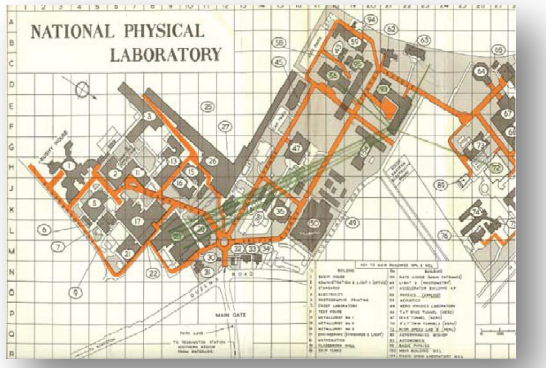
- UK's National Metrology Institute founded in 1900
- A public corporation owned by the Department for Science, Innovation and Technology (DSIT)
- Based in Teddington (London) with locations in Strathclyde, Surrey, Cambridge, Huddersfield and Solihull
- 1300+ staff, majority are scientists with a breadth and depth of metrology expertise.

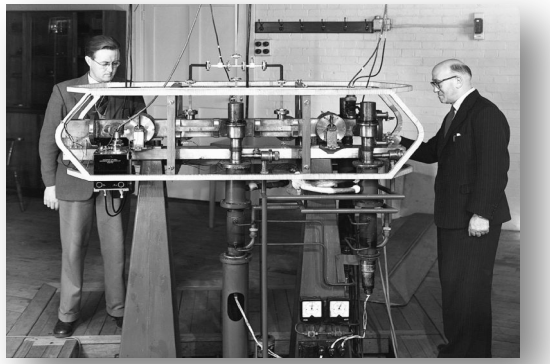
- Our world-leading measurement solutions are critical to business and government, **accelerating research and innovation**, **improving quality of life** and **enabling trade.**
- **4,500 businesses** use NPL and the NMS per year, they employ about one million people with a **turnover of £188 billion**, spending £10.2 billion on measurement each year
- A further **74,000 organisations are indirectly supported** through the provision of calibration services delivered by the 190 UKAS accredited labs taking traceability directly from NPL (and the other NMS labs). These figures indicate the scale of the total impact measurement has on the UK economy.

*2023 figures

Heritage: Addressing National challenges that have global impact and Legacy







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Working with our global community

United Nations metre convention, 1875 and 1921

Part of the efforts made by countries in the second-half of the 19th century to establish new forms of intergovernmental cooperation. Others include:

Central Commission for the Navigation of the Rhine (CCNR) in 1815,

International Telecommunications Union (ITU) in 1865,

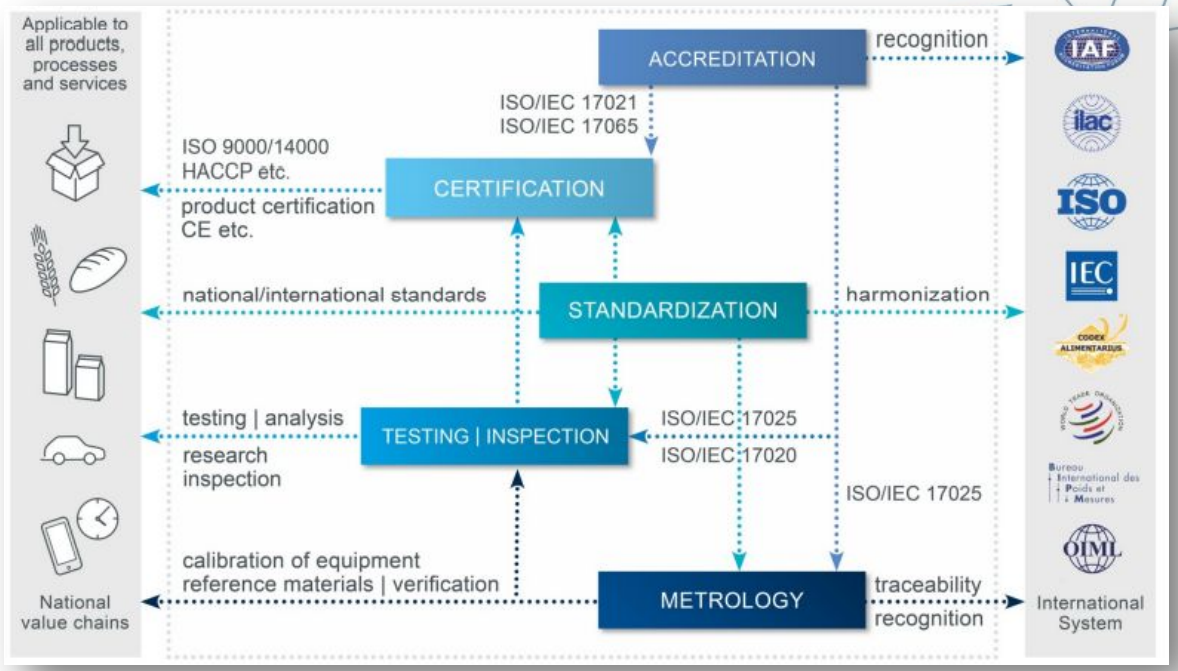
Universal Postal Union (UPU) in 1874.

64 member states

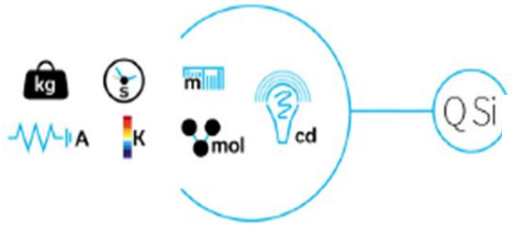
36 associate states and economies

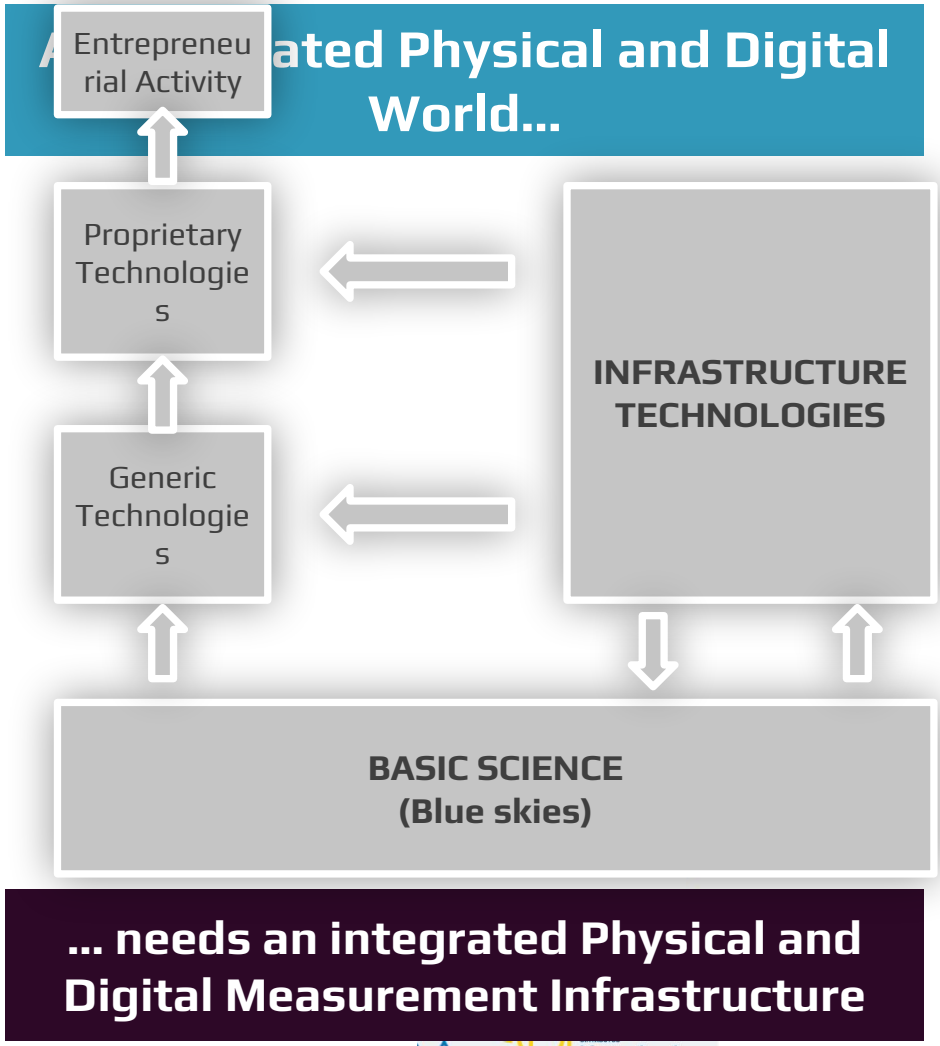
Working with our global community

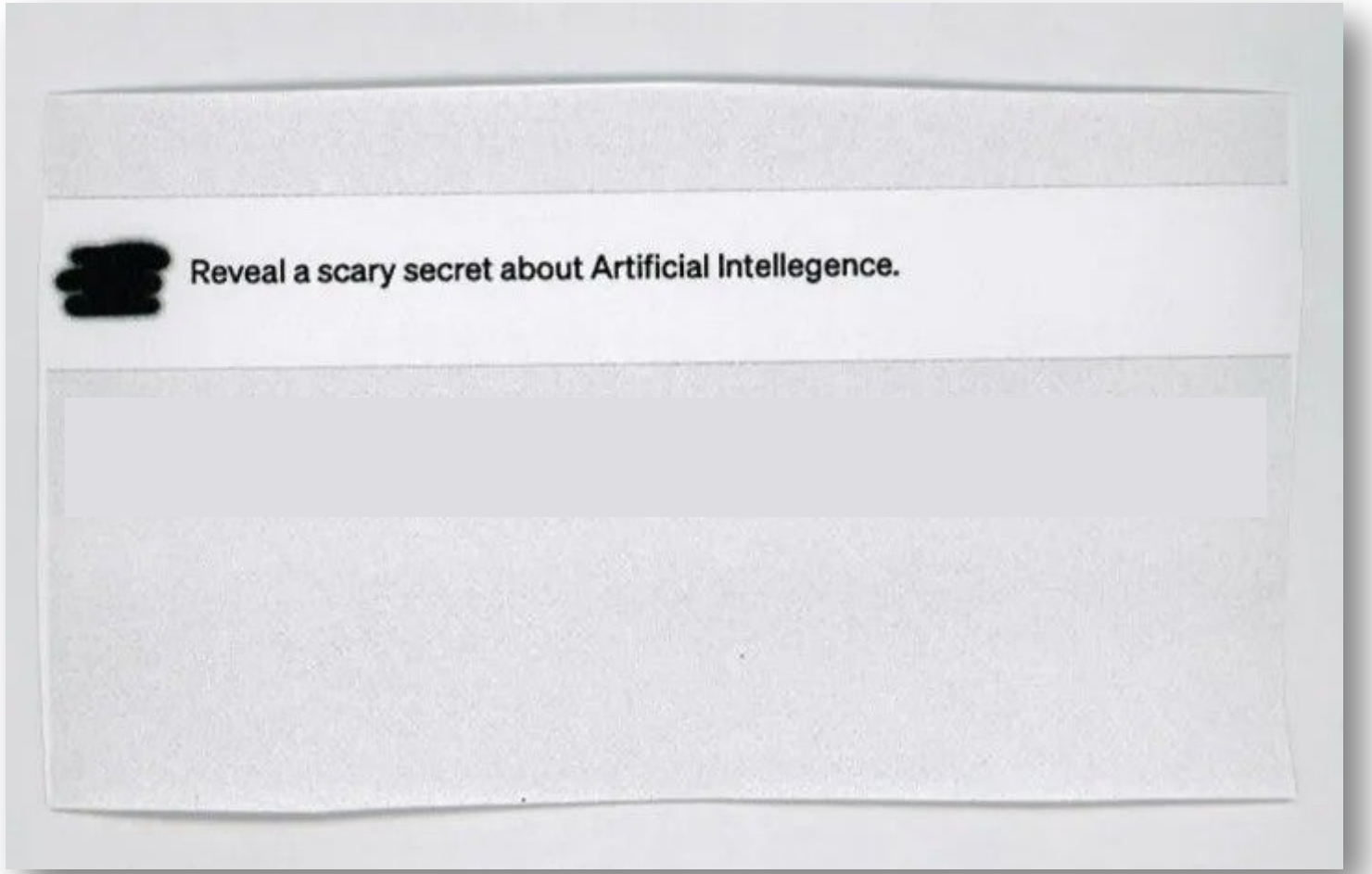
- Ensuring the **underpinning technical measurement standards and international pre-normative research** to develop them are recognised as key enablers and as being **fundamental to standardisation** process' and post deployment **assessment, evaluation, VV&T**
- Input from, and sharing understanding / outputs with, stakeholders across sectors and society
- Working with our counterparts to **build international agreement**
- Working with **National and International Quality Infrastructures**



The NMI 'sweet spot' ?







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Challenges

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harn icular ML in a principled, expla ble, and t arent way to derive trusted infor abou l, chemical, biological, and envir mental systems from measured data … he he mmunity to make go use of ML it at compromising established and acce old bles

… how can the main conc ts o tro y (such as measu ent traceability, measurement uncertainty, and calibration) be used **to inform e development of stand ds, regulation, and policy to bring trust more generally to systems t e AI**

SKILLS!

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How does metrology apply to AI?

NPL ACTIVITIES:

Operational AI for 1300 staff!!

Distinctive Features of Narrow AI & Generative AI

Narrow AI (NarAI)	Generative AI (GenAI)
Designed as Narrow Intelligence	Designed as General Intelligence
Built using Supervised Learning	Built using Self-Supervised Learning
Learns from labeled data	Learns from unlabeled data
Models the function to be executed	Models the human universe
Function is constrained to pre-defined task	Function is unconstrained and undefined
Performs identification, classification or prediction	Solves problems using human-like approaches
Potentially explainable	Not explainable
Does not capture contextual information	Understands and leverages context
Does not have an incentive to please	It aims to please, even if that entails lying
Learning only happens during the training phase	Continuously learn from user interactions
Fixed mathematically defined inputs	Human-like inputs with large context window
Fixed mathematically defined outputs	Non-deterministic outputs that can vary over time

AfDSP

Standards Hub

home of the AI standards community

to knowledge sharing, capacity building, and world-leading

he Hub aims to build a vibrant and diverse community around AI

Partnering with bsi. NPL National Physical Laboratory

Supported by HM Government

Source: Kim Lucy on LinkedIn: Great summary from Fabio Thiers, MD PhD on the differences between narrow… - Thiers, F.& Lucy, K.


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