Formulation Update for IAGs

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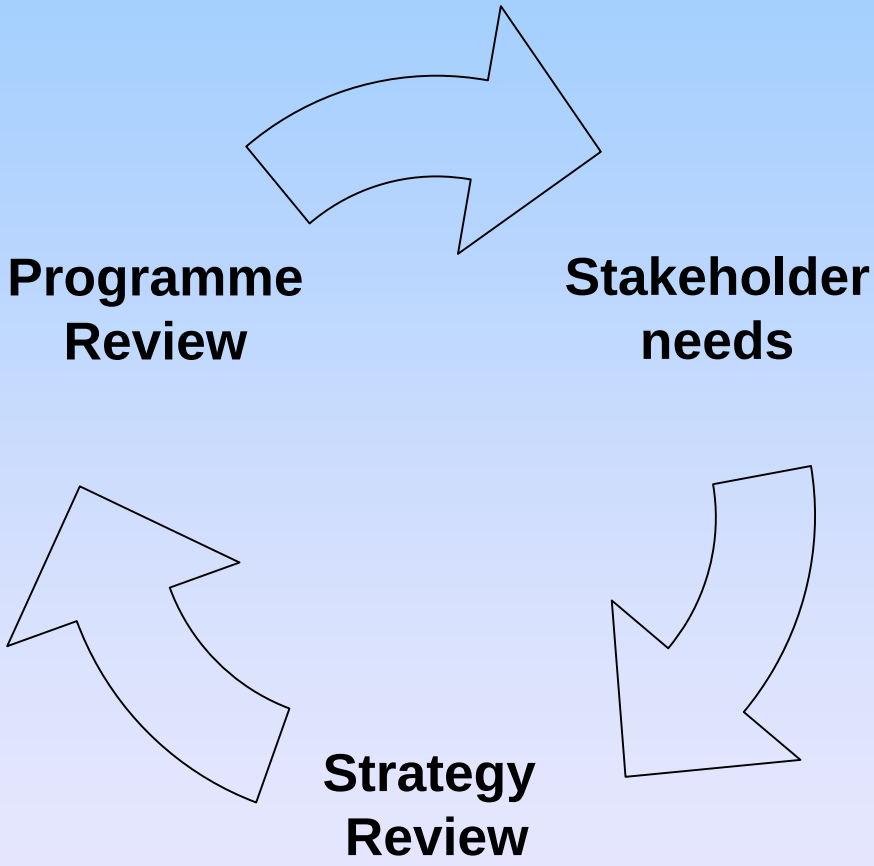
Impact and Formulation Leader: Materials

Rolling Formulation Concepts

What formulation is about

- Understand stakeholder needs
- Developing programme strategy to meet needs
- Proposing and prioritising projects that support the strategy

Rolling Formulation Concept



Rolling Formulation

- Three elements
  - Development of Programme strategy (roadmap) through continuous consultation on needs and impact
  - Rigorous reviews of existing projects to free up resources/money
  - Continuous definition of potential projects and collaborators

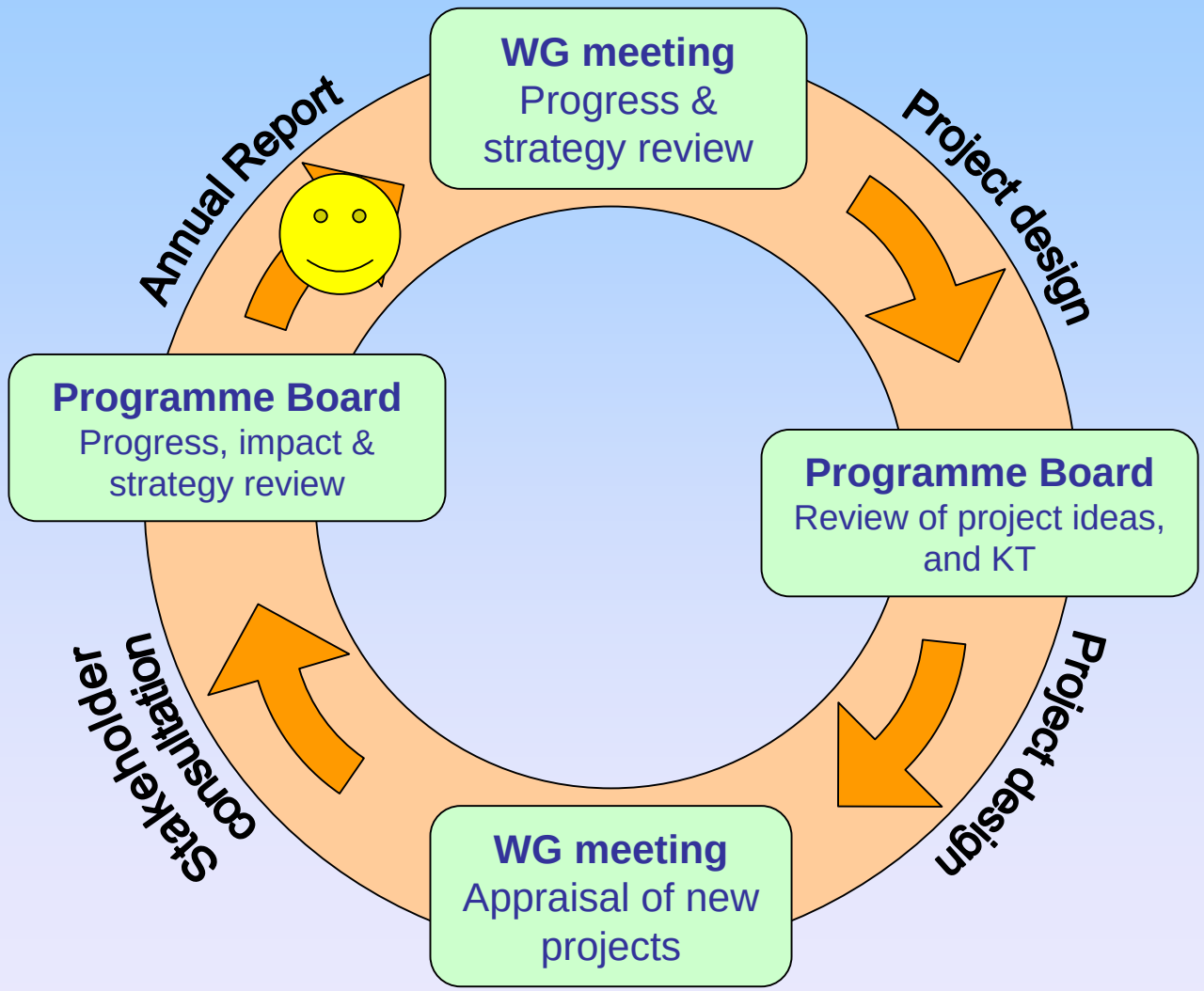
- Cyclical (may be annual) Process – rolling

- Resources (money) available each cycle

Benefits of Rolling Formulation

- Explicit long-term strategy for next 5 to10 years
  - Confidence for long term investment
  - Decisions based on strategy
  - Enables alignment of Programme Strategies
- No “end of cliff” in contracted funding of programmes
- Projects not forced into 3 years
- Changing requirements addressed immediately
- NMS strategic priorities can be rapidly implemented

Key Stages in Rolling Formulation



Roadmaps

Why do we need roadmaps

- To prioritise the initiation of projects on a strategic basis
- To manage the development of projects using a rolling formulation process

Who will use roadmaps?

- IAGs to plan the future
- WGs to provide advice to DIUS
- NPL to develop capability and direct impact
- UK PLC to influence content of programmes
- DIUS to decide what to fund

Roadmaps exist on two levels

- Programme – a snapshot of the programme content and drivers
- Theme – shows the way to meeting technical targets for a strand of work

Programme Level Roadmaps

- Driver or target need
- What NMS is going to do about it
- What impact the work will have
- Shows which themes deliver in relation to which drivers

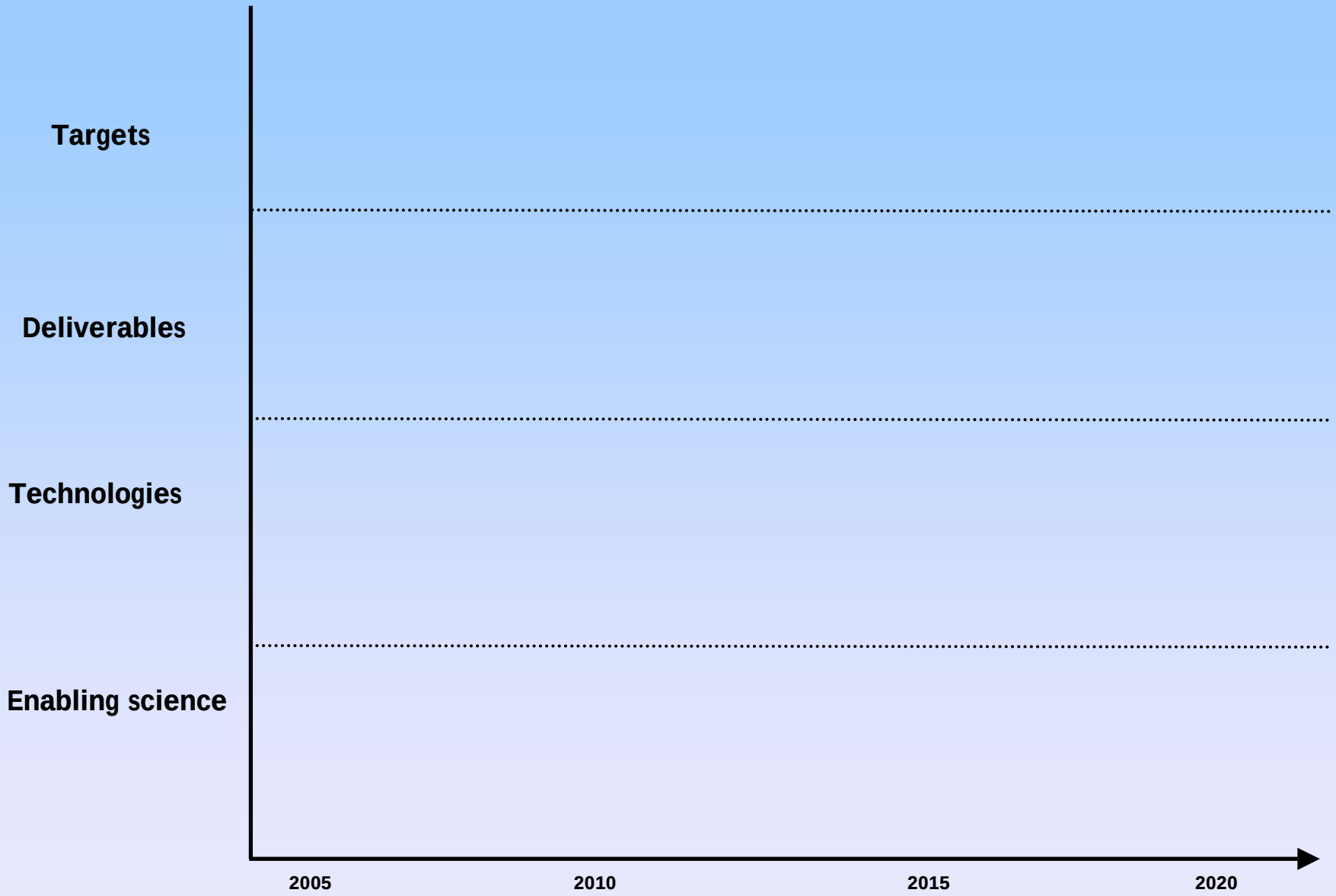
Example

- Driver: Maintaining and maximising the lifetime and reducing the environmental impact of the UKs major infrastructural assets

- What NMS should do: Support the development of techniques for the assessment of structural integrity and residual lifetime of assets such as nuclear power stations and bridges

- Impact: Increased safety,lower maintenance costs and less environmental impact

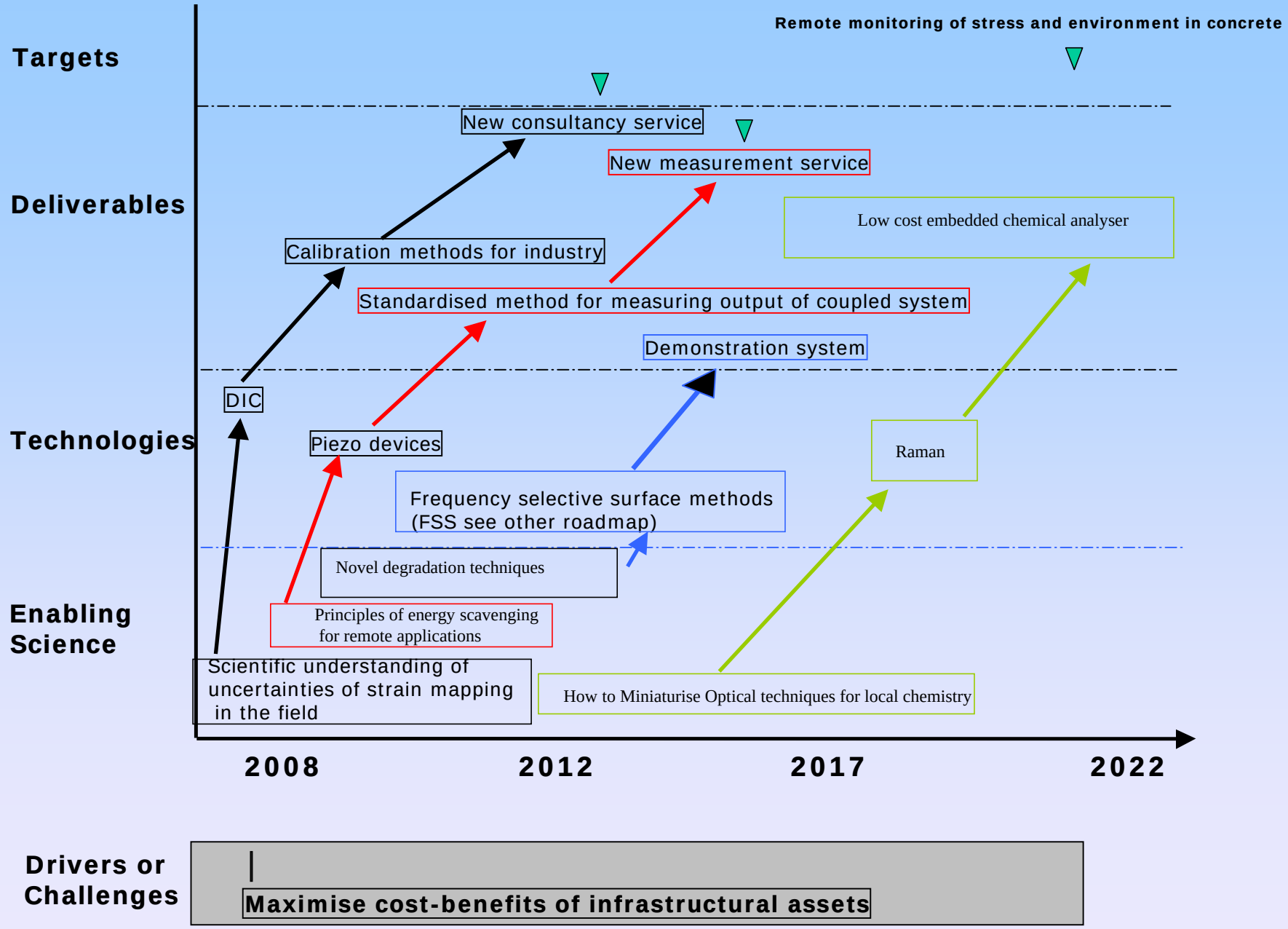
Theme Roadmap Template



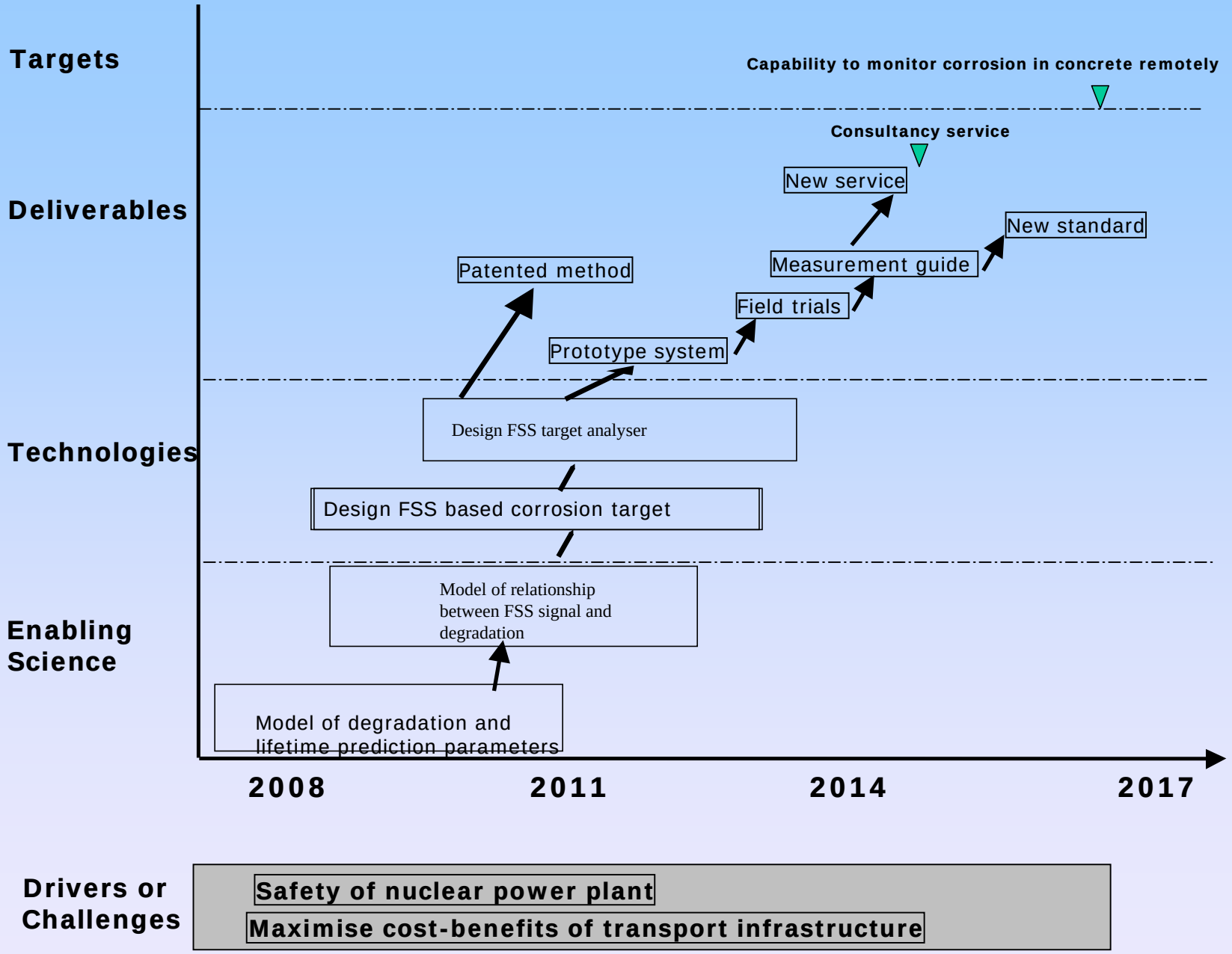
Example roadmap – structural health monitoring in concrete

- Measurement of strain over whole structure (Black)
- Need to be self powered (energy scavenging) (Red)
- Innovative solutions may be required to meet industry needs (Blue)
- Assessment of environmental chemistry (Green)

Theme Roadmap example In –situ measurement - Structural Health monitoring



In –situ Sub roadmap example – FSS system for concrete lifetime management



Drivers or Challenges

- **Safety of nuclear power plant**
- **Maximise cost-benefits of transport infrastructure**

Three things to do

- Plan
- Plan
- Plan

Some suggestions

- Convert existing roadmaps to DIUS format (By June)
- At every IAG meeting refresh the roadmap
- Include other funding options on the roadmap

Polymer/Multiscale IAG - Feedback

Triggers & targets

- *Sustainable longer life products*
- *Novel polymers and nanocomposites*
- Ageing population ⇒ Increased need for healthcare products
- Biofuel stocks
- *Polymer materials in the nuclear industry*
- Materials recycling
- Global use of materials: higher temperatures moisture, UV.
- Improve knowledge transfer skills especially between industries
- *Improve product lifetime capability*
- *Reduction of materials/Define best design practice*
- *Total design with: Polymers, Processing, Properties - Product*
- *Formulation science as a distinct discipline*
- *Thinner products: less energy, less materials, benefits. Need to retain performance*

Product realisation

- New polymers from biofuel stocks
- *UK Centre of Excellence for Healthcare product design*
- New Bio-Polymers require longer-term material data in short term
- New Inorganic polymers- Longer life – low flammability
- *Fillers for improved product performance*
- Reduced compression set in foams
- Chemical bonding of mass particles to polymer backbone - improved energy transfer

Metrological application of basic science & technology

- *Need for more accurate lifetime predictive design*
- *Time/Temperature/moisture behaviour of polymers*
- Long life wear resistant rubber
- *Full characterisation dispersion*

Enabling measurement science & technology / metrology fundamentals

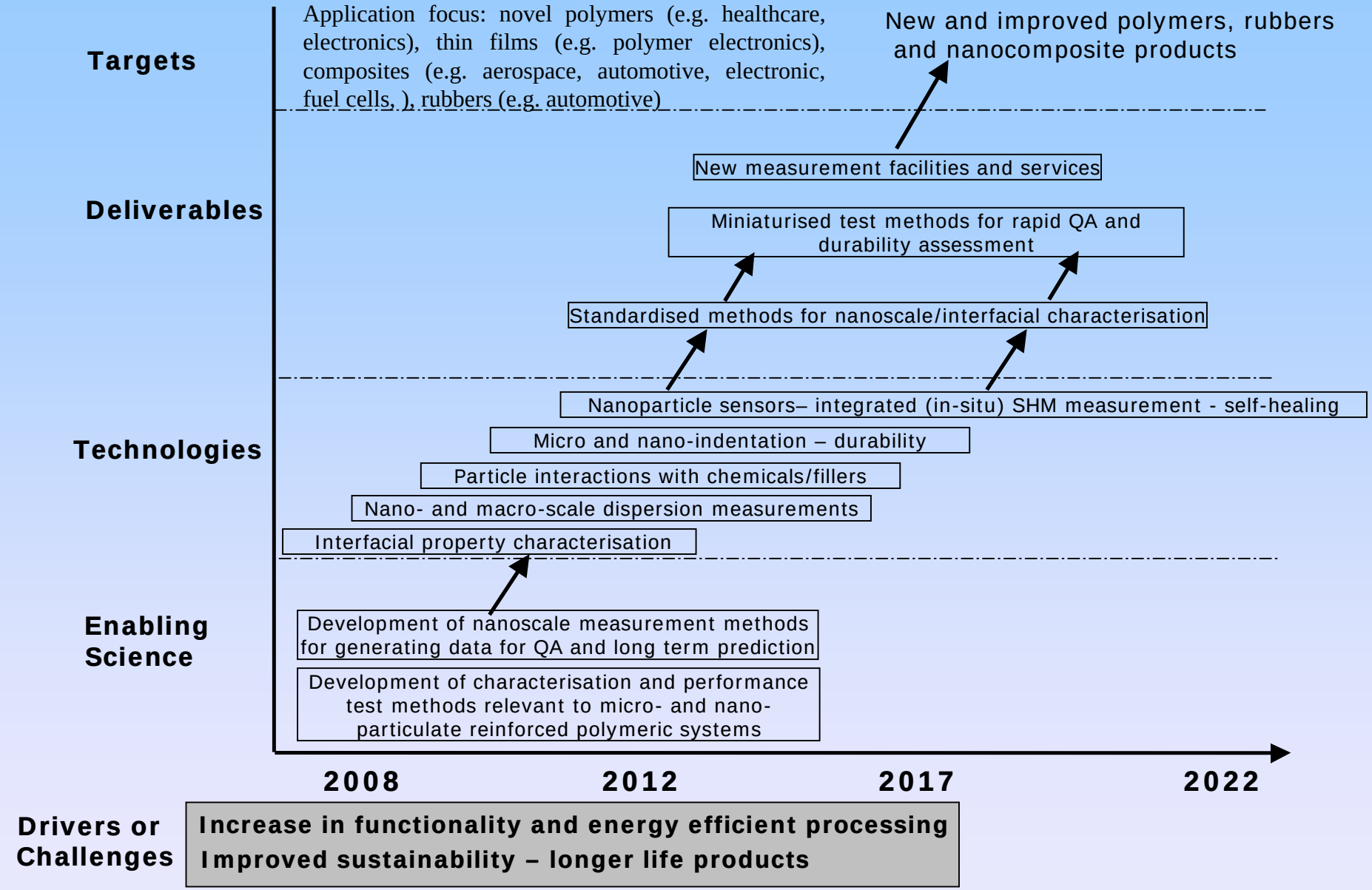
- *Creep, fatigue, durability data for polymers*
- *Time/temperature superposition for rapid creep testing*
- Latex particle interactions with chemicals and fillers
- *Full characterisation of particle-matrix interfaces*
- Latex technology: + curing, + gelation, + avoid bubbles

Polymers Multiscale IAG

- Two proposed theme roadmaps on characterisation and lifetime of:
- Nanocomposites
- Polymeric materials

Others ??

Nanocomposites – Nano-scale Characterisation and Life Time Performance



Polymeric materials – micro-scale characterisation and life time performance