

Accompanying document

Repository of interoperability initiatives



int:net

Interoperability Network for
the Energy Transition

DOCUMENT INFORMATION

Project	int:net
Title	Accompanying document of the repository of interoperability initiatives
Work package	WP1
Contractual delivery date	NA
Actual delivery date	27/01/2023
Lead organisation	TECNALIA
Security	P
Nature	Other
Version	1
Total number of pages	17

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The research leading to these results has received funding from the European Union's Horizon Europe Research and Innovation Programme, under Grant Agreement no 101070086.

ABSTRACT

This document presents an overview of the categories and tagging system employed to classify the interoperability initiatives analysed by the partners involved in the int:net project. Most of these initiatives were focused on the smart grid domain. This document is intended to serve as an accompanying file to read and understand better the initiatives gathered in the repository.

KEYWORD LIST

Energy sector, interoperability initiatives, tagging system

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1 Introduction

This document presents an overview of the categories and tagging system employed to classify the interoperability initiatives analysed by the partners involved in the int:net project. Although most of these initiatives were focused on the smart grid domain, it does not exclude other sectors. This document is intended to serve as an accompanying file to understand the structure and read in a better way the digital repository of interoperability initiatives gathered in the int:net platform. This repository is currently located in the int:net project website www.intnet-project.eu, in the read-only Excel file “*Repository-of-interoperability-initiatives-v1.0*”.

1.1 The int:net project

The int:net project is a response to the need to establish an open, cross-domain community bringing together all stakeholders relevant to the European energy sector to jointly work on developing, testing, and deploying interoperable energy services. In addition to this, Int:net will develop a comprehensive and accepted Interoperability Maturity Model (IMM) that will allow the assessment of the level of maturity in organisations and will support developing actions to reach higher levels of interoperability maturity. Besides, the int:net project will establish a framework for interoperability testing in ongoing projects and harmonise test procedures in a network of closely cooperating, self-sustained testing facilities.

1.2 Objectives of the work reported

The digital repository collects in a structured way relevant information on the multiple activities on interoperability at a national and international level related to the energy sector, trying to provide a comprehensive and consolidated view of the work done by different stakeholders regarding interoperability functions and business needs. Besides, the catalogue of interoperability actions and best practices is public to increase interoperability of energy services, data and platforms and is a live document that can be updated by external stakeholders (see section 5.2).

2 Structure of the repository

The digital repository was defined as a table in order to provide information in a structured way and to be used in widely-spread tools like Excel. All information regarding a single initiative is on the same page, and no need to scroll for specific information. In this sense, the digital repository was structured in four main columns and several subcolumns that specify detailed information about each initiative.

All initiatives are classified per category in **Column A**. From **Columns B to G**, readers can find general information regarding the initiative: name, responsible organisation, dates, and website. **Column H** provides a short description of the initiative. **Column I** highlights its added value, and it answers questions such as: What is the main service provided? What is the main useful result? How is it used? and What does it bring to the topic of interoperability? From **Columns J to R**, a more detailed categorisation based on the **Organisational** and **Applicability** criteria is presented. Finally, **Column S** adds a series of tags that allow readers to directly search a specific term in the document, for instance, a specific application area.

Table 1 shows a description of the different fields used in the repository of interoperability initiatives. Further details about the categories and tags can be found in sections 2 and 3, respectively:

Table 1: Structure of the repository

Column	Field	Sub-field	Description
A	Category	-	Main category classification for the initiative: <ul style="list-style-type: none"> • Common framework • Regulation, policy and law • Standardisation • R&D project • Implementation project • Laboratory testing facility • Best practices • Working group • Report
B-I	Description	Name	Name of the initiative
		Responsible Organisations	Organisations developing the initiative
		Last Update Date	Last date when the initiative was active, or for a report, the release date of its final version
		Start Date	Date when the initiative started
		Scope	Geographical scope:

Column	Field	Sub-field	Description
			<ul style="list-style-type: none"> • International • European • National
		Website links	Link to useful websites to learn more about the initiative
		Short Description	A short description of the initiative
		Added value	A description with relevant information about the initiative (main service provided, main useful result, how it is used, what it brings to the topic of interoperability, etc.) This analysis has been performed by the int:net partners.
J-R	Categorisation	Organisational	<p>Detailed categorisation from the organisational point of view:</p> <ul style="list-style-type: none"> • Collaborative Project • Working group • Ongoing standards activity • Policy • Player (SDOs, policymakers, regulators, etc.)
		Applicability	<p>Detailed categorisation from the applicability point of view:</p> <ul style="list-style-type: none"> • Best practice • Common framework • Method • Demonstration
S	Tags	-	<p>List of tags according to Smart grid related applications:</p> <ul style="list-style-type: none"> • Wide-Area Situational awareness • Flexibility trading • Demand response • Distribution grid management • Advanced metering infrastructure • Energy storage • Electric vehicles • Cybersecurity • Distributed generation • Energy management system • Energy trading

Column	Field	Sub-field	Description
			<ul style="list-style-type: none">• Microgrid• Ancillary services• Sector coupling (P2X)• Etc.

Figure 1 shows an example of an initiative in the digital repository. In this case, the Smart Grid Architecture Model (SGAM) framework is described throughout the columns presented above. This initiative is categorised as a common framework due to its description and applicability. Besides, it contains a series of tags that involve different application areas.

Category	Description								Categorization								Tags		
	Name	Responsible Organization (s)	Last Update Date	Start Date	Scope	Website links	Short description	Added-value of the initiative (What is the main service provided? What is the main useful result? How it is used?)	Organizational				Applicability						
									collaborative Project	Working group	Ongoing standards activity	Policy	Player (SDOs, policy makers, regulators, etc.)	Best practice	Common framework	Method		Demonstration	
Common framework	Smart Grid Architecture Model (SGAM) framework	CEN, CENELEC, ETSI	2012 (tbc)	2012	European	https://energy.ec.europa.eu/documents_en?f%5B0%5D=document_title%3Aarchitecture	A unified standard for smart grid use-case and architecture design. This reference architecture aims to give a global view of a Smart Grid system by mapping its different actors and devices on a Smart Grid Plane subdivided in Domains and Zones. The framework is described in the document "xpert_group1_reference_architecture.pdf"	With its five layers highlighting different interoperability conditions, the SGAM framework aims to cover the interoperability issues of a system		x						x			Reference Architecture, Wide-Area Situational awareness, network ICT communications, flexibility trading, demand response, distribution grid management, advanced metering infrastructure, energy storage, electric vehicles, cybersecurity, distributed generation, energy management system, energy trading, microgrid, ancillary services, sector coupling

Figure 1 Example of an initiative categorised as a Common framework

3 Categorisation of initiatives

In order to classify the collected initiatives, it has been decided to propose a categorisation by the int:net partners. It is based on improving readability, finding at first glance the type of the initiative, allowing the reconciliation of similar initiatives, and highlighting the topics that are less covered by initiatives (e.g., interoperability testing, regulation etc.) – that might help decision-makers to decide future investments. This categorisation should help the reader to find what he is looking for at first glance. However, please note that some initiatives listed might be part of several categories. In that case, the most relevant one has been chosen.

The different categories are:

- Common framework: this category presents the different frameworks developed for harmonisation purposes. It includes, for instance, role models and diverse terminologies to ensure effective discussion between various stakeholders and reference architectures to promote reusable designs and best practices.
- Regulation, policy and law: this category gathers the various laws governing the smart grid sector and related processes, such as the data exchange process.
- Standardisation activities: this category gathers all initiatives linked to standardisation. It can thus be standards, repositories of standards, standardisation roadmaps but also Standards Development Organizations (SDOs) or institutions such as industrial alliances promoting and fostering interoperability through standardisation and certification.
- R&D project: this category gathers all the research and development projects undertaken to innovate and introduce new platforms, roadmaps, and implementation guides. This includes, for instance, Horizon 2020 and Horizon Europe projects without real-life demonstration or pilots (like int:net).
- Implementation project, real-life demonstration: similar to the previous category, this group gathers projects with a demonstration and pilot sites (e.g., Invade).
- Laboratory testing facility: this category gathers the different interoperability testing facilities (e.g., DERLab). Laboratory testing refers to the process of performing any tests or procedures that are conducted in a controlled environment. In the context of int:net, it refers to both interoperability and compliance tests: an interoperability test ensures that a device will work with other devices, while a compliance test ensures that a device will meet the requirements set out by some standards.
- Best practices: this category presents the best practices and methodologies developed to tackle the energy sector sector. It gathers methodologies to develop use cases (e.g., IEC 62559-1), to select relevant standards (e.g., IEC TR 63097 or the BRIDGE catalogue of standards), and to test the interoperability of the system (e.g., JRC's interoperability testing methodology).
- Working group: this category gathers working groups bringing together multiple stakeholders and experts to guide the research, development and innovation of new standards, frameworks and best practices.
- Report: in this category, readers can find informative reports covering various analyses.

4 Tagging system

In order to make the catalogue searchable, it has been decided to use a tagging system. A tag is indeed a keyword or term assigned to an initiative that helps describe an item and allows it to be found again by browsing or searching. This kind of metadata was chosen informally and personally by the int:net partners. As a baseline for the tagging system, we decided to assign to each initiative its main application areas (e.g., network communications, demand-response, distribution grid management, advanced metering infrastructure, energy storage, electric vehicles, cybersecurity, etc.). The full list of tags used is presented in Table 2.

Table 2: List of tags

5G And 6G Connectivity	Data Exchange	Federate Machine Learning.	Local Energy Community	Sector Coupling (P2X)
Advanced Metering Infrastructure	Data Governance	Fit For 55	Management Of Energy Systems	Semantic Interoperability
Ancillary Services	Data Hubs	Flexibility	Market Models	Sequence Diagram
Assessment Schema	Data Model	Flexibility Devices	Metadata Registry	SGAM Extensions
Automatic Validation	Data Sharing	Flexibility Resources Register	Metering Infrastructure	Short Term Adequacy Forecasts (STA)
Automation	Data Space	Flexibility Services	Meters	Smart Building
Balancing Of Supply And Demand	Data Storage Services	Flexibility Trading	Methodology	Smart Grids
Battery Energy Storage	Data Technologies	Flexible Power Consumption	Microgrid	Smart Home
Big Data For Energy	Data Value Stack	Frameworks And Reference Architectures	Modelling Methodology	Smart lot Devices And Meters
Blockchain	Databases	Gateways	Monitoring/Observatory	Smart Metering
Building Blocks	Decarbonization Of Energy	Glossary	Multi-Carrier Energy System	Smart Services
Business Models	Demand Response	Green Deal	Network/ICT Communications	Software
Business Processes.	Demand-Side Flexibility	Heat Pumps	Networking	Sovereignty
Business Requirements	Demonstration Sites	Home Automation	Official Certification	Standard
Capacity Calculation	Dictionary	Horizon 2020	Ontology	Standardization
Certification	Digital Orchestration	Horizon Europe	Open APIs	Standardized Products
Chargers	Digital Technologies	HVAC	Open Modular Big Data Analytics Energy Toolbox	Standards Repository
CIM	Digital Transformation	IDS Components	Open Source	System Development
Clean Energy Transition	Digital Twin of the Energy System	IDS Knowledge Base	Optimisation	System Operation
Cloud Computing	Distributed Energy Resources	IDS Reference Testbed	Outage Planning Coordination (OPC)	Systems

Coding Schemes Mapping	Distributed Generation	IDS-Based Connector	Pan European Verification Function (PEVF)	Test Procedures
Cogeneration	Distribution Grid Management	IEC 61850	Peer-To-Peer Trading	Testing
Common Energy Data Space	DLMS-COSEM	IEC Specifications	Performance Interoperability	Testing Tools
Common Grid Model	Dynamic System Management	IEDs	Platform	Trade
Common Terminology for IT Development	EIC Data Exchange	Implementation Guides	Pre-Qualifications	Training
Communication And Data Protocols	Electric Vehicles (EV)	Information Exchange	PRIME	Transparency Platform
Community Of Experts	Electrical Protection	Innovative Business Process	Privacy Control App	Transportation
Configurations	Electricity Market	Innovative Energy Services	Profile And Context Modelling Rules	True Connector
Conformance Assessment	Electromobility/ E-Mobility	Interconnection	Profiles	Trust
Conformance Testing	Electronic Communications Services	Interface	Prosumers	Trusted Data Infrastructures
Conformity Scheme	Energy Communities	International Standard	R&I	TSO- DSO Collaboration
Congestion Management	Energy Data Spaces	Interoperability	REAL TIME MONITORING	TSO-DSO-Market Collaboration
Context Broker	Energy Efficiency	Interoperability of ID Schemes	Reference Architecture	TYNDP
Control	Energy Management System	Interoperability Testing	Reference Implementation	Unified Modelling Language
Coordinated Capacity Calculation	Energy Smart Appliances	Interoperable Pan-European Market	Regulatory Framework	Usage Control App
Coordination TSO-DSO	Energy Storage	IoT	Renewables In Buildings	Use Cases
Cross-Sector	Energy Trading	IT Security	Report	Virtualization
Cybersecurity	Energy Transition	Laboratory Testing Network	REPowerEU	Vocabulary Provider
Data	EU Project	Labs	Role Model	Wide-Area Situational Awareness
Data Concentrators	European Energy Market	Landscape And Gap Analysis	RTUs	XSD
Data Driven Ecosystem	European Style Market Profile (ESMP)	Library	SAREF	

5 Integration in the int:net ecosystem and continuity in the collection of initiatives

5.1 Integration into the int:net platform and community

The collection of initiatives will be made available on the int:net platform, together with an explanatory document on the categorisation and tagging system. As a first step, making this collection publicly available will be performed through a read-only Excel file on the int:net project website *www.intnet-project.eu*. Every interested party can find this collection of initiatives without needing to register or log in. The listed initiatives will be regularly checked in order to motivate the stakeholders to contribute actively to the int:net community activities.

5.2 How to add new initiatives

The int:net project builds on receiving external inputs to extend the expertise of its consortium members. Therefore, as an example, E.DSO created a survey titled “Int:net Survey on National, European, and non-European Interoperability Initiatives” with the EU Survey tool provided by the European Commission, which was used to collect such information. The setup of the survey was reviewed by Trialog to ensure the significance of the replies. The survey was eventually accessible under the URL https://ec.europa.eu/eusurvey/runner/IntNETSurveyT1_1 (see Figure 2) and online for about a month in the fall of 2022.

Through the E.DSO Innovation Committee, about five responses with about 30 initiatives were collected from leading DSOs within the European Union. Due to the positive impact, the survey was shared with additional consortium members to receive input from experts within their companies. This led to two additional entries with about five initiatives.

Following an analysis to complement entered details, they were incorporated into the repository developed by int:net. The added value consisted mainly in gathering initiatives with a national focus, whereas the consortium members tentatively listed international initiatives.

Surveys like the one by E.DSO will serve as a role model for the next steps within the int:net project to expand the repository and foster knowledge-sharing of energy system stakeholders. Although the method for collecting new initiatives is still in definition, contributions from external stakeholders are welcomed through the mail info@intnet-project.eu.


☒ Save a backup on your local computer (disable if you are using a public/shared computer)

Int:net Survey on National, European, and non-European Interoperability Initiatives

Fields marked with * are mandatory.

Disclaimer

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int:net
Interoperability Network for
the Energy Transition

Electricity from renewable resources, combined with a smart digital grid infrastructure, is the only way to decarbonise the energy sector. The energy transition towards a carbon neutral European future in 2050 affects many other sectors than just energy: transport, building, agriculture and industrial production, to name just a few. To make the transition happen, not only connectivity in the energy sector is needed but energy related processes and products across all sectors have to be aligned. With the int:net project we want to link these domains and bring joint standardisation and interoperability to a new level.

The int:net consortium is currently creating a **knowledge base for energy interoperability initiatives**. The project partners will be extending the database throughout the project period. Edited outcomes are planned to be published on the [int:net website](#).

For now, **initiatives are defined in a broad way** – from research projects, working groups, reports, to standard-setting initiatives – as long as they are related to interoperability of the energy sector. At this stage, we are looking for **national, European, and non-European initiatives**.



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Contact

sebastian.vogel@edsoformartgrids.eu

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Please provide us with **details on initiatives** that you consider to be relevant. Not all fields have to be filled. We value any input you might contribute to int:net.

In case you would like to enter more than 10 initiatives, feel free to start the survey again or contact us directly.

Initiative Name	Website Link	Short Description	Added Value (Provided services, main results, etc.)	Contact to the Initiative (partner entity and/or name)
1	//	//	//	//
2	//	//	//	//
3	//	//	//	//
4	//	//	//	//
5	//	//	//	//
6	//	//	//	//
7	//	//	//	//
8	//	//	//	//
9	//	//	//	//
10	//	//	//	//

* Your **entity and name** (will only be used if necessary for follow-ups on your input):

* **Email** (again, only for inquiries regarding this survey):

* **Int:net partner(s) linked to you:**
at least 1 choice(s)

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☐ RWTH ☐ Tecnalia ☐ AIT ☐ EPRI

Do you have any remarks regarding this survey or the int:net project in general?


Thank you for **sharing knowledge** across borders, **supporting familiar initiatives**, and possibly contributing to **standardised results**.

This survey will be closed on November 15, 2022. Please feel free to contact us if you have any questions:

- The respective Int:net Task 1.1 is led by Marjolaine Farre (Trialog): marjolaine.farre@trialog.com.
- This survey was created by Sebastian Vogel (EDSO): sebastian.vogel@edsoformartgrids.eu.

Find more details about the project here: www.intnet-project.eu.

This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement N°101070086.



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Figure 2. Int:net Survey on National, European, and non-European Interoperability Initiatives

5.3 Validate a new initiative

Once an external stakeholder has proposed a new initiative, int:net partners will assess its relevance for the catalogue by answering three questions:

1. Is it an ongoing initiative?
int:net partners prefer to focus on ongoing initiatives with regular updates to embrace the constant evolutions of the smart grid sector. Still, if it is an already ended initiative, it might be worth looking into it for learnings about best practices. That has to be decided on a case-by-case basis.
2. Does the initiative promote sustainable and long-lasting results?
If the result is replicable, especially in another context, the initiative will preferably be added to the collection, as the added value to interested parties and community members is expected to be rather high.
3. Is the initiative related to or can be linked to one of the four cornerstones of the int:net project – knowledge base, maturity model, test and certification, standards and governance?
If the initiative can contribute to one of the cornerstone topics, it is even more beneficial to add it to the collection and encourage it to become an active part of the community.

