Proposed questions (Vishnu):

NOTE- these are my unedited first impressions, only for discussion purposes. Final list of questions is subject to edit by colleagues.

1. Discussion around work-plans

* Use Case & possible gaps (Additional Use Cases, Mapping of ENI, ZSM, ML5G;

Q1>> is there a discernible pattern among the AI/ML use cases in the networks so far? Is it possible to generalize (at least) some aspects of these use cases? Another way to frame this question: Are there classification methods which can effectively classify the use cases for AI/ML in networks?

NOTE- “networks” include all aspects of IMT-2020 networks, including slices and applications.

*Aim of the question>> to stimulate the discussion on different ways of capturing and classifying use cases, exchange experiences, best practices. Discuss about who and how would the use cases doc be consumed, the workflow.*

Q2>> is there an (relatively) “easy” or standard way of mapping use cases to modelling or data oriented analytic methods?

*Aim of the question>> to stimulate the discussion on different ways of capturing and classifying use cases, exchange experiences, best practices. Discuss about who and how would the use cases doc be consumed, especially the workflow. This should lead to the scalability discussion below.*

Q3>> some-what philosophical/rhetorical question – would we ever be “done” with all use cases of AI/ML in networks? So, what is the way forward to capture, document and enable such use cases?

*Aim of the question>> scalability of the workflow is problematic. Discuss the experience in focussed domains as in ITU FG, ENI and ZSM shows that the workflows would work in small number of use cases. But in the networks of the future, we expect scalable mechanism to on-board such AI/ML based use cases.*

* + Completing the information flows in all Use Cases)

Q4>> Keeping in mind Q3 above, is there a way to automate this “completion” of information flows in “all” use cases or even the future ones?

*Aim of the question>> Discuss aspects on scalable, dynamic approaches, especially the ones which can capture the essence of the use case from the “customer” and post process them based on the workflow. Discuss also interworking between the various types of use cases.*

* Intelligent policy management & resource management:
  + Radio access networks, transport networks, etc..

Q5>> Given that algorithms are generally considered out of scope for standardization, both resource scheduling and ML algorithms can be considered out of scope? How then are we to bridge the gap between the needs of the algorithm and the capabilities of the data sources/sinks? E.g. Algorithms may expect a certain input data item, which may or may not be available in a standard, interoperable form from the data source/sink. Would the loss of standards be the gain of open source?

*Aim of the question>> Discuss aspects on characterization and metadata of algorithms. Trigger discussion on approaches followed by open source projects e.g.: Linux Foundation ONAP DCAE vs. standards approaches.*

* Models and Techniques in general

Q6>> Have the experts concluded yet on the data-oriented techniques vs. the model oriented techniques, especially in the area of networks?

*Aim of the question>> continuing the discussion from the previous questions, there are several types of data available in the network, e.g.: logs. Alarms, events, etc. These may form the data which may be analysed in data-oriented methods. But these are also subject to change, so are the innovations in the modelling space. Hence it is important to superimpose the innovations in the data analytics, modelling and networks to evolve a strategy for scalable AI/ML use case on boarding.*

Q7>> How to solve important problems in the networks using minimal data? Low-quality data?

*Aim of the question>> data available from the network may be low-quality, sparse, with noise, anonymized, with ambiguity. Let us discuss techniques, perhaps borrowed from the AI/ML scientists, which could give us the best possible inference performance, with different qualities and quantities of data.*

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Q8>> the models which are derived for generic problems (e.g. image recognition), would they be optimal to solve the problems in networks? What kind of Models are important in Networks? Is it really an endpoint issue?

*Aim of the question>> mechanisms like classification, clustering, prediction etc. have been used successfully in many domains. Deep learning models have been successful in certain domains too. Now let us discuss which type of models are needed to solve problems in the networks.*

* Architectures (functional and reference points & modelling):
  + Architectural Modelling: Benchmarks, KPIs, distributed architectures

Q9>> There have been some research to train and apply intelligence at edge. Are these techniques practical?

Q10>> what is the overlap between CP, UP, management plane and intelligence? Scott C has an answer

*Aim of the question>> trigger discussion about the application of training or inference in different parts and domains in the network. Discuss also the evolution of networks (CP, UP, management plane) and the role of AI/ML.*

* Interoperability & Simulations (PoCs, Testing and Open Source)

Q11>> what is Interoperability of intelligence? Is this a valid requirement: VNF-1 from provider-1 🡨--ML data ---🡪 VNF-2 from provider-2? It is envisaged that ENI interacts with assisted systems. These Systems will include their own intelligence and extract their profiles etc.. Read ENI 005; Details to follow.

*Aim of the question>> trigger discussion about the role of standard interfaces between intelligent entities in the network.*

* Benefits of standards & competition:
  + Written standards or things open to differentiation,
  + Open Source (OTS implementations):

Linux Foundation

Eclipse Foundation

* Cooperation and or contribution to 3GPP (S2 ENA, NWDAP, etc..)
* Vertical industries

Q12>> what is the expectation of vertical industries (e.g. automotive or e-health) when it comes to intelligent service management in future networks? Yes

E.g. is there an expectation of edge intelligence? Is there an expectation of differentiated data handling? Yes & No (there is the option that the core does not assist or they can refuse to cooperate). Do we have frameworks to “Know and cooperate”? Not Yet

*Aim of the question>> trigger discussion about the role of feedback from vertical industries and slices on the “intelligence” service. Discuss the ways in which SDOs can work to enable intelligence as a service which can be used by vertical industries, in addition to the “bit-pipe” offered by operators.*

*What is the Priority?*

*It is almost impossible to have a complete list of AI in verticals.*

* Industry requirements