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FUTURE POWER SYSTEM ARCHITECTURE

MEETING BRITAIN'S FUTURE POWER SYSTEM CHALLENGES

Future Power System Architecture Programme

FPSA3 EO/EF Development – RFP Introduction and Q&A Teleconference – 2pm 16th Oct 2017

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Introduction to the call

Gordon Graham, chairperson

FPSA Programme Lead, Energy Systems Catapult

Agenda

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Department for Business, Energy & Industrial Strategy

1	**Opening Statements, Welcome and Introduction to the Webinar**	**Gordon Graham**	**5 mins**
2	Contract and Timelines	Jim Owen	5 mins
3	FPSA – Background and Status	Dave Openshaw	15 mins
4	FPSA3 – Requirements for the development stage	Duncan Botting	30 mins
5	Questions from interested parties	All	30 mins
6	Next Steps	Gordon Graham	5 mins

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Contract and Timescales

Jim Owen

Procurement and Legal Manager, Energy Systems Catapult

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FPSA Background and Current Status

Dave Openshaw

Millhouse Power Limited and FPSA Steering Group

BACKGROUND

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The IET's 'Power Networks Joint Vision' concluded that the power system will require transformative change

- What are the drivers of these changes?
- Will new system functionality be needed?
- What barriers might exist to delivering required functionality?

UK Government initiated the Future Power System Architecture programme (FPSA) to address these questions

- FPSA1 examined the required functions
- FPSA2 refined the analysis and assessed potential barriers
- FPSA3 will explore and develop the concept of Enabling Frameworks as means of managing transformative change
- FPSA4 will explore required RD&D leading to …
- Demonstration Pilots (FPSA5) and transition to BAU (FPSA6)

KEY FINDINGS TO DATE

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Headlines

- Growth of intermittent DG displacing synchronous generation is creating **issues for system balancing and stability**
- **DER, smart metering, EVs, HPs** and new developments 'beyond the meter' will create both **challenges and opportunities**
- As a consequence, the GB power system will require **35 new or enhanced technical/commercial functions** many of which are **'whole-system'** in nature, spanning traditional sector party boundaries
- But there are currently **barriers to the delivery of these functions** and the issues are material: **technical + commercial + regulatory**
- The change agenda is demanding: **complexity is increasing** and many new parties need to be involved
- Current industry change governance was not designed for this context: so **delivery risk is elevated**
- **New agile and more inclusive governance concepts** have been proposed (Enabling Frameworks)
- The analysis revealed challenges that require **R&D actions**

KEY FINDINGS TO DATE

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The seven key drivers of new functionality

- The flexibility to meet changing but uncertain requirements
- The change in mix of electricity generation
- The use of incentives to enable customers to benefit and the system to operate more efficiently
- The recovery from major events or emergencies
- The active management of networks, generation, storage and demand
- The emergence of new parties providing new services to customers
- The emerging need for coordination across energy vectors

These drivers impact upon all business timescales:

Investment Planning + Operational Planning + Real Time operations + Post-event settlement

KEY FINDINGS TO DATE

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The 35 new or extended functions can be categorised according to the following objectives:

- Design a competitive framework to address the energy trilemma
- Form and share best view of state of the power system in each time scale
- Enable and execute necessary operator interventions
- Manage the interface with connected energy systems
- Use smart grid and other technologies to accommodate new demand, generation and energy resources
- Monitor trends and scan for emerging risks and opportunities on the power system, and implement appropriate responses
- Provide capabilities for use in emergencies
- Develop markets to support customer aspirations and new functionality

KEY FINDINGS TO DATE

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Examples of the new technical/commercial functions

Achieving Black Start in a power system with highly distributed energy resources, including storage

Implementing smart EV charging to respond to dynamic market prices while avoiding local network overloading or unacceptable national generation/demand imbalance

Avoiding conflicting demand management instructions whereby different parties call for demand changes that are opposing in their effect, so cancelling out yet incurring costs

Enabling Community Energy enterprises that accommodate local trading and, if required, off-grid islanding operation

Open provision of the data needed by smart energy systems enabling interoperability and customer choice, with rigorous cyber and data security across system and commercial boundaries

WHAT NEEDS TO HAPPEN?

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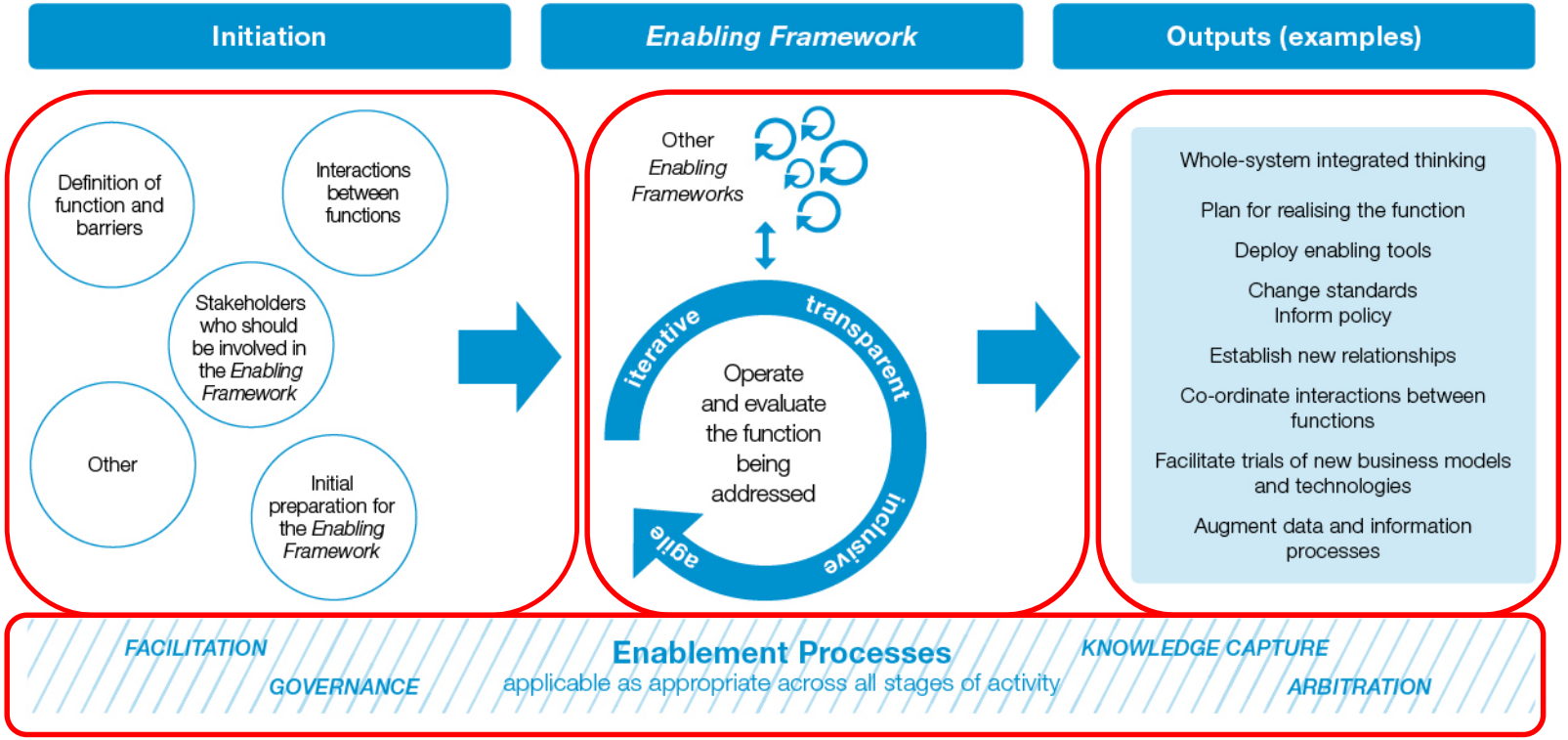
Enabling Frameworks: Summary of key concepts

- An agile change governance methodology, drawing lessons from agile manufacturing and agile software development
- Iterative, transparent, Inclusive and agile working
- Supported by an Enablement Organisation



NEXT STAGES

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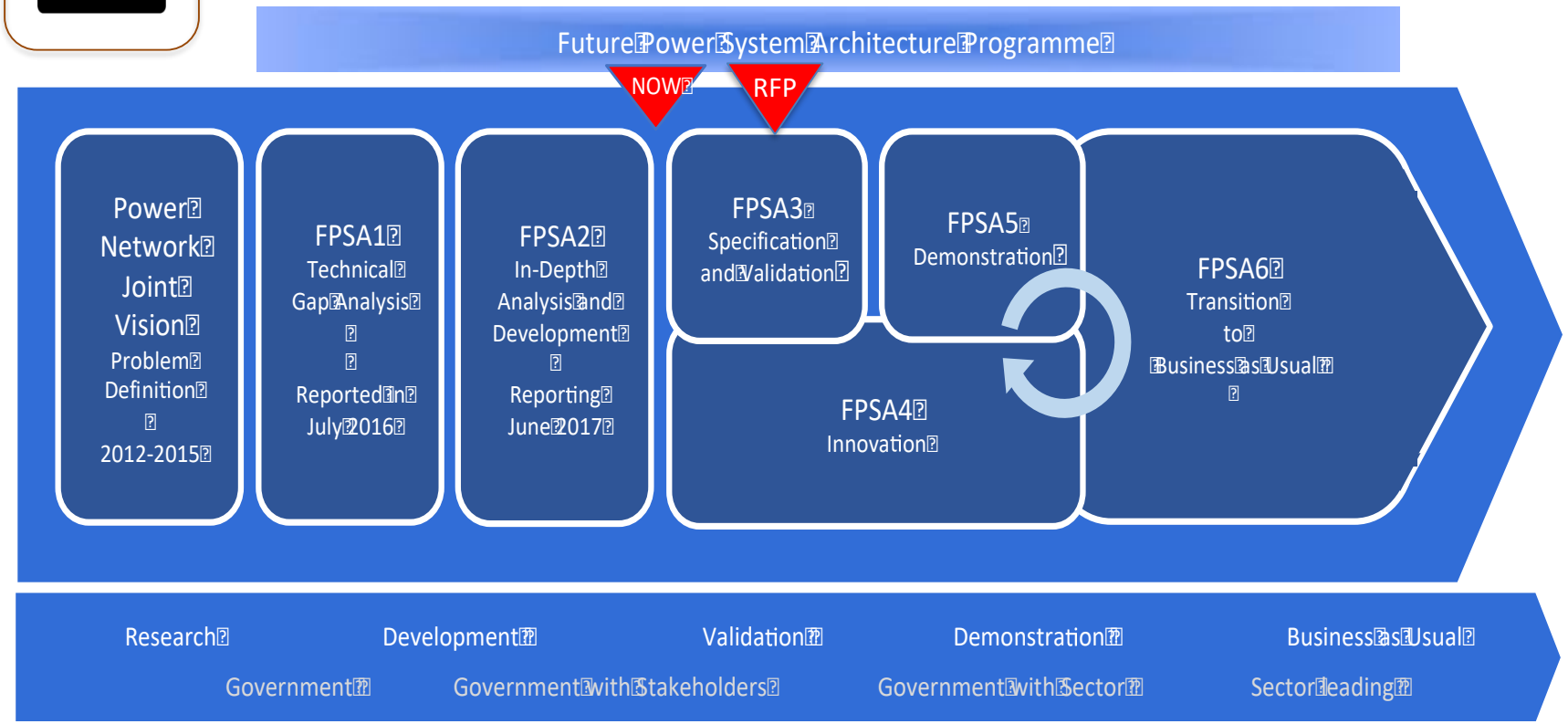
Further work in progress and planned



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Delivering FPSA3

Enabling frameworks

Duncan Botting

Global Smart Transformations Limited and FPSA Steering Group

Today's Electricity Industry Change Process

and some of the challenges for new parties

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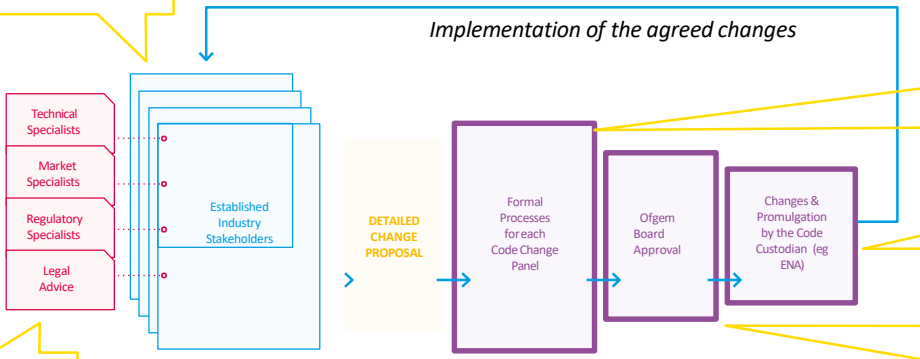
Many parties, especially 'beyond the meter', were not active in the sector when today's arrangements were formulated.

Not agile or responsive to the emerging demands



The Panels generally consider what is put to them, they are not funded to be proactive. They undertake little horizon scanning or research and have no formal mechanisms for knowledge continuity.

Today's process can be very lengthy, typically with a queue even to get into the work plan.

Approval requires compliance with rules regarding each element of a change being beneficial to customers (this can be problematic for complex or strategic matters).

SMEs & other community stakeholders do not have these resources, or the time to engage in complex Change Proposal development.

The panels do not have permanent staff, but are supported by secretariat services for administration and to ensure compliance with extensive rules and process obligations.

The membership of the Panels does not include parties new to the sector. The members are unlikely to have first-hand knowledge of new products and services coming into the sector, or business barriers being experienced by SMEs and new entrants.

Today's Electricity Industry Change Process

Some pointers for change – further steps

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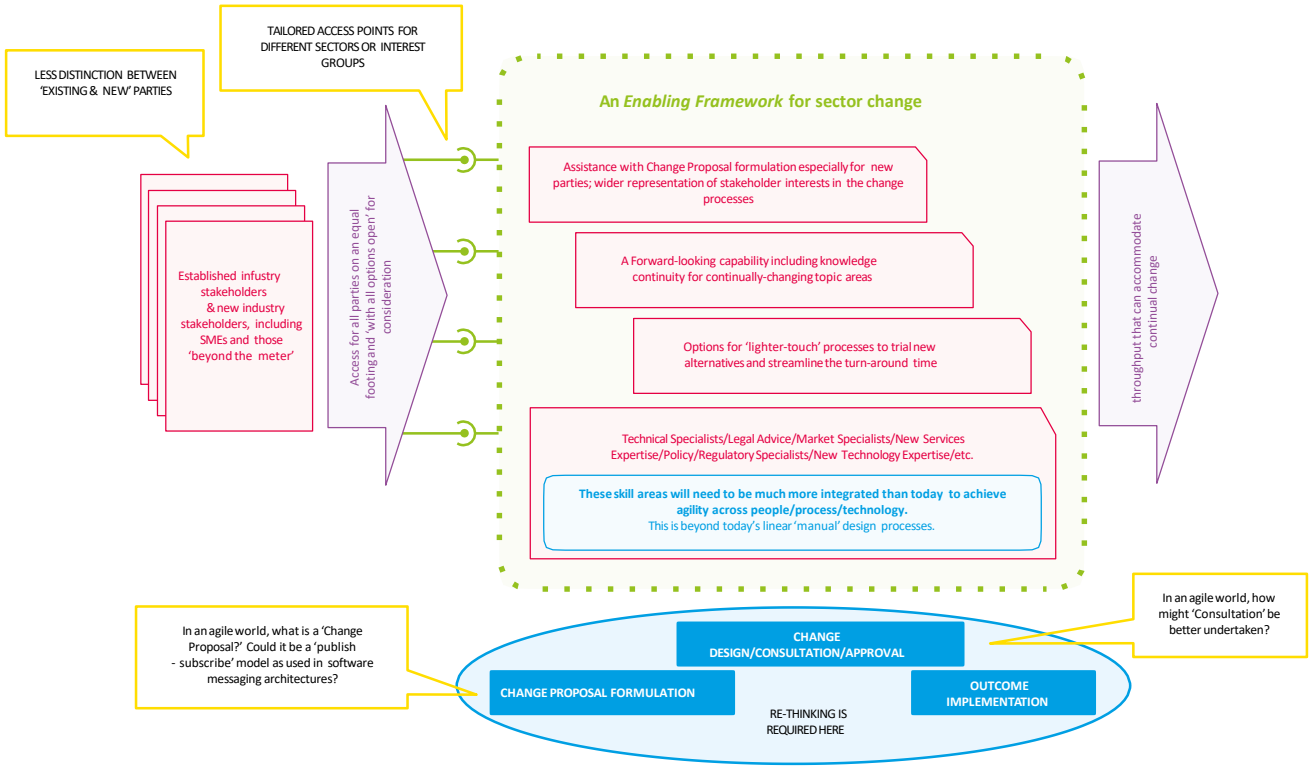

Enabling Frameworks - Principals

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Enabling Frameworks will promote the integration of iterative continuous learning and leveraging learning from other sectors. Using this approach, the following aspects have been identified as the foundation and guiding principles for the development of Enabling Frameworks:

- **Foundation principles** – These are informed by requirements that are mandated by UK legislation:
  - Facilitating decarbonisation.
  - Supporting competition and championing consumer interest.

- **Guiding principles** – These are built with reference to the requirements of the system and its stakeholders, using the evidence built up within FPSA2.
  - Stakeholders integrated in the process.
  - Enhanced co-ordination and facilitation.
  - Maximise synergies.
  - Facilitate conflict resolution.
  - Transparency and visibility.
  - Innovative approaches to accelerate decisions and support system change.
  - Ongoing feedback from and iteration of all activities – an iterative learning and adapting ecosystem.
  - Support and harmonise technical and economic evaluation.
  - Strive for simplicity at the point of use.
- The concept of Enabling Frameworks, along with supporting research and evidence, was developed within FPSA2 in workpackage 4, and reported in detail here: www.theiet.org/FPSA and https://es.catepult.org.uk/FPSA

Rethinking the concepts for Change Management

A parallel with software engineering

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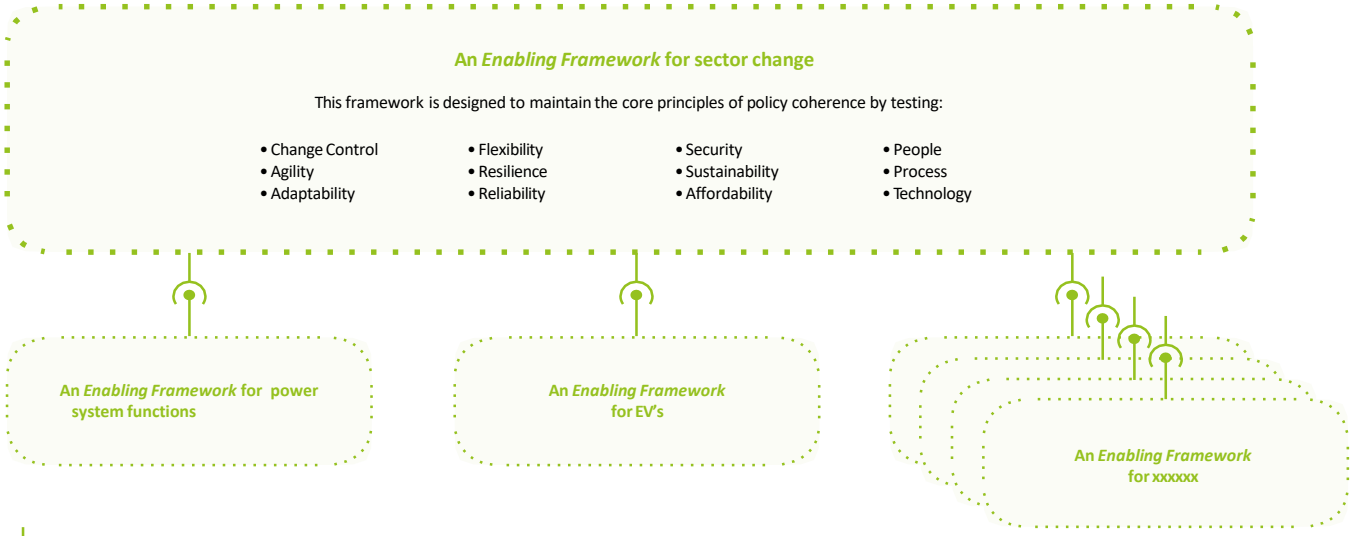

= the interface into the Kernel Framework ensures fit for purpose:

- Market Structure compatibility
- Commercial Openness
- Technical Interoperability
- Societal Fulfilment

A modular ecosystem that maintains standard interfaces and has change and adaptability built-in.

Summarising – an Enabling Framework for New Thinking

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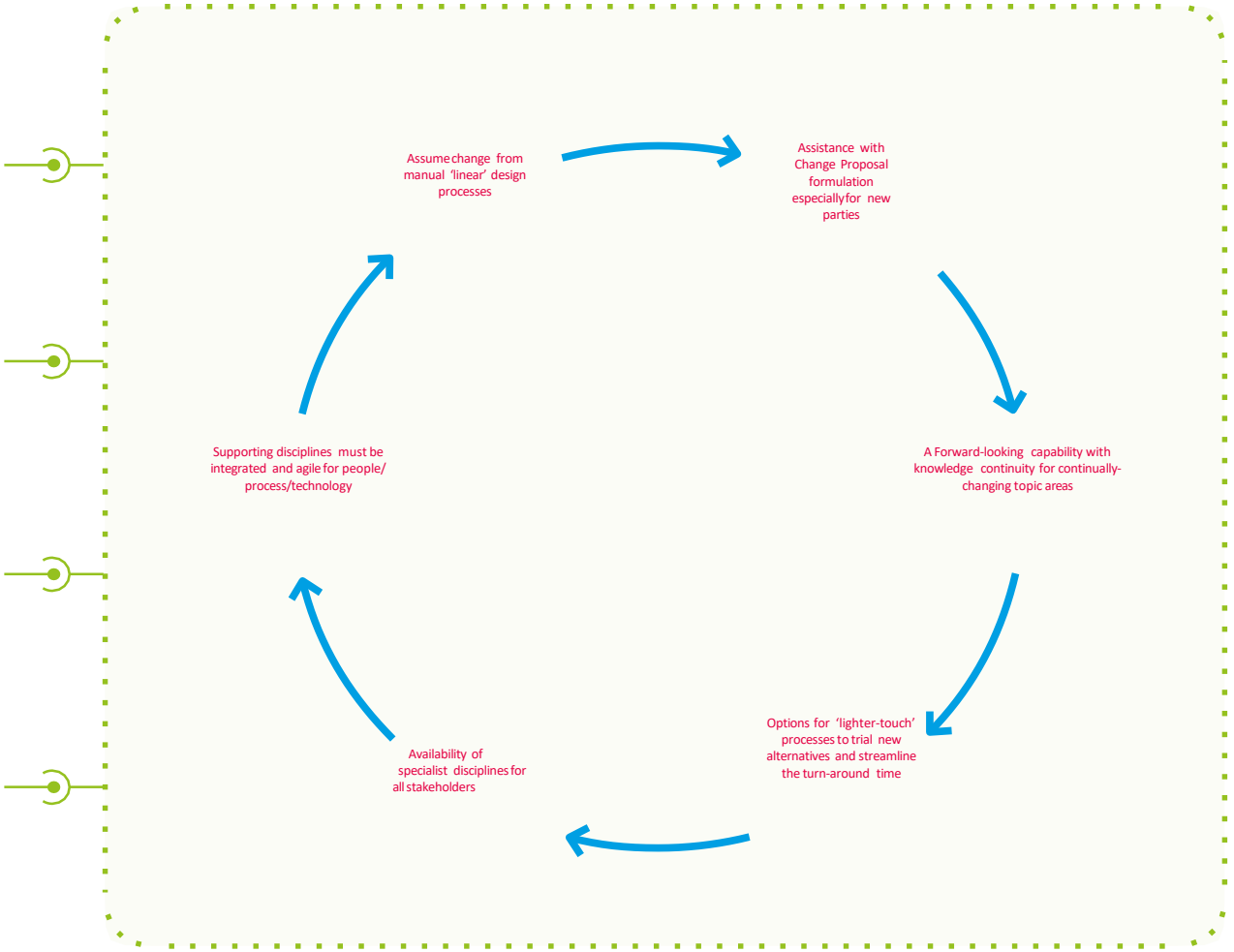

The Biggest Challenge?

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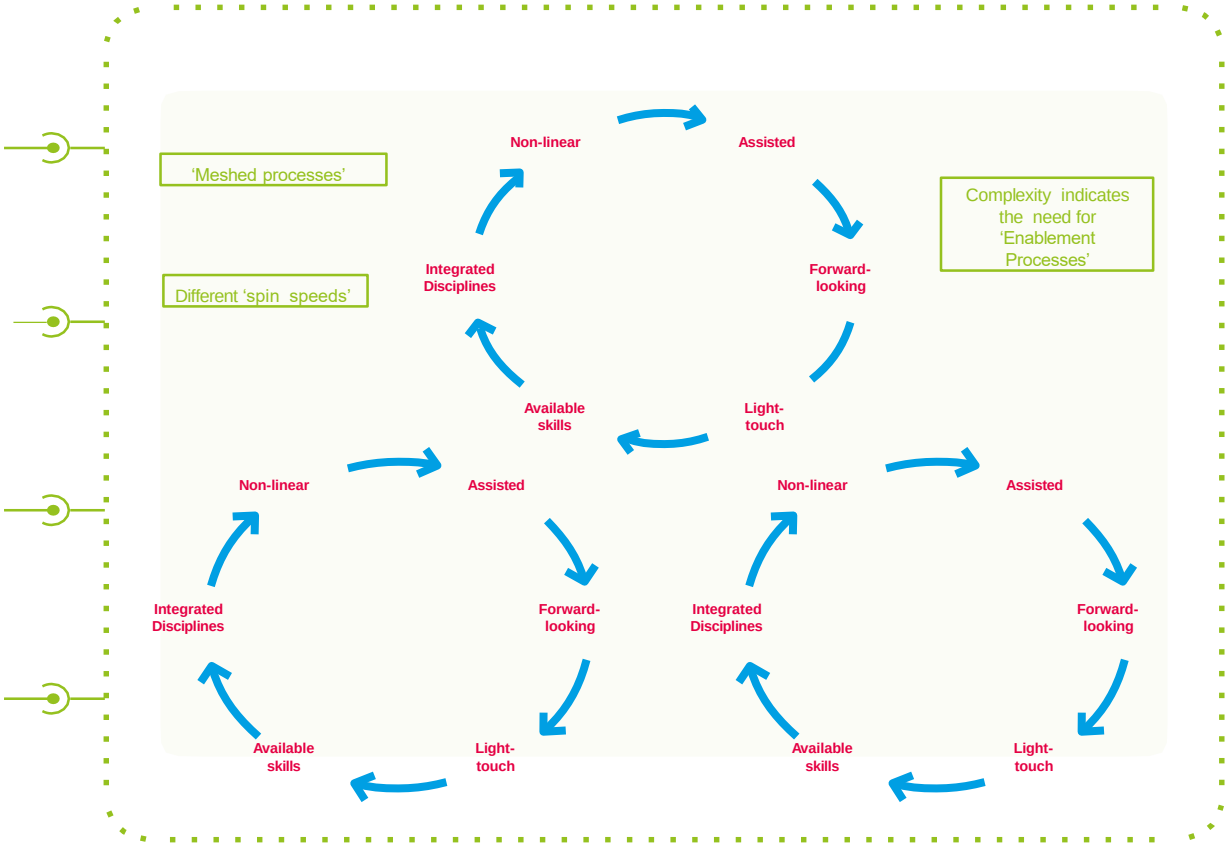

EF – Development Stairway

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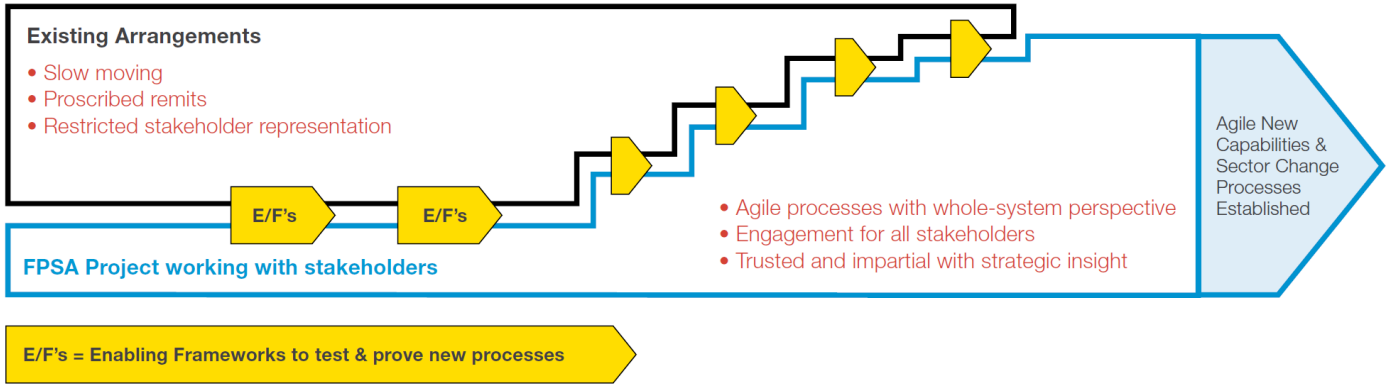

EF - Assembly Process – pt. 1

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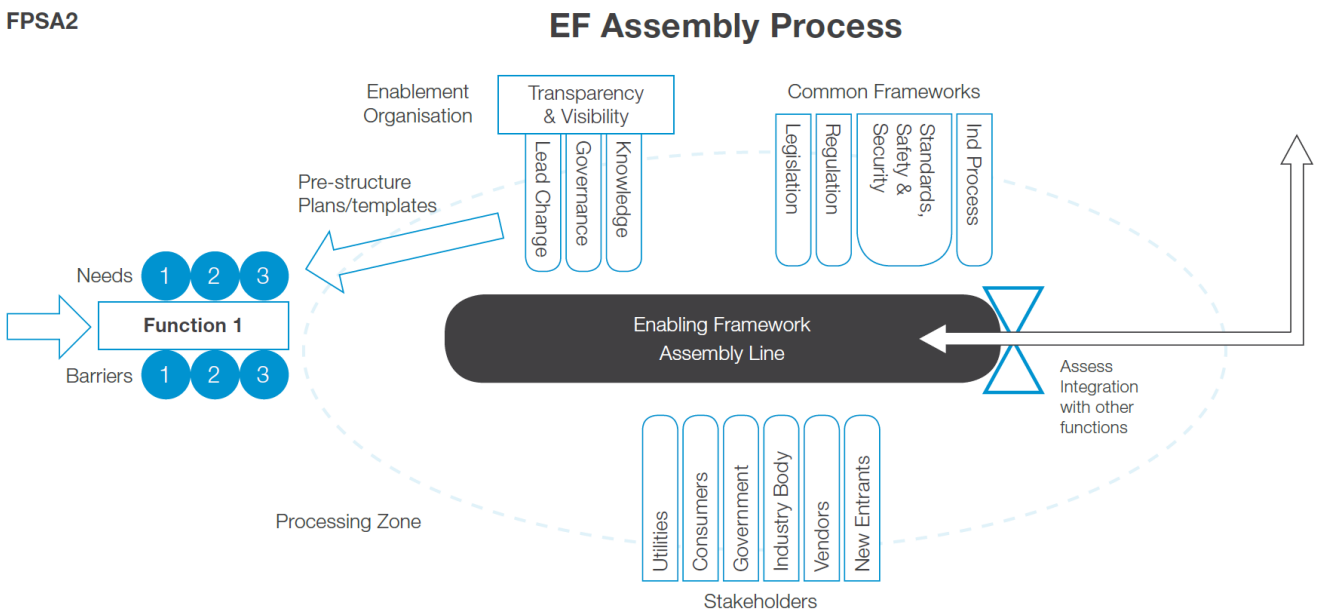

EF - Assembly Process pt. 2

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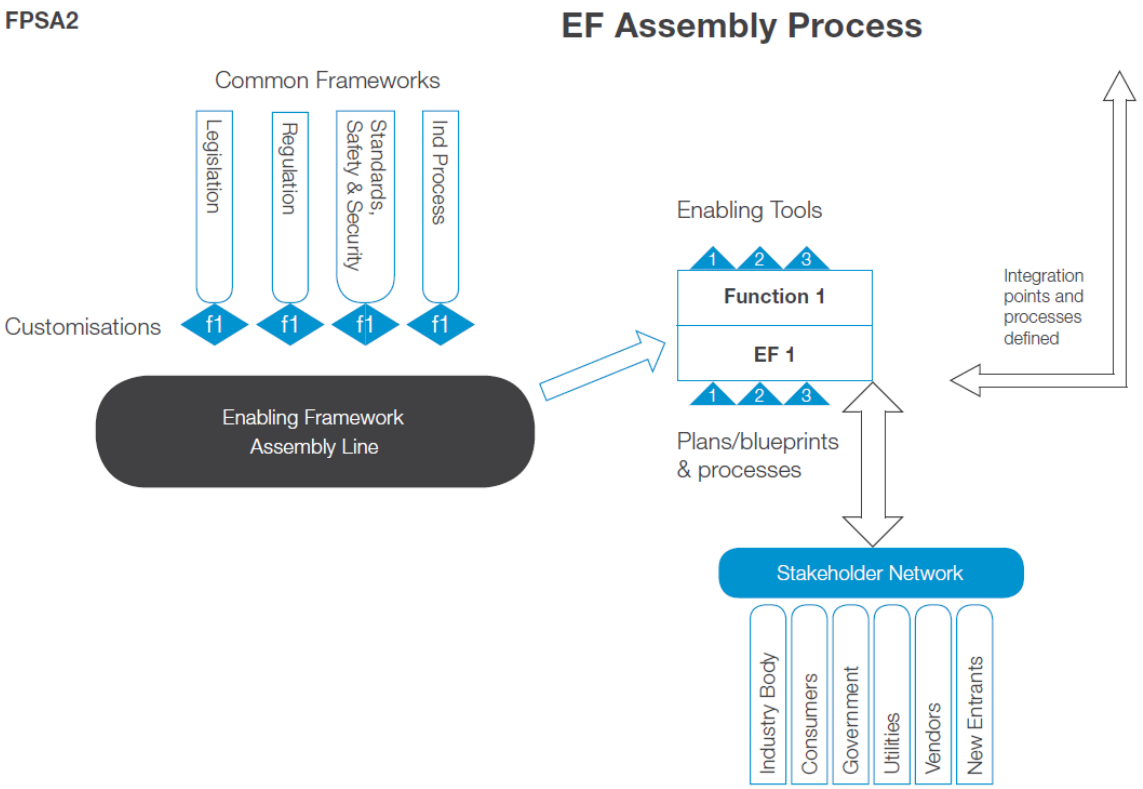

EF - Enablement Assembly

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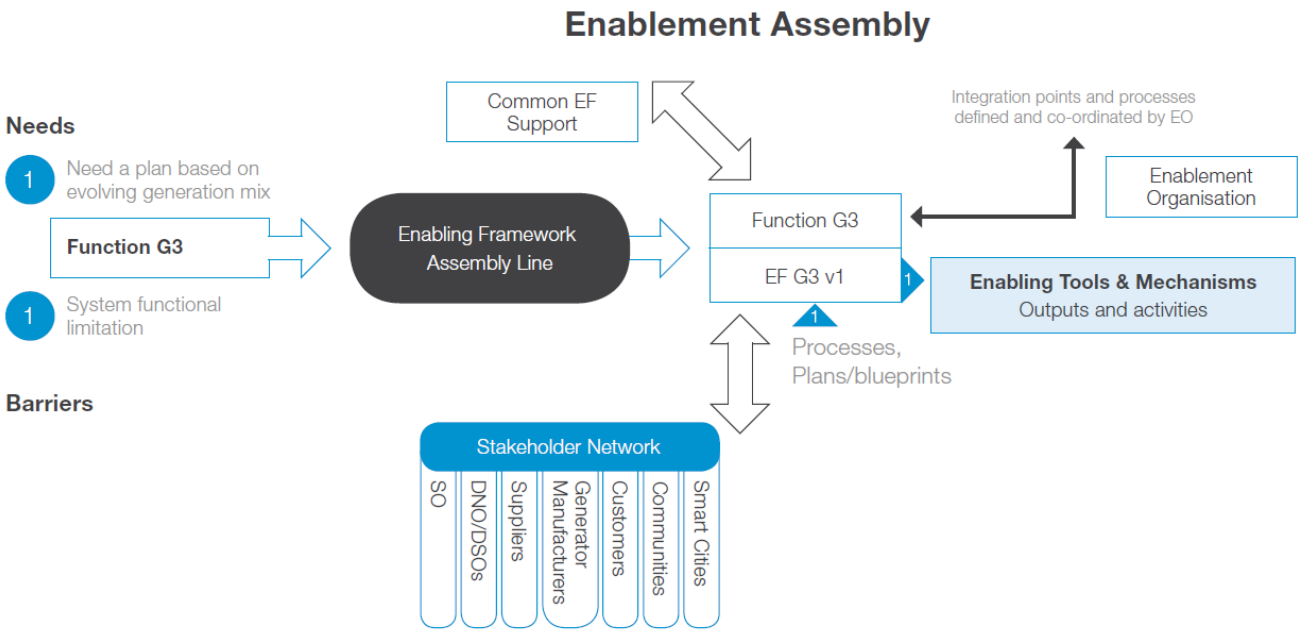

EF Summary

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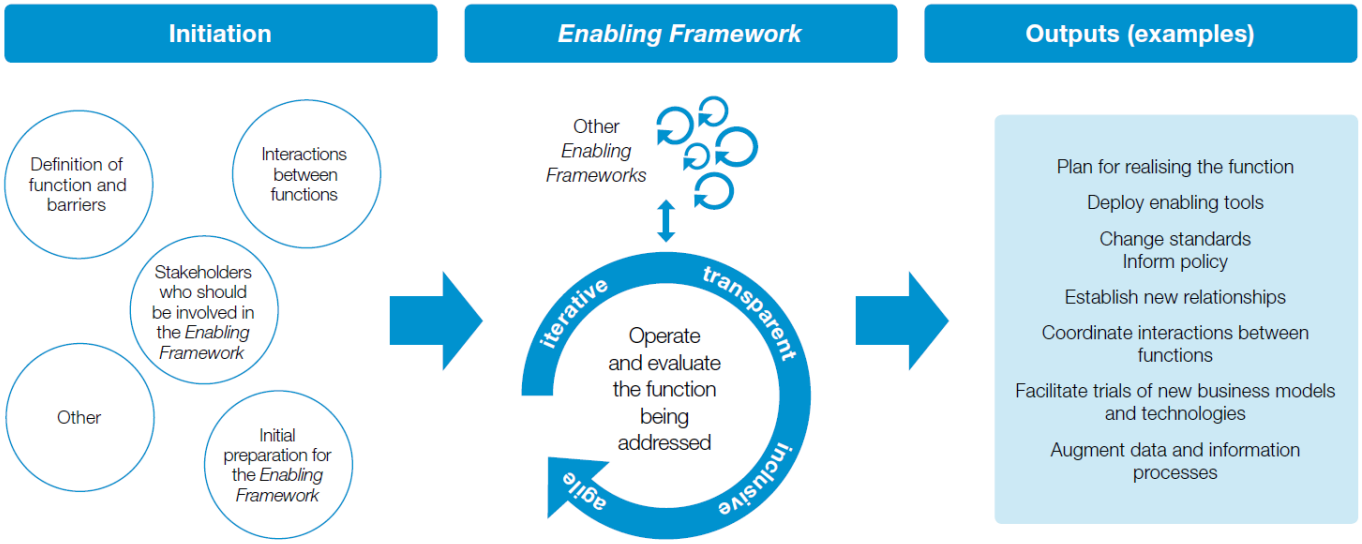

EF – The Skills and Competencies

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What help are we seeking:

- **Understanding the current landscape** – There is a need to understand the current:
  - Legislation and regulation for the power sector – European, national, regional
  - Complex relationships that exist across government depts., regulators, NDPB's, utilities, local authorities, end users, etc
  - Change processes, standards bodies and the role different agencies play in this process.
  - FPSA programme and especially FPSA2 WP4 report

- **Enabling Frameworks** – understand, advise and propose solutions to:
  - Provide the legal framework that will be required to allow the Enabling Framework FPSA2 concept to become a reality.
  - The way that new and existing elements of the concept will need to be configured to deliver the desired aim from a legal perspective
  - The way that existing institutional approaches can transition towards the proposed solution by parallel and convergent approaches

- **Working with a collaborative team** – The successful candidates will need to demonstrate a collegiate approach to delivery and will need to:
  - Command the respect of government, regulators and current market stakeholders as well as the new market entrants.
  - Be able to work with the FPSA Steering Group in a flexible and reactive manner.
  - Identify and articulate the proposed solutions to different audiences in a way that is appropriate to that set of stakeholders.

- **Making it happen** – FPSA is focused on making it happen not compiling reports – there is a need for pragmatism, the report requested is focused on demonstration in the next phase.

EF – The needs of this call

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The deliverables:

- **Legislation** – There will be a need to provide:
  - A clear, credible and sound plan of how the EF proposals can first be:
    - Configured in a legally enabling manner (the detail will be delivered in the FPSA3 timeline)
    - Then 'sold' to the establishment as a credible way forward
    - Demonstrated in a trial with all needed institutional derogations to enable business as usual testing.
- **Regulation** – There will be a need to provide:
  - A clear indication of how regulatory mechanisms will need to change to adapt to the EF concept
  - Any 'show stopper' issues that would prevent implementation and approaches to mitigate them
- **Roles, Responsibilities, Accountabilities** – To date FPSA has not identified who should have certain roles, responsibilities and accountabilities. There is a need:
  - To highlight the impact that different ownership of these attributes (above) would have on both legislation and regulation proposals
  - To propose how this could be handled in any transition process
- **Funding** – Given the different models considered above propose how the funding model of this new market could operate.

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Questions and Answers

Email to: Procurement@es.catapult.org.uk

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Next Steps