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STFC's approach to evaluating the impact of research infrastructures

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To achieve our Vision we have to do two things

- Create more impact
- Demonstrate it more clearly

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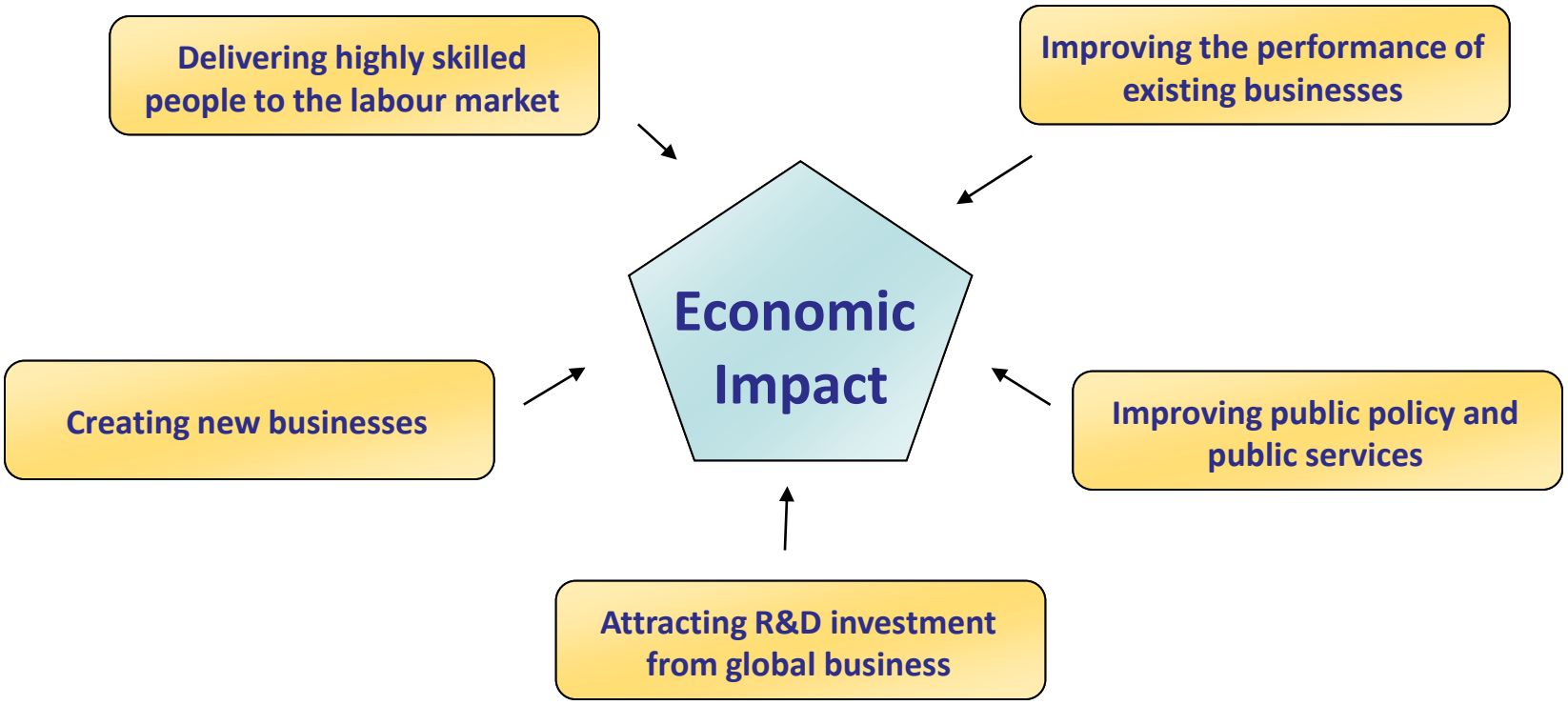
How we deliver impact

Delivery vehicles

- STFC delivers impact by
  - Providing grant-funded programmes in astronomy, particle and nuclear physics
  - Developing and operating UK large facilities for the wider research base
  - Providing access to international research facilities for the UK research base
  - Developing innovative technologies in our national laboratories and with University groups
  - Fostering knowledge exchange at our [illegible]rwell Ox[illegible] and Daresbury Science & Innovation Campus

The outcomes Government wants



DIUS 'Economic Impact Framework' – May 2007

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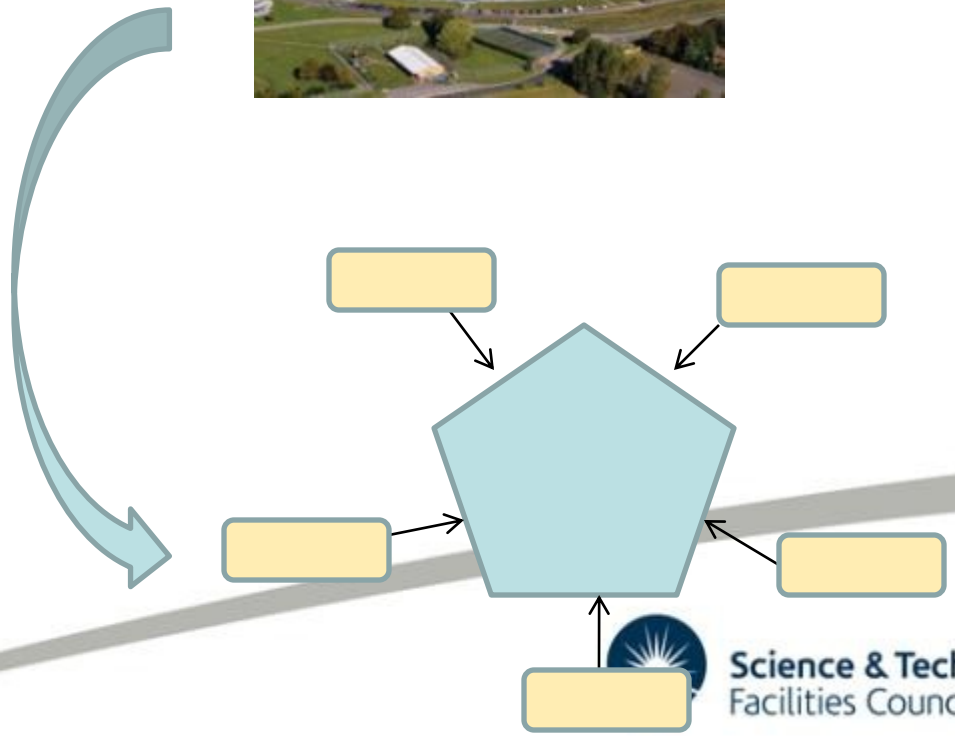
Bridging the gap



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Developing an impact evaluation framework

Delivery vehicles

Strategic goals

	Laboratories	UK Facilities	Campuses	International Subscriptions	Universities
Research Impacts					
Innovation Impacts					
Skills Impacts					

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Populating the framework...

	Laboratories	UK Facilities	Campuses	International Subscriptions	Universities
Research Impacts	Some publications Some joint appointments	Publications Citations Joint appointments Grant users		Publications Citations (CERN/ESO) Grant users	Publications Citations Awards Further funding
Innovation Impacts	IP & licensing Spinouts Some technology prospects	Industrial users by sector Contracts to industry IP & licensing Spinouts	Daresbury companies, jobs, collaborations, products Harwell companies	Contract value to UK companies (CERN/ESO)	Collaborations Technology development IP & licensing Spinouts
Skills Impacts		No. PhDs using facilities PhD training days Apprentices			PhD completion Next destination Dissemination

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Data quality and completeness

	Laboratories	UK Facilities	Campuses	International Subscriptions	Universities
Research Impacts	Some publications Some joint appointments	Publications Citations Joint appointments Grant users		Publications Citations (CERN/ESO) Grant users	Publications Citations Awards Further funding
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Addressing data gaps

	Labs	UK Facilities	Campuses	International Subscriptions	Universities
Research Impacts	High impact publications Citations Leadership Joint R&D	High impa publica Leadersh Joint R&		ESRF/ILL publications High impact publications Joint work	High impact publications Publications with industry Scientific leaders
Innovation Impacts	Collaborations Contracts Industry joint appointments Technology prospects	Collabor Contract Industry appointr Technol prospect	Full data on Harwell Overall performance data for whole campus, contribution GVA etc	IP/Spin-outs associated with UK organisations/users	Procurement £ collaborations Industry joint appointments
Skills Impacts	Collaborative working, Masters, PhDs, external training, apprentices sandwich students data	Training external collabor working	Training to external partners, collaborative working	PhDs trained, using facilities, other training offered, collaborative working,	Next destinations of physics undergraduates, high performing PhDs

SRS Study

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SRS – New Light on Science

- Project to capture the considerable impact from a UK large science facility over 28 year life
- Quantitative and qualitative data, eg
  - Scientific impact
  - Skills/qualifications
  - Technology development
  - Commercialisation

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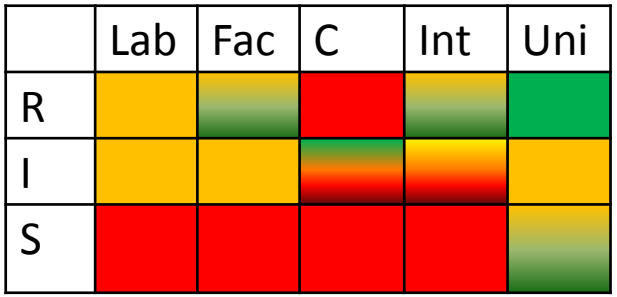
Different levels of impact

- Direct / short term
  - Scaleable, can predict, can attribute but only part of the story, do this very quickly



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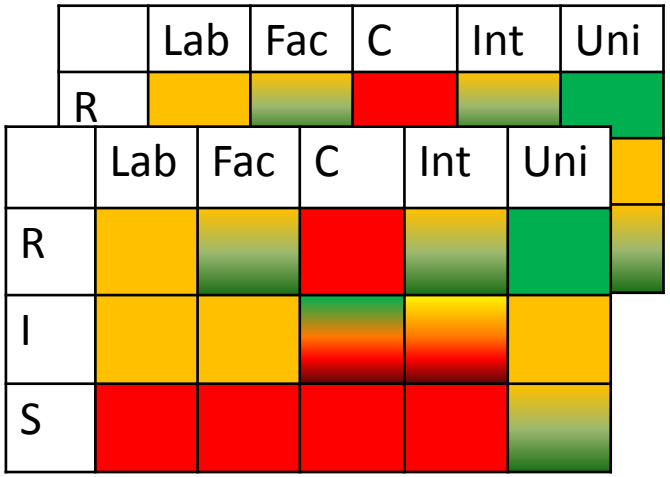

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Different levels of impact

- Direct / short term
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- Indirect / medium term
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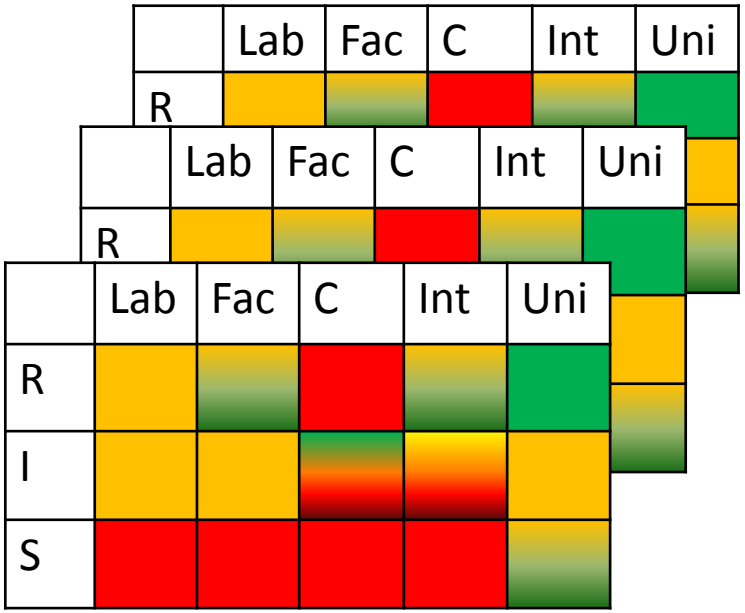
- Global / life changing
  - Cannot predict, impact immense, attribution impossible to quantify



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SRS – Impact

- Direct
  - Helped trained 4,000 PhD students
  - 11.000 users trained in techniques
  - 100 staff working on other synchrotrons
  - 1,200 protein structures solved

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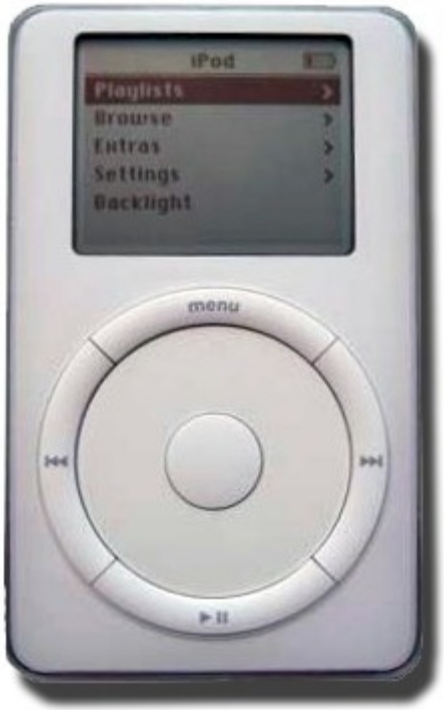
  - 9 spin-outs, 25 patents, 11 licenses
  - 200 industrial proprietary users
  - New applications, eg RF coating in TV transmitters generated £250m sales



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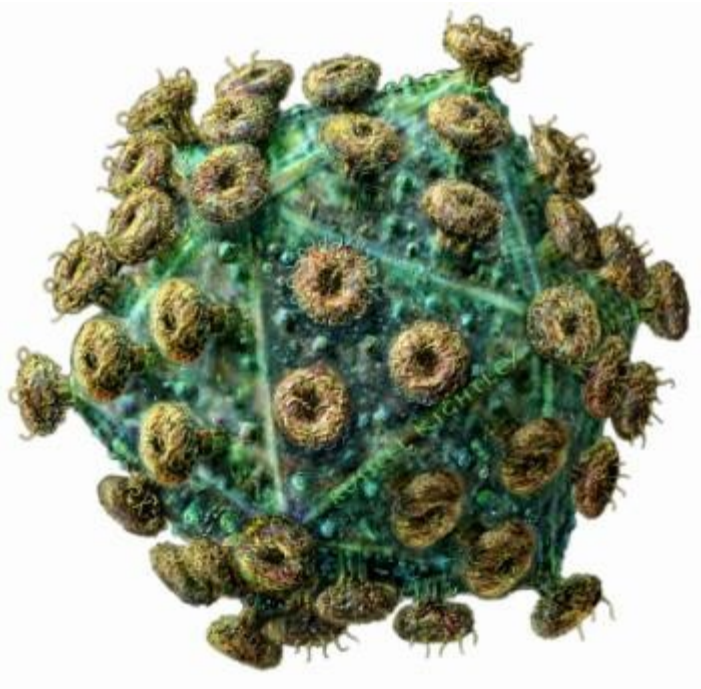
  - New applications, eg RF coating in TV transmitters generated £250m sales
- Global
  - First 2nd generation multi user synchrotror
  - Pioneered protein crystallography
  - Led the way to 70 further facilities



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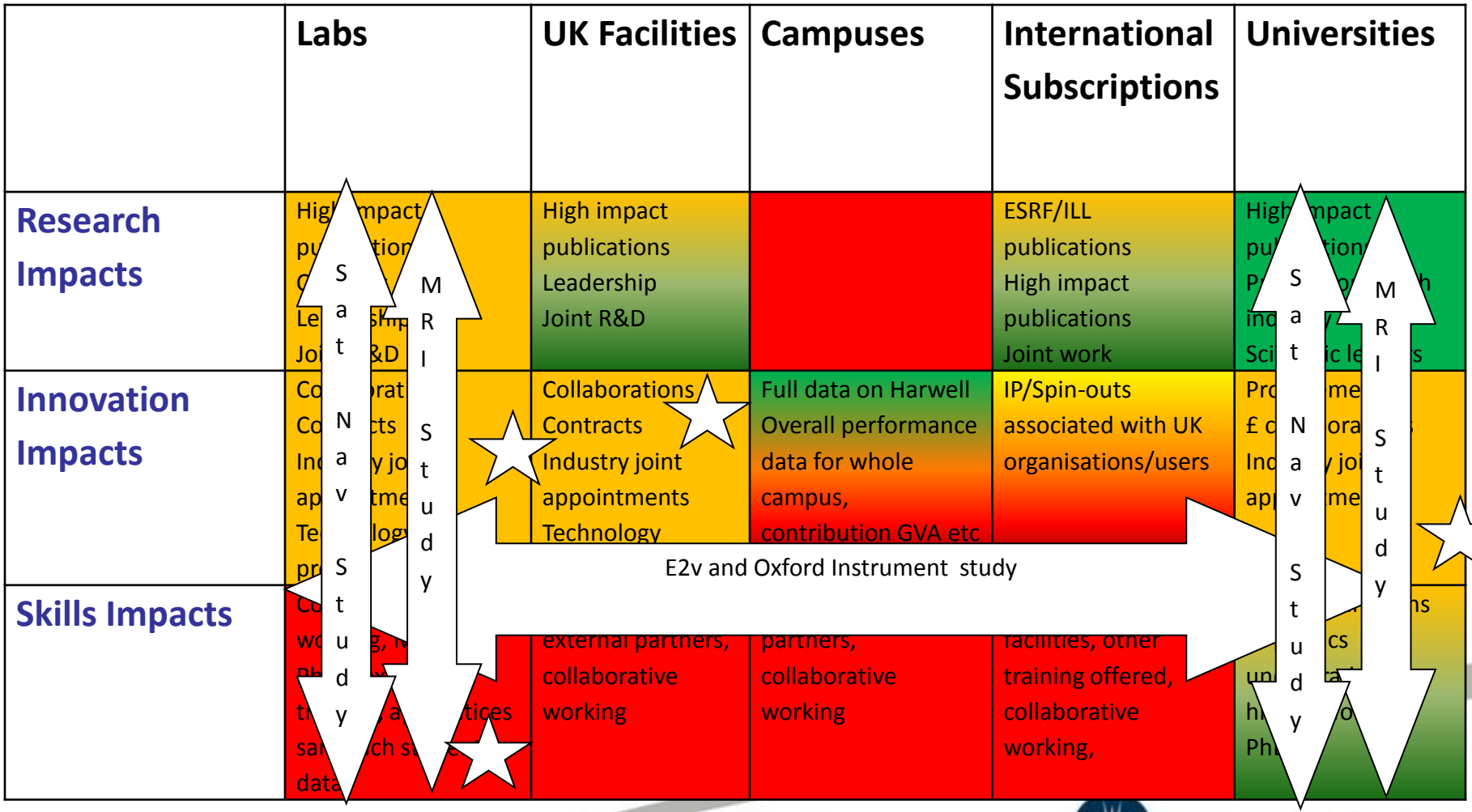
How we are building on this approach



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Economic impact of physics research

- Case studies on MRI and Satellite Navigation
  - Oxford Economics - independent analysis of the economic benefits to the UK of these sectors
  - Identifies STFC's underpinning contribution to the technology
  - Demonstrates the path from fundamental research through to commercialisation & impact on daily lives
  - Quantifies the overall value to UK economy using recognised economic analyses

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Satellite navigation study - findings

- The ‘GPS sensitive’ part of the UK economy is worth 7% of GDP, or ~£100 billion
  - road/rail/air transport, maritime, agriculture, search & rescue, location-based services, oil & gas exploration
  - Expected to grow by 10% per year for next decade

- Satellite navigation reduce vehicle mileage by 16% and time spent travelling by 18%
- If satellite navigation was unavailable would have…
  - increased UK vehicle travel by 5.2 billion miles (8.3bn km
  - cost consumers/businesses an additional £5.2bn in fuel
- Underpinned by fundamental physics research & by STFC expertise

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Impact of STFC collaboration

e2v scientific instruments

OXFORD INSTRUMENTS
The Business of Science™

- Case studies on the long term relationship between STFC and two well-established high-tech companies, Oxford Instruments and e2v
  - Commissioned Galbraith Muir Consultancy - independent analysis
  - Identifies STFC inputs over the years
  - Assesses contribution to benefits accrued by those companies
  - Exemplars & case studies of particular business benefits

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Impact of STFC collaboration

e2v scientific instruments

OXFORD INSTRUMENTS
The Business of Science™

- Methodology
  - Extensive interviews/follow-up discussions with employees past & present of STFC, Oxford Instruments & e2v
  - Documentary evidence from a variety of sources, literature reviews etc
- Preliminary findings
  - Ideas generated within STFC and further developed by these companies created economic & societal benefits in diverse fields cancer treatment, space science & environmental engineering

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Short case studies

- Example from ISIS…
  - Unclogging the cholesterol of crude oil
  - Using ISIS facility to understand why oil pipes get blocked & improving extraction from reservoirs

"The work at ISIS allowed us to understand more clearly how the asphaltenes aggregate. This should allow more efficient extraction of hydrocarbons in the future." Edo Boek, Senior Research Scientist, Schlumberger Cambridge Research

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Short case studies

- Example from STFC's laboratories…
  - STFC developed early software & protocols that underpin by the film CGI industry worth £20 billion
  - STFC graphics used in 'Alien' won Oscar for Best Special Effects in 1980
  - Software and protocols underpin UK gaming industry worth £1bn and employing 9,000 highly skilled development staff , 85% of whom are employed outside London

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Short case studies

- Example from University groups…
  - Particle physics used to mitigate natural disasters
  - Using GRID technology to develop web portal to access landslide modelling calculations

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Mapping our impact

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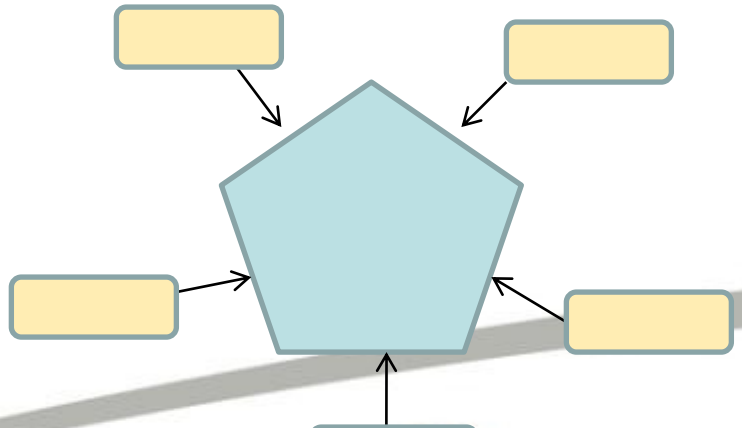
Having a coherent means of articulating STFC's impacts enables us to draw out the relevant information from all areas of the organisation & map it on to BIS's priorities



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Improving existing business

- Innovation accounts for 25-50% of labour productivity and 63% of other productivity growth. Investments by STFC have made significant contributions to
  - **Development of high growth sectors**; design training allows £23bn microelectronics sector to grow at 15% pa and underpin aerospace, automotive, consumer technology and defence industries, £78bn of GDP employing 700,000 people
  - **The competitiveness of established sectors;** 15 of top world's 75 best selling drugs were developed in the UK using techniques pioneered by STFC; pharmaceuticals contributes £8bn to UK GDP and provides 67,000 jobs
  - **Increasing productivity of less innovative sectors;** GPS road tracking reduces UK vehicle mileage by 16%, fuel costs by £5bn and time spent travelling by 18% every year

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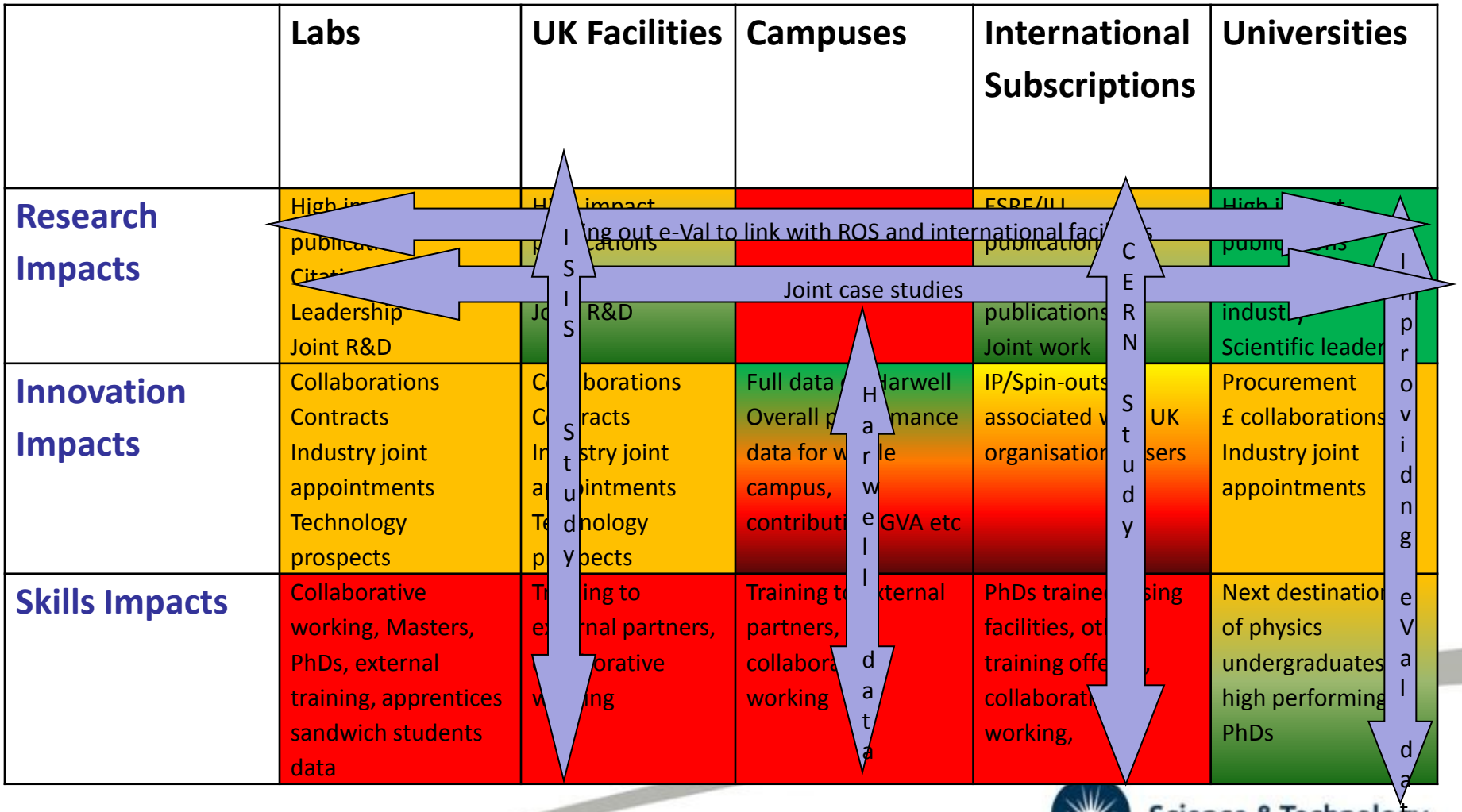
Future plans



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Future plans

- Apply methodologies to other studies
  - STFC facilities, subscriptions, etc…
- Target our efforts:
  - Evaluation framework enables us to identify gaps in our knowledge
  - Ensure alignment both with our strategy and Government priorities
- Opportunities for joint working:
  - Avoids duplication of effort and strengthens our messages
  - Share best practise

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Discussion