VISION 2050

A SYSTEM OF SYSTEMS

ET PLAN. INNOVATE. ENGAGE.

Vienna, 05.12.2018

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INNOVATE.
ENGAGE.

Towards Next Generation European Digital Cyber-Robustness & Cybersecurity

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European Union
European Regional Development Fund

HELLENIC REPUBLIC
MINISTRY OF ECONOMY & DEVELOPMENT
SPECIAL SECRETARY FOR ERDF & CF
MANAGING AUTHORITY OF EPAnEK

EPAnEK 2014-2020
OPERATIONAL PROGRAMME
COMPETITIVENESS
ENTREPRENEURSHIP
INNOVATION

ΕΣΠΑ 2014-2020
ανάπτυξη - εργασία - αλληλεγγύη
Partnership Agreement 2014 - 2020

Co-financed by Greece and the European Union

Agenda

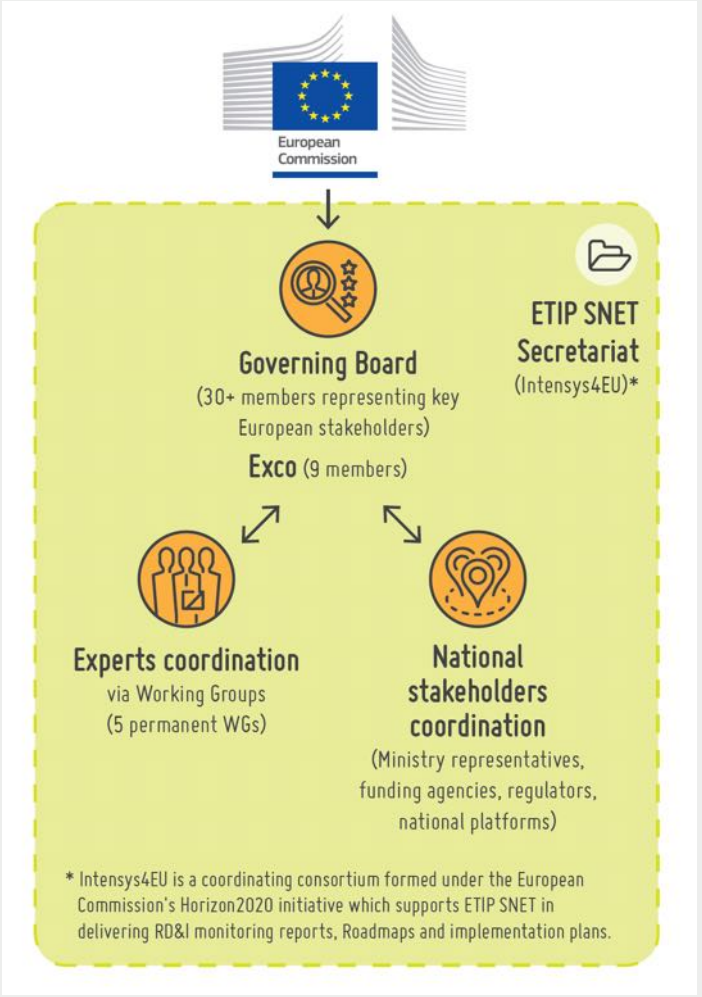
- **11:30 – 11:40 Introduction to ETIP SNET WG4/TF3**
  - ✓ Organization, Structure & Objectives
- **11:40 – 12:00 Findings & Propositions**
  - ✓ View Points
  - ✓ Findings
  - ✓ Propositions
- **12:00 – 12:15 Audience, please participate**
  - ✓ Ask questions & make suggestions
  - ✓ Take the stage (2-3 minutes per participant)
  - ✓ Take a short quiz on-line

ETIP SNET

EUROPEAN TECHNOLOGY AND INNOVATION PLATFORM

SMART NETWORKS FOR ENERGY TRANSITION

Guide Research, Development & Innovation
to support Europe's energy transition



ETIP SNET PLAN. INNOVATE. ENGAGE. Six Working Groups & Three Task Forces

WG1
Reliable, economic and efficient smart grid system

WG2
Storage technologies and sector interfaces

WG3
Flexible Generation

WG4
Digitisation of the electricity system and Customer participation

WG5
Innovation implementation in the business environment

NSCG
NATIONAL STAKEHOLDERS COORDINATION GROUP

Task Force 1

- Digital Technologies and reference architectures and standards, data Science and Modeling (enablers)

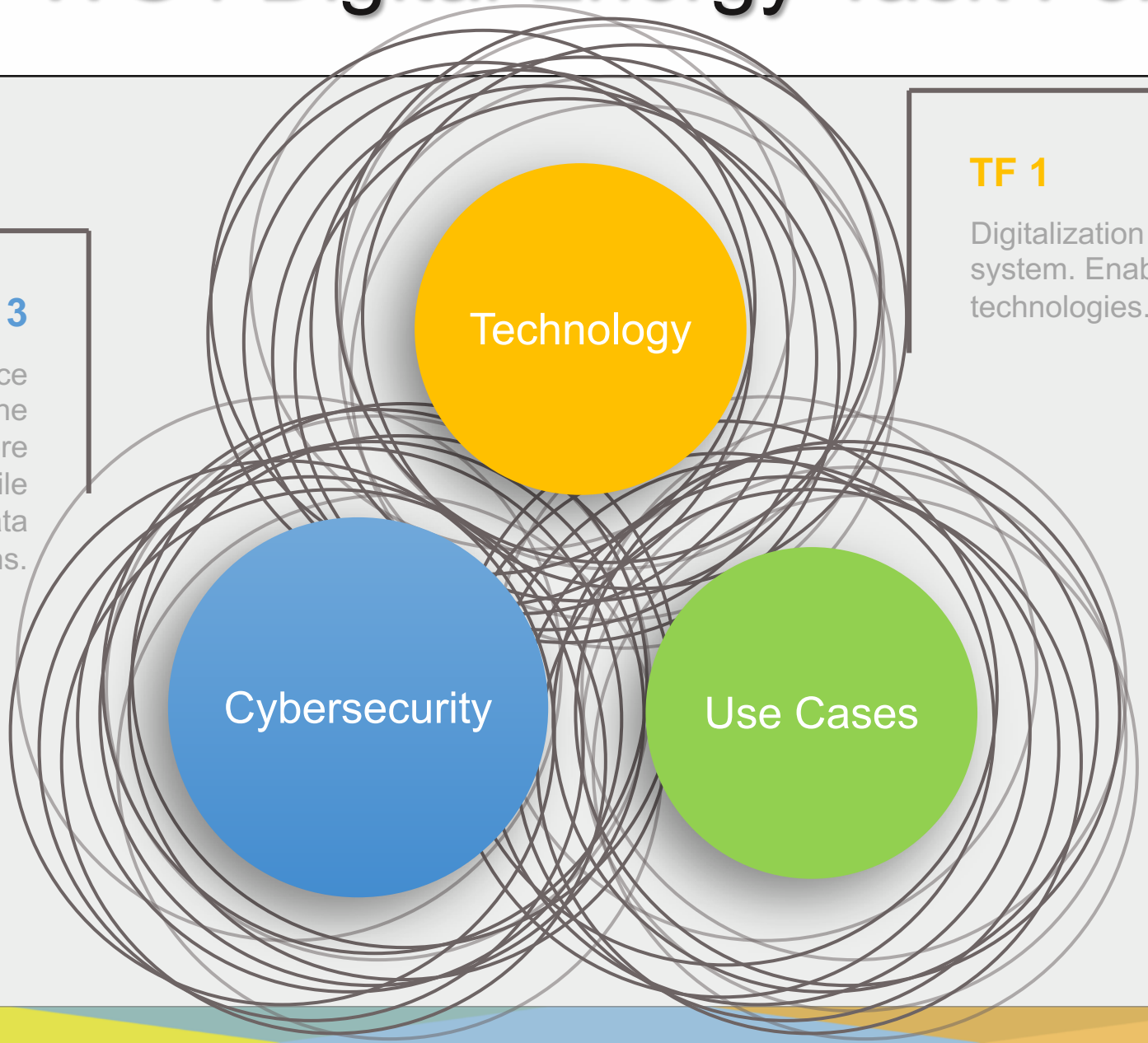
Task Force 2

Digital Energy Disruptive Use Cases and New Market and Business Models (services)

Task Force 3

Digital Cyber Security Recommendations (robust)

WG4 Digital Energy Task Forces Positions



TF 1

Digitalization in the energy system. Enabling relevant technologies.

TF 3

Cybersecurity and resilience (cyber-robustnes) in the energy sector. Securing more digital infrastructure while protecting the necessary data (privacy) of citizens.

TF 2

Disruptive Use Cases and new markets, business models, and customer participation. Emerging trends and recommendations.

WG4 TF3: Robust – Tasks

- People:
  - Physical meetings, telcos, webinars, conferences
  - Established collaboration, infrastructure, and trust
  - Pool of competences with cybersecurity as focus
- Expertise:
  - Feedback on consultations (e.g., Implementation Plans)
  - Summary of reports, collection of related work
  - Deduplication check of work done e.g., in EU Smart Grids Expert Groups
  - Providing reference to research programs
- Technical Position Paper:
  - Introductory chapter on risk analysis and contradiction of cybersecurity vs. operational requirements
  - Active contribution and refinement to formulating future cyber-security topics
  - Clustering of future cyber-security topics with expected outcome of threats, what to secure and how to research for that

Stakeholders as Experts

- DSO/TSO
- Equipment suppliers
- ICT technology providers
- Telecom operators
- Renewable energy source providers
- Research and Academia
- Consumers

And more, actively working together with the Paris Agreement in mind

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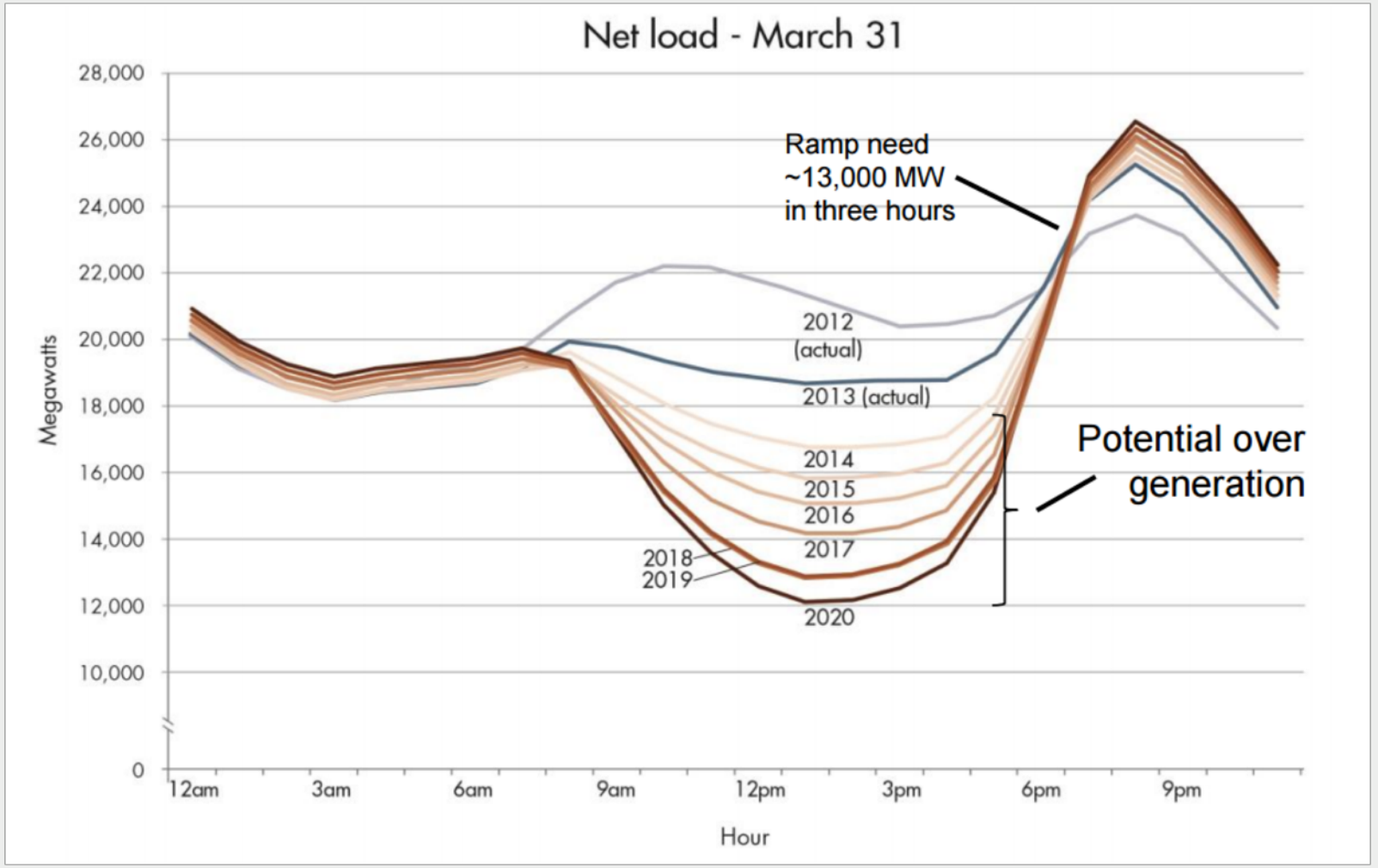
A typical example



Market (Economic) Stability

Power Stability

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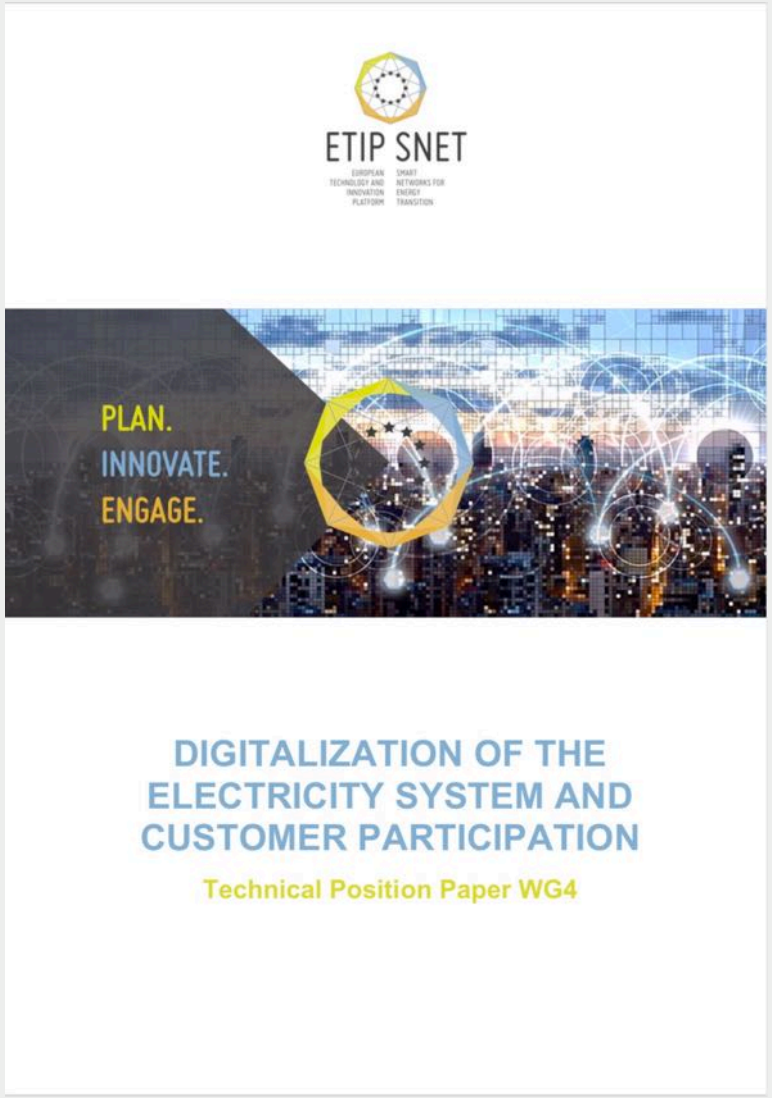
Related Publications

Copies are available

Technical Position Paper



Task Force 1

Task Force 2

Task Force 3

40 authors, 175 pages

Available online only

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Clusters in Task Force 3

- **Cluster Technology**
  - topics already relevant or expected to be relevant in a near-term time frame
  - technology related topics
- **Cluster Policy**
  - topics already relevant or expected to be relevant in a near to mid- term time frame.
  - policy and governance related topics
- **Cluster Future**
  - topics expected to be relevant in a mid-term future or seem far- fetched.
  - interdisciplinary research necessary in today maybe unrelated fields
  - deal with unknown challenges from suddenly exponentially growing sectors (biotech, AI, quantum computing)

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Participation & Outcome

60+ individuals from

50+ organizations

100+ take away messages

in 27 Topics

in 3 Clusters

&

A collection of big Ideas

2050 as Horizon

Det er vanskeligt at spaa, især naar det gælder Fremtiden.

It is difficult to make predictions, especially about the future. (English translation)

1948, Farvel Og Tak: Minder Og Meninger by K. K. Steincke, (Farvel Og tak: Ogsaa en Tilvaerelse IV (1935-1939)), Quote Page 227, Forlaget Fremad, København. (Publisher Fremad, Copenhagen, Denmark)

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Clusters

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Cluster: Technology

Technology Topics

- Artificial Intelligence
- Authentication
- Vision Cybersecurity Centralized vs. Distributed
- Huge Sensor Databases
- Cloud Computing
- Safety intersecting Security
- Blockchain
- Predictive Analytics
- Integrity

Technology Topics

- **AI** helps the cybersecurity industry to monitor sophisticated threats efficiently.
- The blockchain is considered as a promising technology to address **authentication**, **authorization**, **consensus**, and **immutability**.
- **Decentralized distributed systems** efficiency needs to be measured and its scaling understood.
- Digitalization enables and relies on data of massive deployment of **IoT** enabled devices and sensors that make the energy system more transparent and efficient with analytics.
- OT/IT cybersecurity architecture raises the question of on-**premise vs. cloud**-based calculation.
- For highly networked components, **safety** is **not reachable without cybersecurity**.
- **Blockchain** deploys a mathematically secure decentralized way to guarantee the veracity of transactions, but connecting the real world safely too, is open research.
- Machine learning enables **predictive analytics** which helps in detecting cyber-attacks.
- To ensure security and integrity of the system, addressing these issues at a device level and along the whole supply chain of these devices should be investigated as research scope.

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Cluster: Policy

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Policy Topics

- Metrics
- Existing Related Efforts
- Regulation (GDPR)
- Naming Risk Cost Benefit
- Anonymisation by Aggregation
- Privacy Layer
- Directives (NIS)
- Sharing of Vulnerabilities
- Training and Policy Amendments

Policy Topics

- **Metrics** and frameworks should be developed for decision making tools on cyber-risks.
- Stakeholders operating in isolated silos need a **communication platform** (IT, TSOs, DSOs, ESCOs, Policy) to stimulate cybersecurity research at a meta-level among member states.
- Transparency of data flows, and standardized data models are required for **GDPR**.
- To lower burden on society, **cost-benefit analyses** shall be considered (e.g., blackout simulators, mandatory patch & updates, hacked IoT device vendor liability).
- Opposing demands of **anonymisation** and **aggregation** need research to allow both.
- Research should investigate **privacy layer** design principles and techniques beyond cryptography, to guarantee data privacy protection, without halting innovation, research, and progress, meeting a delicate balance.
- The **NIS directive** boosts cooperation between the Member States for cybersecurity, but the EU should go further following USA NERC example, organizing research of large-scale interdisciplinary attack scenarios.
- **Knowledge databases** are used to share, and access known vulnerabilities.
- Regular **trainings** are vital to make our critical infrastructure resilient against cyber-attacks.

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Cluster: Future

Future Challenges (near to midterm)

- Progress Considerations
- Societal Impact
- Quantum Processing
- Quantifying Impacts
- New Crypto Environments
- Data Stream Challenges
- Bio Nano Challenges
- Robotics Safety Impact
- Autonomous Vehicles Regulation

Future Challenges (near to midterm)

- Technological **progress** is ongoing and predicting research needs to include variations.
- **Society** and energy users need awareness about cybersecurity in the energy system. Involvement of energy users is necessary to achieve the desired level of risk protection.
- **Quantum cryptography** is a promising disruptive computing technology.
- Simulation is promising to **quantify** cyber-attack **impacts** on energy systems.
- Research on **new crypto-environments** should include field demonstrations with cryptographic open protocol solutions.
- New communication technologies, e.g., 5G need new methods to guarantee SLAs for critical infrastructures **data streams** and the infrastructure needs to expect this failure.
- **Bio- and nano-technologies** raise the number of cyber threats which require research; Programming tools need to offer new testing and simulation frameworks, and security protocols for life forms need to guide customers, e.g., at home with DIY CRISPR Kits.
- **Robotics** introduces new threats together with opportunities, which requires research in, e.g., Physical Unclonable Functions (PUF) for robot-identification.
- Investigate **autonomous vehicles**, such as drones and cars, introducing new threats to energy systems.

Prioritization

- High speed of technological developments
- Needs to be reevaluated and adapted
- Different stakeholders – different priorities
- The ideal: fund research in all topics at the same time and adjust funding as a society, technology, and trends develop

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Main Message

Cyber-security is a **crosscutting issue** enabling the safe and secure use of new products, services, and technologies, in an increasingly more distributed energy system with a tighter inclusion of customers as prosumers.

Some issues concerning the resilience of the energy system as critical infrastructure need **good practice examples**, governance, or directed focusing and cannot be left to a voluntary by-chance basis.

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Future Task

Identifying BIG cybersecurity ideas for Europe

Multiple stakeholders and devices working together

No one-size-fits-all solution single point of failure wanted

Standards are not enough – there are more layers

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Good Example: Integration

Identifying good examples everywhere

Adapting procedures, workflows, concepts to meet the own sectors needs

Allow for diversity – but guarantee interoperability

IES | Integrating the Energy System

powered by klima+ energie fonds

IES – Integrating the Energy System

on ICT 2018 Networking-Session

"Towards Next Generation European Digital Cyber-Robustness and Cybersecurity"

Vienna, 05. Dec. 2018

Georg Koch, IES Project

www.iesaustria.at

SMARTGRIDS AUSTRIA

Gefördert vom Klima- und Energiefonds im Rahmen des Programms Energieforschung 2015

IES was born in March 2016

IES Integrating the Energy System

SMARTGRIDS AUSTRIA

sprecher automation

SOFTWARE AICO

IES Integrating the Energy System

TIANI SPIRIT

FH University of Applied Sciences TECHNIKUM WIEN

Sponsored by

FFG Österreichische Forschungsförderungsgesellschaft

OFFIS

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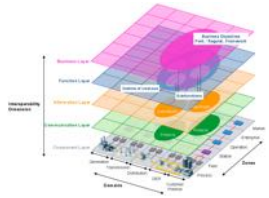
Cookbook – Ingredients

IES Integrating the Energy System



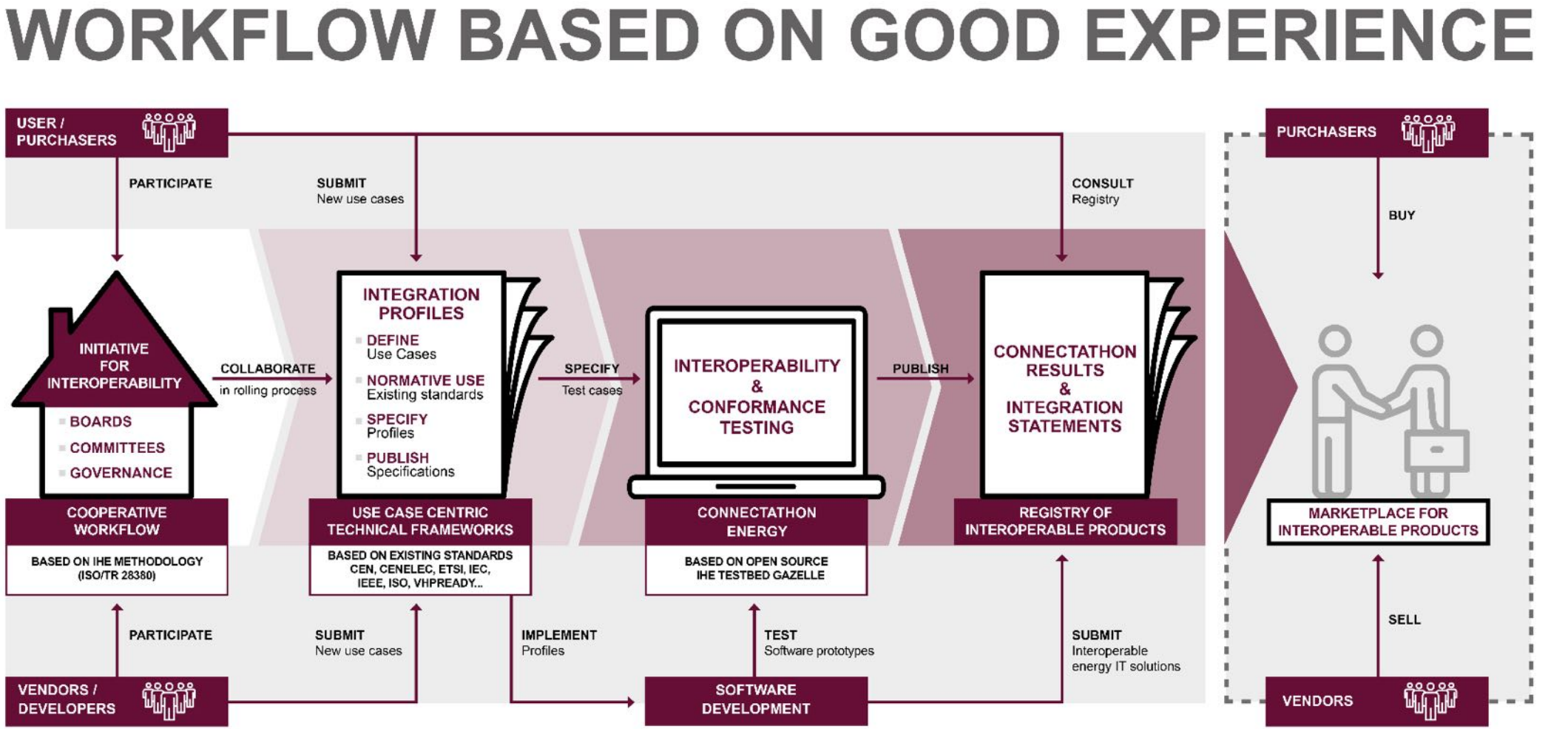
Take:

1. SGAM → the Smart Grid Architecture Model with IEC 62559 methodology
2. M490 mandate report → the results of the European Smart Grid Mandate
3. IHE ISO TR 28380 → a living, standardised method for interoperability profiling
4. Gazelle → a proven and reliable open source testplatform

→ IES combines SGAM/M490 with IHE framework to achive:

Interoperability for Smart Energy Systems!

IES – Workflow



Invitation & Contact

IES Integrating the Energy System

Invitation to the

SET-Plan Symposium

on Interoperability

30th January 2019 - Vienna

Contact:

www.iesaustria.at

info@smartgrids.at

SMARTGRIDS AUSTRIA

Upcoming Networking for You

Identifying BIG cybersecurity ideas for Europe

Necessary/Worth working together for!

What is missing for you, what is your big idea?

Participate, Share, Care – to steer the future!

Participation

- ❑ Questions?
- ❑ Big Ideas!
- ❑ Take the Quiz:
  - Visit www.socrative.com
  - Hit STUDENT LOGIN
  - Give "**ETIPSNET**" as room name
  - Have Fun!

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SMART NETWORKS FOR ENERGY TRANSITION

Thank you for your attention

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