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Interoperability Network for the Energy Transition

Int:net Final Conference

From component testing to systemic test approaches

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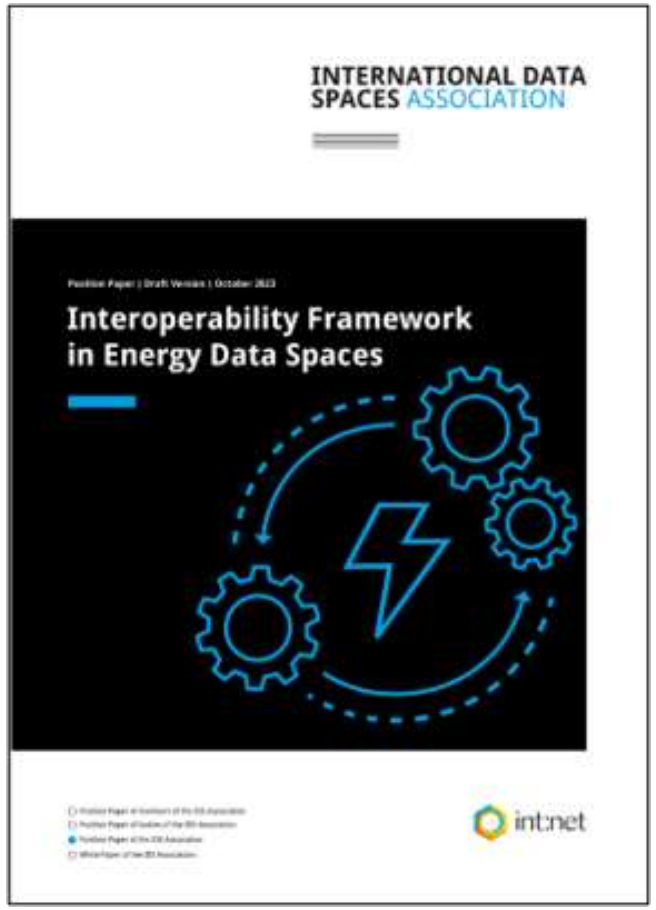
18 September 2025

Lessons Learned

Realisation of 5 CEEDS Use Cases

Insights from the CEEDS 5 system use cases

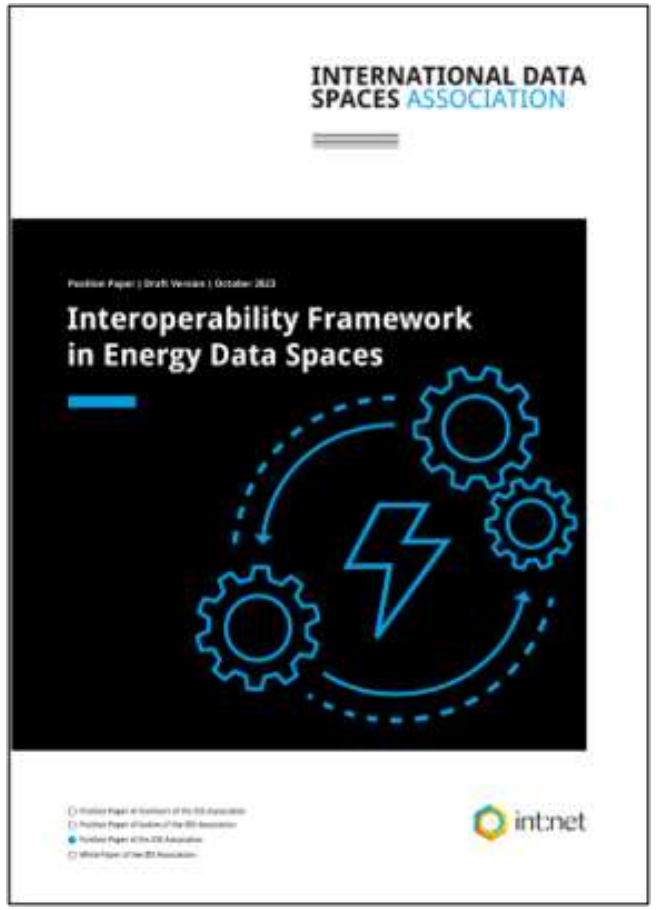
- Energy cluster projects **defined 5 system use cases** aimed at achieving **inter-data space interoperability:**
  - **SUC1 - Onboarding** (process to generate, and check credentials to access an ecosystem)
  - **SUC2 - Data Discovery** and push into the catalogue
  - **SUC3 - Contracting** (selecting a dataset and/or service to purchase it).
  - **SUC4 - Data Exchange** and interoperability
  - **SUC5 – Semantic** interoperability



Insights from the CEEDS 5 system use cases

- Energy cluster projects **defined 5 system use cases** aimed at achieving **inter-data space interoperability:**

System Use Case	Projects
SUC1 - Onboarding (process to generate, and check credentials to access an ecosystem)	Enershare, omega-x
SUC2 - Data Discovery and push into the catalogue	DATA CELLAR, omega-x
SUC3 - Contracting (selecting a dataset and/or service to purchase it)	DATA CELLAR, omega-x
SUC4 - Data Exchange and interoperability	SYNERGIES, EDDIE
SUC5 – Semantic interoperability	All projects

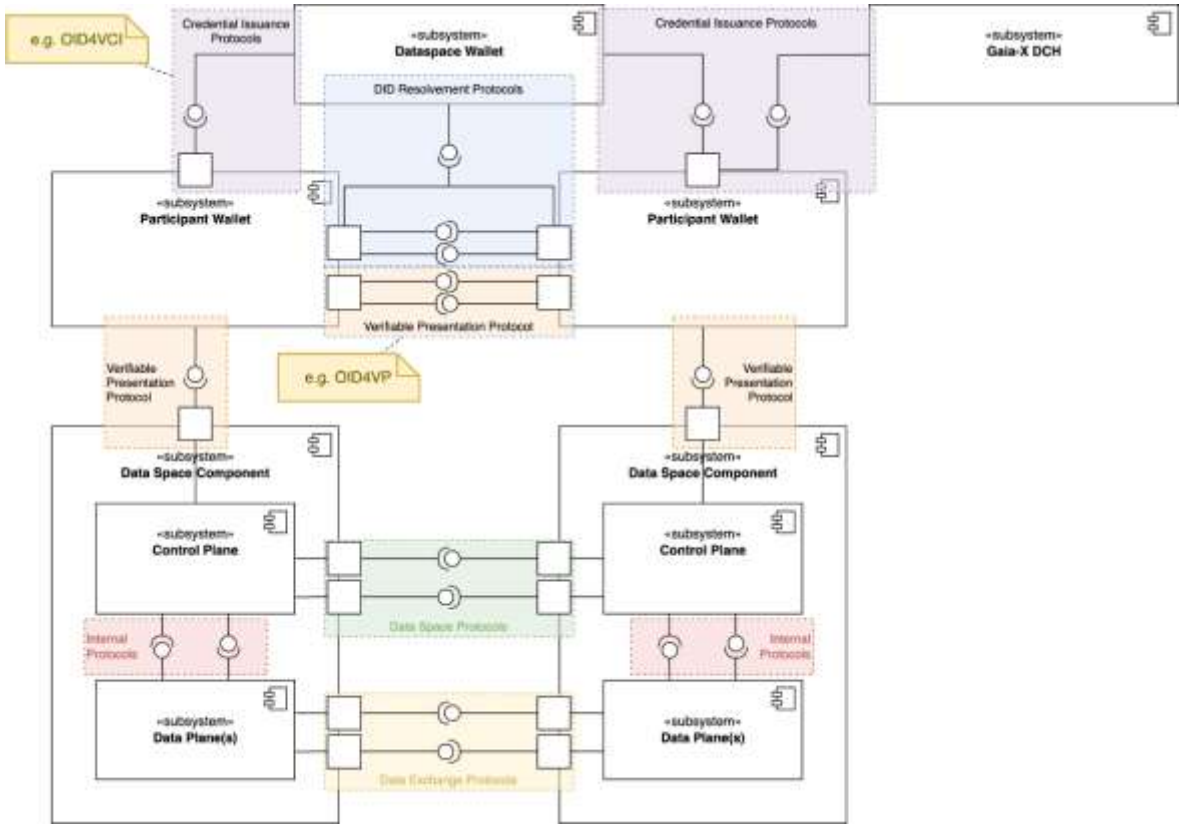


SUC1: Onboarding

- **Interoperable Credential Recognition**:
  Participants can enroll in a Data Space and obtain a Verifiable Credential (VC) recognized across multiple Data Spaces, provided the VC issuer is accepted and trusted.

- **Standardized Credential Issuance:** The OpenID for Verifiable Credential Issuing (OID4VCI) standard ensures consistent, interoperable credential issuance and management, fostering trust and scalability.

- **Flexible Verification Methods:** Accepted verification methods, including DID Web and DID Key, provide robust and flexible mechanisms for validating credentials across interconnected Data Spaces.



SUC1: Onboarding – Challenges & Recommendations

Challenges

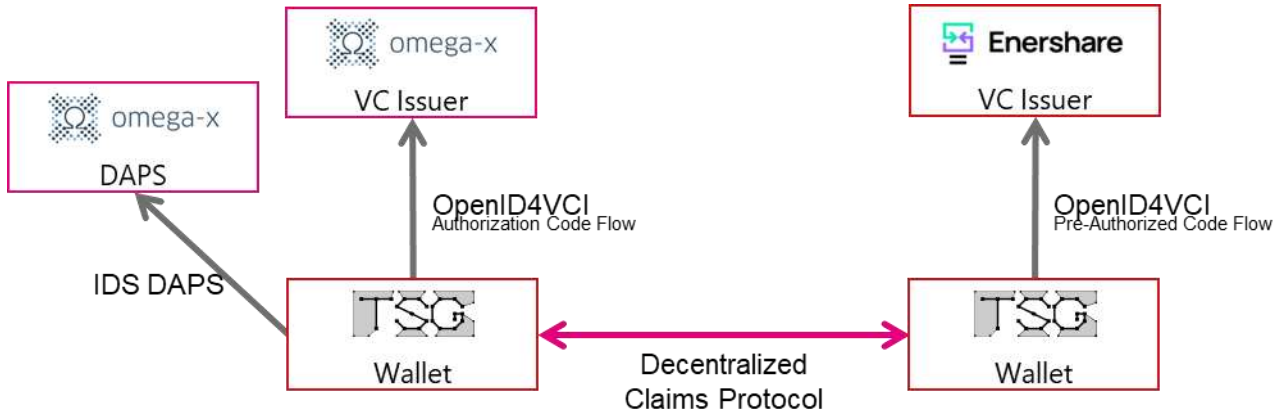
- **Protocol Interpretation and Feature Selection:** A key challenge in Test 1 was aligning on the OID4VCI protocol implementation, particularly the differing approaches of OMEGA-X (Authorization Code Flow) and ENERSHARE (Pre-Authorized Code Flow). This was resolved by both parties agreeing to use the Authorization Code Flow.
- **Metadata Synchronization:** Challenges related to metadata were resolved efficiently during synchronization sessions.
- **Credential Trust Frameworks:** Ensuring that credentials and their associated trust frameworks are synchronized is essential to maintaining their value across different data spaces.
- **Interoperability Between Connectors:** Full interoperability between the connectors (SUC4) remains a significant challenge and requires ongoing collaboration

Recommentations

- **Validity of Current Agreements:** The technical agreements made between OMEGA-X and ENERSHARE remain valid for future technical implementations.
- **Flexible Protocol Selection:** Future credential issuance may involve selecting the appropriate protocol at the moment of issuance, as implementations are expected to support multiple protocols.
- **Efficient Presentation Protocols:** For presenting credentials, efficiency in protocol selection is critical. Implementations might restrict available protocols in scenarios requiring optimal performance.

SUC1: Onboarding - Results

- The ENERSHARE and OMEGA-X projects have successfully demonstrated SUC1:
  - A Verifiable Credential (VC) is generated by the OMEGA-X issuer for an ENESHARE participant using the OID4VCI protocol.
  - ENERSHARE participant stores the credential in a wallet integrated with the connector and presented to another ENERSHARE participant using OpenID for Verifiable Presentation Protocol (OID4VP). The generated credential is successfully accepted the same as the credentials generated by the ENERSHARE VC issuer.



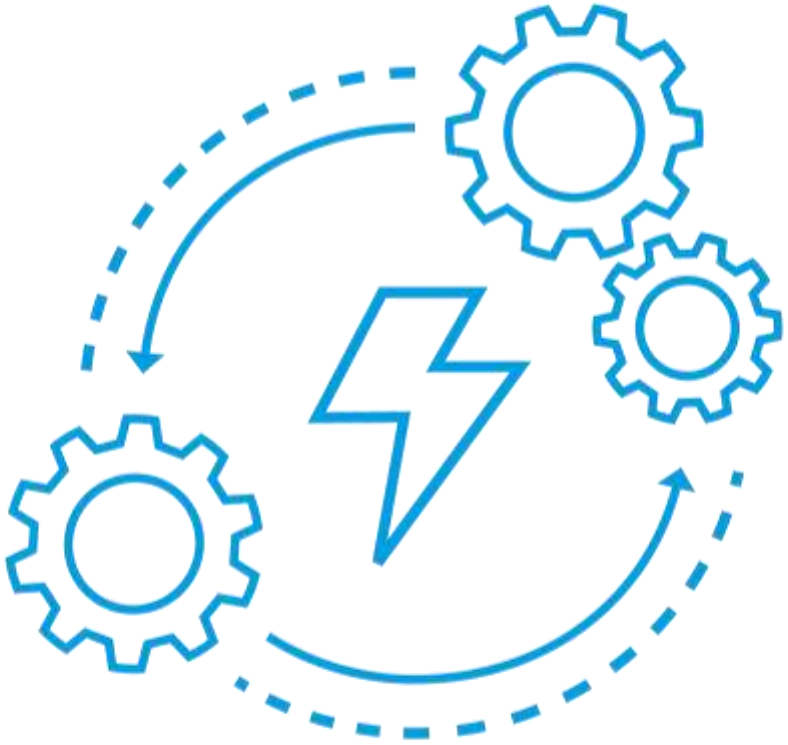
Key Learnings & Next Steps

Key Learnings:

- Component tests prove feasibility; systemic integration is harder.
- Semantic alignment, and flexible protocols are recurring needs.
- Cross-project collaboration accelerates convergence.

Next Steps:

- Develop pan-European standards for onboarding, contracts, metadata.
- Establish governance for semantic models.
- Pilot real-life deployments to validate at scale.
- Foster cross-sector integration (energy, mobility, buildings).



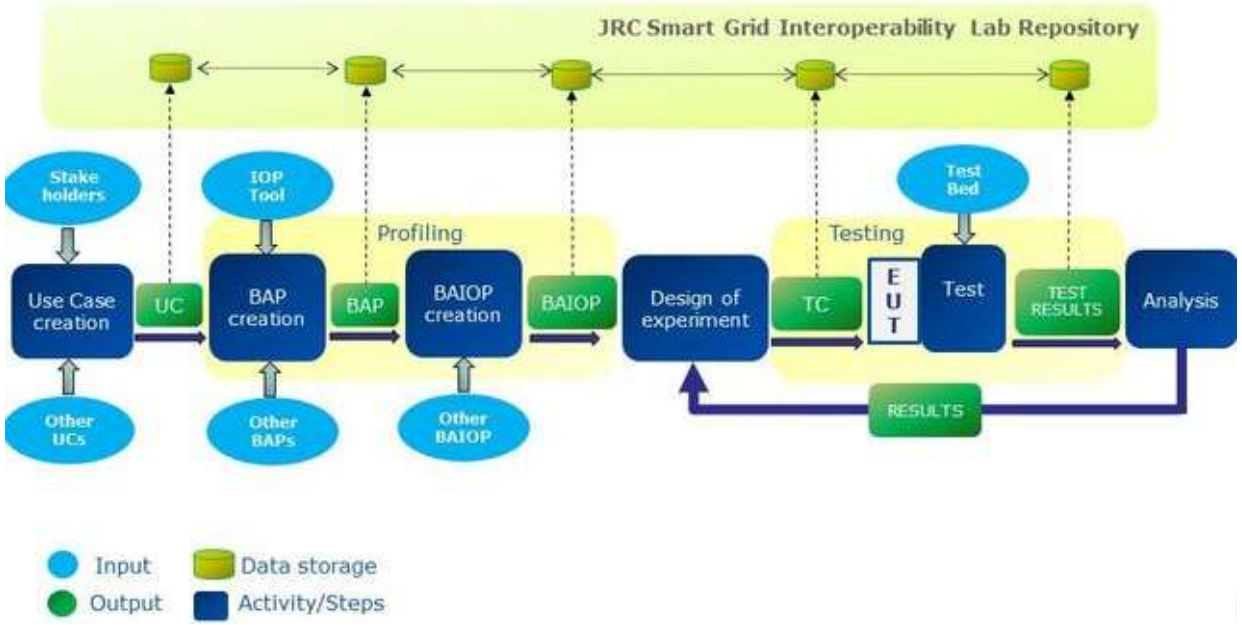
Future Approach

Systematic and Community-driven

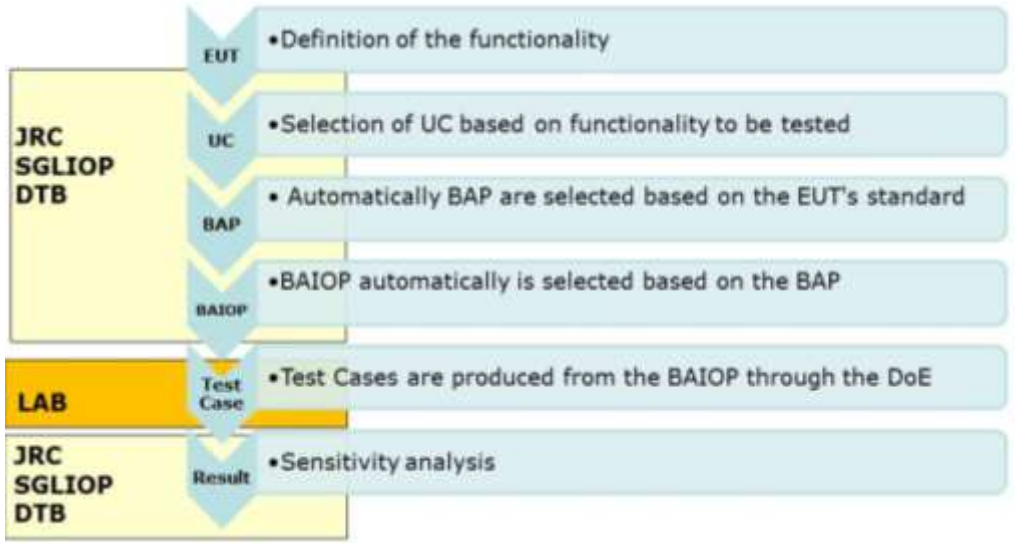
Best Practicies – System-Level Interoperabiliy Testing

- Example: JRC Smart Grid Interoperability Testing Methodology and Laboratory
  - Provision of tools, methods, and testing facilities

Methodology in general

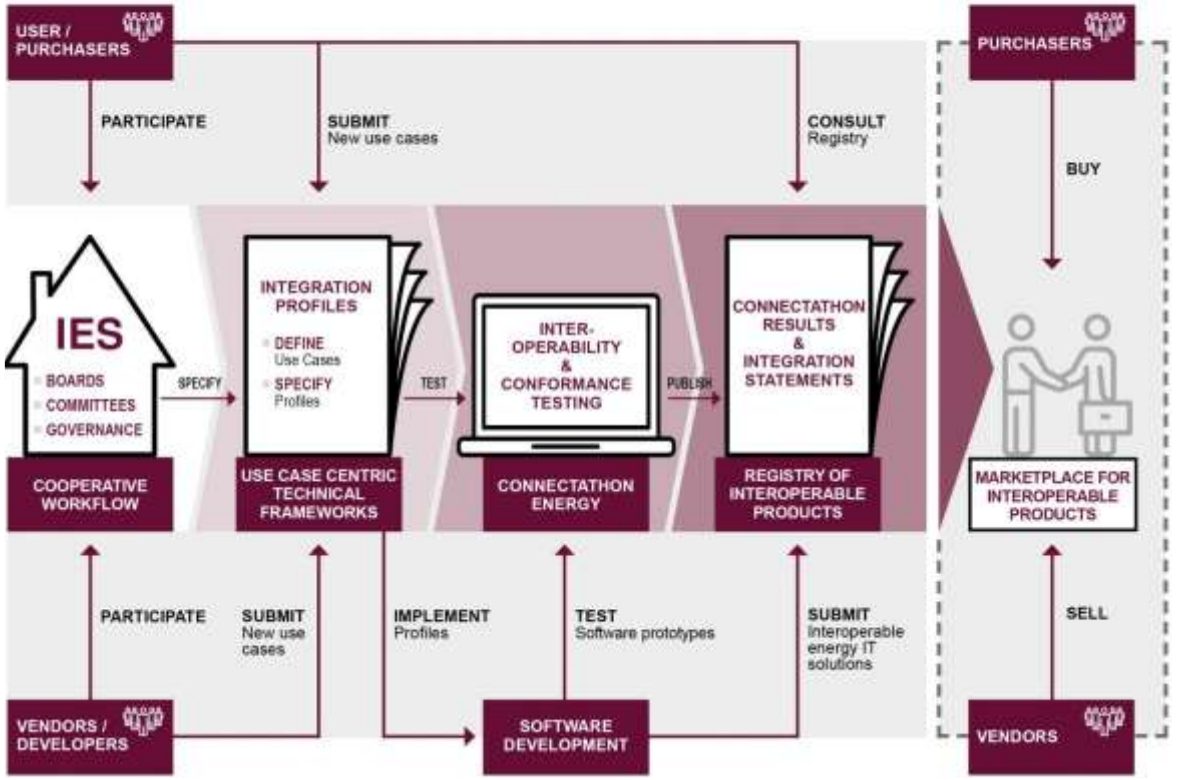


Methodology mapped to test facility



Best Practicies – System-Level Interoperabiliy Testing

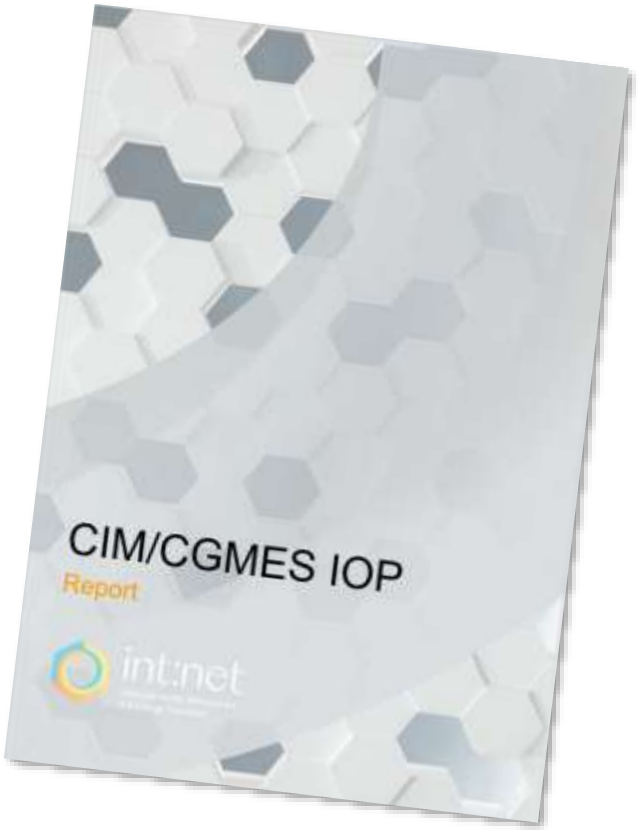
- Example: Connectathons
  - SMARTGRIDS Austria IES-Process (based on the IHE approach from the healthcare sector)
  - Process chain and tools for testing technological integration
  - Usage of Integration Profiles and Technical Framework
  - Organisation of test events (connecthatons)
  - Community involvement



Source: SMARTGRIDS Austria

Best Practicies – System-Level Interoperabiliy Testing

- Example: ENTSO-E Testing Events
  Harmonization of CIM/CGMES v3 ENTSO-E grid model exchange approach
  - Outcomes
    - IOP participants recognize the importance of CGMES v3
    - Several issues have been identified for improvements
  - Lessons learned and suggestions
    - Wider dissemination and exploitation of CGMES v3 necessary
    - Development of a stable interoperability framework related to conformity assessments
    - Communication between vendors, standardisation activities and TSO/DSO organisations need improvement
    - Improvements regarding boundary, reference data, manifest, and new serializations necessary



Next Steps

- Follow best practices, establish testing community
- Organise regular events (e.g., connectathons every year)
- Sharing of experiences and results will improve collaboration and trust
- Award successful institutions with a label (“int:net approved”)

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Thank you for your attention.