Towards a UK National Formulation Centre

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Consumer products through IB
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Overview

- Why is UK formulation important?
- The Special Interest Group Report
  - ‘Realising the Potential for Formulation in the UK’
- The TSB Collaborative R&D Competition in Formulation
- The National Formulation Centre
- Status / Next steps

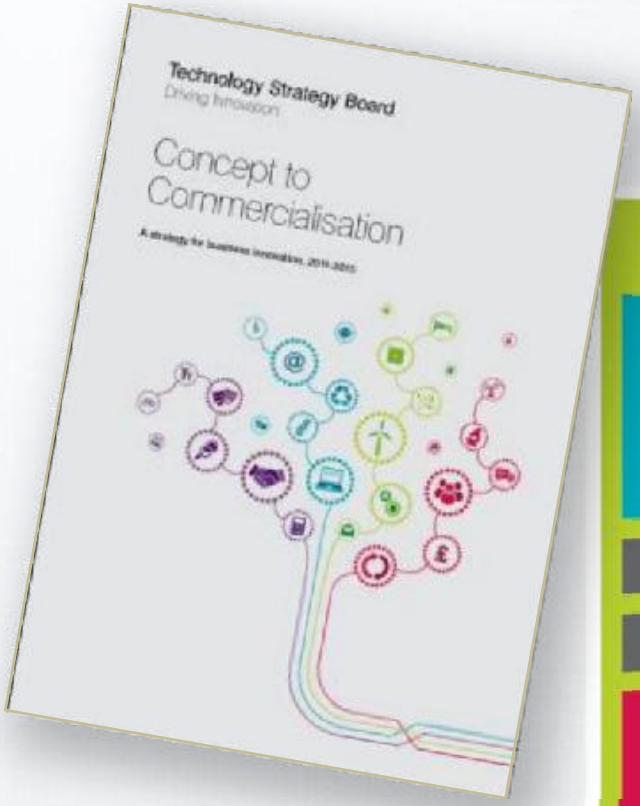
The opportunity

- Formulation, the creation of multi-component, often multi-phase products, is an enabling capability
- Underpins many sectors in our economy and high-value manufacturing industries globally.
- The formulated products market in the UK is worth around £180 billion pa with a potential for companies in emerging overseas markets of around £1,000 billion pa

A key strength for the UK

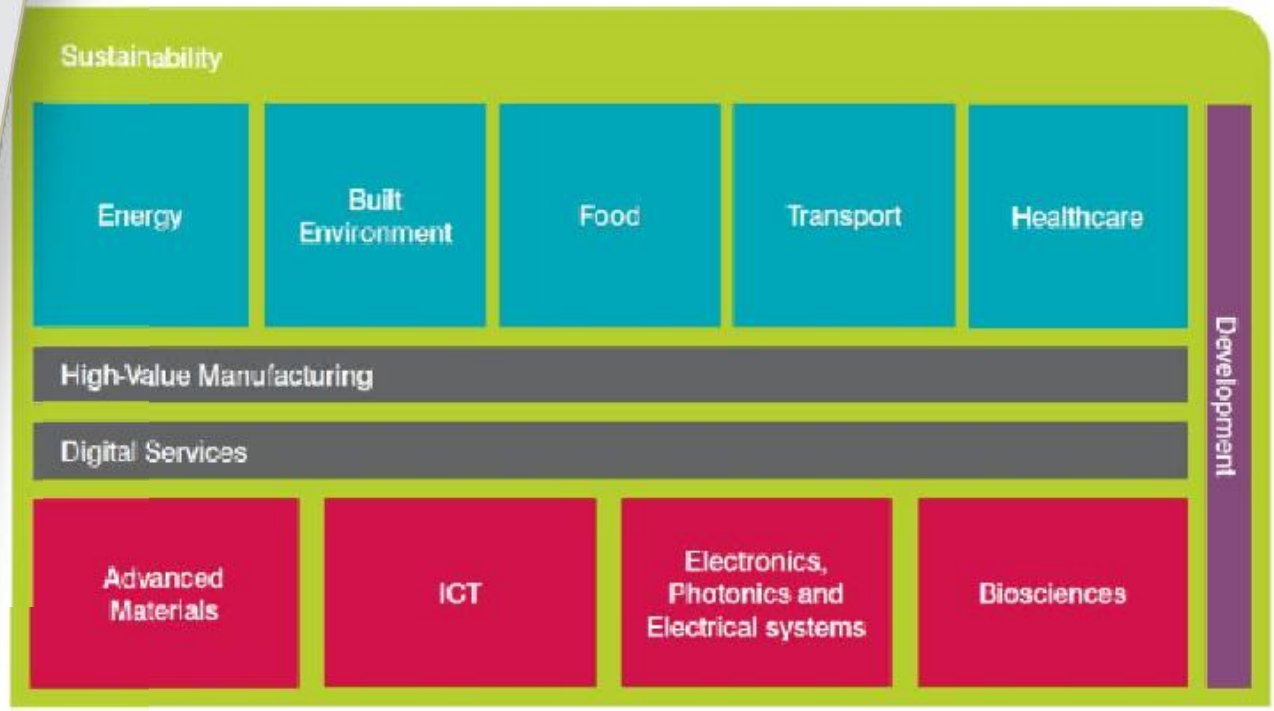
- UK has a critical mass of world leading formulation companies with manufacturing and R&D activities
  - >22% of top 1000 UK R&D spenders are involved in formulation.
- Strong underpinning high–tech SME and academic supply chain
  - measurement, modelling and simulation, automation, surfactants, informatics, particle design, colloid science

Formulation in UK strategy



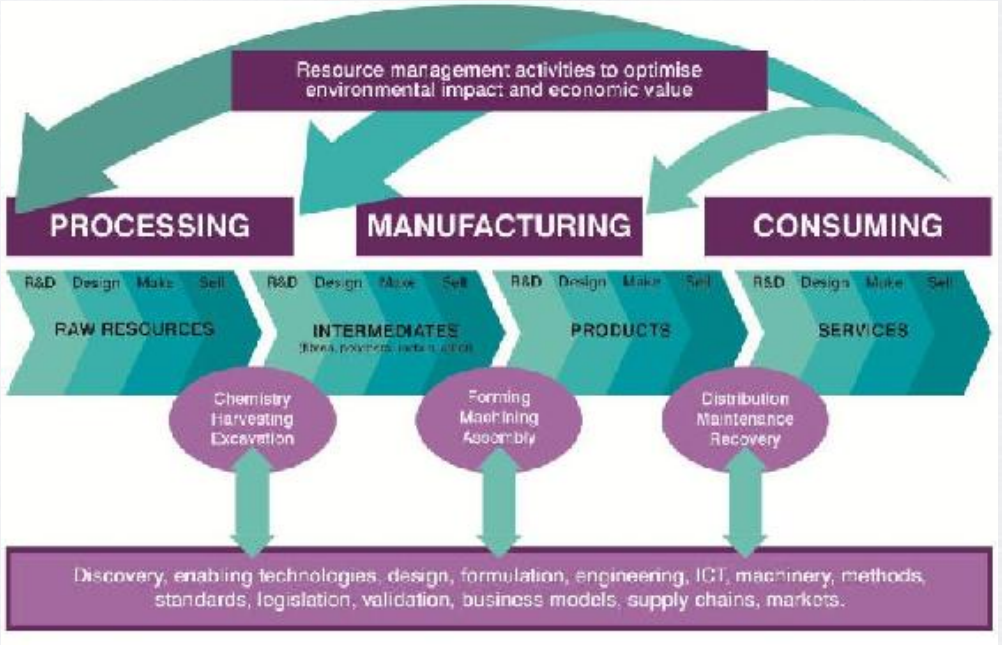
"Concept to commercialisation"

- TSB's overarching strategy
- Includes High-value manufacturing



High Value Manufacturing

High value manufacturing is the application of leading-edge technical knowledge and expertise to the creation of products, production processes, and associated services which have strong potential to bring sustainable growth and high economic value to the UK. Activities may stretch from R&D at one end to recycling at the other.



Such potential is characterised by a combination of high R&D intensity and high growth

Formulation in UK strategy

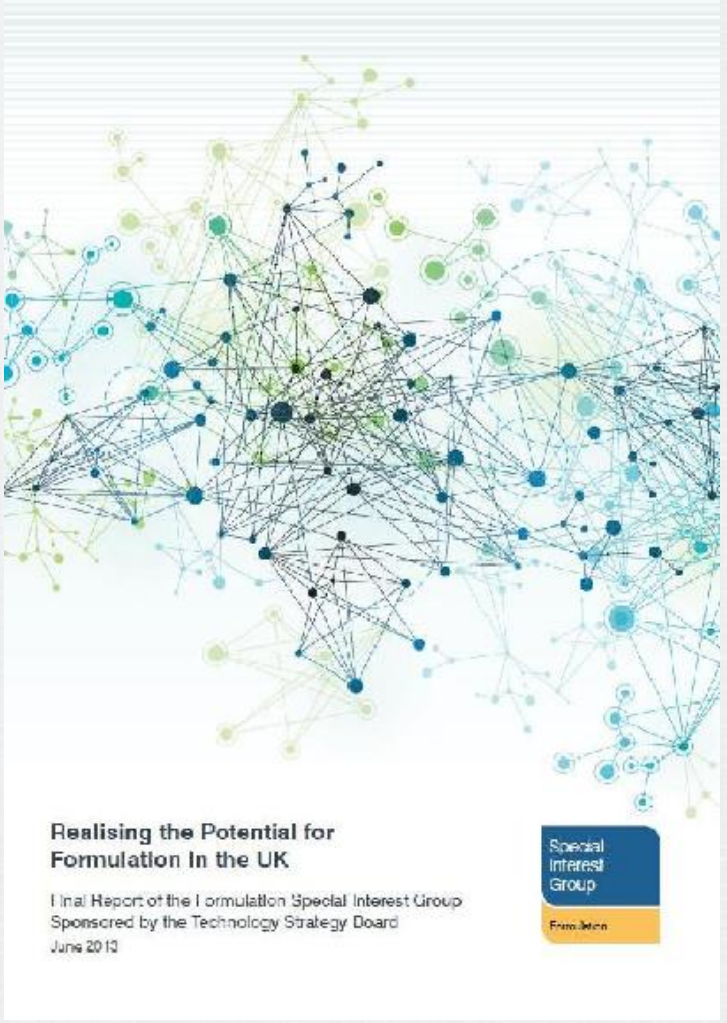
- May 2012:
  Formulation one of 22 key competencies within the TSB High Value Manufacturing strategy

- July 2012-Apr 2013:
  Formulation Special Interest Group created to answer a difficult question...

- ***"How can TSB best support innovation in UK formulating companies?"***

The Formulation SIG Report

- Formulation and its Importance to the UK
- Mapping the Science and Technology Capabilities and Needs
- Building Projects and Collaborations
- **Collaborative R&D Competition**
- **Creating an Open-Access Formulation Centre for the UK - The business plan executive summary**
- Skills Development and Training to Support Innovation



https://connect.innovateuk.org/web/formulation1

TSB Collaborative R&D Competition

- **TSB and EPSRC investing** in projects to accelerate the development of new ways of designing, improving and manufacturing complex high-value formulated products
  - Large **collaborative R&D**
  - **Feasibility projects**

Innovation Themes

- Radical Formulated Product Design
- Formulation for Delivery
- Radical Formulation Process Design
- Formulation for Stability
- Formulation for Sustainability

https://www.innovateuk.org/-/formulated-products-meeting-the-product-and-process-design-challenge-feasibility-study

TSB Collaborative R&D Competition

- V. successful, total TSB investment raised from £6m to £9.2m
- With matched private investment, total >£20m in formulation projects
- Diverse project coverage: e.g.shampoo, catalysts, chocolate, cutting fluids, medicines, paints, Agrichem, cosmetics, packaging adhesives, wine making, medical devices, env. remediation, biosensors, (bio)pharma, process chemical intermediates
- Excellent way to prime a larger, more strategic investment / activity

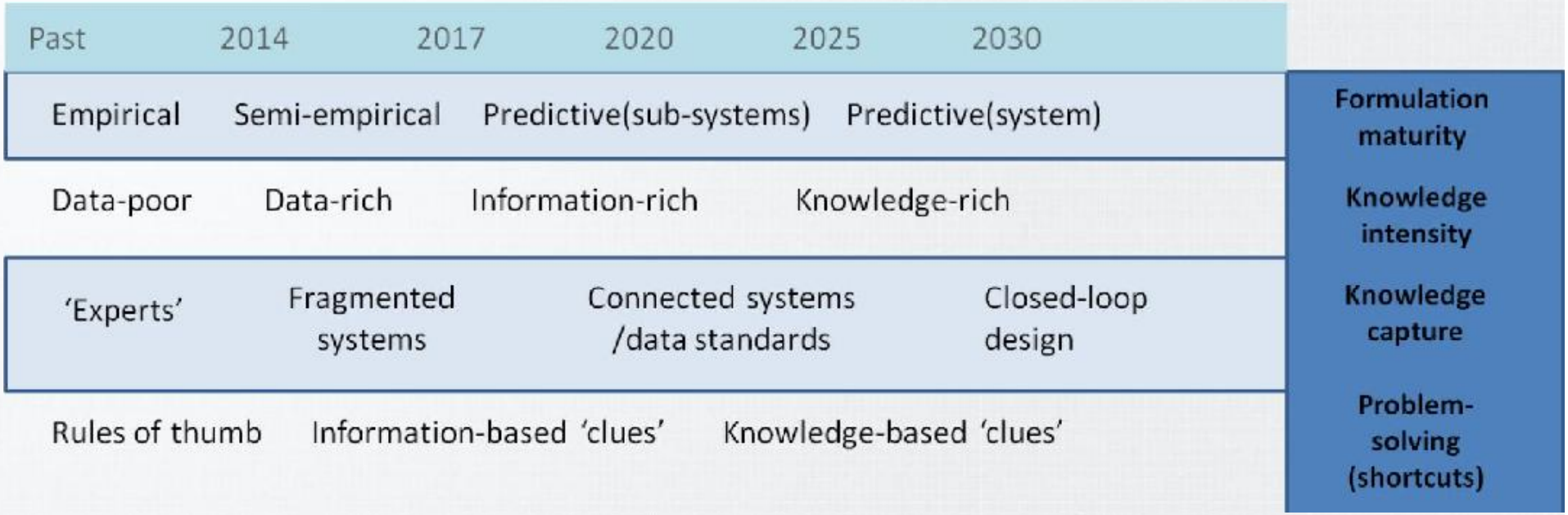
https://www.innovateuk.org/-/formulated-products-meeting-the-product-and-process-design-challenge-feasibility-study

Centre Implementation Team - Industry

	Industry High–level Group	Industry Working Group
AkzoNobel	Andrew Burgess Chief Scientist	John Carroll Director RD&I
Unilever	Jon Hague VP Open Innovation Matt Reid Senior Open Innovation Director	Ian Howell High Throughput Science leader
P&G	Charles Bragg R&D Director	Euan Magennis Strategic Innovation and Technology
AstraZeneca	Paul Stott VP Medicines Development	Marcel de Matas Principal Scientist Richard Storey Physical Scientist

Other companies engaged: GSK, Pfizer, Johnson Matthey, Syngenta, Infineum

Enabling UK leadership in a global capability race



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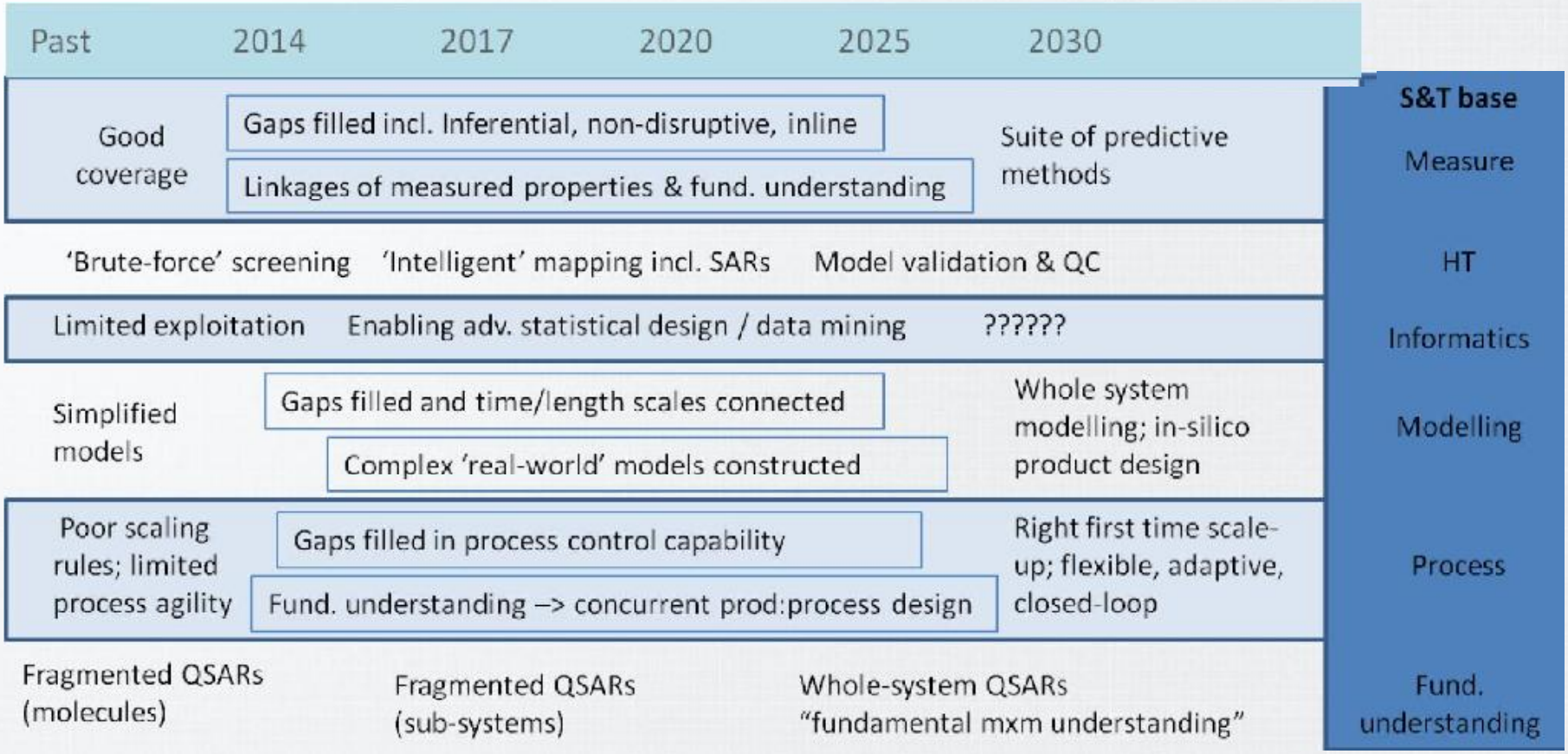
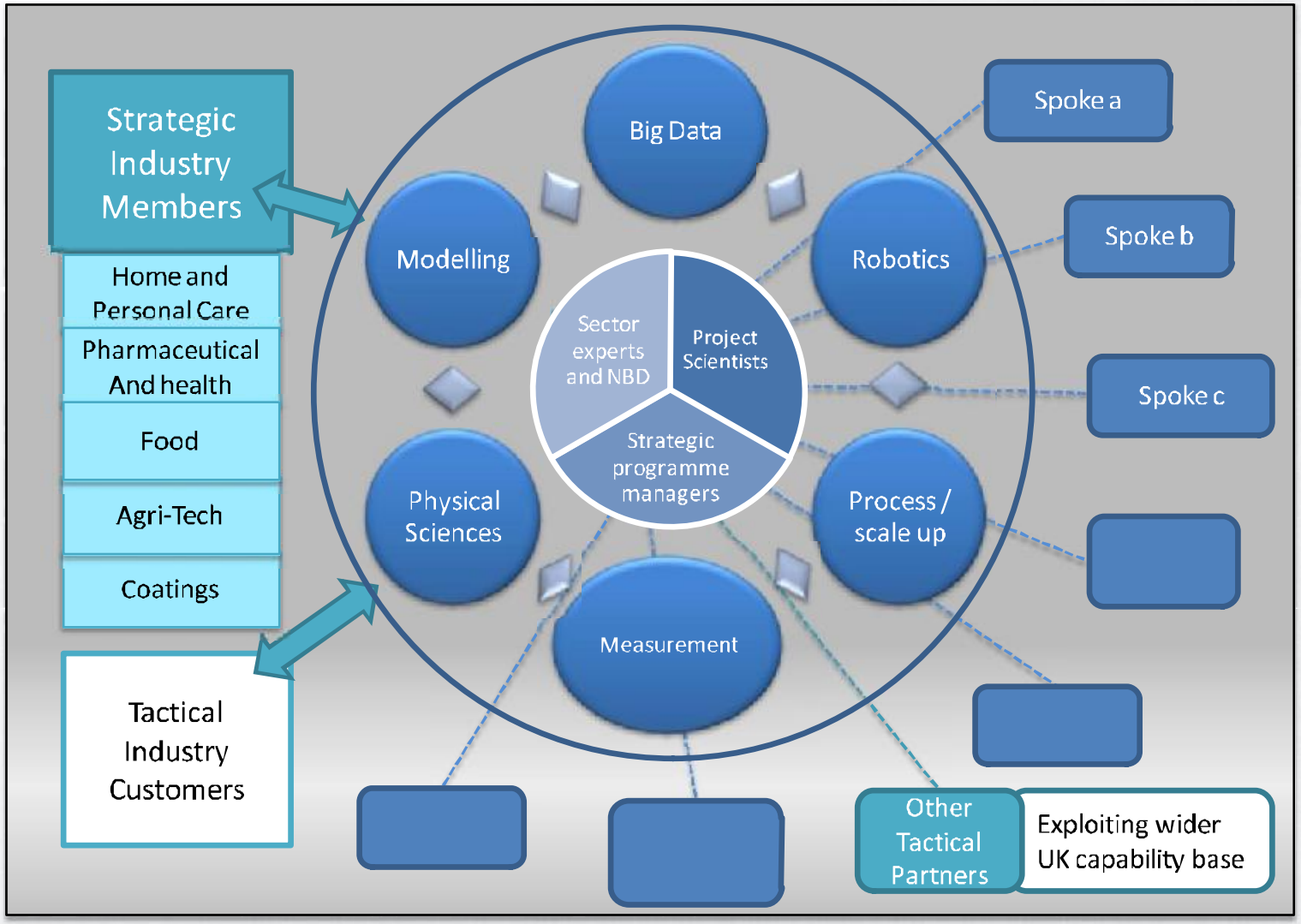


Accelerating Innovation - Hub and spoke model



Bringing the Vision to Life: What Will The Formulation Centre Do?

Vision: A world-leading collaborative industrial innovation centre which will revolutionise the development and manufacture of complex high-value formulated products by embedding fundamental understanding into new predictive methods for product and process design.

Grand Challenges:
Radical products, speed, flexibility, true predictivity

Radical Formulated Product Design
Designing *The Right Product Right, First Time*

Radical Formulation Process Design
Making *The Right Product Right, First Time*

Formulation for Delivery and Performance
Predictive Product Design to Maximise Product Benefits

Formulation for Stable Products and Processes
Predictive Design for Product Stability and Robust Processes

Formulation for Sustainable Products and Processes
Design for Zero Environmental Impact

Strategic Themes

Example Programmes and Projects

Example Capabilities

- Product Design: From Data to Knowledge
- Design of Complex Microstructures
- Designing New Effects and Functionality
- Designing New Product Forms

Data and Knowledge Hub

Liquid Stability
Solid Stability

- Modelling, Simulation and Data for Stability
- Microstructure Control for Stability Fundamental Component & System Understanding

- Predictive Scale-Up and Scale Down
- Robust Quality Manufacturing
- Agile Manufacturing
- Demonstrating 21st Century Manufacturing

Continuous Processing

- Enabling Sustainable Raw Materials
- Sustainable Manufacturing Processes
- Maximum Efficacy from Minimum Product
- Minimum Water Footprint, Minimum VOC
- Maximising Recovery and Re-Use

Technology Strategy Board
Driving Innovation

The USP

- Unique **cross-sector collaboration hub** to enable best practice to be exchanged across industries – benefits from academic and industry expertise.

- Centre takes companies on a **strategic journey** to achieve goals which would be too long-term and complex to do on their own. Timelines up to 10 years, compared to companies <5year horizons.

- Model enables **leverage (public and private)** allowing ~7x the project to be done for the same money, or to get otherwise unfundable projects through a stage gate process.

The Hub v1.0

Initial focus:

- Brains > New Kit
- Fill 'Data and Knowledge management' capability gap
- Central mgt team
- Location tbc

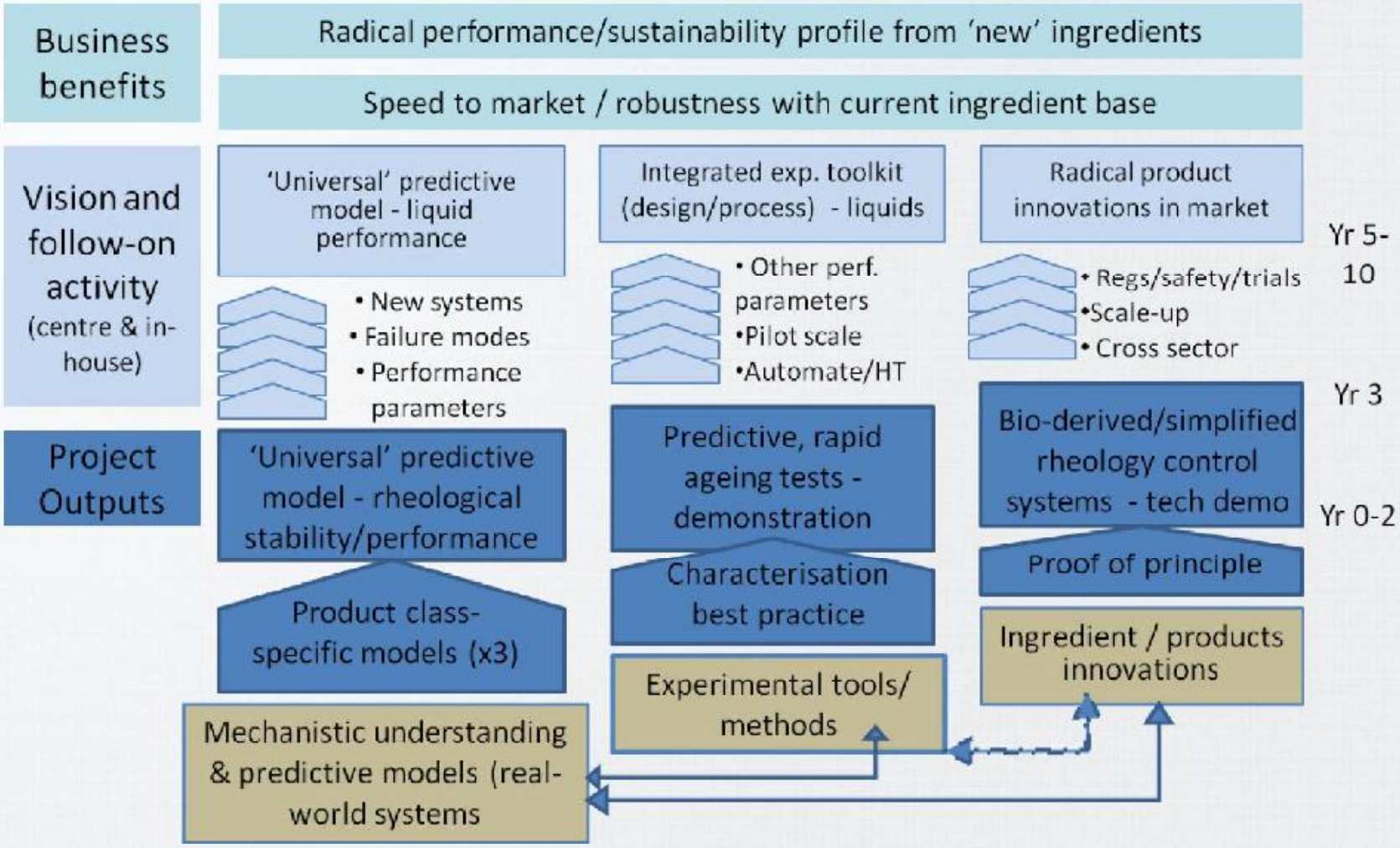
E-Science for the National Formulation Centre

Efficient Data Capture: A consistent toolset for experimental data capture, connecting UK formulation centre partners. Utilisation of Electronic Laboratory Notebooks is the first step in the establishment of a national formulation e-Science Infrastructure.

Codifying our knowledge: Establishment of a Structured Information Library which draws data from a suite of data capture tools and connects disparate data into a unified whole to enable data analytics and visualisation.

Predictive Solutioning: A consistent modelling toolset to enable rapid, new insights from data and create new product solutions.

Project 1.1 - Liquids Performance and Stability



The Centre in Numbers

- Tiered industry membership model
  - Tier I @ 250K per year; Tier II @ 20-50K per year; cash or in-kind
- People
  - 27 FTEs; approx. 8 secondees from industry and academia
- Budget
  - £50m overall investment (2015 – 2020); ~50:50 Public:Private
  - Targeting initial public contribution ~£19m
  - Projected spend profile: 20% capital, 80% revenue
- UK Business Benefit
  - Direct return of ~£300m GVA; 'projects specific'; 2015 - 2025
  - Anchor & grow £180bn UK industry; 'exploiting global leadership'; 2020+

Recent Developments / Next Steps

- Secured 'ownership' from senior leaders in TSB/Catapult, BIS
  - Shared vision for the centre to be delivered by CPI as part of the HVM Catapult
- Centre also a flagship programme in the Chemical Growth Strategy
  - Co-chairs – Neil Carson (CEO, Johnson Matthey)
    Michael Fallon (Business Minister)
  - Centre is also a priority for the parallel 'UK Pharma Manufacturing' initiative
- TSB/BIS Bid for £19m set-up funding in 2014 Autumn Statement (Oct)
  - Follows unsuccessful spring budget bid

The journey so far