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Enabling innovation in the GB rail sector – a systems approach

INCOSE UK RIG

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TSAG commissioned a study to validate the barriers to innovation and to propose solutions to enhance innovation across the industry

Context

- Implementing the Railway Technical Strategy, and meeting HLOS, will require short and long-term technological innovation – some of it radical
- There is a widely-held perception that the GB rail industry has a conservative attitude towards innovation and that there is a culture of risk-aversion
- We were asked to validate a prior systems analysis of barriers to innovation, to validate the analysis through consultation, and identify key strategic actions to improve innovation
- Reviewing and developing the analysis, we spoke with about 40 stakeholders across the industry, clarified barriers and sought to separate cause from symptom
- Our proposed solutions are under discussion at TSAG

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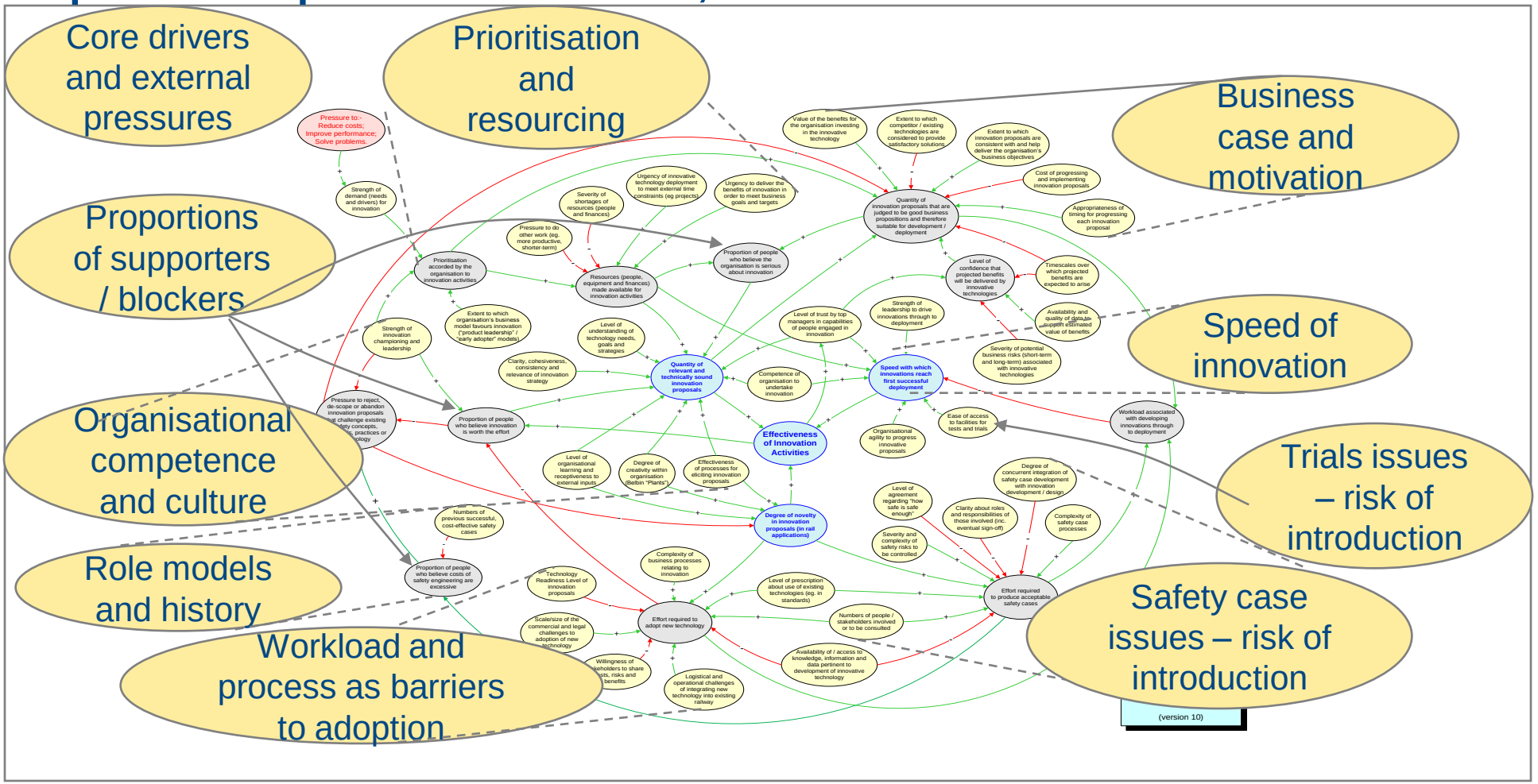
We reviewed prior work and refocused it to key aspects of innovation as a template for identifying barriers and solutions

Rail industry Innovation – a systems view

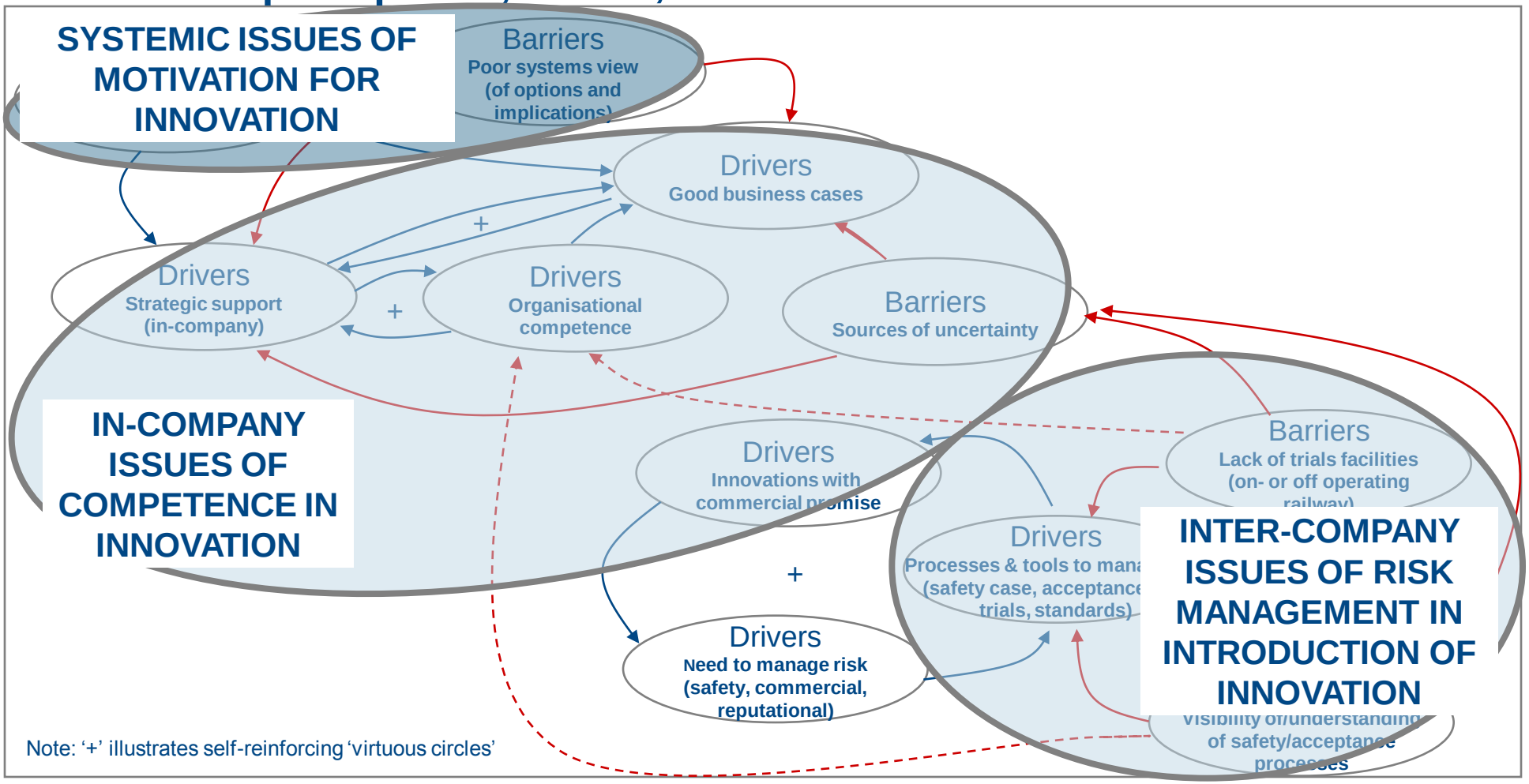
- We began with a starting point from Francis How and RIA
- In parallel we mapped supply chains, reviewed literature, consulted with railway industry stakeholders and drew comparisons with other industries
- This gave us a map of the industry and of the big issues seen by many practitioners

RIA's system model identified many issues – for example external drivers, corporate competence and culture, and risks of introduction

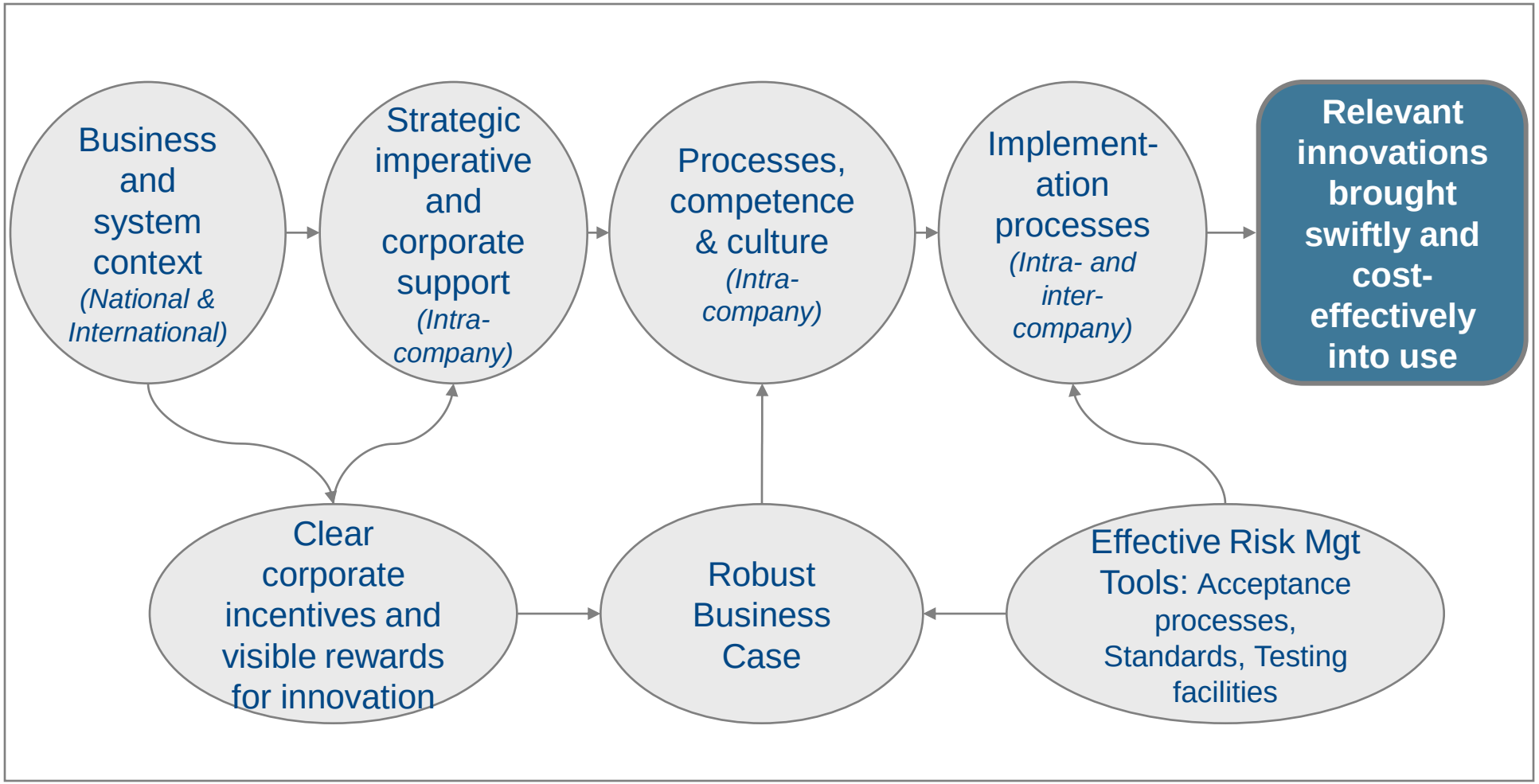


The prior system diagram was developed by the RIA, aimed at characterising cause/effect chains affecting technological innovation. Thanks to Francis How

We developed the diagram – consulting with stakeholders throughout for validation of perceptions, issues, barriers and candidate solutions



A simplified diagram focuses on key linkages and the flow of innovation



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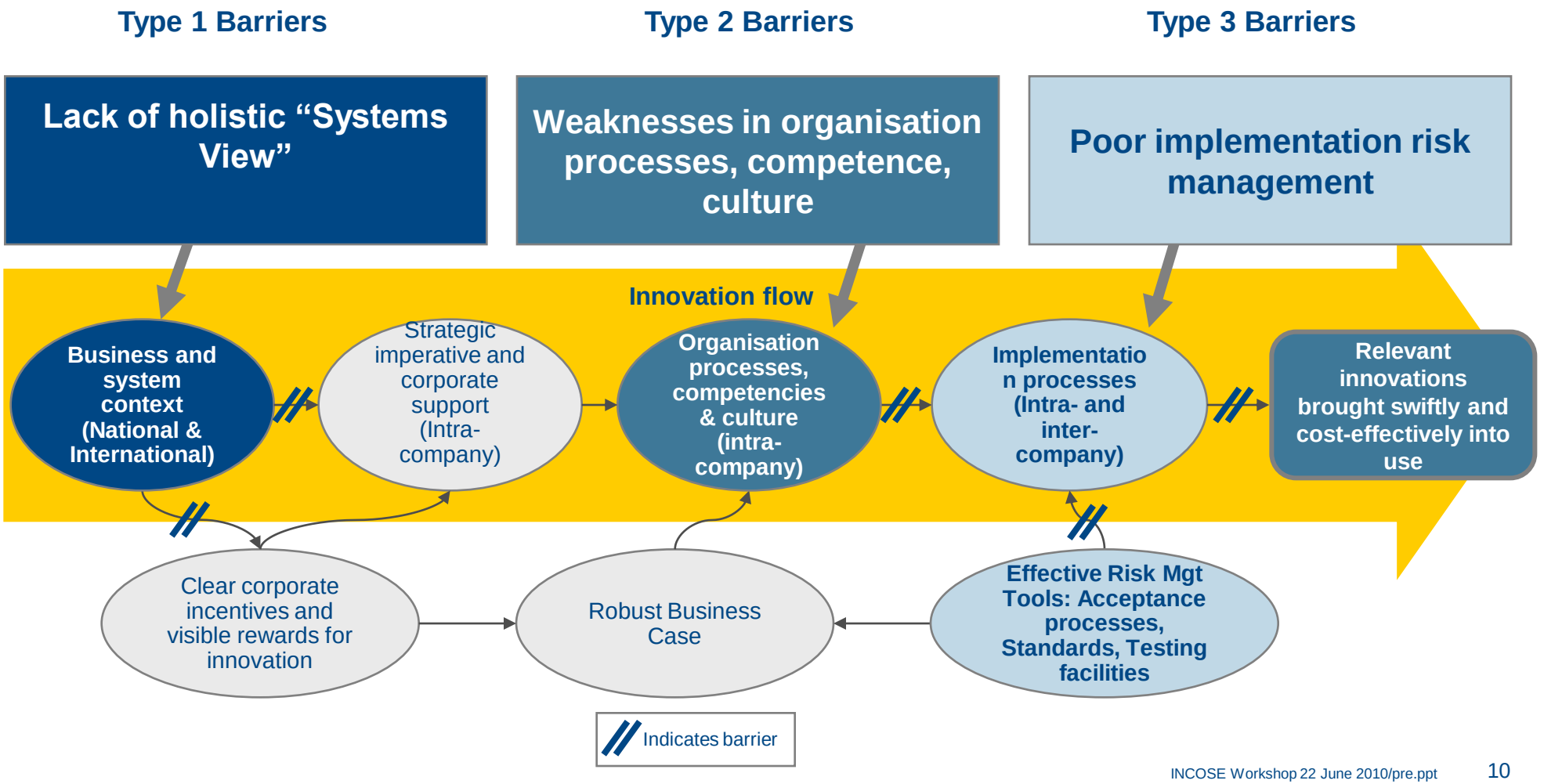
We confirmed three types of barrier which hinder delivery of innovation and lead to a reputation for risk aversion towards new innovation introduction



Within each type, specific strategic and practical barriers have been identified that significantly affect key players across the supply chain

Holistic "Systems view"

- Alignment of **business drivers and incentives**
- Visibility of opportunities that **cross system or organisation boundaries**
- Understanding **customers' priorities**
- **Constrained timescales** to deliver benefits
- **Franchise conditions** that delay innovation
- **Small market** for applications unique to GB

Organisation processes, competence and culture

- **Monetising benefits** of innovation
- Concerns about **risks** exceeding rewards (safety and reputation)
- **Cultural** barriers from history of frustration about innovation
- Possible weaknesses in **processes / resources / competencies**

But most organisations regard themselves as competent innovators!

Implementation risk management

- Access to **testing and trialling facilities**
- **Acceptance processes** – understanding and flexibility (e.g. accepting of prior trial evidence)
- Equitable management of **implementation risk**
- **IP protection** under cost focused procurement processes
- Maintenance/operational practices rely on **long experience**
- **Standards** - understanding of their creation, development and change
- "**Ex-BR" approach**

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We focus now on the issues of systems perspectives of innovation

The impact of a systems view

- First – a key premise: People can innovate, overcoming barriers, if they understand the need and can make a commercial return at an acceptable risk
- It is difficult to see the full extent of possible returns from innovation within a complex system - it's hard to see the need
- It is difficult to realise benefits from a complex and fragmented system – and even harder to realise benefits equitably
- Risks multiply through a complex system that is hard to influence
- While other barriers undoubtedly apply, system understanding and commercial motivation are primary blocks to innovation

We proposed three main areas of intervention: to underpin motivation for systemic innovation; to build capability; and to manage the risk of introduction

1. Create systems leadership for innovation

Purpose

- Provide commercial motivation for innovation, especially radical innovation with the capacity to transform system performance and through-life economics
- Open the innovation landscape by providing stable and credible systemic strategies for the rail industry

2. Enhance industry capability for innovation

Purpose

- Create a focus for large-scale research and feasibility demonstration in the industry
- Provide support to individual companies seeking to enhance their internal innovation capabilities and resources

3. Reduce the risks of introducing innovation to the system

Purpose

- Manage better the risks of bringing innovations onto the rail system, thereby improving speed of introduction
- Enhance the effectiveness of approaches for standards, acceptance and testing

Today we will focus on the systems aspects – and specifically on building a landscape within which systemic innovation is better understood

1. Create systems leadership for innovation

A 'system sponsor' function

Senior executives from key organisations in the industry

Powerful enough to make big strategic commitments
- about direction
- about budget
- about trade-offs

A 'system leadership' function

Systems engineers and economic modellers

Tasked with identifying and assessing options and implications of innovative schemes
- across boundaries
- across timescales

Systems context for innovation – what do people need to do?

A 'system sponsor' function

Direct the focus of the analyses and assessments

Review and adopt the recommendations

Make commercial arrangements and commitments that allow system innovation to go ahead

A 'system leadership' function

Develop schemes, structures, alternatives and trade-offs

Make recommendations that allow system optimisation

Clarify benefits, disbenefits, costs and returns

Make visible the implications of systemic innovation

Systems context for innovation – what are the factors for success?

A 'system sponsor' function

Credibility and authority

Visible and credible ability to act in the interests of the industry at large rather than organisationally

Clarity of scope and authority

A 'system leadership' function

Credibility, competence and independence of team

Ability to articulate commercial, operational and technical trade-offs, advantages and disadvantages

Minimum bureaucracy and maximum agility

Systems context for innovation – issues?

How to make it work in practice

Scope and size – project, route, region, network?

Capacity and cost – new body, adapted previous entity, permanent, seconded?

Credibility and independence?

Overlap with other bodies and avoiding yet another entity?

Examples

Aerospace

Railway