ETIP SNET Roadmap Structure: Integration Enablers (Inputs to Integration Actions)

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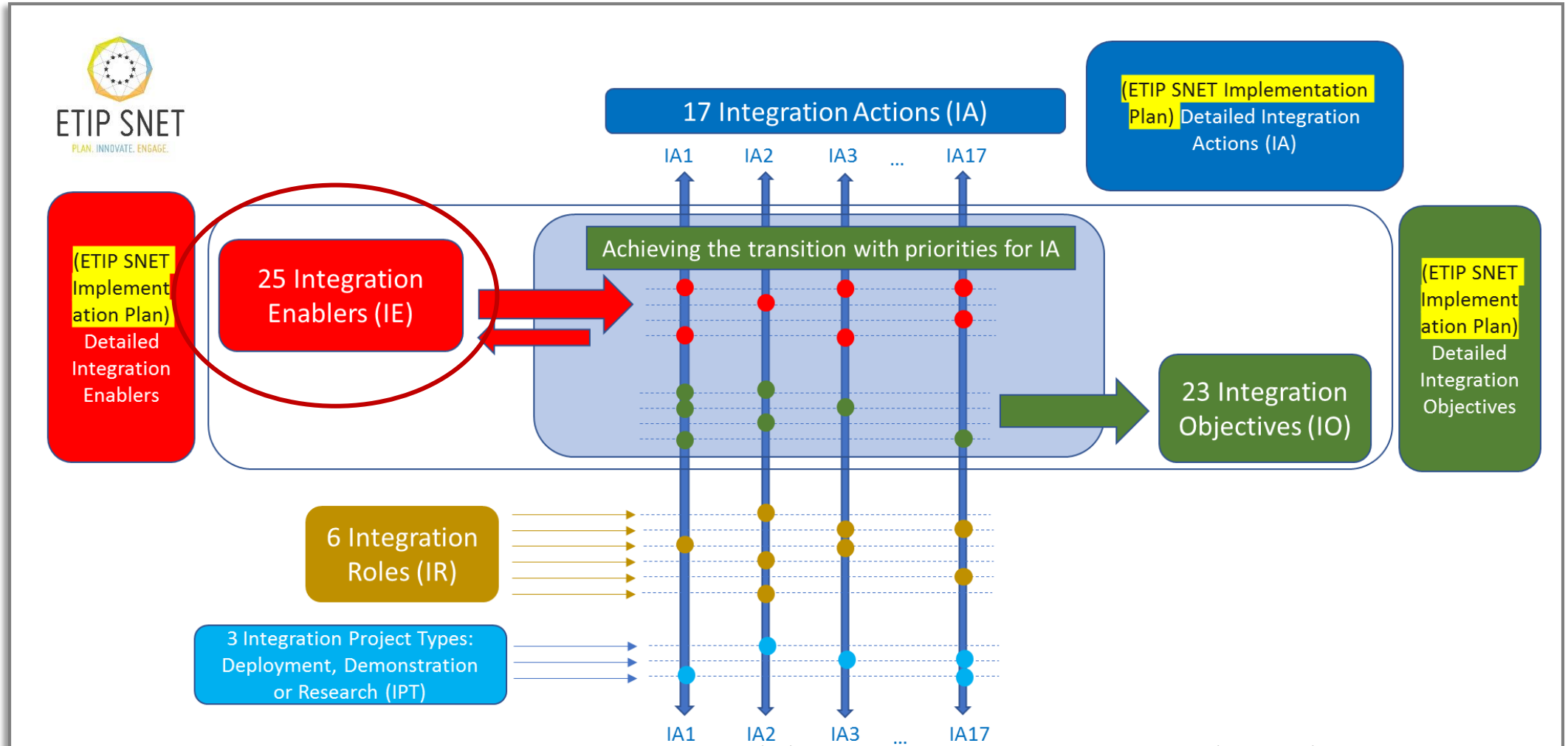
Proposed ETIP SNET RM Structure



Each of 17 Integration Actions (IA) is characterised by: One or more IE (enabler), IO (objectives), IP (Project type) and IR (role)

What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

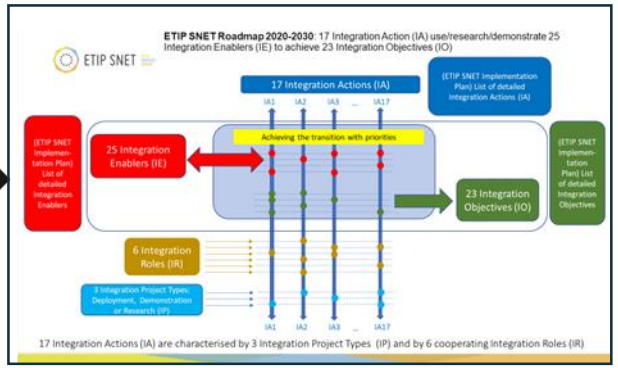
- **An "Enabler" is either a "techno-enabler" or a "non-techno (social, environmental or legal/regulatory) enabler".**
- **A "Techno Enabler"** is a tangible characteristic of a physical infrastructure element (electricity and/or non-electricity), of ICT and of digital solutions (e.g. HW such as sensors; any SW) which – together with other enablers **supports one or more of the ETIP SNET Integration Objectives**
  - Examples of challenging techno enablers:
    - Voltage phase angle monitoring device (PMU), Battery reactive power control device, …, Reactance changer of a transmission line, DC line switch, etc.
    - Lower levels: FACTS parameters; Cycles of a battery; Battery charging and releasing energy speed (Energy per time)
- **A "Non-techno Enabler"** is a tangible legal and regulatory rule, a tangible means for changed social behavior or for environmental effects which - together with other enablers **supports one or more of the ETIP SNET Integration Objectives**
  - Example: Rewards to engage people

What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

Integration Enablers are used (as input) by Integration Actions

- Integration Enablers in ICT and Digitalisation
- Integration Enablers in physical electricity infrastructures
- Integration Enablers in physical non-electricity infrastructures
- Integration Enablers in Society and Environment
- Integration Enablers in Legal and regulatory environments



What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

ICT and Digitalisation

ICT Infrastructure and Digital enablers:provide flexibility, security at low cost to the electricity system with integrated gas, mobility and heating/cooling sub-system and its users					
IE1	IE2	IE3	IE4	IE5	IE6
Data Management enablers	**Interoperability and standards enablers**	**Monitoring, control and automation enablers**	**Critical infrastructure protection (CIP) enablers**	**Cybersecurity enablers**	**ICT infrastructures related enablers**

What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

Physical Electricity Infrastructures

Enablers in Physical Electricity Infrastructures: provide circularity, flexibility, security, reliability, resilience, quality to the electricity system users					
IE7	IE8	IE9	IE10	IE11	IE12
Non-renewable (fossil) generation enablers	**Renewable generation enablers**	**Conversion (PtX, XtP [Generation]) related enablers**	**Electricity Transmission enablers**	**Electricity Distribution enablers**	**Storage (with electricity release) flexibility enablers (Hydro storage, Battery storage, Gas storage, Heat/cooling storage)**

What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

Physical Non-Electricity Infrastructures

Enablers in Physical Non-Electricity Infrastructures: provide flexibility (also seasonal), circularity at low cost to the electricity system, to mobility and to heating/cooling			
IE13	IE14	IE15	IE16
Conversion (GtH, GtL) enablers	**Storage (Non-electricity release) enablers (Heat storage, Gas storage, Liquids storage)**	**Gas Network flexibility enablers**	**Heating and Cooling network enablers**

What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

Social and Environmental

Social and Environmental Enablers: provide circularity, renewables investments and siting, adapted user behavior, infrastructure acceptance, own responsibility within the society with its citizens				
IE17	IE18	IE19	IE20	IE21
Circularity enablers	**Renewables enablers (for increased RES Siting, RES capacity)**	**Adaptive behaviour related enablers (for Efficient use, Knowledge)**	**Energy transmission and distribution, storage and conversion related acceptance enablers (for visibility, perceived dangers, costs, etc.)**	**Subsidiarity related enablers (for self responsibility)**

What is an Integration Enabler (IE)?

ETIP SNET Definition, May 2019

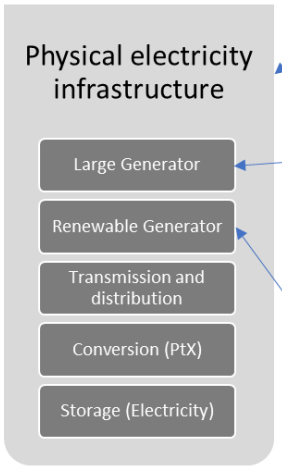
Legal and regulatory

Legal and regulatory enablers: provide maximum welfare, low cost, fairness and empowerment to users			
IE22	IE23	IE24	IE25
EC and National Acts, Directives and Regulations as enablers (for sandboxes; unbundling; market versus natural monopoly; costs (CAPEX, OPEX), market design; Metering responsible; Control responsible)	**Market rules as enablers (for access to markets, choice of products and services, price determination, congestion)**	**Grid rules as enablers (for natural monopoly, tariffs, connection, in-feed subsidisation, unbundling, self-prosumers)**	**End-Use Sector rules as enablers (for small and large users, for prosumers)**

Integration Enabler (IE): Example

ETIP SNET Definition, May 2019

What is an Integration enabler? Concrete enablers?



Elements of the "physical electricity infrastructure" (such as transmission lines, distribution lines, Shunts, generators, etc.) have enablers supporting one or more of the integration Objectives

A concrete enabler in the group of "Large generator" is "Ramping up and down":
By the integration of this enabler, the following Energy System Integration Objective for "Security, Quality, Reliability and Resilience" can be achieved: Support balancing in 15-minute intervals

A concrete enabler in "Renewables" is "Partially switch-off a PV generator":
By the integration of this enabler, the following Energy System Integration Objective for

- "Security, Quality, Reliability and Resilience" can be achieved: Avoiding overloads on Distribution lines; reducing overvoltages to acceptable levels
- "Welfare & Affordability" can be achieved: Lower total costs due to avoided grid reinforcement
- "Empowered and Engaged Users" can be achieved: This enabler leads to higher user contributions to coordinated grid-friendly actions and thus to lower total physical infrastructure costs.

etc

Integration Enablers: First impressions

1. **Complexity of the structure**

A highly complex structure would be difficult to disseminate and appeal to a wider audience.

→ **Review structure: higher level representation suggested**

2. **Iterative approach for definition of IE's suggested**

IE's could evolve based on objectives and the solutions that are developed (e.g. standards, regulation, solutions)

→ **Include feedback loop linked to objectives**

3. **Flexible definition of IE's recommended**

The definition on IE's could be part of the solutions and allowing flexibility on definitions is needed to open up innovation

→ **The definition of IE's could be limited to categories only**