# TSDSI-IIT Workshop on ML and standards, 5G and Beyond

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# Project is a permanent presence in India

***SESEI*** (**S**econded **E**uropean **S**tandardization **E**xpert in **I**ndia) ***is a local face for the European standardization community in India: Dinesh Chand Sharma***

**Why SESEI:** India is a major trade partners for Europe, Increasing role of standards to gain market access and Evolving & complex nature of regulatory and standardization landscapes, Sharing best practices, work together

**Sector: 1. ICT**: M2M/IoT, Security, 5G, NFV/SDN, e-Accesibility, eHealth, eCALL
**2. Electrical equipment including Consumer Electronics**: Smart Grid, Smart Meter, LVDC, Micro- Grid, Lift Escalator
**3. Automotive**: Connected Cars, ITS, e-Mobility,
**4. Smart Cities**: Mobility, Waste, Energy, ICT

www.sesei.eu , www.sesei.in , www.eustandards.in

# AI - Introduction

- Because of Digitization, Big Data, Deep Data, Data Science capabilities and availabilities (M2M/IoT, Smart Cities, Industry 4.0 etc.):
  - Artificial Intelligence (AI) is emerging very fast these days and is affecting widely the entire industry e.g. automation, data management, integration of smart technology.
- Artificial Intelligence (AI) is not new: European Association for AI EurAI was established in July 1982 as a representative body for the EU AI community.
  - Its aim is to promote the study, research and application of Artificial Intelligence in Europe.
  - Its an online platform aim to stimulate debate on AI and is also a place to share practices, contribute to the AI ethics guidelines, encourage activities related to the development of AI.
- AI applies to a variety of sectors : smart manufacturing, robots, autonomous cars, virtual reality, healthcare, interactive speech interfaces, visual recognition, data analysis/manipulation, home appliances, cybersecurity or spatial programming.
- 57% of the companies expect AI to have a high or a very high impact on business areas that are “entirely unknown to the company today”.

# EU strategy for AI

- EC released its strategy communication 'Artificial Intelligence for Europe' in April 2018 and it is based on **three distinct pillars**:
  - ✓ **Boost technological expertise and industrial capacity with "AI uptake**" by both the private and public sectors
  - ✓ **Prepare for social-economic changes** brought about by AI, by encouraging the modernisation of education and training systems, nurturing talent, anticipating changes in the labour market, supporting labour market transitions and adapting social protection systems.
  - ✓ **Ensuring an appropriate ethical and legal framework** based on the EU's values and in line with the Charter of Fundamental Rights.
- On 10th April 2018, Twenty-five EU countries agreed to work together in AI domain and signed declaration on AI cooperation.

# The European AI Alliance

- EC launched the European AI Alliance—a community of stakeholders and experts in AI Field.
- It is an online platform aim to stimulate debate on AI.
- The Alliance is also a place to share practices, contribute to the AI ethics guidelines, Network and encourage activities related to the development of AI.
- Supported by high-level expert group on AI.

**Goal: Making it the world-wide reference platform for thinking and reflecting on AI**

- Anyone who would like to participate in debate on AI in Europe can join Alliance.
- For more information, check: **https://ec.europa.eu/digital-single-market/en/european-ai-alliance**

# Kick-off CEN-CLC Focus Group on AI, April 24, 2019

- Facts & Figures: 3 physical meetings, 5 web-meetings
  - 11 countries, 65+ members
- European org.: EC, ANEC, SBS, ETUI, HLEG, APPLIA
  - 26+ Use cases
- Next step: submit final report of the focus group towards the end of Q1 2020

# Tasks – CEN-CENELEC Focus Group on AI

1. Propose a **shared vision** as a basis for standardization of AI in Europe.
2. **Outreach to relevant European stakeholders**.
3. Prepare a **mapping of current European and International standardization initiatives** on AI e.g. EU Rolling Plan for ICT Standardization.
4. **Identify specific standardization needs for AI**, relating these needs against the work items of ISO/IEC/JTC 1/SC 42 (and other application-based TCs impacted by AI), IEC SEG 10 and other relevant bodies, formulating recommendations on the best ways to address AI Ethics in the European context.
5. **Identify the CEN and CENELEC Technical Committees that will be impacted by AI**.
6. **Monitor potential changes in European legislation** related to e.g. AI-enabled products, which could have an impact on the CEN and CENELEC TCs which prepares Harmonized Standards.
7. **Liaise with the High-Level Expert Group on AI** and identify potential synergies and outcomes.
8. Identify other relevant groups including European initiatives on AI to cooperate with.
9. **Act as the focal point for the CEN-CENELEC TCs**, which may be impacted by AI; and for the European Commission's ambitions on Standardization for AI.
10. **Encourage further European participation in the ISO and IEC technical committees**, which already address AI, and propose actions to raise awareness on the importance of standards as a key element in developing AI across Europe.

# Towards the CEN-CENELEC Roadmap for AI standardization

## Investigating the standardization needs for AI deployment in Europe

### December 2018

CEN and CENELEC officially created the Focus Group on AI, in support of ISO/IEC JTC 1 SC 42

### February/March 2019

CEN and CENELEC Technical Boards (BTs) meetings: secretariat allocation

### March 2019

Kick-off meeting, decision on the terms of reference, work programme, objectives, structure and convenorship

### As from March 2019

Liaising with relevant TCs, national and European stakeholders, the EC, the High-Level expert group

### October 2019

CEN and CENELEC Technical Boards meeting – first report of the Focus Group

### October 2019

ISO/IEC JTC 1/SC 42 plenary meeting in Japan – taking stock of international activities outcomes and presenting the draft CEN-CENELEC roadmap outcomes

### Q1 2020

Deliver the final AI standardization Roadmap. Presentation of the recommendations to international standardization, European technical committees, European Policy makers

# AI/ML Related Activities in ETSI

## ISG ENI – Experiential Networked Intelligence

- The assessment of Networked Experience using Artificial Intelligence in 5G communications systems.

**Experiential Networked Intelligence OUTPUT IN 2019:**

- ✓ Group Report (GR) on definition of networked intelligence categorization
- ✓ Revision to Group Specification (GS) on ENI PoC framework
- ✓ GS on ENI system architecture
- ✓ Revision to GR on terminology for main concepts in ENI
- ✓ Revision to GSs on ENI requirements and use cases

## ISG SAI- ISG Securing Artificial Intelligence

- Securing AI from attack, Mitigating against AI where AI is the 'problem' and
- Using AI to enhance security measures against attack from other things – as part of the 'solution'.

**The planned outcome of the ISG work includes:**

- ✓ Securing AI from attacks e.g. where AI is a component in the system that needs "defending"
- ✓ Mitigating against AI e.g. Where AI is "Problem"
- ✓ Using AI to enhance security measures against attack from other things e.g. AI id the part of "solution"

## ISG ZSM - Zero touch network and Service Management

- Goal: To provide a framework that enables zero-touch automated network and service management in a multivendor environment. This holistic end-to-end network and service management concept enables the integration of ETSI ENI, NFV and MEC management demands.
- ZSM supports enablers for closed loop automation and for data-driven management algorithms that can be based on machine learning and artificial intelligence.

**ISG ZSM recent Group Specifications (GS) :**

- ✓ ETSI **GS ZSM 001** (10/2019): Requirements based on documented scenarios
- ✓ ETSI **GS ZSM 002** (08/2019): Reference Architecture
- ✓ ETSI **GS ZSM 006** (05/2018): Proof of Concept Framework
- ✓ ETSI **GS ZSM 007** (08/2019): Terminology concepts in ZSM

# ENI Goals, Members and Participants

**Core idea: Network perception analysis, data-driven policy, AI based closed-loop control**

ETSI ISG ENI founded at 17Q1

- The ISG ENI focuses on improving the operator experience, adding closed-loop artificial intelligence mechanisms based on context-aware, metadata-driven policies to more quickly recognize and incorporate new and changed knowledge, and hence, make actionable decisions.
- In particular, ENI will specify a set of use cases, and the architecture, for a network supervisory assistant system based on the 'observe-orient-decide-act' control loop model.
- This model can assist decision-making systems, such as network control and management systems, to adjust services and resources offered based on changes in user needs, environmental conditions and business goals.

**The ISG ENI Leadership team**

| Role | Company |
|---|---|
| **Chairman** | **Huawei** (Dr. Raymond Forbes) |
| **Vice Chairman** | **China Telecom** (Mrs. Haining Wang) |
| **Second Vice Chairman** | **Verizon** (Mr. Farid Feisullin "Fred") |
| **Technical Officer** | **ETSI** (Mrs. Sylwia Korycinska) |
| **Technical Manager** | **Huawei** (Dr. Shucheng Liu "Will") |
| **Secretary** | **Samsung** (Dr. Yue Wang) |
| **ENI ISG PoC Review Team** | **Raymond Forbes** (Huawei) ENI Chairman<br>**Sylwia Korycinska** (ETSI Technical Officer)<br>**Michele Carignani** (ETSI CTI)<br>**Haining Wang** (China Telecom) & ENI Vice Chairman<br>**Luca Pesando** (TIM)<br>**Mostafa Essa** (Vodafone)<br>**Antonio Gamelas** (Portugal Telecom) |

*Source: https://portal.etsi.org/TBSiteMap/ENI/ListOfENIMembers.aspx*

# ENI Members and Participants

- 43 operators, vendors and research institutes from across Europe, USA and Asia


*Source: https://portal.etsi.org/TBSiteMap/ENI/ListOfENIMembers.aspx*
*Members signed the ENI Member agreement and are ETSI members*
*Participants signed the ENI Participant agreement but are not ETSI members*

# ENI: Objectives

**Identify requirements to improve experience**

**Standardize how the network experience is measured**

**Enable intelligent service assurance**

**Publish reference architecture**

**Engage with SDOs and consortia**

# ENI: Use Cases

| Network Operations |
| --- |
| Policy-driven IP managed networks |
| Radio coverage and capacity optimization |
| Intelligent software rollouts |
| Policy-based network slicing for IoT security |
| Intelligent fronthaul management and orchestration |
| Elastic Resource Management and Orchestration |
| Application Characteristic based Network Operation |
| AI enabled network traffic classification |

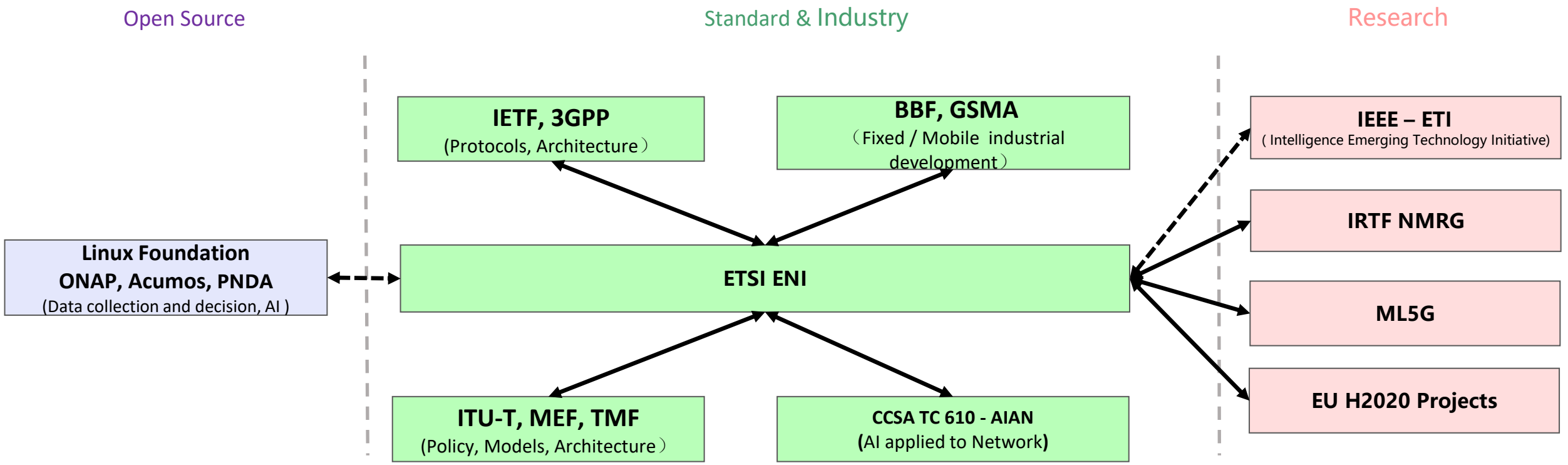
| Infrastructure Management |
| --- |
| Policy-driven IDC traffic steering |
| Handling of peak planned occurrences |
| Energy optimization using AI |

| Network Assurance |
| --- |
| Network fault identification and prediction |
| Assurance of service requirements |

| Service Orchestration and Management |
| --- |
| Context aware VoLTE service experience optimization |
| Intelligent network slicing management |
| Intelligent carrier-managed SD-WAN |

*Source: ETSI RGS/ENI-008 , Experiential Networked Intelligence (ENI); ENI use cases; – Wang, Yue (Samsung)*

# ENI: Ecosystem




- Cooperate with mainstream operators, vendors and research institutes in Europe, USA and Asia
- Collaborate with other SDOs and industry ad-hocs
  - Liaisons exchanged with IETF, BBF, MEF, ITU-T
  - Liaisons with other ETSI groups: NFV, NGP, MEC, NTECH, OSM, ZSM
- Position ETSI ENI as the home of network intelligence standards
- Guide the industry with consensus on evolution of network intelligence
- Boarder between different categories are becoming vague.

# ENI: Deliverables

- ETSI ENI ISG released followings as first deliverables:
  - ✓ ETSI GR ENI 001, specifies a set of use cases to be applied to the fixed network, the mobile network, or both, and defines the expected benefits operators can gain from using an ENI system.
  - ✓ ETSI GS ENI 002 captures the requirements of how intelligence is applied to the network in different scenarios to improve operators' experience of service provision and network operation.
  - ✓ ETSI GR ENI 003 analyses the work done in various Standards Developing Organisations and open source consortia on policy management in general, and context-aware policy management specifically.
  - ✓ ETSI GR ENI 004 addresses terminology for the main concepts in ENI.
  - ✓ ENI has launched a **Proof of Concepts** activity whose framework is defined in **ETSI GS ENI 006**. Proofs of Concept will help provide proof of the technical feasibility of ENI within the Industry.

# ETSI ISG "Securing Artificial Intelligence (ISG SAI)"

- **Areas of Activities**:

✓ Initially, ISG SAI will focus on following deliverables:

- ✓ **AI threat ontology:** will address AI as system, attacker and defence
- ✓ **Securing AI problem statement**: this document is modelled on ETSI NFV "Security Problem Statement"
- ✓ **Data Supply Chain**: Report will summarize the methods currently used to source data for training AI,

For more details, please click here

https://www.etsi.org/committee?id=1650

## Following deliverables may be considered for ISG SAI:

- Group Report(s) describing the challenges related to securing AI enhanced infrastructures
- Group Specification(s) of the end-to-end security mitigations for AI systems
- Group Specification(s) of the functional architecture and solutions for the provision of a secure interconnection of AIs
- Group Specification(s) including interfaces/APIs/protocols and information / data models to secure the target infrastructures,
- Group Report(s) describing the challenges related to securing infrastructures against AI/ML amplified threats,
- Group Specification(s) of the key use cases and related security requirements in relation to AI/ML threats,
- Group Specification(s) on test methodologies used to validate that threats can be mitigated in the target use cases.
- Group Report(s) describing the opportunities offered by AI/ML security technologies
- Group Specification(s) including interfaces/APIs/protocols and information / data models to produce robust, effective AI/ML security products
- Group Report(s) providing a descriptive Proof of Concept (PoC) framework with minimum requirements, templates, process description,
- Group Report(s) providing gap analysis of the work done in existing standards and open source groups in relation to the agreed AI use cases,
- Group Specification(s) of the business use cases and related requirements (including analysis of outputs from each of ISG ENI and ISG ZSM).

# Other related SDOs, Industry Consortia and EU Projects

| Organization | Activity |
|---|---|
| ITU-T | Focus Group on Machine Learning for Future Networks including 5G |
| IETF ANIMA | IETF Research group on Autonomic Networking Integrated Model and Approach |
| CCSA TC610 (was SDNIA) | AIAN (Artificial Intelligence Applied in Network) industry group |
| H2020 & 5G-PPP | SliceNet, SelfNet, 5G-MoNArch, Shield |
| BBF SDN&NFV WA | CloudCO Project Stream focusing on the CloudCO reference architectural framework |
| MEF | Lifecycle Service Orchestration Committee, Service Committee, Applications Committee |
| OASIS | Advanced systems interworking – Open intelligent protocols |
| Linux Foundation | ONAP, Acumos, PNDA |
| Telecom Infra Project (TIP) | Artificial Intelligence (AI) and Applied Machine Learning (ML) Project Group |
| TMForum | Telecommunication Management Forum |
| IEEE | ComSoc Network Intelligence Emerging Technology Initiative (ETI) |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