ANNEX 4

ISG ENI Terms of Reference

(approved by the Director-General on **1st February 2019** following Board#121 consultation)

Scope

ENI focuses on improving the operator experience by adding closed-loop Artificial Intelligence (AI) mechanisms based on context-aware, metadata-driven policies to more quickly recognize and incorporate new and changed knowledge, and hence, make actionable decisions.

The main objectives of ISG ENI are:

- to consider standardization and to develop specifications for a Cognitive Network Management system incorporating a closed loop control approach. The closed loop control approach is based on a "monitor-analyze-plan-execute" model and will be enhanced by learning capabilities,
- to enable the steering of the usage of available network resources and services of the envisaged Cognitive Network Management system according to the real-time evolution of user needs, environmental conditions and business goals, considering also that decisions taken by that system rely on detailed information about the complex states of network resources and policies expressing operators' preferences,
- to quantify the Operator Experience as a unique added value of the ISG ENI approach by introducing a metric as well as performing the optimization and adjustment of the Operator Experience over time taking advantage of cognitive methods, such as machine learning and reasoning,
- to review different types of policies that will be used to drive adaptive behavioral changes by using various cognitive methods, including AI mechanisms,
- to review and reuse, wherever applicable, existing standardized solutions for legacy and evolving network management functions like, e.g. resource management, service management, orchestration, policy management, etc.
- to create specifications of an adaptable, phased-approach friendly ENI system (including AI/ML) that can accelerate ICT's adoption for existing and emerging systems/networks and technologies,
- to provide the ability of the ENI system to morph and adapt to the most relevant AI/ML evolution,
- to further elaborate specifications that will address:

  (1) the demonstration of Use Cases by using the System Architecture, and

  (2) the requirements of the Operator Experience in and across all kinds of network infrastructures, including 5G networks, and

  (3) the model-driven architecture, described by functional blocks and appropriate Reference Points and Interfaces, that supports adaptive and evidence-driven service operation through Cognitive Network Management to provide the required Operator Experience. This model provides recommendations and/or commands to 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, and

  (4) the security architecture for network protection that ensures regulatory compliance and secure operation. In recognizing the threat to overall system operation, as well as to various AI mechanisms, due care shall be paid to ensure that all communication between ENI and the system to which ENI provides recommendations and/or commands are accomplished.
- to define categories of AI support in a network in a report to clarify the different options for the level at which a network can benefit of AI techniques and the resultant automation,
- to launch additional Proof of Concept (PoC) activities, where PoC proposals shall address at least one goal relevant to ENI, related with an ENI Use Case, a set of ENI Requirements, and the suitability for aspects of the ENI System Architecture. The output report of each PoC project shall be used to provide feedback contributions for completion of the applicable ongoing specifications within ISG ENI. The overall process will be accomplished by following methods according to the ETSI CTI guidance, e.g. elaboration of an output report and provision of feedback contributions,

- to provide external Reference Points to be used for ENI to interact in an operator-controlled manner with existing and emerging ICT systems. This promotes interoperability between ENI and Assisted Systems as well as migration towards AI/ML controlled ICT services,
- to evolve toward Plugtests and Hackathons events to test interoperability.
- Note: It is expected that these activities will provide an evidence of the technical feasibility of ENI within the Industry.

Areas of activity

The activities of ISG ENI are spread amongst the following broad areas:

- Revision/maintenance of already published documents.
- Architecture framework
    - accomplish with the Use Cases and Requirements for a generic technology independent architecture (activity carried out in every release), and
    - a report detailing a gap analysis of work on context-aware and policy-based specifications (activity completed in Release 1), and
    - a generic technology independent system architecture of a network supervisory assistant system will be specified in Release 1 based on the 'observe-orient-decide-act' control loop model with reference points description and flows, and
    - an information model for the main objects in the System Architecture (in Release 2), and
    - enhancement of the System Architecture to include interfaces and protocols, detailed functional flow diagrams, sequence and interaction diagrams, state machine diagrams, Reference Points, APIs (activity envisaged for Release 2, and
    - specification of a phased approach on the adoption across the industry of AI features is envisioned, allowing migration in compliance with the ENI system and its associated reference points, and
    - interworking outlining the use of reference points and APIs (activity envisaged for Release 2), and
    - a report that outlines the best practices to preserve network data privacy (activity envisaged for Release 2), and
- AI framework
    - an outline on the categories and types of Artificial intelligence that can be used in a system,
        - a report in Release 1, specification is expected to follow up, and
    - a report that outlines the capabilities of AI equipment (activity envisaged for Release 2) and
- Security framework
    - a security model and security architecture that will be developed in Release 2, and
- PoC framework
    - increase of the number of PoCs,
    - recommend new PoCs to follow the ENI architecture, support the Reference Points and provide essential feedback to the Reference Points definition,
    - preparation to evolve to ENI Plugtests, Hackathons (activities envisaged for Release 2), and
- Cooperation with internal and external entities, e.g.:
    - coordinated activities with security groups (including ETSI TC CYBER), to ensure that all communications between ENI and Assisted Systems to operate securely (activity envisaged for Release 2), and
    - Open Source work in cooperation with the Linux Foundation and other Open Source Communities (OSCs) (activity envisaged for Release 2), and
    - H2020 projects and other research entities with promotion and realization of workshops and other demos
        - demonstration of one or two use cases related with System Architecture in Release 1, others in Release 2
    - dissemination of the ENI concept foundations through several media/tutorial events.

Annex (informative): Collaboration with other bodies

ISG ENI will set-up the appropriate communication channels to the following groups both within and outside of ETSI.

ETSI groups

- ETSI PP 3GPP
- ETSI TC INT/AFI
- ETSI TC CYBER
- ETSI ISG NFV
- ETSI ISG ZSM
- ETSI ISG MEC
- ETSI ISG NGP
- ETSI OSG OSM

External groups

- BBF
- ONF/ONS
- IETF
- MEF
- TMF
- CCSA
- OASIS
- CEC projects H2020/5GPPP
  - Horizon Europe
- Linux foundation
  - ONAP
  - Acumos
  - PNDA

If required, the ISG ENI may decide to establish additional liaison relationships.

❖