Toolkits:
Enabling Ubiquitous Intelligence in future networks

[Presentation to Joint ITU-ETSI Workshop
on
Machine Learning in Communication Networks
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https://www.itu.int/en/ITU-T/focusgroups/ml5g/Pages/default.aspx

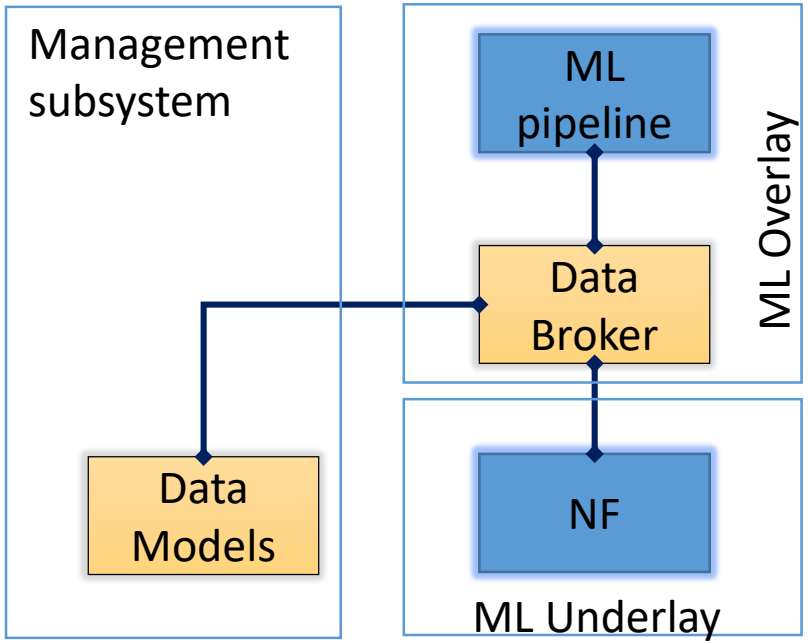
Agenda

- ITU Toolkit for Enabling Ubiquitous Intelligence in future networks
  - Data handling framework
  - Distributed Sandbox
  - Serving/optimization framework
  - Orchestration of intelligence
  - Interoperable marketplace
  - Levels of intelligence

- Potential collaboration opportunities

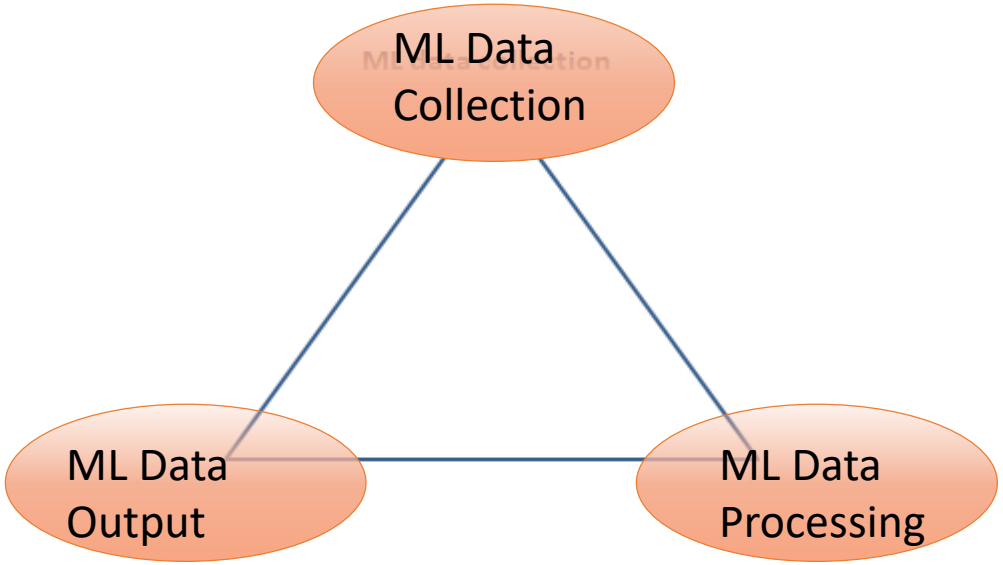
Enabling ubiquitous intelligence: Toolkit #1: data handling

•Approved : ITU-T Y.3174 “Framework for data handling to enable machine learning in future networks including IMT-2020”
•https://www.itu.int/rec/T-REC-Y.3174-202002-P/en (prepublished)



(simplified figure from ITU-T Y.3174)

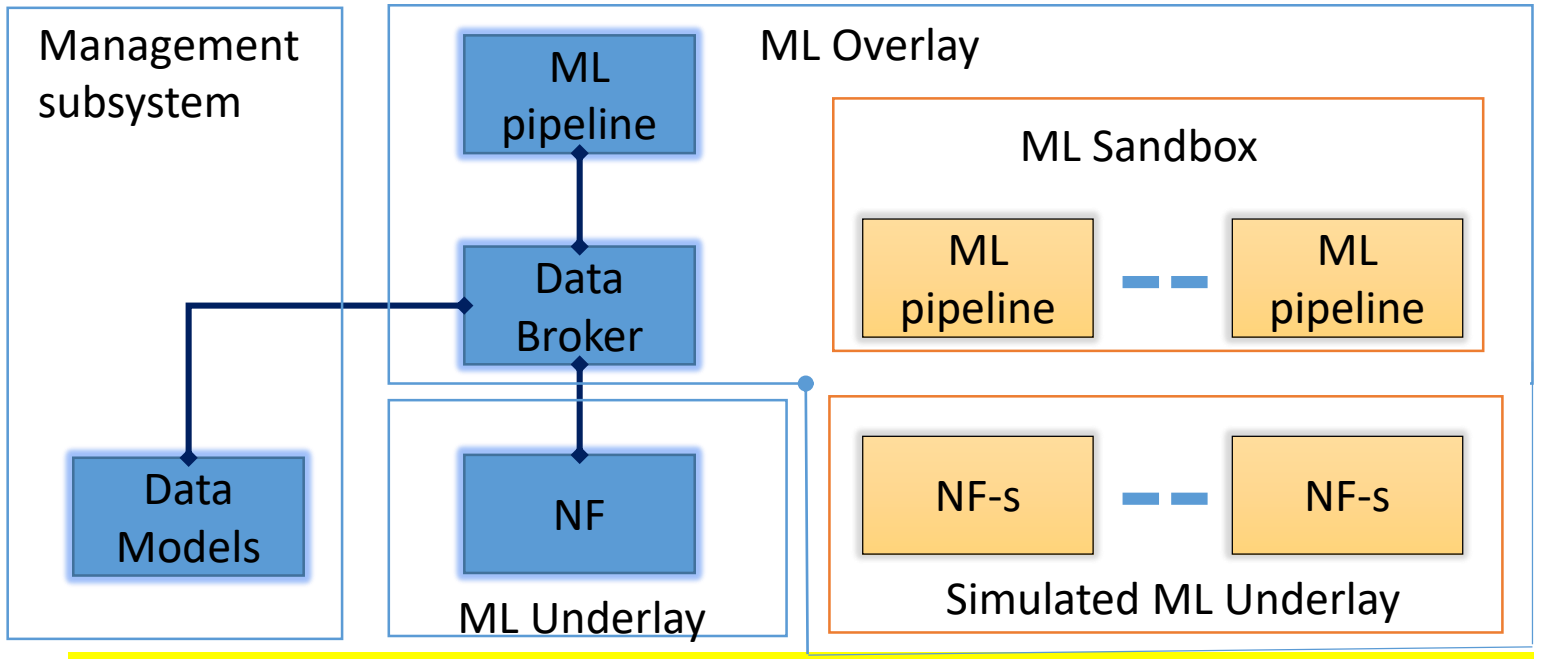
•How to handle the diversity in network data sources?
•How to handle the increased flexibility and agility in future networks?
•How to approach the different kinds of data handling requirements?



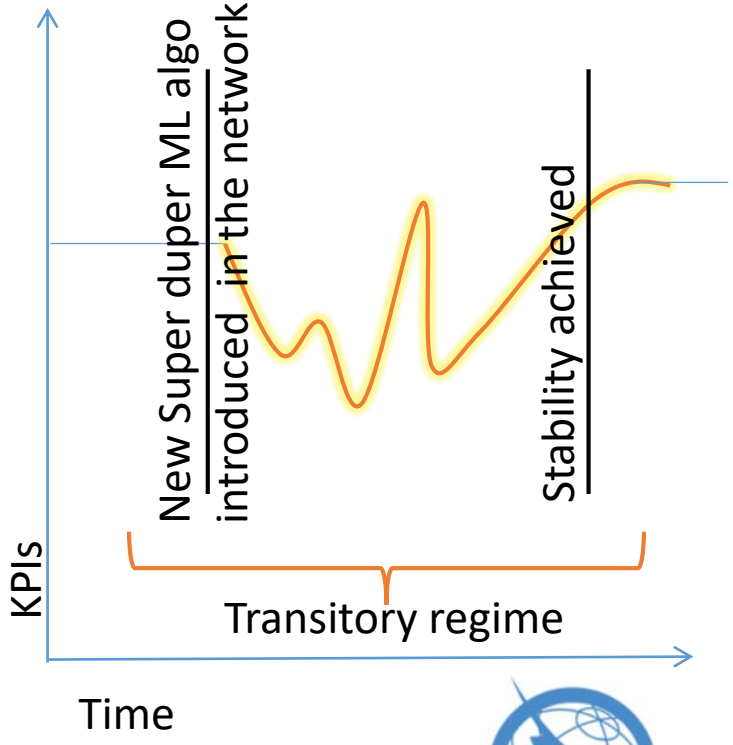
Enabling ubiquitous intelligence: Toolkit #2: ML Sandbox

•Ongoing work: Machine Learning Sandbox for future networks including IMT-2020: requirements and architecture framework

•https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/input/ML5G-I-232.docx (status: draft)



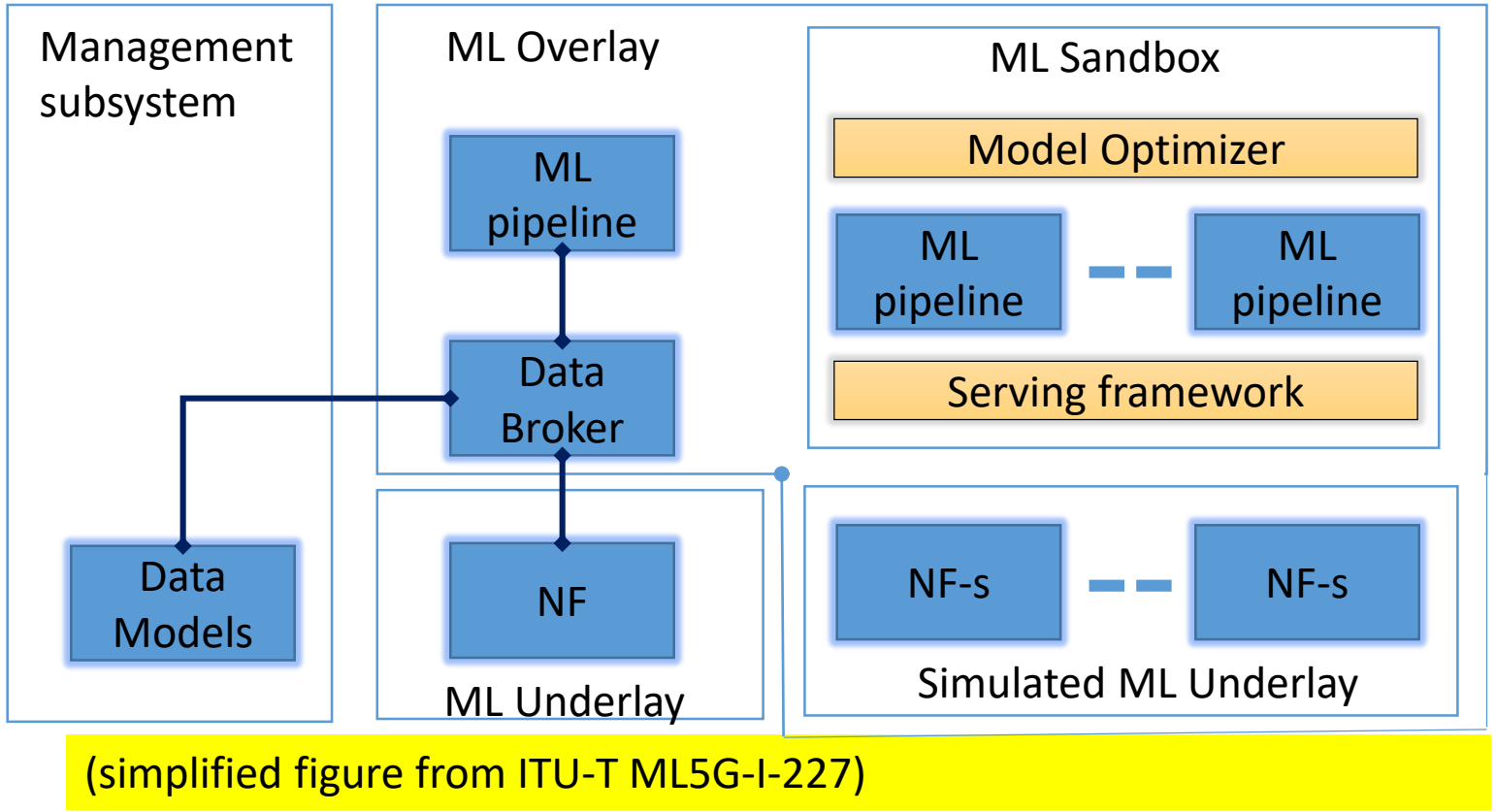
(simplified figure from ITU-T ML5G-I-232)



ML sandbox allows experimentation, comparison, benchmarking, testing and evaluation before the Model hits the live network

Enabling ubiquitous intelligence: Toolkit #3: Serving framework

- Ongoing work: Serving framework for ML models in future networks including IMT-2020
- https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/input/ML5G-I-227-R1.docx (status: draft)



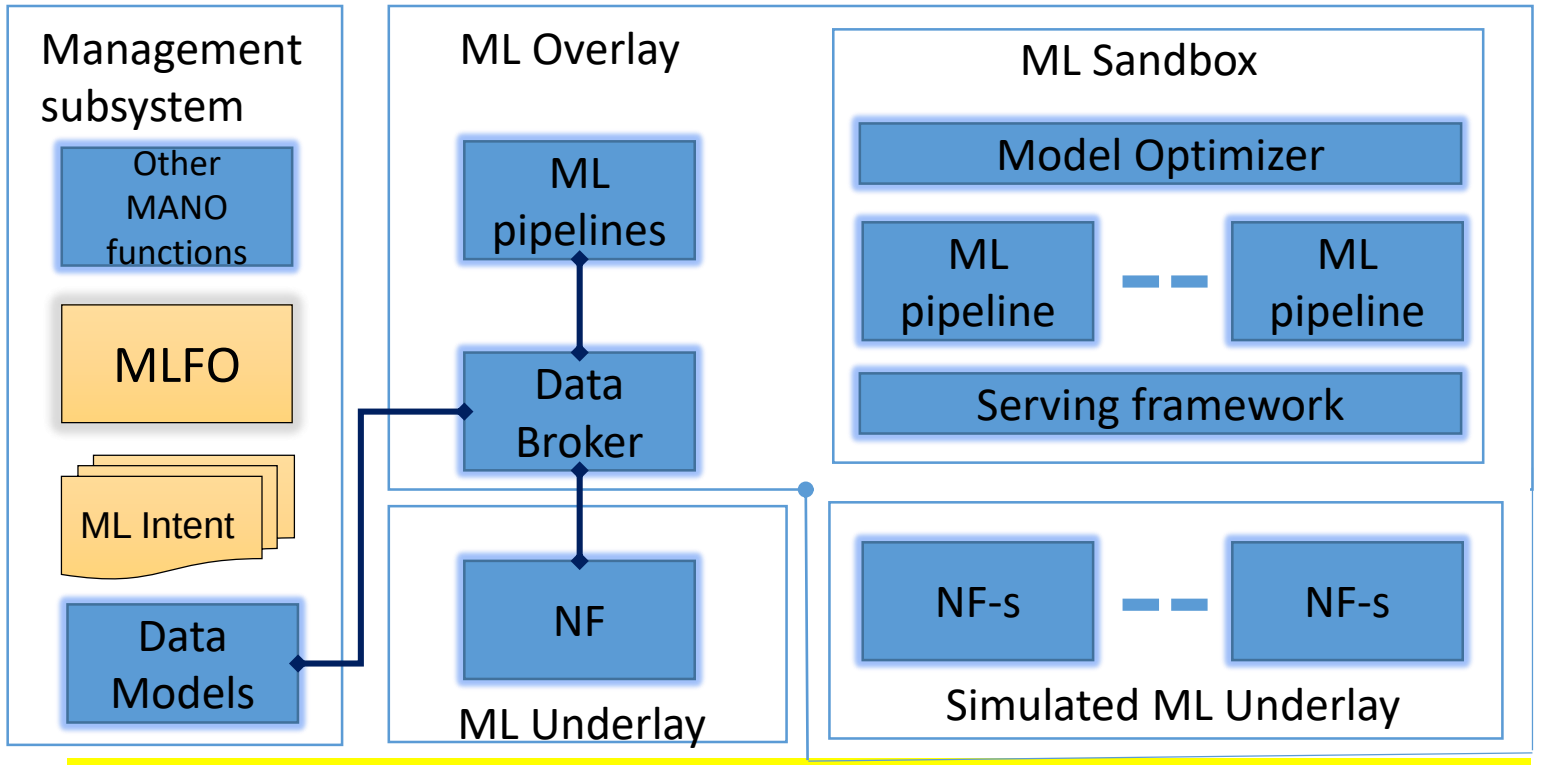
(simplified figure from ITU-T ML5G-I-227)

Requirements and architecture for serving ML models in future networks including IMT-2020, including inference optimization, model deployment and model inference.

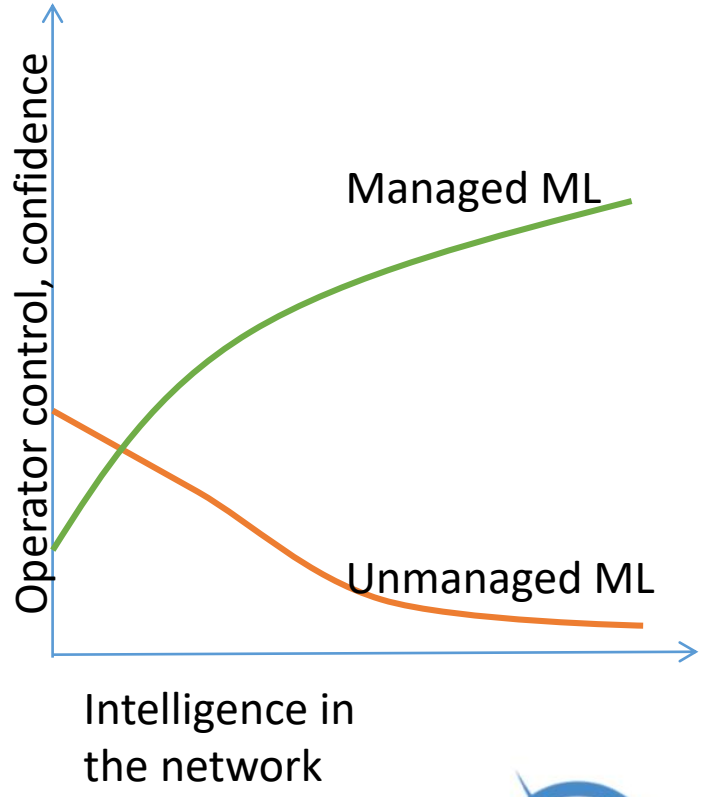
Serving framework provides platform specific optimizations, deployment preferences and inference mechanisms.

Enabling ubiquitous intelligence: Toolkit #4: MLFO

- Ongoing work: Requirements, architecture and design for machine learning function orchestrator
- https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/input/ML5G-I-216-R1.docx (status: draft)



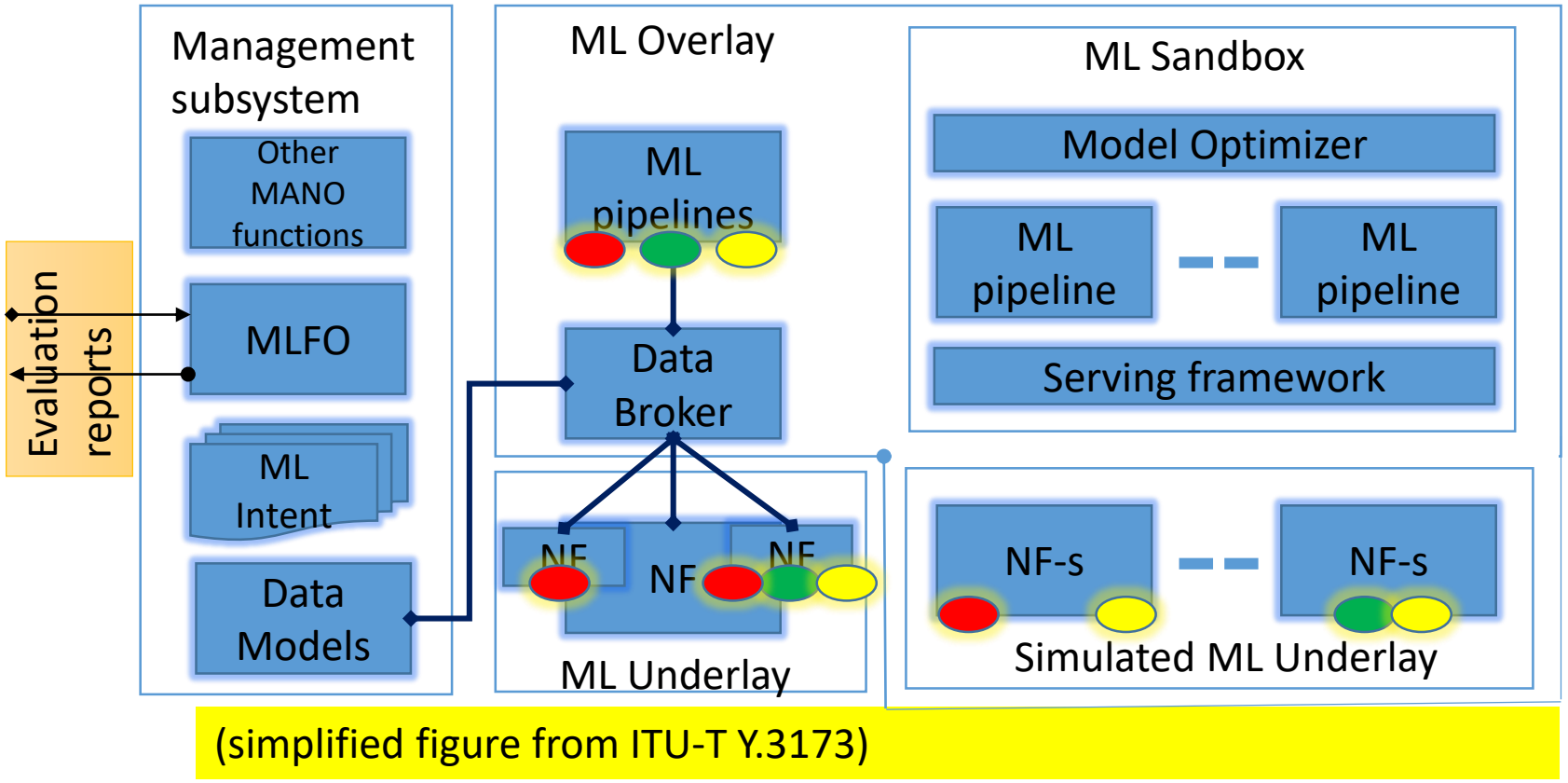
(simplified figure from ITU-T ML5G-I-216-R1)



MLFO orchestrates the operation of machine learning pipeline across the network to provide a managed AI/ML integration for the operator

Enabling ubiquitous intelligence: Toolkit #5: Intelligence levels

- Approved : ITU-T Y.3173 “Framework for evaluating intelligence levels of future networks including IMT-2020”
- https://www.itu.int/rec/T-REC-Y.3173-202002-P/en (prepublished)



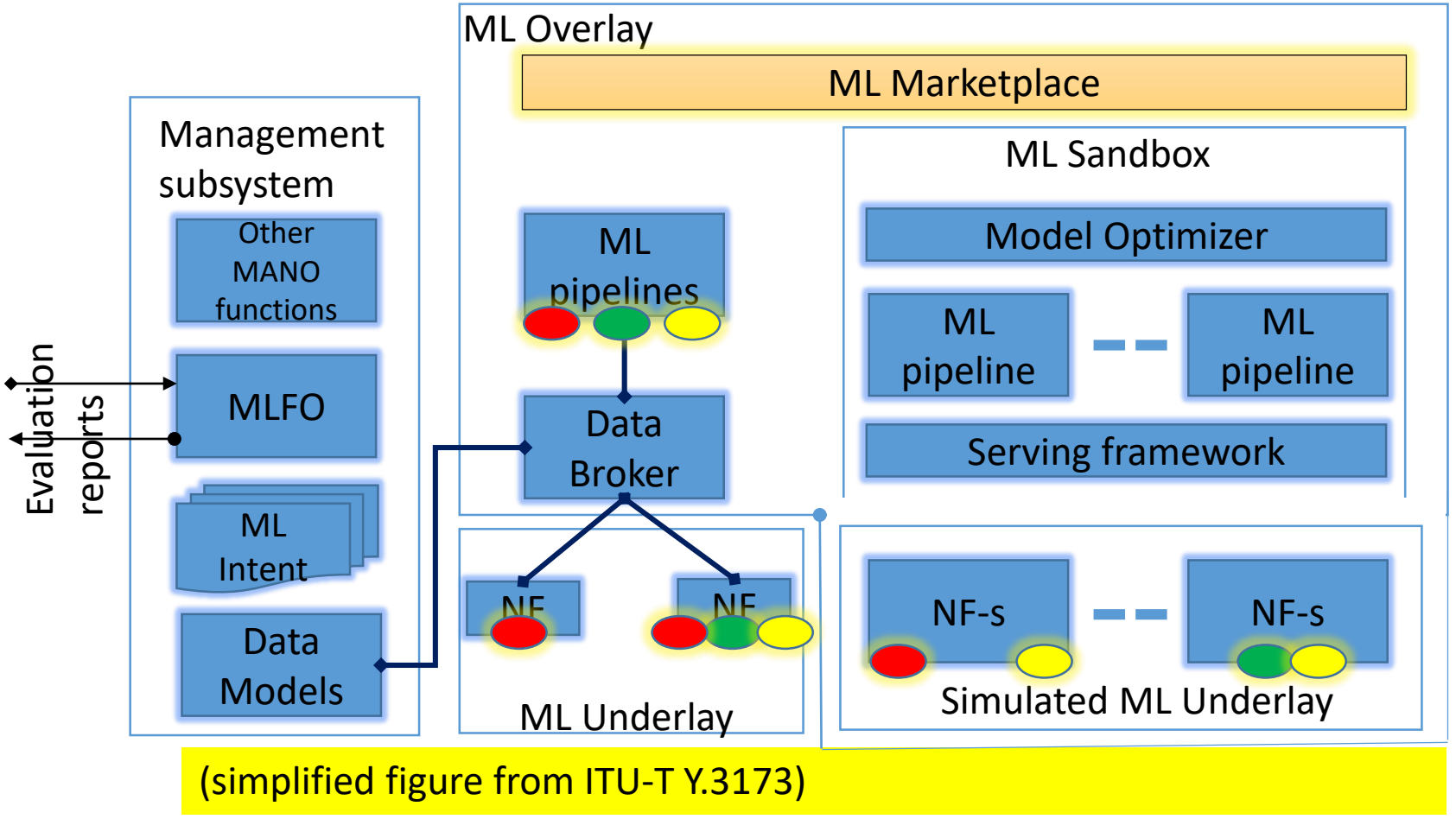
(simplified figure from ITU-T Y.3173)

- Data collection is performed by system (as against by human)
- Action implementation is performed by system
- Analysis is performed by system
- Decision is performed by system
- Demand mapping is performed by system

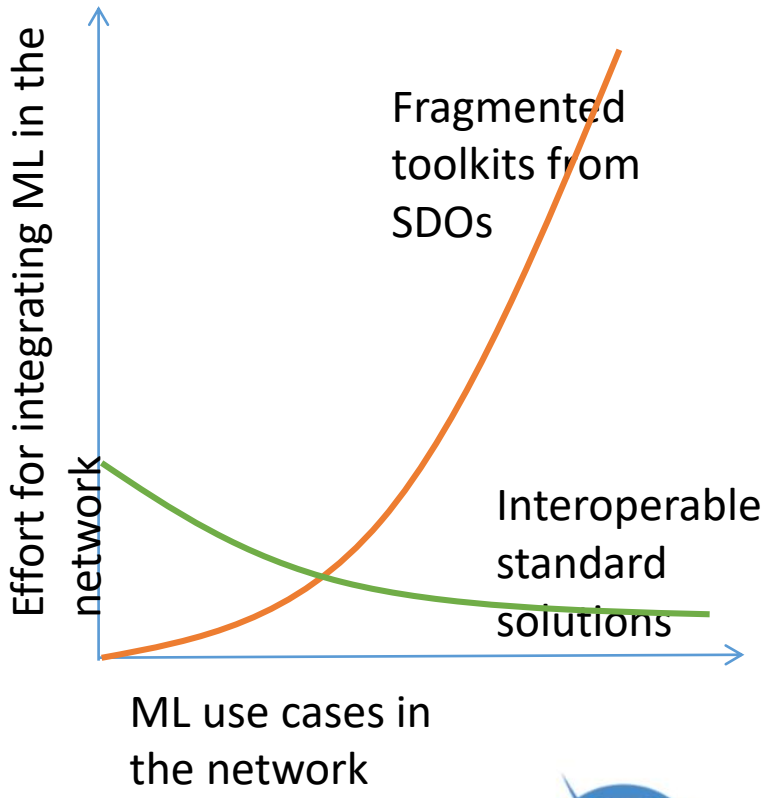
Intelligence levels helps MLFO to interoperate between different ML solutions in the network.

Enabling ubiquitous intelligence: Toolkit #6: ML Marketplace

- Draft Recommendation: ML marketplace integration in future networks including IMT-2020
- ITU-T Y.ML-IMT2020-MP (status: under Q20/13 review)



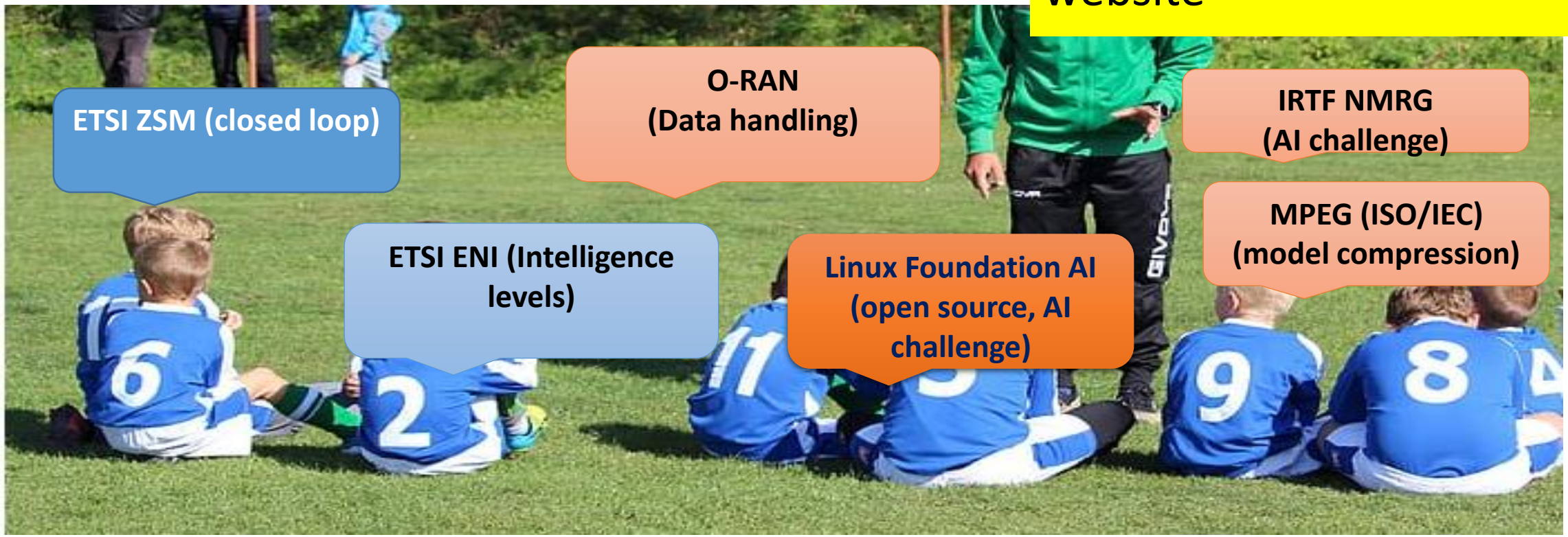
(simplified figure from ITU-T Y.3173)



Enables standard mechanisms to exchange ML models and related metadata between the network and ML marketplace.

Liaisons

LS are published in ML5G website



https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/SitePages/Home.aspx
Accessible via guest account for non members of ITU-T

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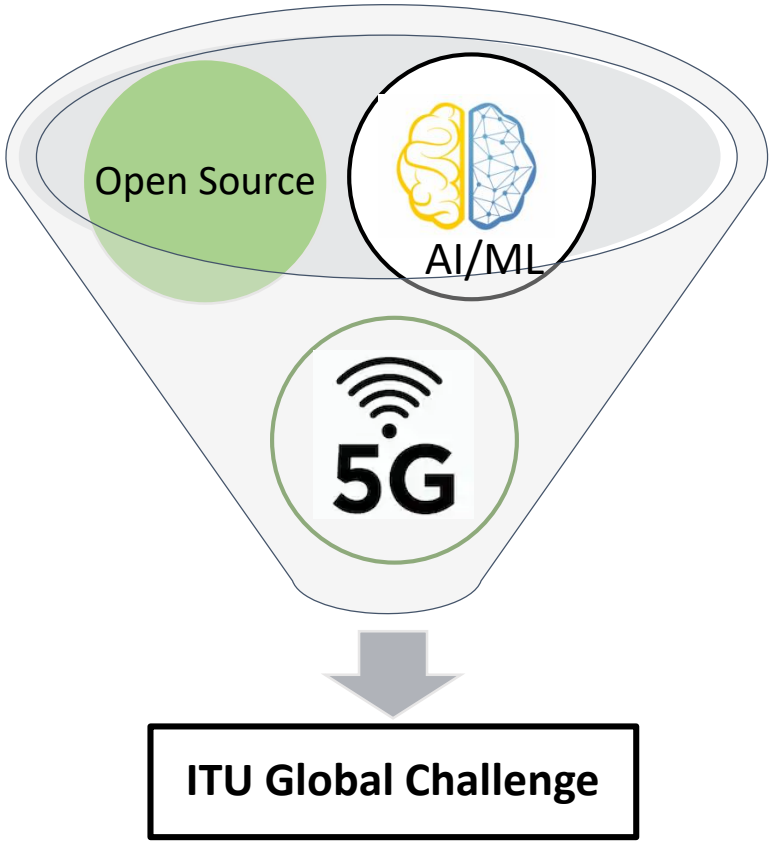
Collaboration to enable ubiquitous intelligence

ITU AI/ML GLOBAL CHALLENGE IN 5G

- Spread over **9 months** in 2020
- Bringing participants from all member countries of ITU.
- Four tracks, 2 rounds, 1 **conference**.
- Apply AI/ML to IMT-2020 networks
- Encouraging **open** source
- **Mentoring** students
- https://www.itu.int/en/ITU-T/AI/challenge/2020/Pages/default.aspx

BACKUP slides

ITU ML5G Challenge: AIMs and Objectives



- ❖ Bring together network operators, network manufactures and academia
- ❖ Innovate and solve 5G problems with AI/ML
- ❖ Apply ITU's AI architecture in 5G

Technical Track	Real Data ("secure track")	Open Data	Synthetic Data	No Data
Network	✓	✓	✓	
Verticals	✓	✓	✓	
Enablers				✓
Social good	✓	✓	✓	✓

* Secure data handling practices (sandboxes for Real anonymized network data)

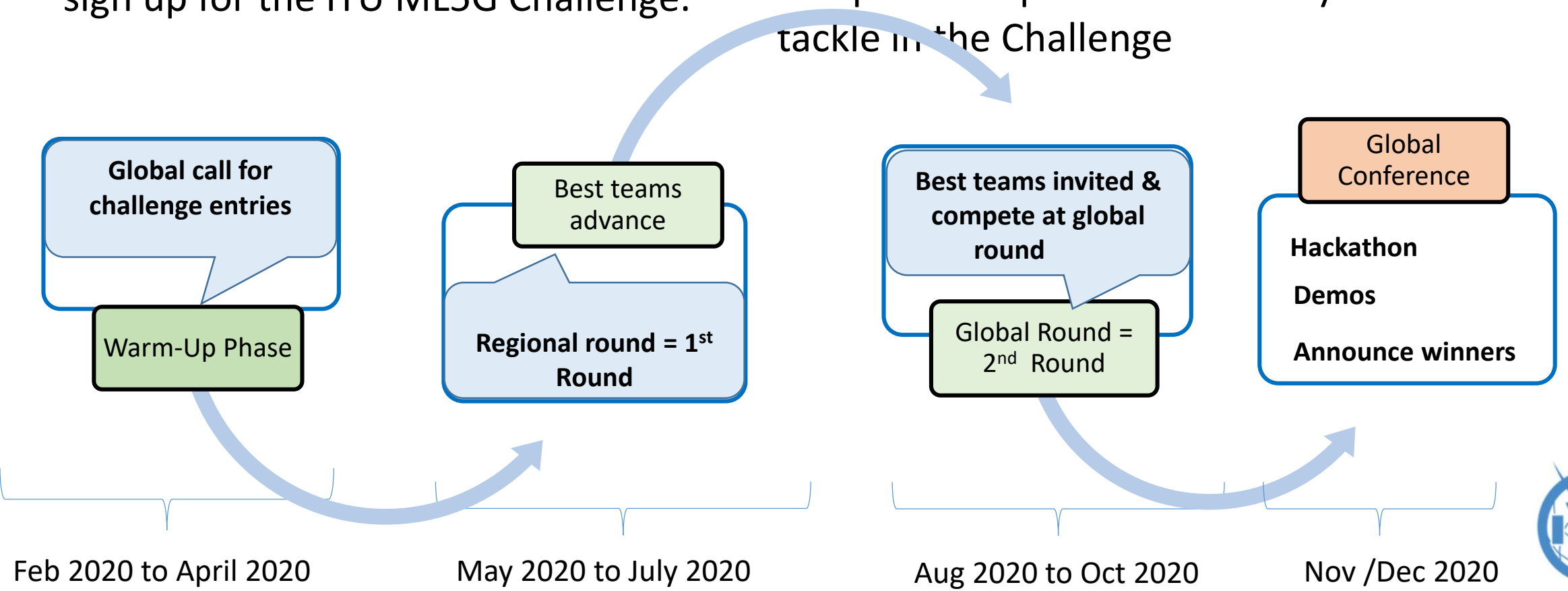
ITU ML5G Challenge: Participation and Timelines

Students

Students need to be registered as students at a university when they sign up for the ITU ML5G Challenge.

Professionals

Anyone else is considered a “professional”. A person who has the necessary skills to complete the problem sets they choose to tackle in the Challenge



ITU ML5G Challenge: Potential collaboration opportunities

Proposal-1: Co-branding, Joint messaging and promotion, Joint analysis of use cases, identify ML solutions/models/datasets which fits a solution.
Example of expected feedback: "yes, this looks interesting and my organization has seen similar problems", "yes, we have similar models in our marketplace", "yes, there are optimization tools which can work with such models".

Proposal-2: Collaborate on contributions to open source, hosting platforms.

Proposal-3: Swap notes on funding opportunities, sponsors, hosts, joint conference opportunities *[sponsor package can be discussed separately]*.

Next step: Open a channel for coordinating the above and follow ups with ITU.
Please send participation interest to vishnu.n@ieee.org , ai5gchallenge@itu.int

Thank you!