Industrial Global Challenges & Opportunities

A View from the Thales Group

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PHEE
A forum for Academic Leaders in
Electrical Engineering and Allied Technologies

Professors & Heads of
Mechanical &
Manufacturing Engineering

Academic Partners
The Institution of
Engineering and Technology

Key Topics

- The Thales Context
- UK Positioning for Global Markets
- UK Political Environment
- Sources of Market Growth
- Disruptive Technologies
- Our Professional Engineers

The Thales Context

How our customers see the world…

A complex world where the security of people and goods, infrastructure and nations depends on the ability of organisations to make the right decisions and act in a timely fashion to obtain the best outcomes

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in all the markets we serve…

Trusted partner for a safer world

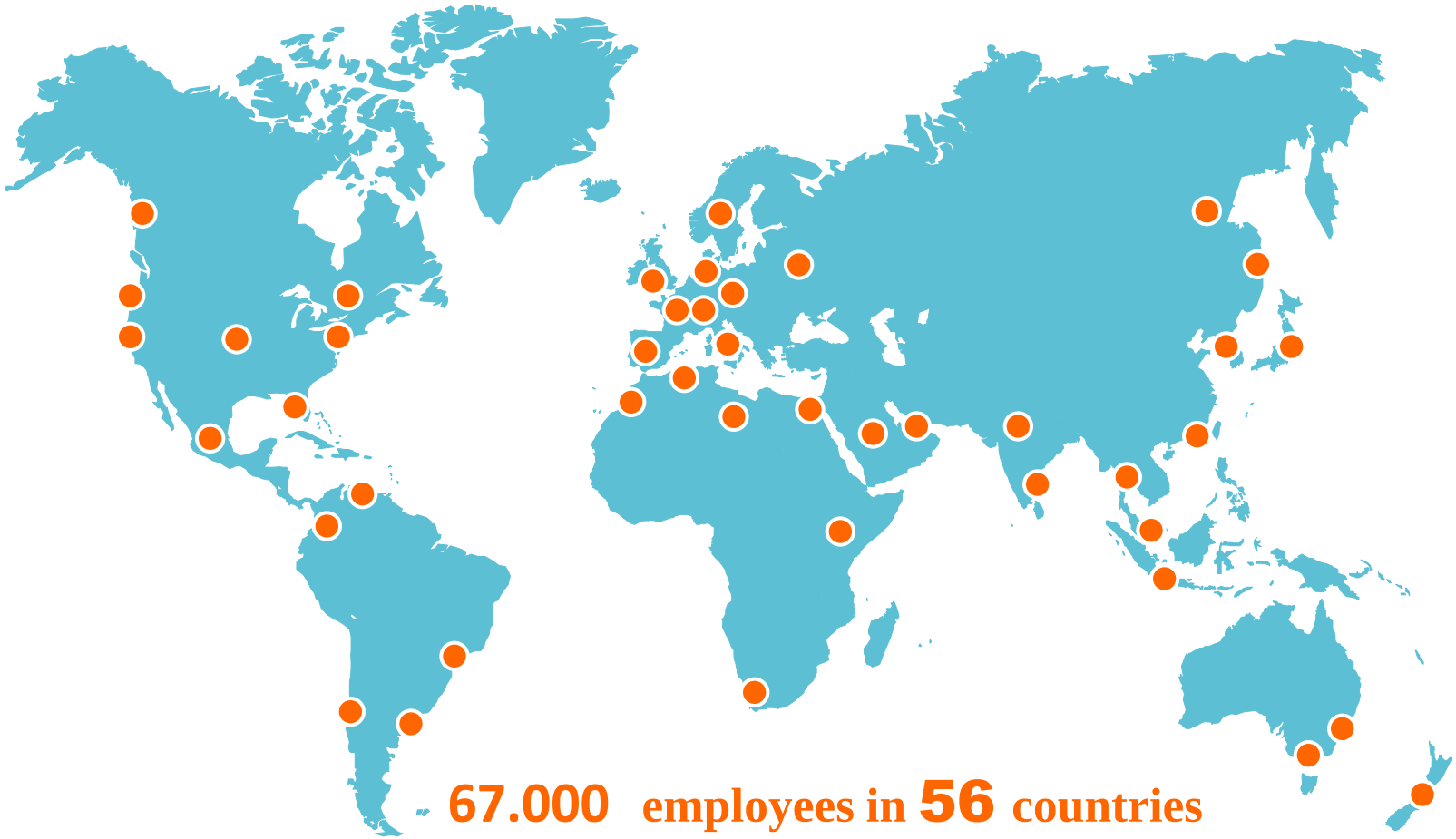
focused on a single mission…

Enable our customers to decide quickly in critical situations

- **Data gathering, processing and distribution**
  - Tools and technologies to help customers understand complex situations, decide and act in a timely fashion and obtain the best outcomes
- **Engineering development and innovation**
  - Large-scale software-driven systems, secure communications, sensors, command & control, onboard electronics, satellites and complex systems integration
- **Human factors**
  - Physical and cognitive sciences applied to human-system interaction

Binding all our businesses together

Worldwide operations…



Global reach, local expertise

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and global leadership

No. 1 worldwide

Payloads for telecom satellites

Air Traffic Management

Sonars

Security for interbank transactions

No. 2 worldwide

Rail signalling systems

In-flight entertainment and connectivity

Military tactical radiocommunications

No. 3 worldwide

Avionics

Civil satellites

Surface radars

€14 billion in revenues

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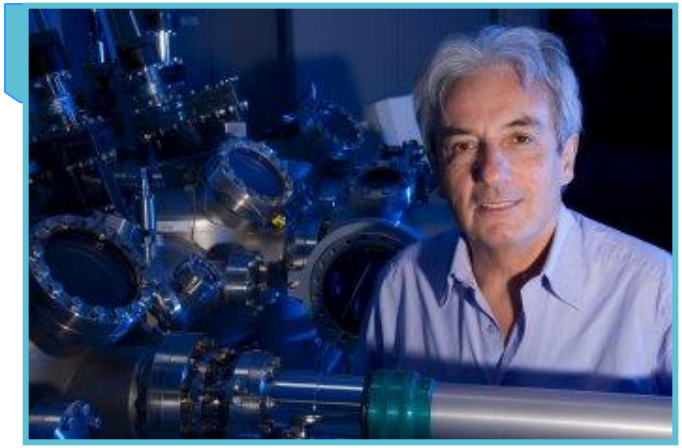
A strategy driven by innovation…

Long-term vision

- **20% of revenues invested in R&D**
- **Focus on key technical domains**
  - Complex systems
  - Hardware (sensor technologies)
  - Software
  - Algorithms and decision support
- **Open research policy**
  - International network of research centres
  - Cooperation with academic and government research institutes worldwide
- **Focused product policy**
  - Shorter development cycles
  - Risk reduction



Albert Fert, scientific director of the CNRS/Thales joint physics unit and winner of the 2007 Nobel Prize in Physics.

Inventing tomorrow's products today

UK Positioning for Global Markets

Key Factors

- **Fading heritage**
  - *Competitive Advantage*
  - *Capability*
  - *Inspiration*
- **Sovereign Requirements**
  - *Few remaining - Nuclear, Cyber*
  - *Military Operational Freedom*
  - *Military Independence of Action*
  - *Presumption of Coalition Interdependence*
  - *Presumption of Free Markets (Defence & Civil)*
- **International Standards**
  - *Facilitate global markets e.g. RTCA DO178B*
  - *Differentiation through "gold standard" still possible e.g. CAA*
- **Global Companies**
  - *International Ownership*
  - *"Multi-Domestic" Structures*

The Political Environment

Free Markets

Long Standing HMG Presumption of "Free Markets"

- Strategy to avoid industrial strategy
- Support of indigenous industry weakens competitivity in export markets
- Competition the only objective demonstration of Value for Money

Risks

- Implicit assumption that global playing field is level
- Largest markets are often quasi monopsonistic, distorting supply side dynamics
- Many UK Industrial Assets in International Ownership / Parent companies free to move R&D, production etc
  - ***Response to domestic social situation***
  - ***Need to build footprint in growth countries***

Why invest in the UK?

- Market Scale
- Early Adopter
- Tax & Tax Credit Regimes
- (Pension Regime)
- Government investments (e.g. “Growth Partnerships” – AGP/CGP/DGP; Increase in ESA contribution)
- Government to Government Relationships (e.g. Anglo French Defence Treaty, Middle East Security Programmes)
- Employment Legislation
- Key Skills
- Key Technologies
- Innovative Environment

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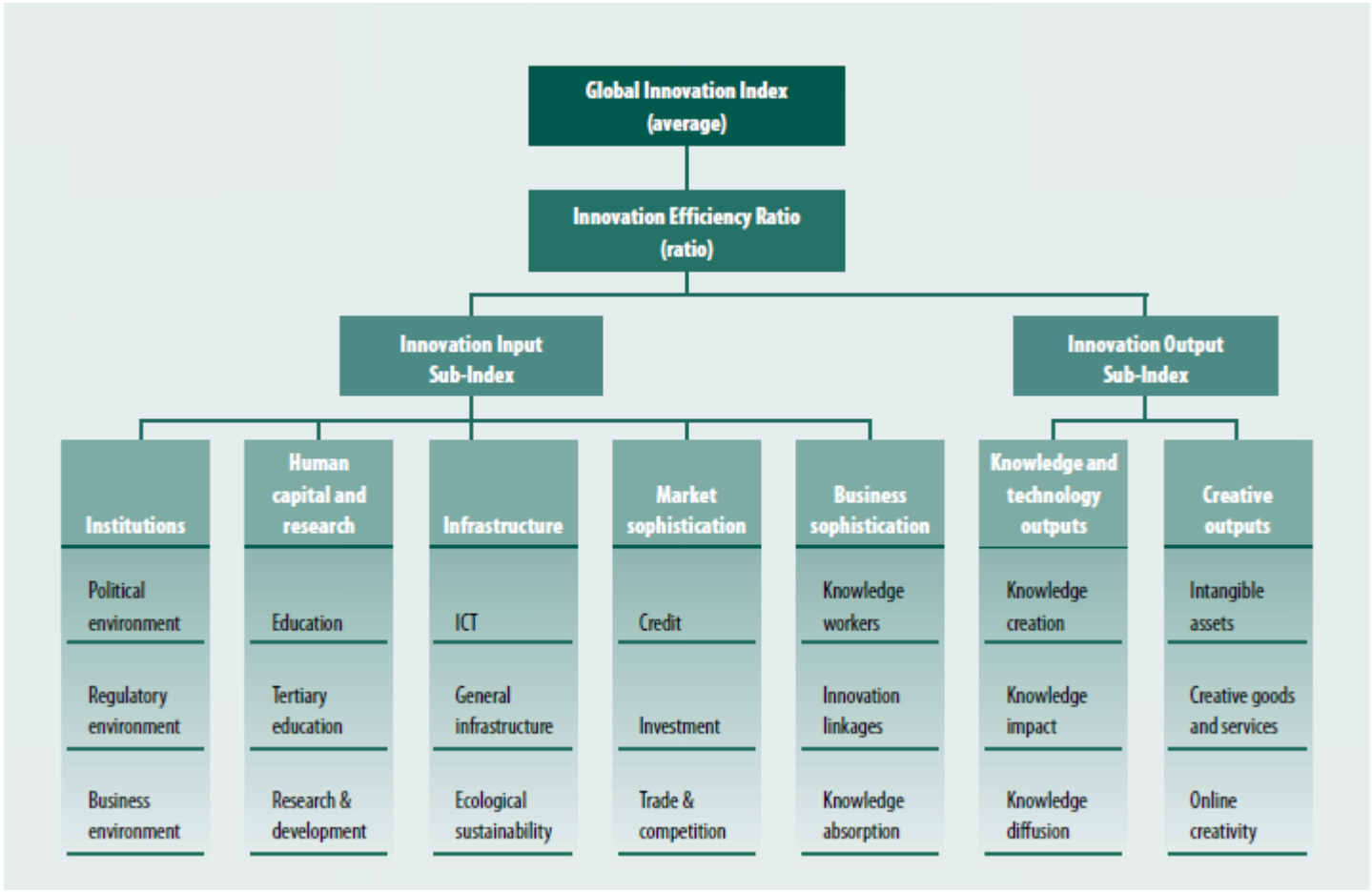
Global Innovation Index 2013



Rankings

UK No. 3

US No. 5

Fr No. 20

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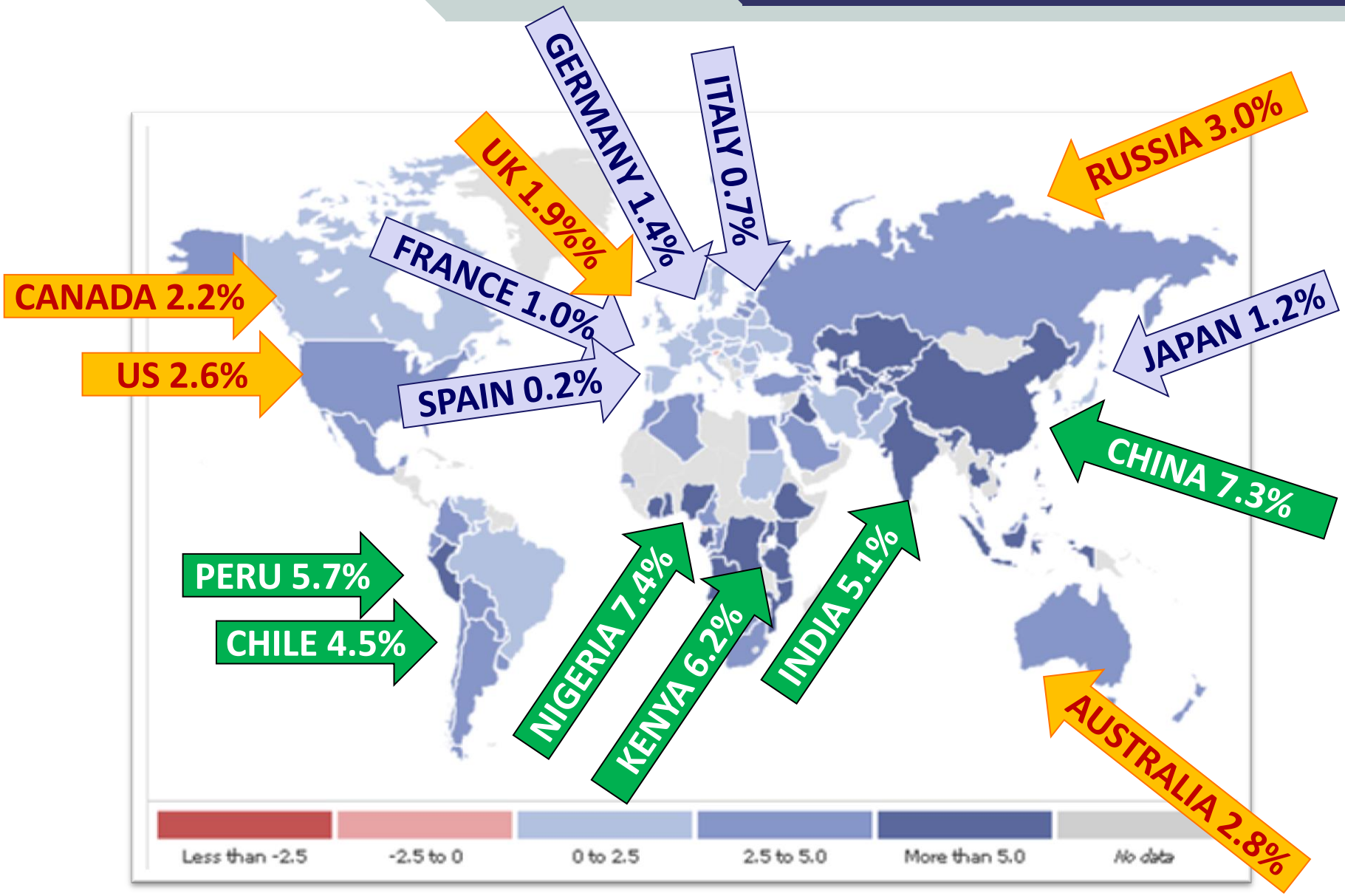
Sources of Market Growth

Sources of growth 2014



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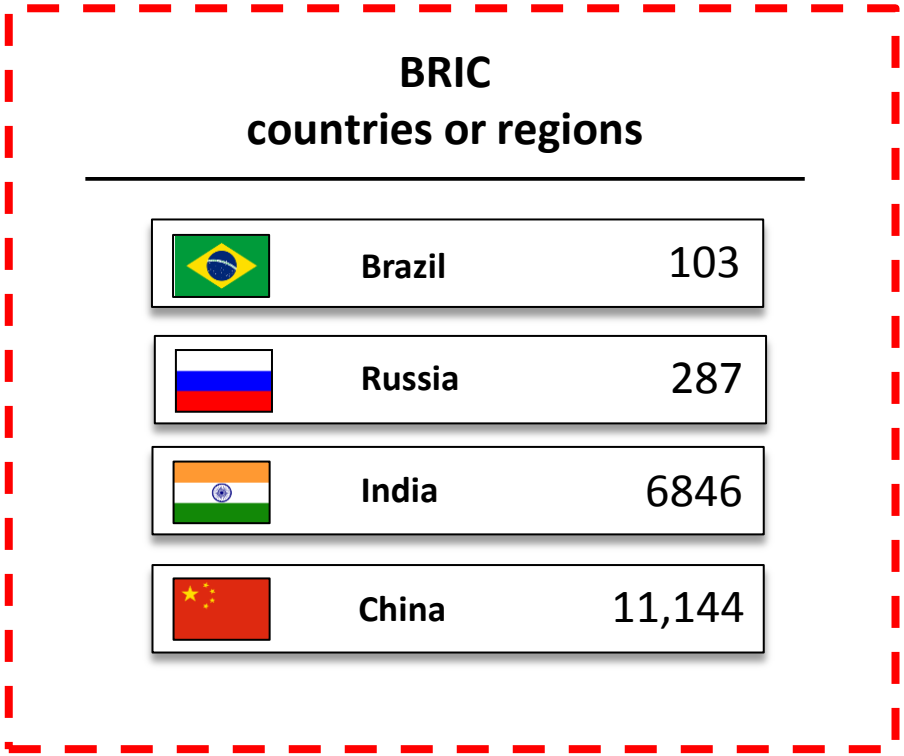
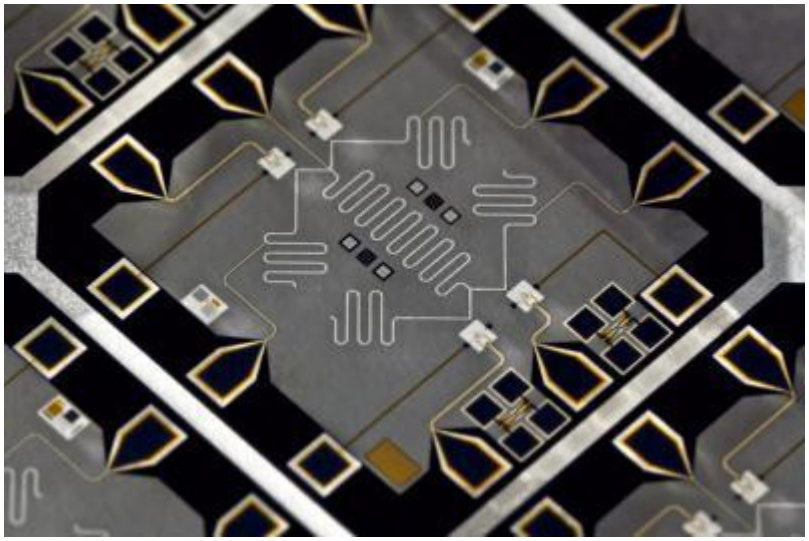
Foreign students studying in the UK

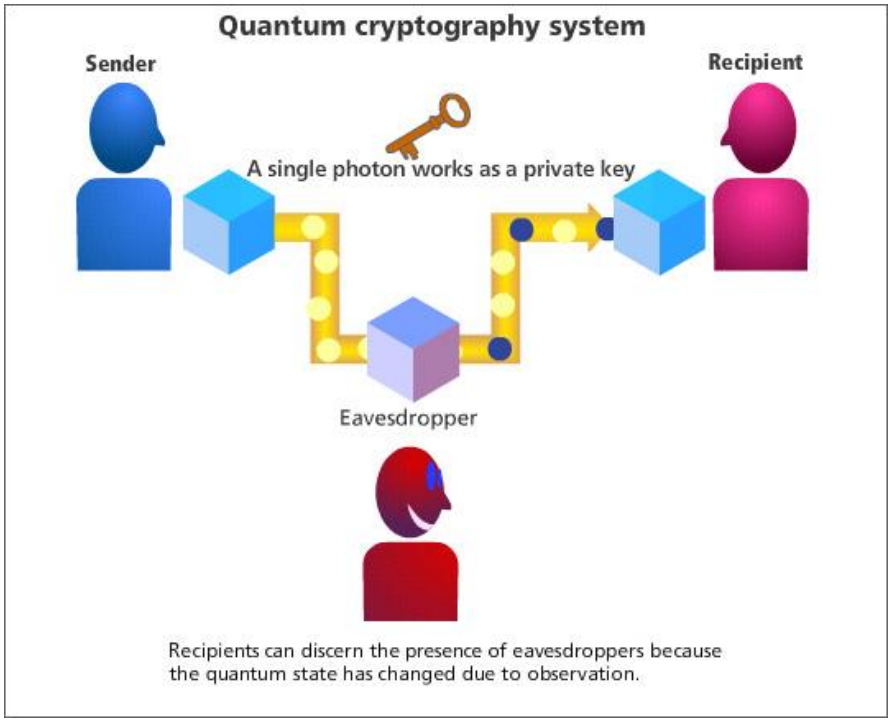


(In STEM skills relevant to Thales.
Source Higher Education Statistics Agency.)

Disruptive Technologies

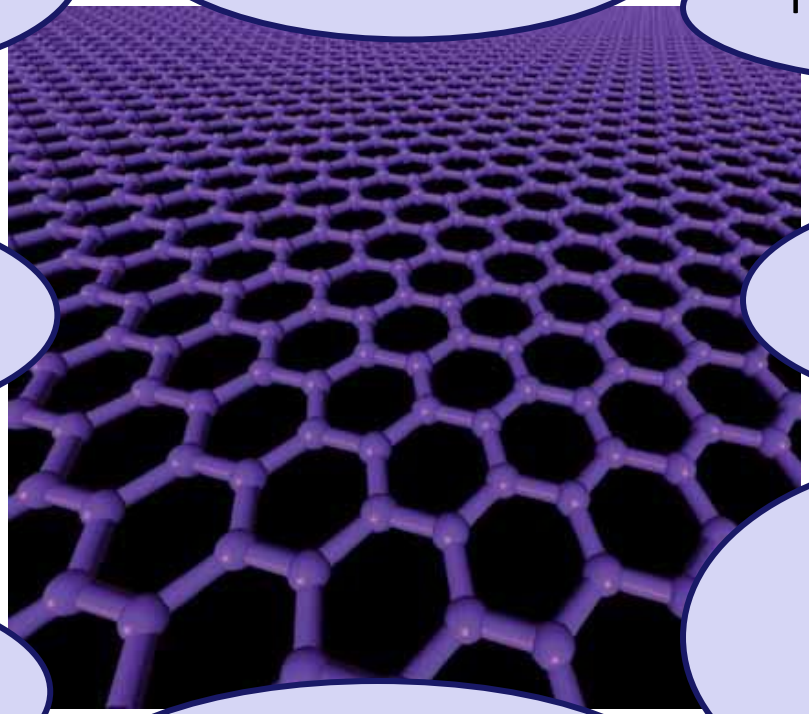
The Quantum “Cyber Arms Race”





Quantum Computing vs Quantum Encryption

Graphene



Anisotropic Heat Sinks

Hydrodynamic Coatings

Flexible displays

Acoustic Sensors

Photonic Devices

High Capacity Batteries & Super Capacitors

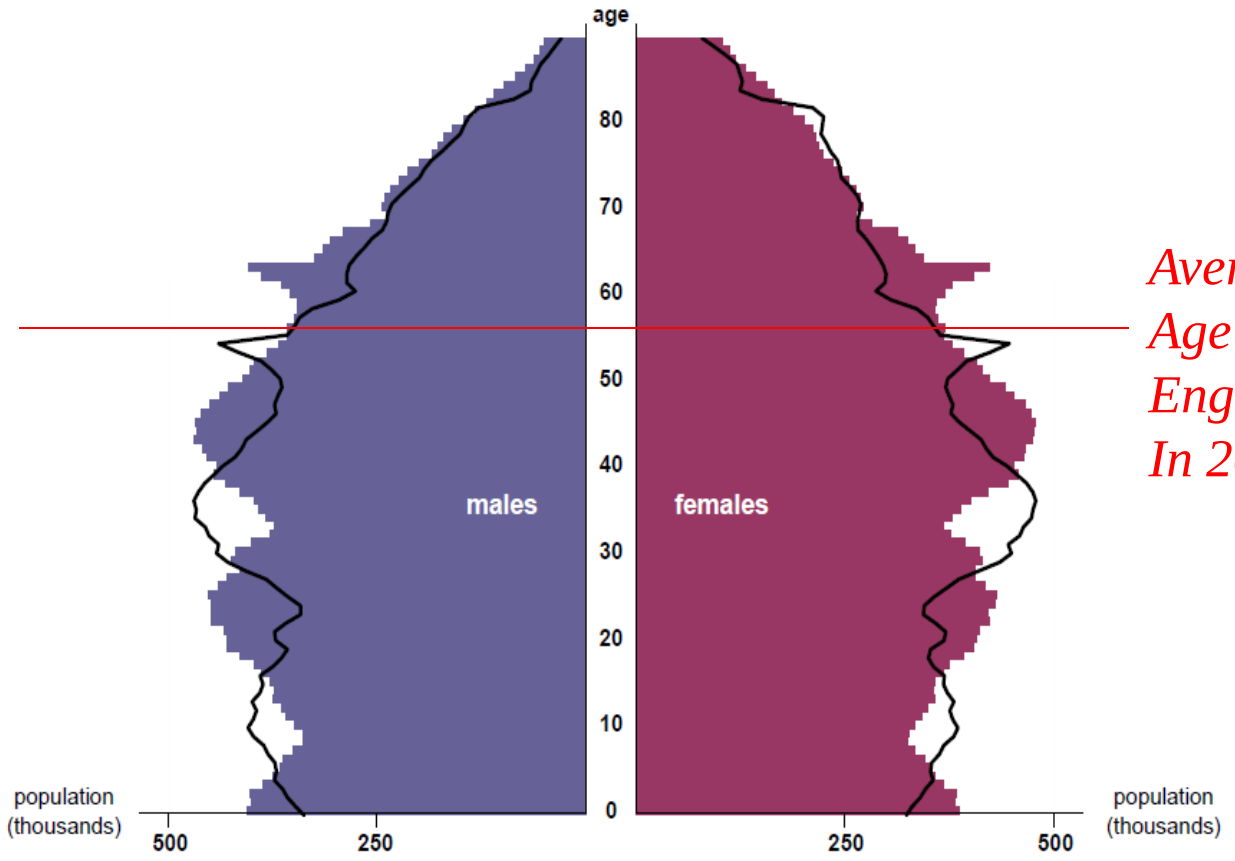
High frequency transistors

Spintronic devices/quantum computers

Our Professional Engineers

Engineering Talent Pipeline Issues

2010 & 2020 Demographics



Average Age of Thales Engineer In 2013

Need to ensure that the pipeline is maintained…

Source: RAEng, UCAS and Office of National Statistics

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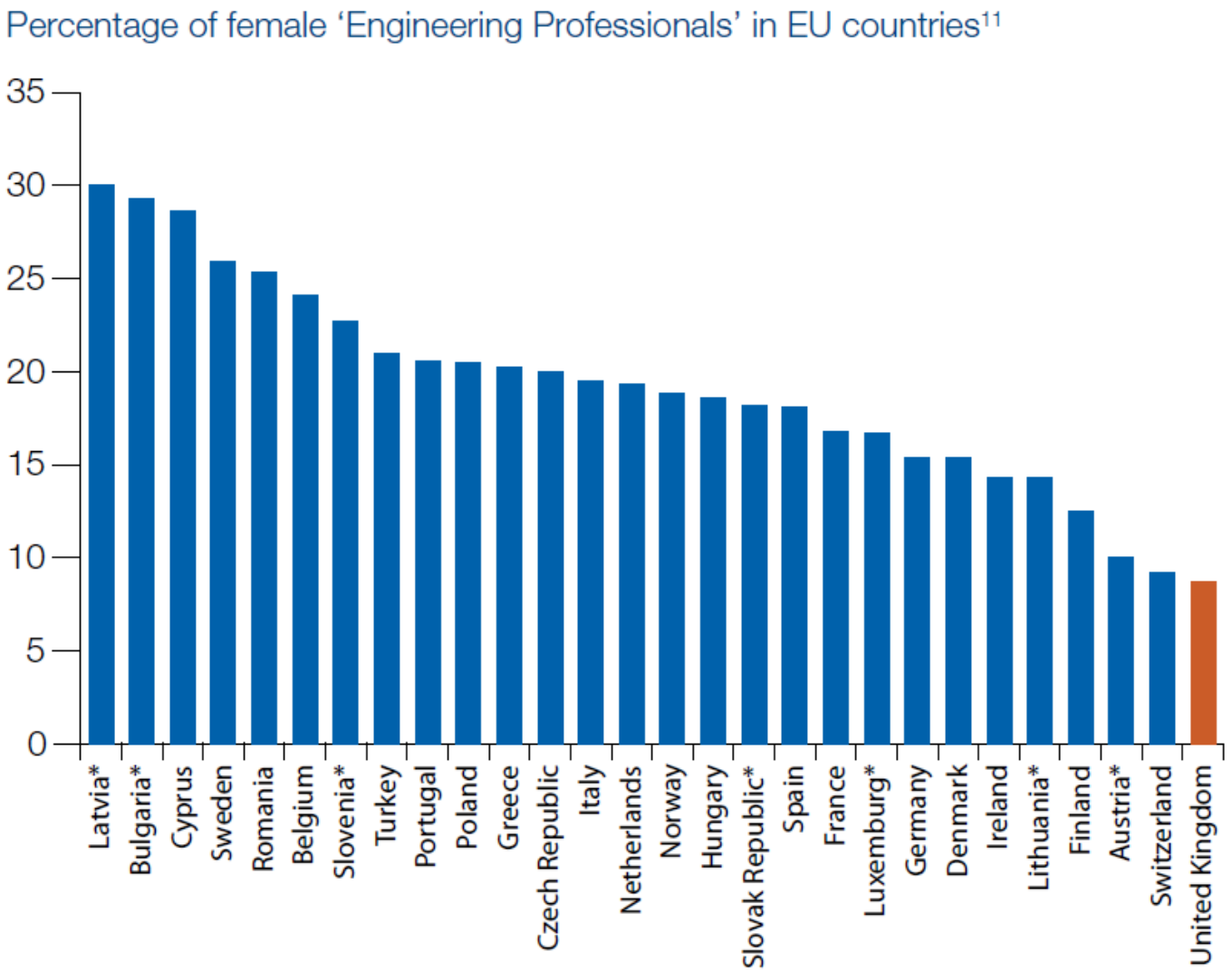
Female Engineers



Source: BIS, Professor John Perkins',Review of Engineering Skills

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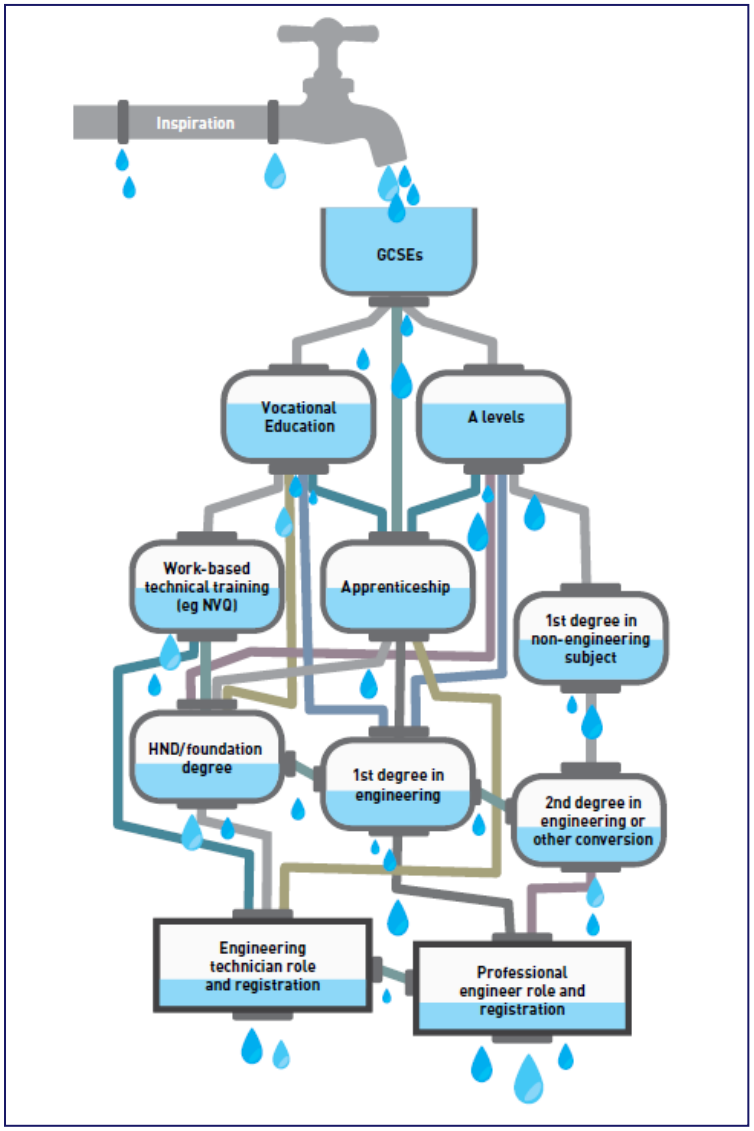
Leaky Pipe



Source: BIS, Professor John Perkins',Review of Engineering Skills

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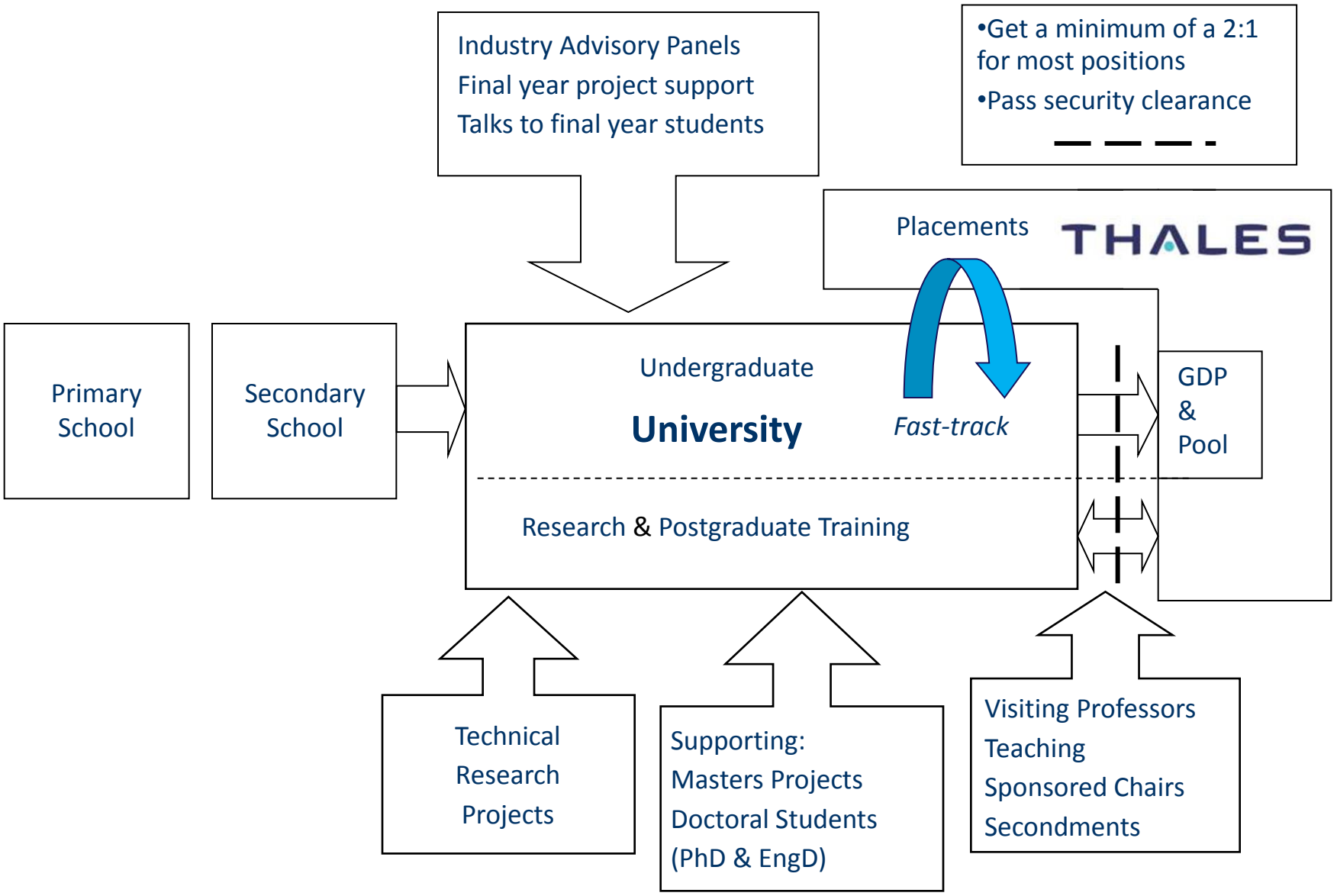
Our pipe line



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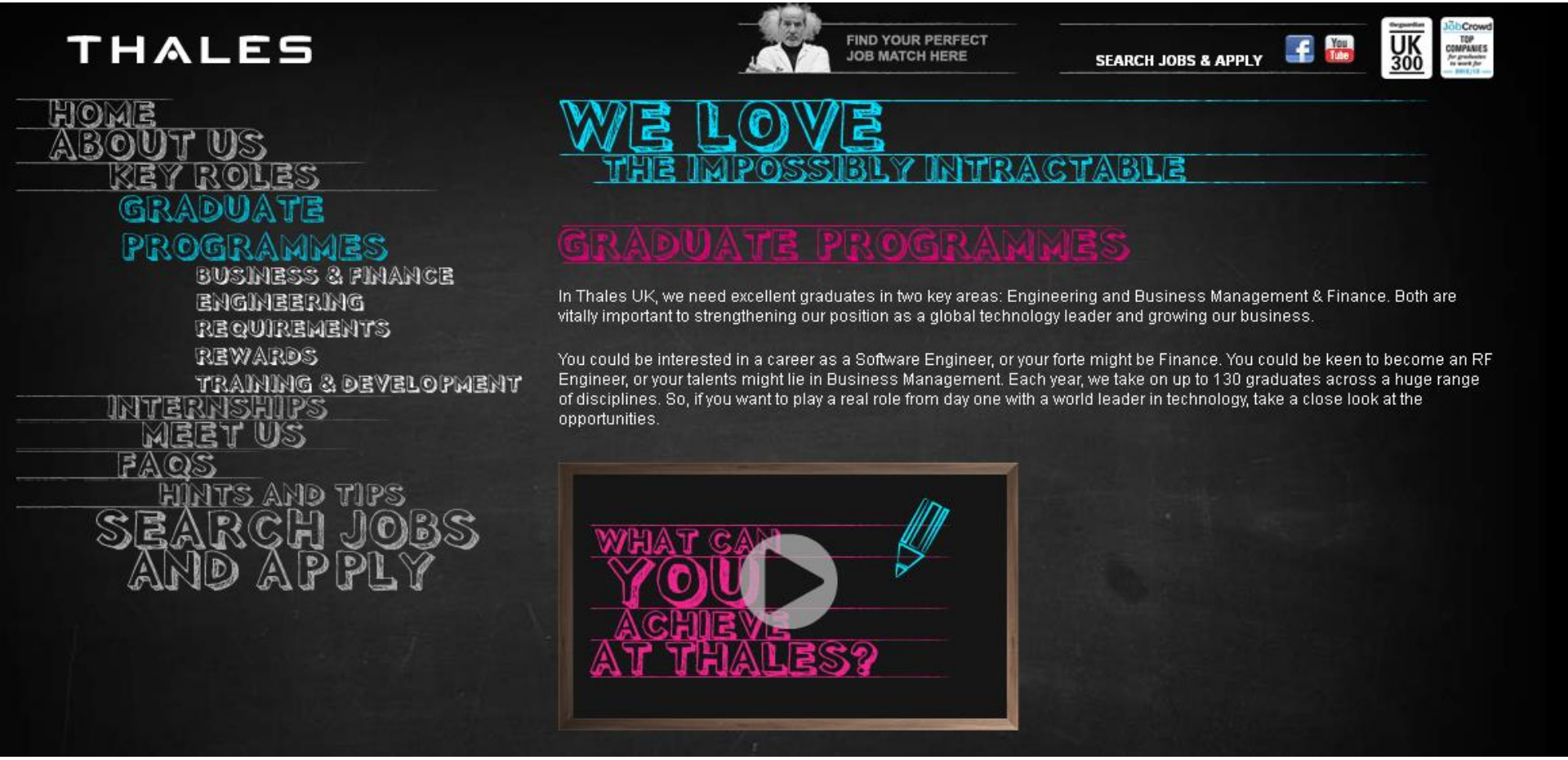
Thales Graduate Scheme



The Thales Graduate Development Programme achieved full Accreditation status on 21st November 2013 for a further 4 years

Accredited by IET. IMechE, RAeS and the IoP

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Summary

- **Markets globalising – even traditional sovereign markets such as defence**
- **UK a generally positive environment for innovation**
- **UK policy implicitly assumes a free market global level playing field (it's not)**
- **Improved industrial/government strategic cooperation essential and need not compromise competitivity**
- **Economic growth demands a more coherent approach to key export markets**
- **Strategic Alignment of Government/Academia/Industry essential**
  - ***We must convert UK technology leadership (e.g. graphene) to UK industrial leadership***
  - ***We must fix the UK Engineering Pipeline – improve approach to managing STEM skills from "cradle to grave"***