Commercialisation of Innovation-Led Research

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Summary of Talk

- Tyndall National Institute – Overview
- Smart Systems:
  - *"Tyndall Making Things for the Internet of Things"*
- Commercialisation from Innovation-led Research
  - Case Studies
- Future Perspectives

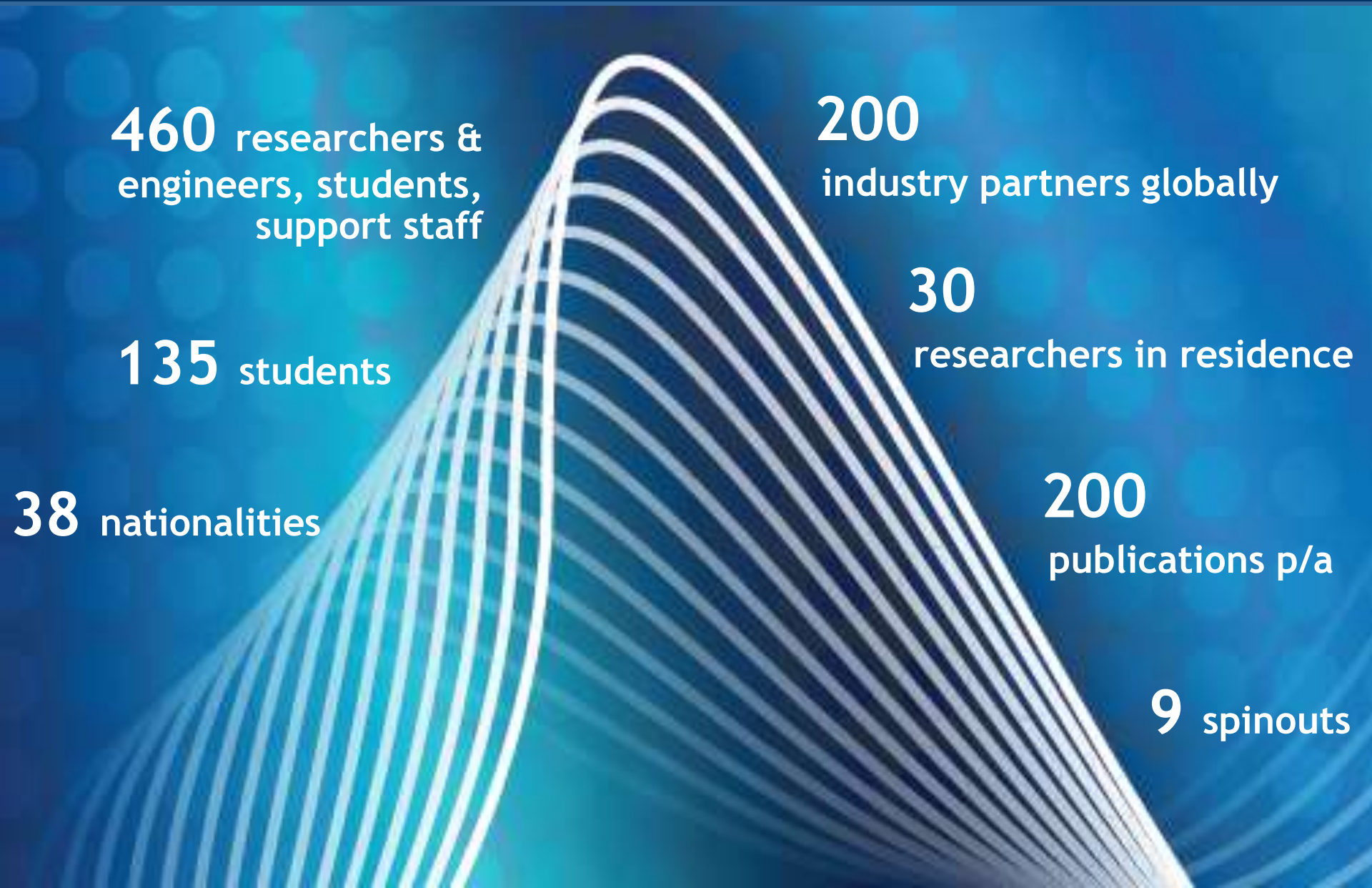
Vision:

To be the Premier Information and Communications Technology research institute worldwide….

in generating Economic Impact through Excellence in Research

Tyndall National Institute

Tyndall in numbers



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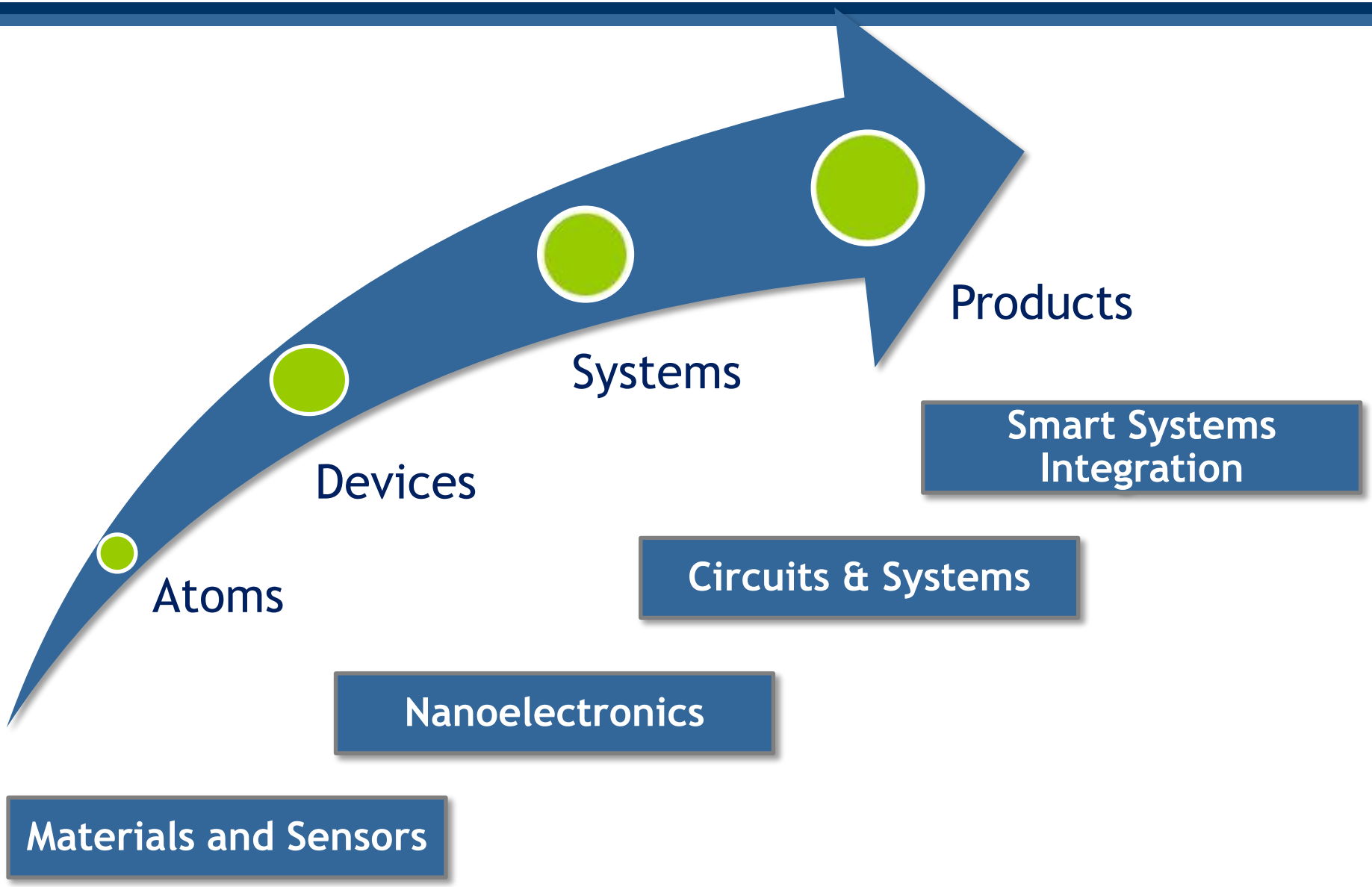
From Atoms to Systems



Products and Services – Making Things

- Silicon Fabrication incl e-beam (20nm)
- Full CMOS Process (100mm)
- III-V Device Fab (Opto/microwave)
- Tyndall “FlexiFab”
- Device assembly & packaging

- Metal plating
- TEM, SEM, Dual beam FIB
- Electrical probing/device charact.
- DC to >60GHz
- Photonic characterisation
- Hi Performance Computing

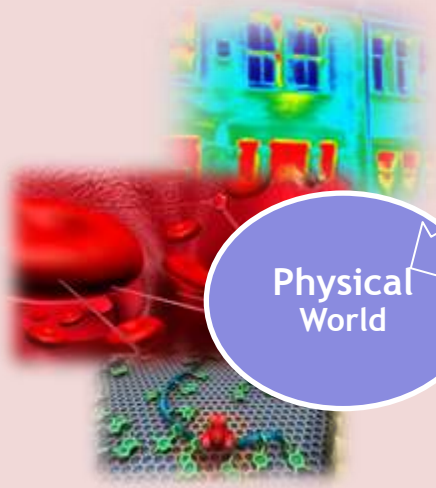
Smart System: physical layer

Individual

Smart System

Physical World

Connected World



Signal Sources

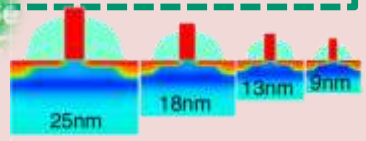
Sensor

Detector

Processing, Storage & Comms

Actuation

Data transmission



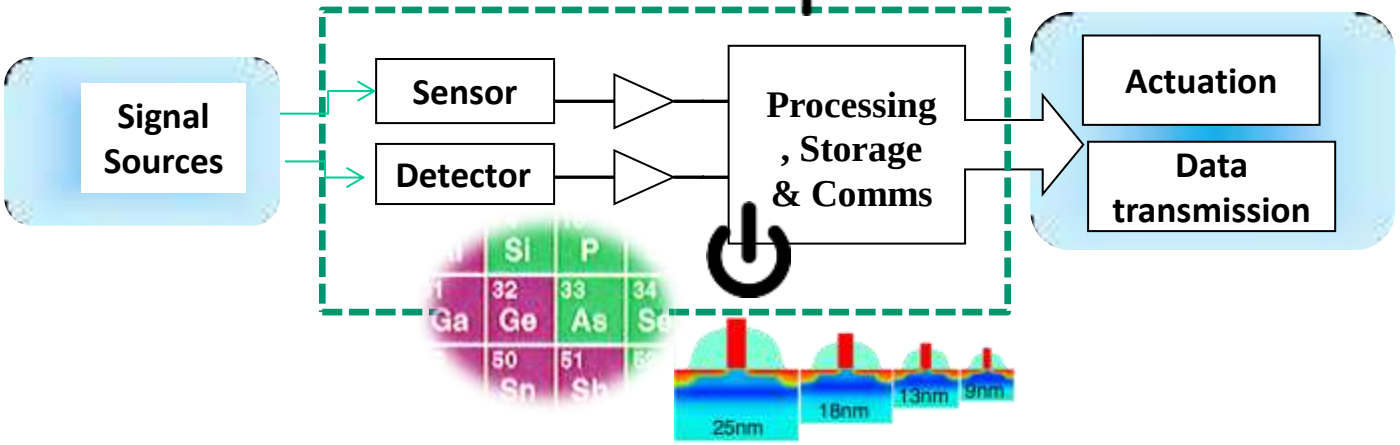
ICT Impacting the Economy

HEALTHCARE:
Longer, healthy lives

COMMUNICATIONS:
Efficient reliable

ENERGY:
Protected, safe, secure

ENVIRONMENT
Sustainable



Tyndall National Institute

Some of our Industry Partners

Tyndall National Institute

Economic Impact

Partnering to Create Impact

Tyndall National Institute

IPIC
BRINGING PHOTONICS TO LIFE

iERC
International Energy Research Centre

MCCI
Microelectronic Circuits Centre Ireland

CCAN
Collaborative Centre for Applied Nanotechnology

IDA IRELAND

sfi Science Foundation Ireland

ENTERPRISE IRELAND

HORIZON 2020
LE PROGRAMME DE RECHERCHE ET D'INNOVATION DE L'UNION EUROPÉENNE

Innovation Ecosystems - Partnering across Supply Chains
Working with your Customers Suppliers and Customers

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Impact: Track Record with New Companies

sensL provide low light detection and measurement devices to the market

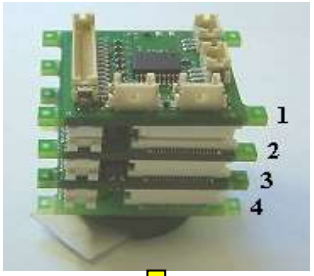
microLED for diagnostics, medical devices, printing, displays

integration of fibre optic solutions and optical transceivers,

Wireless energy control systems for business

Wearable sensor technology and digital sports

Market opportunity – Energy demand management system capable of delivering 10-15% energy savings focusing on the commercial and retail sector



Funding Scheme:

- **Leveraged off SFI funded research**
- EI Innovation Voucher ⇨ EI Feasibility Study ⇨ EI Innovation Partnership

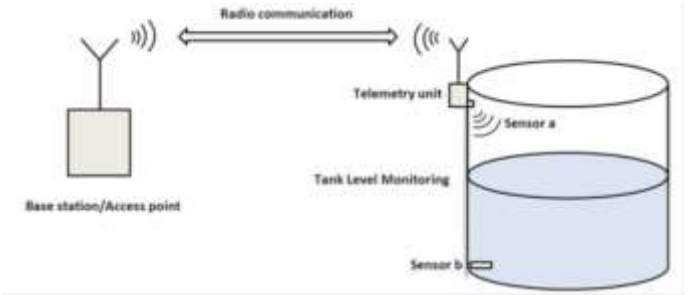
Technology developed – Wireless Sensing and Actuation System for Energy control e.g HVAC /Lighting in Supermarkets and Cold Stores

Outcome/impact–
Spin out company
Attracted VC funding
~ 20 jobs in Dublin and Cork
CTO transferred from Tyndall project team

Market opportunity – Wireless Tank Monitoring of bulk commercial tanks, possibly residential

Funding Scheme –EI Feasibility Study ⇨ EI Innovation Partnership

Technology developed – A Multi Modal Wireless Tank Monitor for measuring various size Tanks and fluids with enclosure



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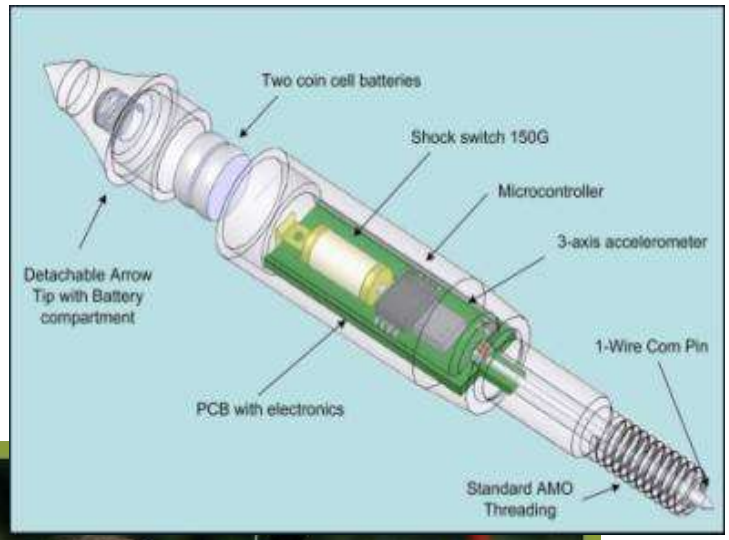
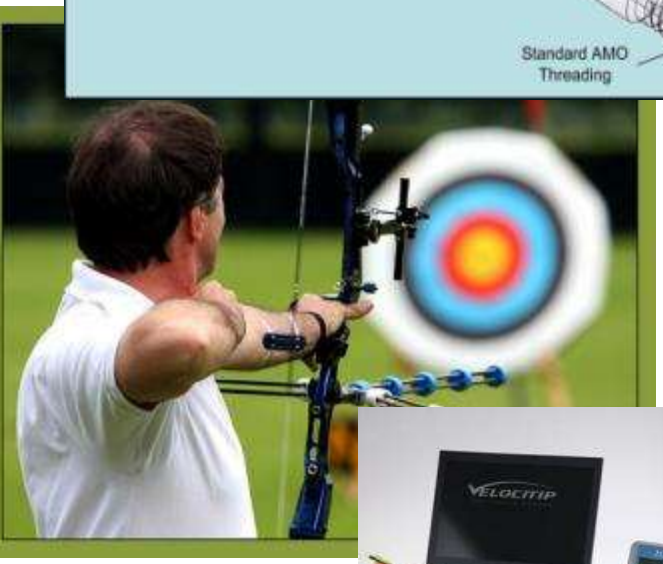
FULL FLIGHT TECHNOLOGY





Ultra-miniature Data Acquisition System

Turnkey solution

Data to information:

- Time of launch, flight and impact
- Gx, Gy, Gz during the flight
- Arrow velocity curve during flight
- Kinetic energy curve during flight
- Radial vibration analysis tool
- Pitch angle stability information before launch

US Archery Market > US$500m

Patented and Licensed to Full Flight Technology (US)

Start up company enabled

Product for sale on Amazon and used by Olympic team

Run Computer that measures technique, efficiency and performance.

First consumer product to measure run technique and identify bio-mechanical efficiency and performance measures.

Real time accuracy with auto calibration.

Suitable for runners at all levels
- smart with multiple modes.

Companion Mobile Apps
- integrates with other devices for feedback

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Tyndall Makes Things
National Access Programme 2005-2013

338
research projects funded for 600 researchers

1,200
User training days provided

71
NAP projects contributed to 56 PhD & 15 Masters theses

40 jobs
in 6 related spin-outs

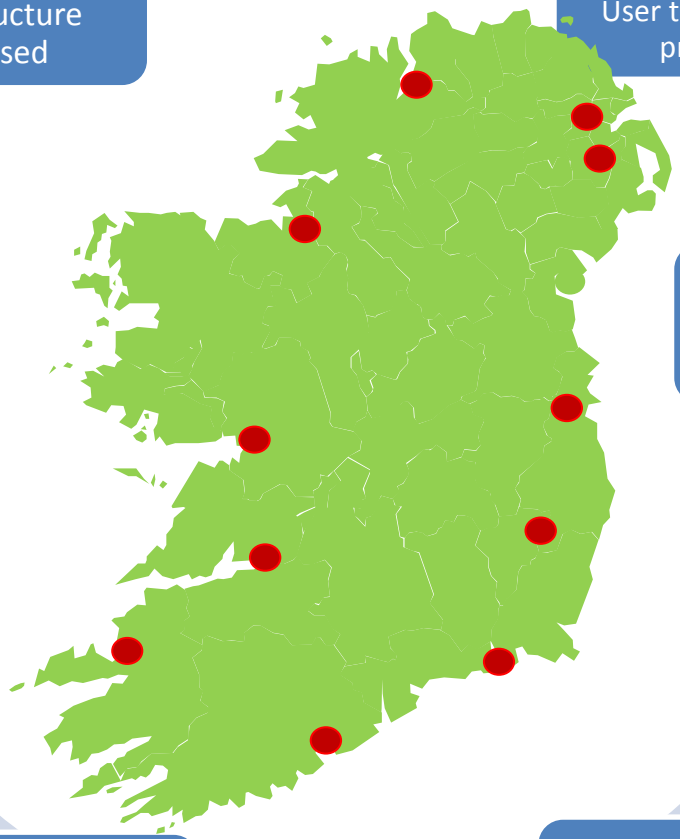
€36M
in skills transfer to industry

€30M
project value generated

10%
Projects led to further commercialisation

€10M
leveraged external funding

€120M
infrastructure accessed



Tyndall National Institute

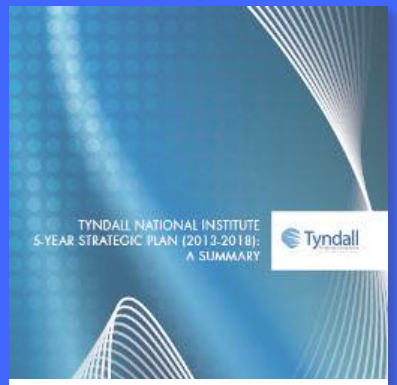
THE FRAMEWORK PROGRAMME FOR RESEARCH AND INNOVATION

HORIZON 2020

Job creation

Doubling EU funding 2013-18

Scientific Excellence



Tyndall plan aligned to H2020

Market and society facing

National infrastructure => to EU infrastructure

30 years of industry delivery

Ireland as a Test-bed

A scale invariant, “end to end” view of data from smart device to personalized digital services presents a unique ICT test bed for IoT ideas which are…

“**big enough to prove but small enough to trial**”

Smart Grid

Smart City

Energy

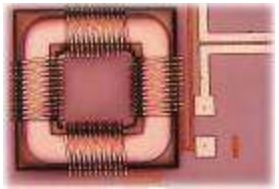
Bandwidth

Computing time

Water

Smart person

Smart device

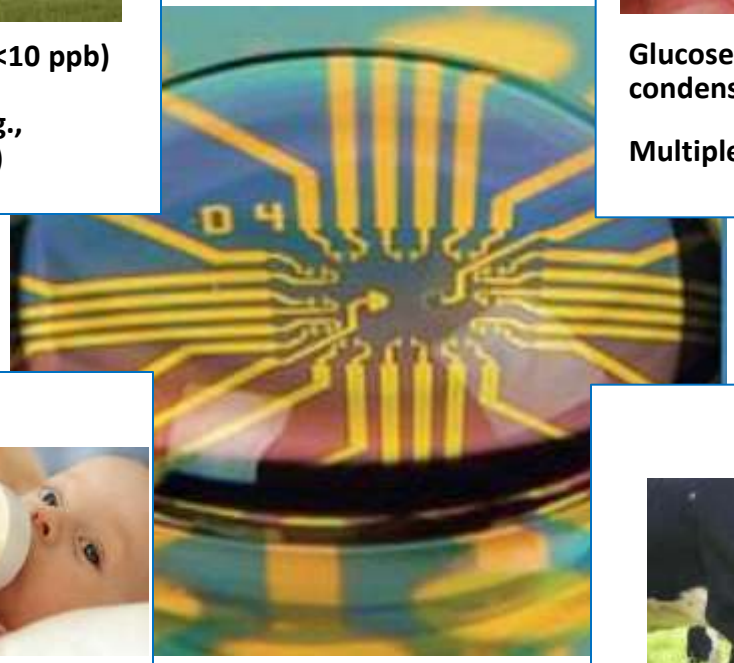


ICT for SAFE - *Sustainable and Secure Agriculture, Food and the Environment*

Security/Environment

Security – explosive detection (e.g., TNT <10 ppb)

Neonicotinoide insecticide detection (e.g., thiamethoxam 2 ng/mL (ppt) in water)



Health - Screening

Glucose detection – (uM, suitable for breath condensate detection)

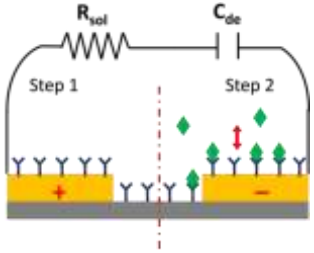
Multiplexed multi-parameter detection

Food Analysis

Water quality analysis, heavy metal detection (100 ppt, nM Cu in water)

Toxins detection – e.g., melamine,

Animal Health



Point of care sensors (label-free, low-cost…)
Biomarker binding (DNA/DNA, Ab/Ag)
Virus - vaccine discrimination
Metabolomics

Our values and culture

- **Leadership -** *Clarity and focus in decision-making with respect and integrity in all dealings*
- **Excellence -** *Creating high value solutions that optimise opportunity*
- **Teamwork -** *Professional, accountable to one another and focused on delivery*
- **People -** *Secure, well-resourced, self-assured*
- **Entrepreneurship -** *Confidence in managing risk and driving enterprise*
- **Optimism -** *Determined and resolute in the face of challenge*

Impact from Excellence