



ERIGrid 2.0 Laboratory Network – Validation Infrastructure for Smart Grids and Energy Systems

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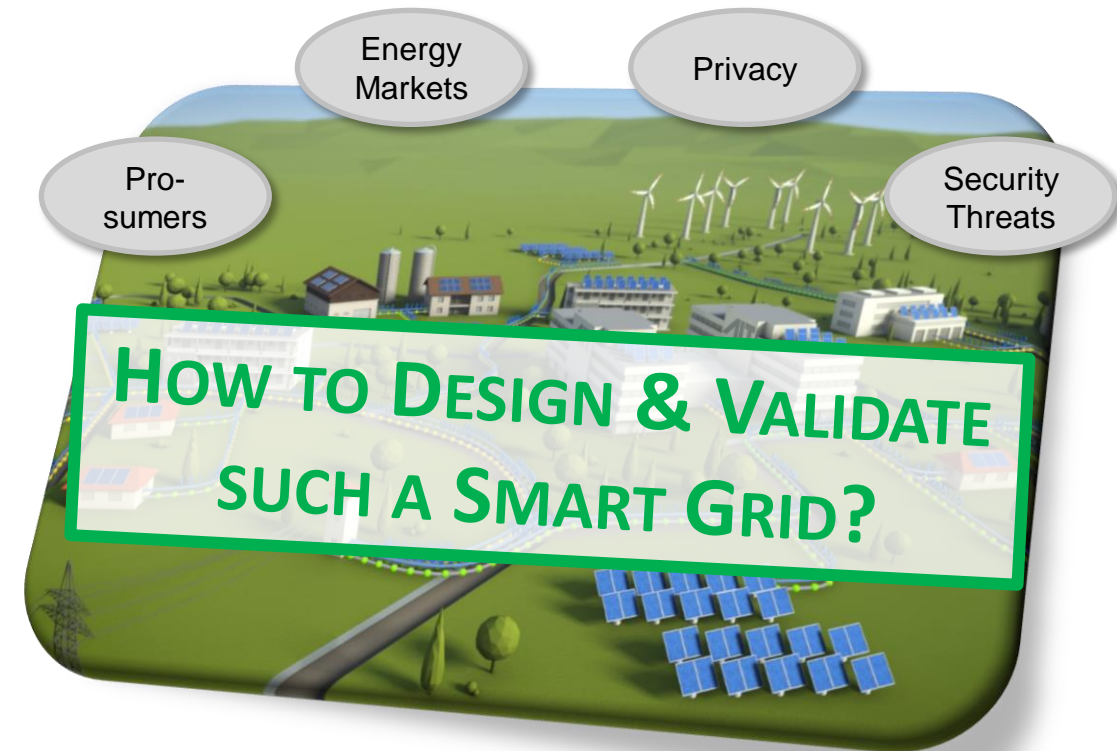
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*JPP ERA-Net SES: Invitation to 2nd Workshop of Validation Network "Sharing of best practices"
03 November 2021 | Online*



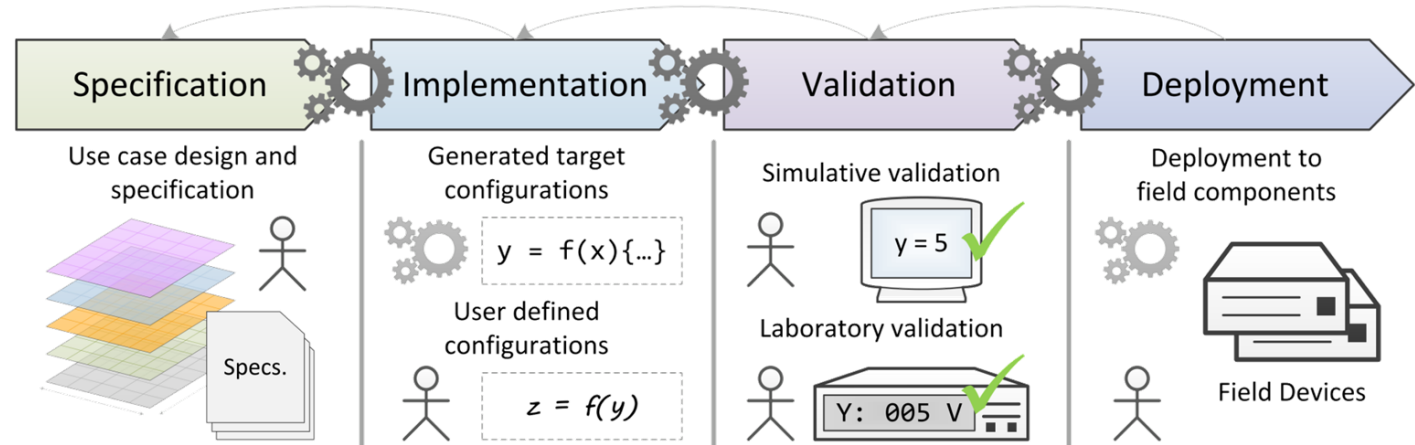
Background and Motivation

- Planning and operation of the energy infrastructure becomes more complex
 - Large-scale integration of renewable sources (Distributed Energy Res./DER – like PV, wind, etc.)
 - Controllable loads (battery storages, electric vehicles, heat pumps, etc.)
- Trends and future directions
 - Digitalisation of energy infrastructure
 - Deeper involvement of consumers and market interaction
 - Sector coupling (linking electricity, gas, and heat grids) for higher flexibility and resilience



Vision and Research Directions

- Support for the integrated design, implementation, validation, and installation of smart grids and smart energy systems
 - Integrated system design
 - Validation and testing
 - Installation and roll out
- Future research needs
 - Improved development and testing services and tools
 - Extended and advanced research infrastructures and laboratories
 - Well educated researchers and engineers (“multi-domain understanding”)



Integrated Smart Grid and Energy Systems RI's

- Long-term, Pan-European cooperation
- Advanced community



- GA-ID 5189299
- FP6 NoE (11/2005-10/2011)
- 3 Mio EUR funding
- 12 partner
- Networking of DER labs, pre-standardization



- GA-ID 228449
- FP7 RI IA (09/2009-12/2013)
- 5 Mio EUR funding
- 16 partner from 12 countries
- TNA to DER labs, pre-standardization



- GA-ID 654113
- H2020 RI IA (11/2015-04/2020)
- 10 Mio EUR funding
- 18 partner from 11 countries
- TNA to Smart Grid and DER labs, pre-standardization



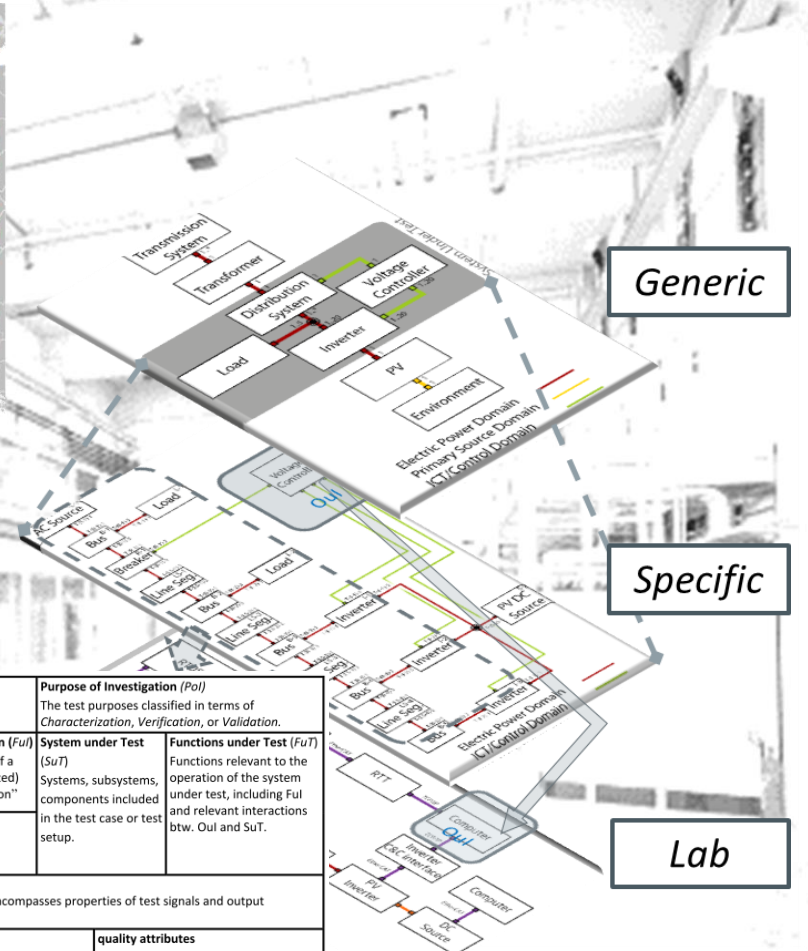
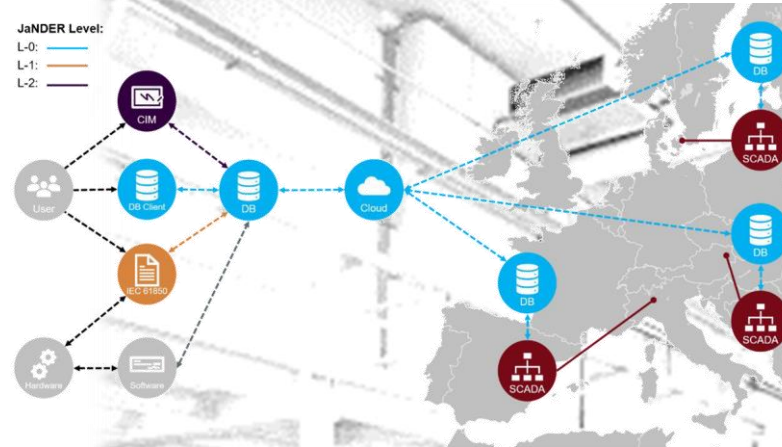
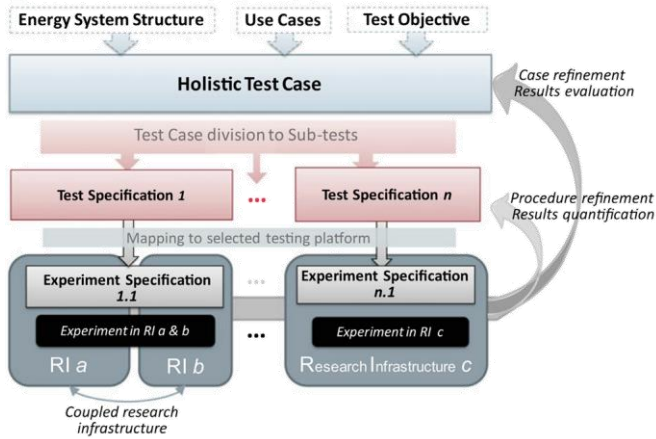
- GA-ID 870620
- H2020 RI IA (04/2020-09/2024)
- 10 Mio EUR funding
- 20 partner from 13 countries
- TNA & VA to Smart Grid, Smart Energy Systems and DER labs, pre-standardization

2005

2024



Smart Grid RI “ERIGrid” - Achievements



- Advanced testing methods and tools
- Holistic validation approach for smart grids
- Approach for specifying test cases, test specifications and experiments
- Coupling approach for smart grid labs
- Virtual Pan-European Smart Grid RI

Test Objectives Why is the test needed? What do we expect to find out? A short narrative of context and goals of the test.		Purpose of Investigation (PoI) The test purposes classified in terms of Characterization, Verification, or Validation.	
Object under Investigation (Oul) "the component(s) (1..n) that are to be qualified by the test"	Function(s) under Investigation (Ful) "the referenced specification of a function realized (operationalized) by the object under investigation"	System under Test (SuT) Systems, subsystems, components included in the test case or test setup.	Functions under Test (Fut) Functions relevant to the operation of the system under test, including Ful and relevant interactions btw. Oul and SuT.
Domain under Investigation (Dul): "the relevant domains or sub-domains of test parameters and connectivity."			
Test criteria: Formulation of criteria for each PoI based on properties of SuT; encompasses properties of test signals and output measures.			
target metrics Measures required to quantify each identified test criteria	variability attributes controllable or uncontrollable factors and the required variability; ref. to PoI.	quality attributes threshold levels for test result quality as well as pass/fail criteria.	

Smart Grid RI “ERIGrid” - Achievements

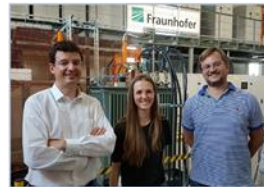
73
user projects from
all over the world
gained lab access



175
engineers accessed
best labs of Europe
free of charge



20
had companies
involved



4
multi-side projects
(involving more than
one laboratory)

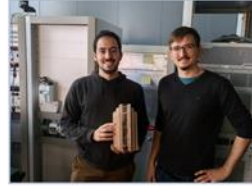


1,000
for over 1,000 days
collectively ERIGrid
labs were in use



14
projects came from
outside Europe

14
projects were led by
companies



7
projects were from
ERIGrid partners
("internal TA")

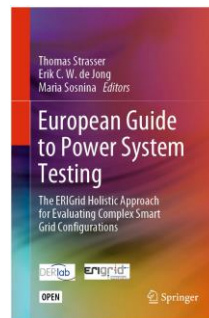


Free access for user groups to

- Power system,
- Smart grid and
- DER laboratories

Smart Grid RI “ERIGrid” - Summary

- Validation methods and tools
 - Integrated pan-European RI
 - System-level validation method and test chain concept
 - Set of open access/source tools (co-/real-time/HIL sim)
- Training activities
 - Education material (450 impacted students, 450 workshop and 290 webinar participants)
- Lab access programme
 - 73 user projects supported (~175 persons, ~1,000 lab days)
- Various reports (~50) and over 160 scientific publications ...



Training of researcher and engineers

- Training schools
- Course/education material
- Tutorials and webinars

Smart Energy Systems “ERIGrid 2.0” - Overview

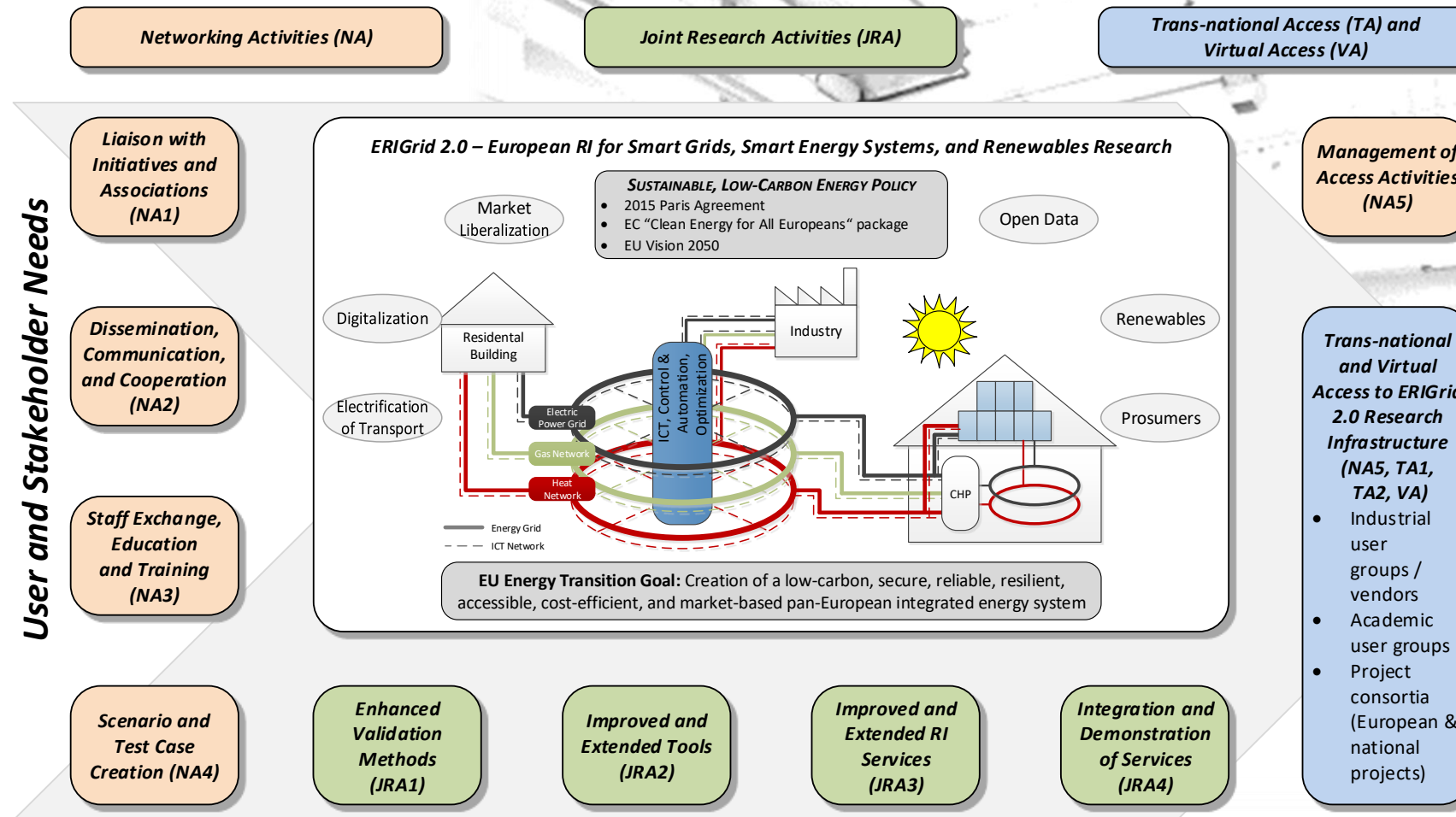


CONSORTIUM COORDINATED BY  **AIT** AUSTRIAN INSTITUTE OF TECHNOLOGY

- Extended and applied research based on ERIGrid topics and achievements for
 - Smart grid and smart energy systems
 - Digitalization with lab interfacing and data exchange for physical/virtual access
- Tight collaboration of partners
 - 13 European countries involved
 - 20 Partners from research and industry
 - 21 top-class smart grid, smart energy systems, and DER labs
 - 8 virtual facilities



Smart Energy Systems “ERIGrid 2.0” - Approach



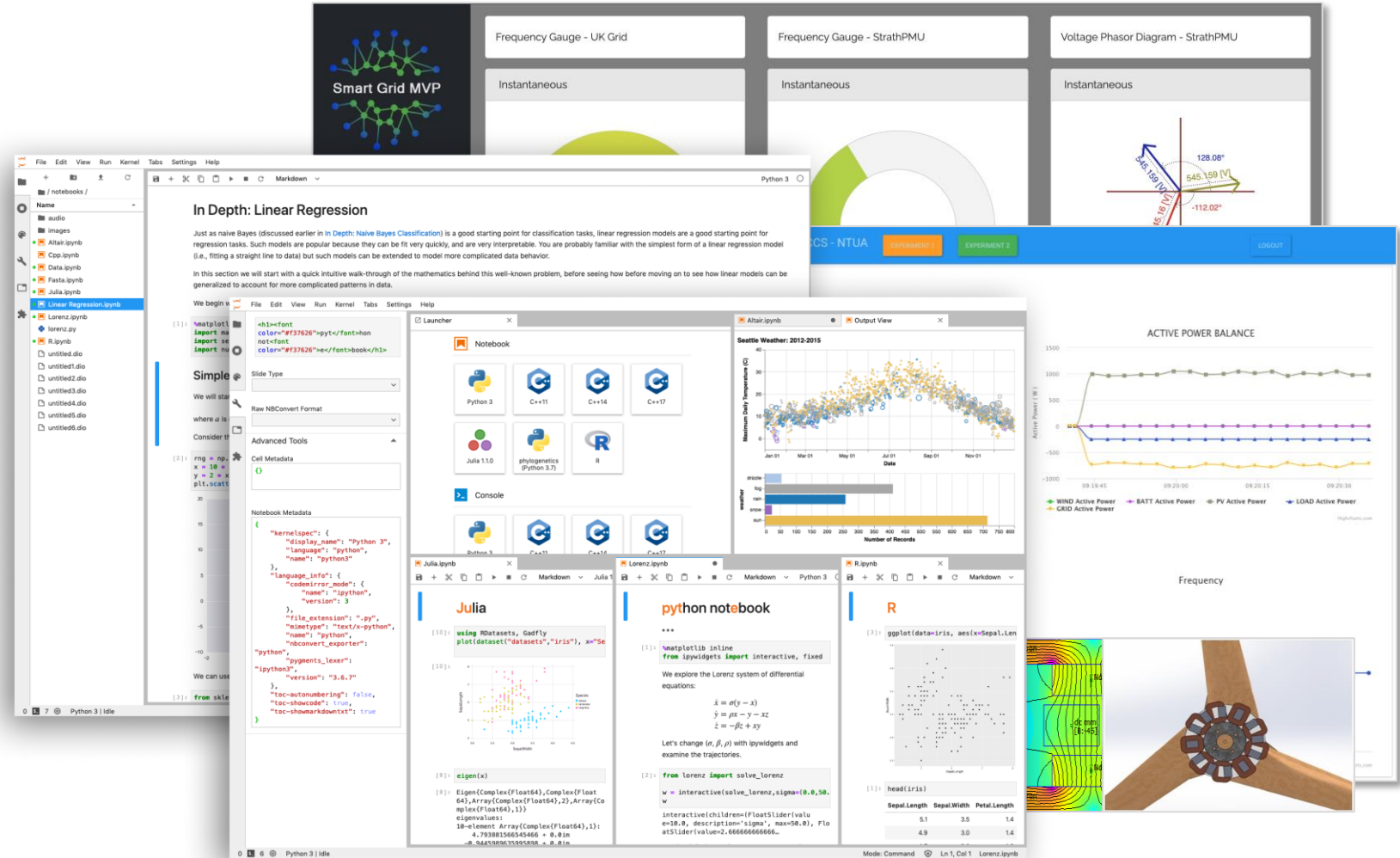
User and Stakeholder Needs

User Innovations

Smart Energy Systems “ERIGrid 2.0” - Virtual Services

■ Focus on

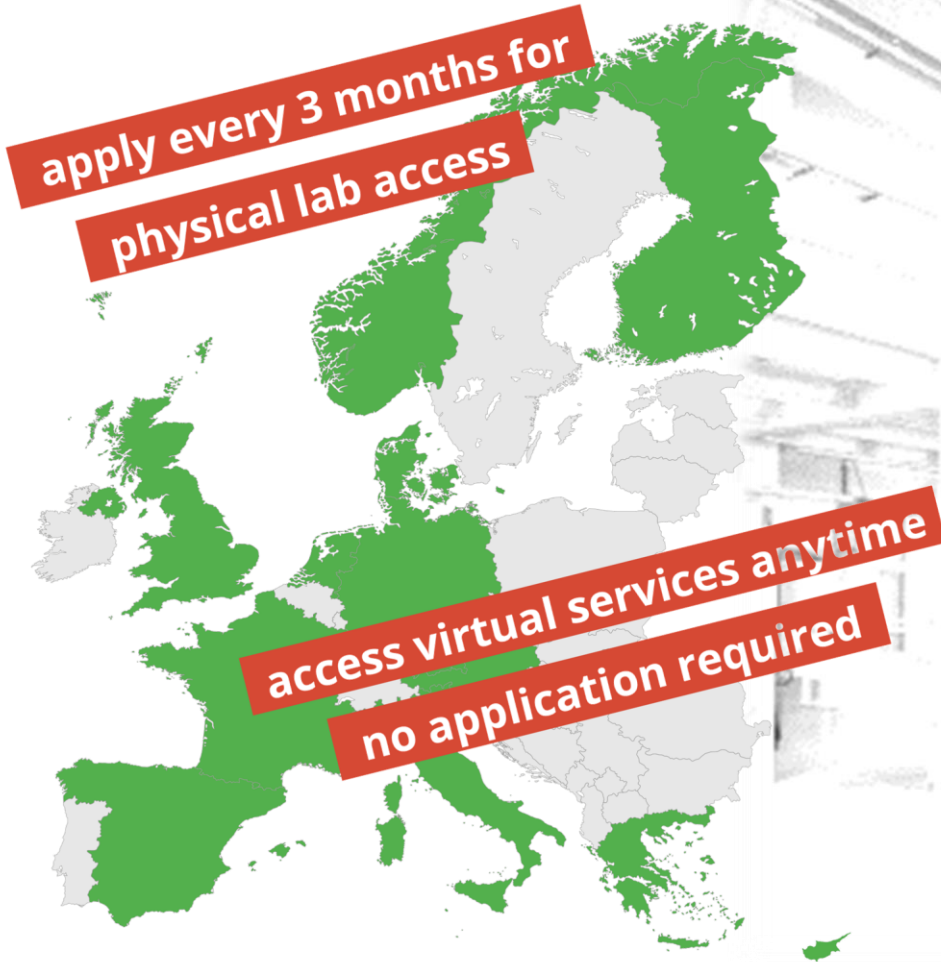
- Simulation-as-a-Service (SaaS)
- Open data, Data-as-a-Service (DaaS)
- Virtual labs



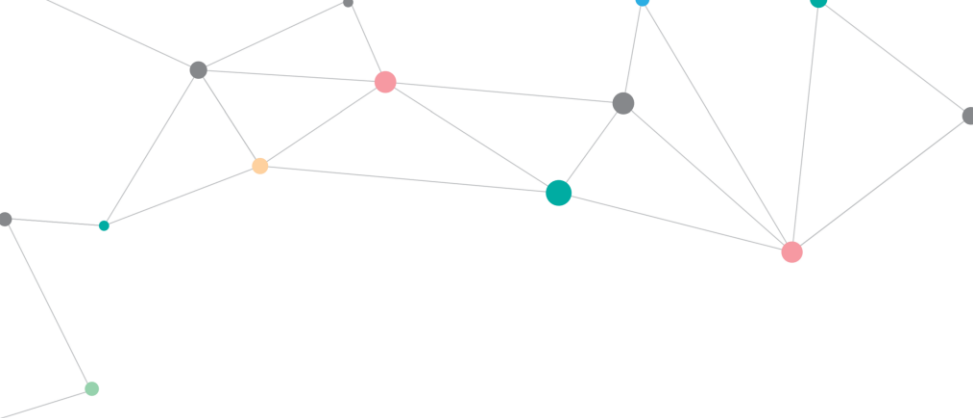
www.erigrd2.eu/lab-access



Smart Energy Systems “ERIGrid 2.0” - Lab Access



www.erigrd2.eu/lab-access



www.erigrd2.eu



@ERIGrid 2.0 Project

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