

**Regional Forum on Emerging Technologies**

# **Standards and architecture approaches for ML in future networks**

**Place: Tunis**

**Date: 22 April 2019**

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(ITU T FG ML5G)**



# Agenda

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- ITU T FG ML5G: intro
- Use cases and Benefits
- “Under the hood”: research options
- Call for action! What can we do together?
- FG ML5G Student projects

# ITU T FG ML5G

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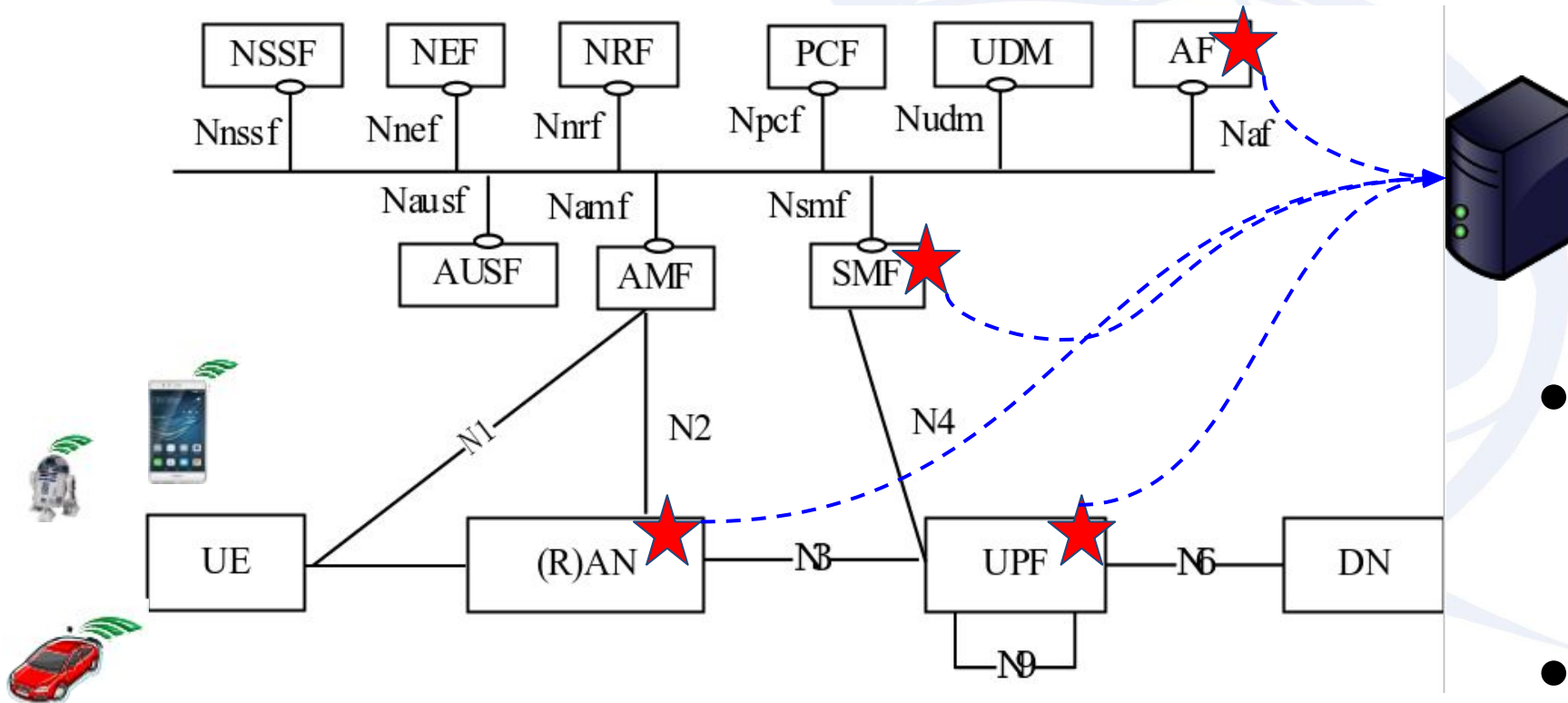
- ITU-T focus group Machine Learning for Future Networks including 5G (FG ML5G) was established by ITU-T **Study Group 13** at its meeting in Geneva (6-17 November 2017).
- WG1: Many **use cases** (e.g., troubleshooting of network problems, drones, self-healing, resource allocation for slices).
- WG2: ongoing work for **data handling and data models** for ML in 5G networks.
- WG3: ongoing work for **ML intelligence levels, ML marketplace** integration.

**ITU-T Y.3172** “Architectural framework for machine learning in future networks including IMT-2020” was consented on Victoria Falls, 4-14 March 2019, with support from multiple countries.

Next meeting of FG in **Geneva, 18 - 20 June 2019**



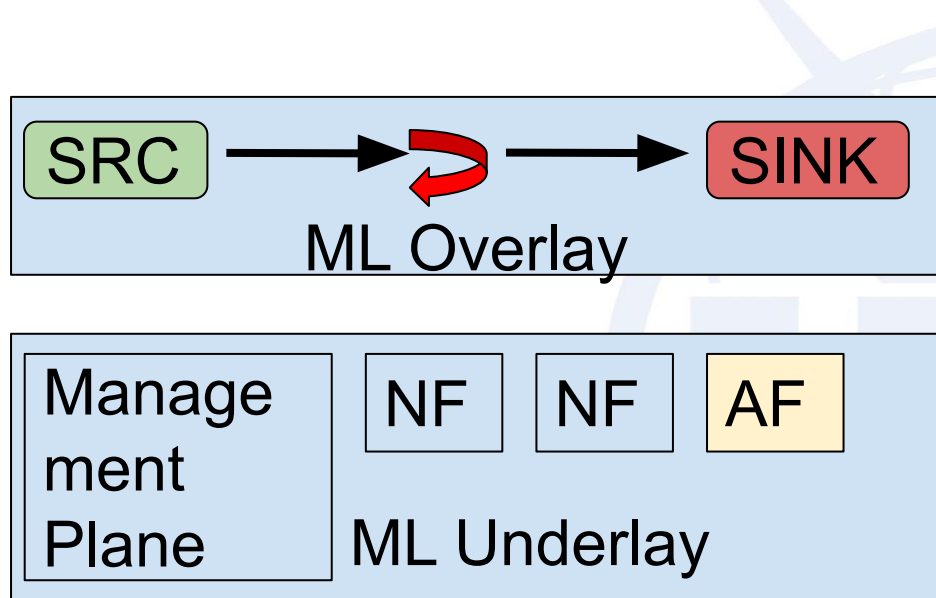
# Use cases-1: ML for 5G network optimization



(from 3GPP TS 23.501 System Architecture for the 5G System)

- Data from different parts of the network is used for correlation, prediction and troubleshooting of problems.
- Network or slice design recommendations can be made based on ML.
- Can lead to better user experience and operator benefits.

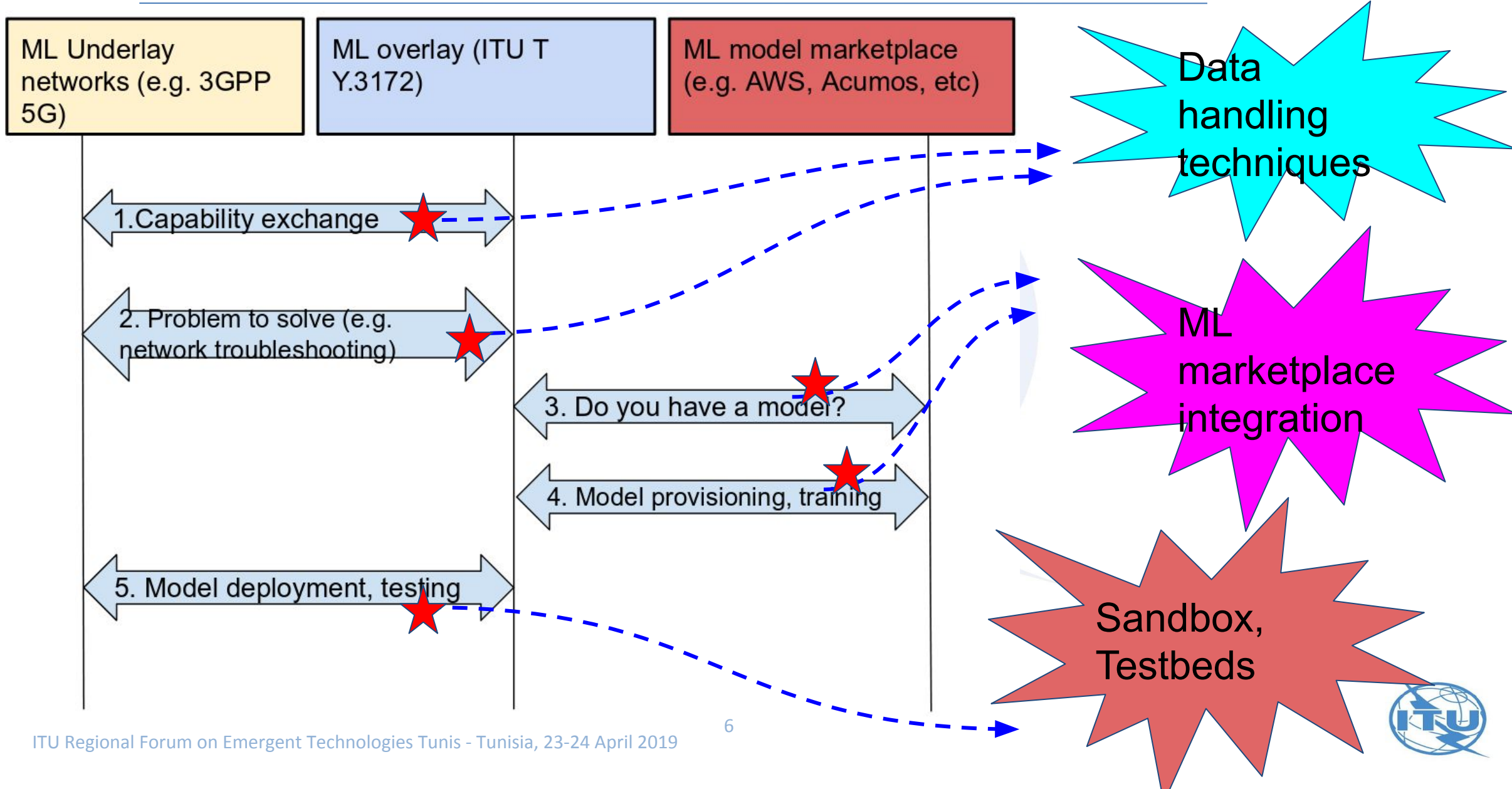
# “Under the hood”



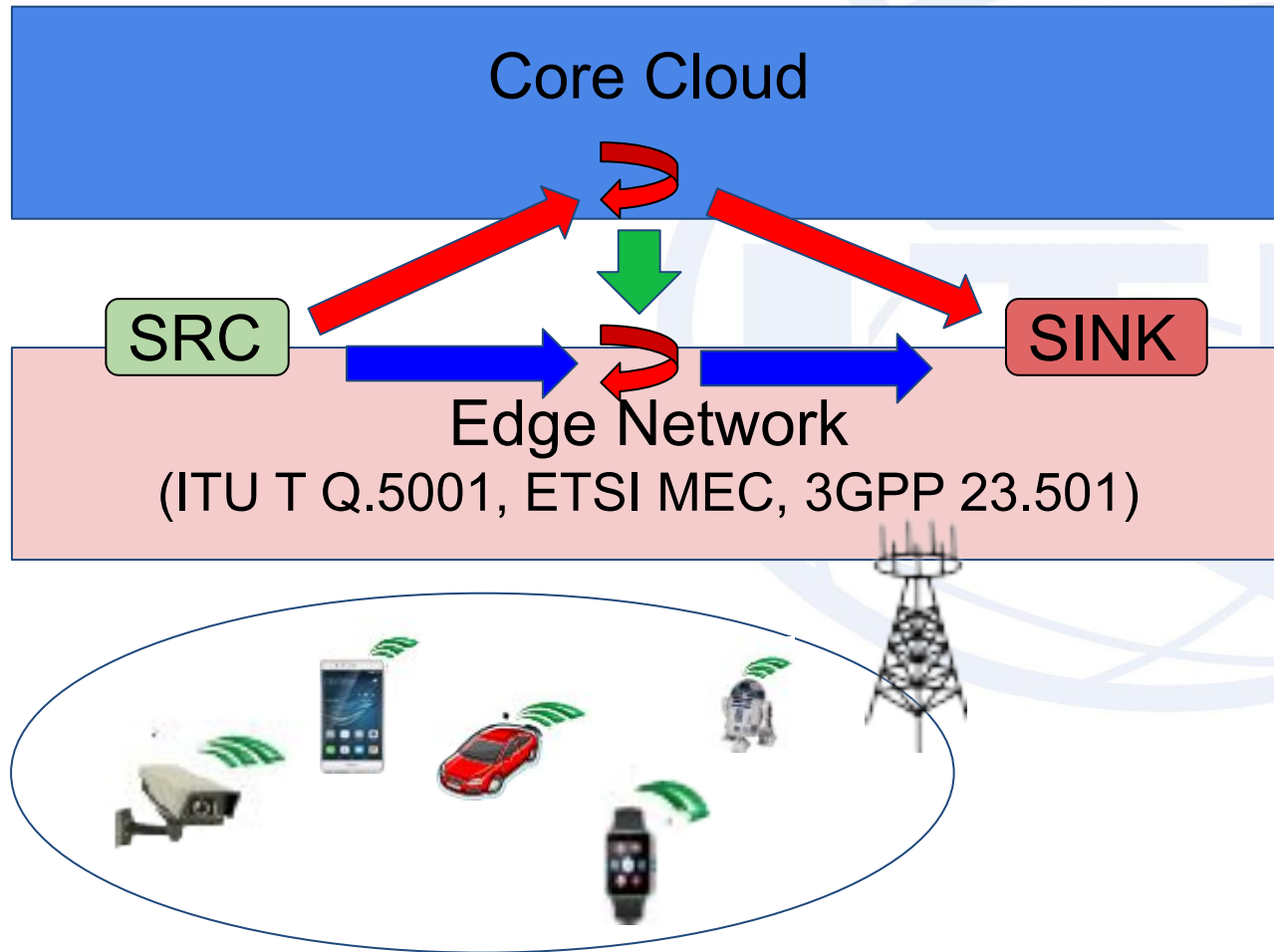
- **Interoperable**, plugin architecture for ML on various types of networks.
- **Adaptive** framework for ML. Overlay can evolve independent of the ML underlay.
- **Unstructured data** may be input.

 Symbol for **ITU T Y.3172** ML Pipeline

# What can we do together? (Work items)



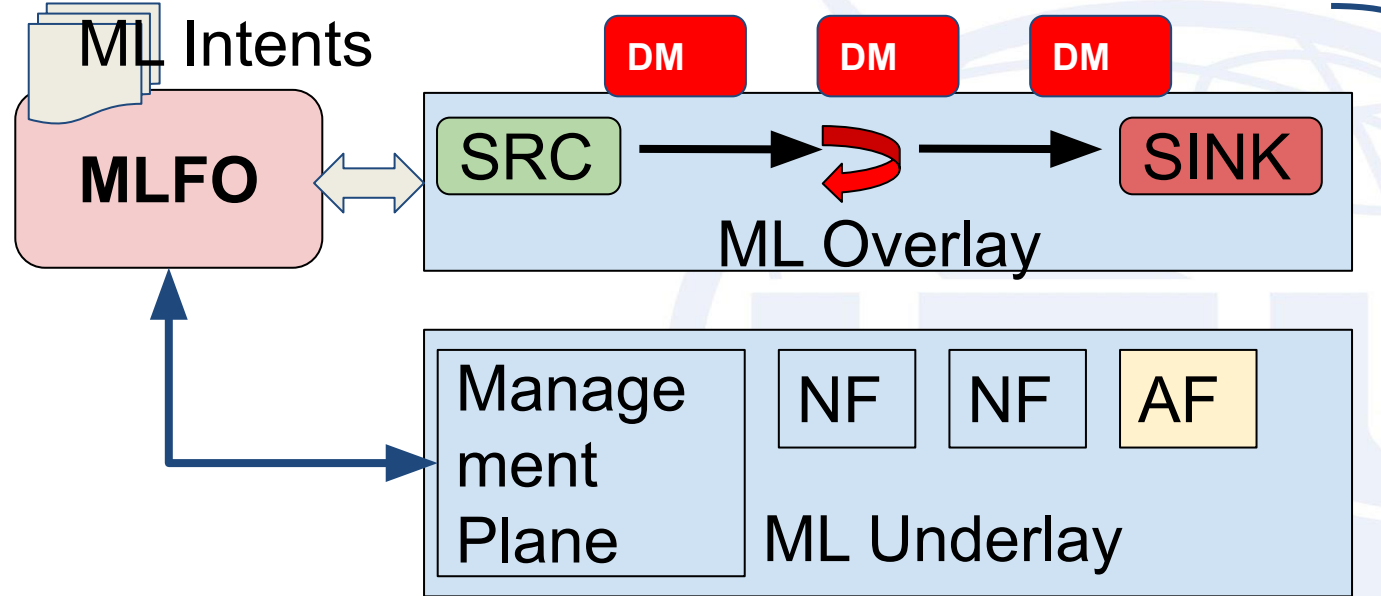
# Use cases-2: ML for real time prediction at edge



- Data from edge is used for real time prediction, can assist MEC in decisions.
- DL models are used for predictions.
- DL Models are deployed in the edge where it is closer to the data.



# “Under the hood”



- **Declarative mechanism** for ML use case specification.
- Enabling **zero-touch** ML service in future networks. Plug in of data source (e.g. IoT) is supported.
- **Distributed** instances of ML pipeline across levels of network, with **chained** models.

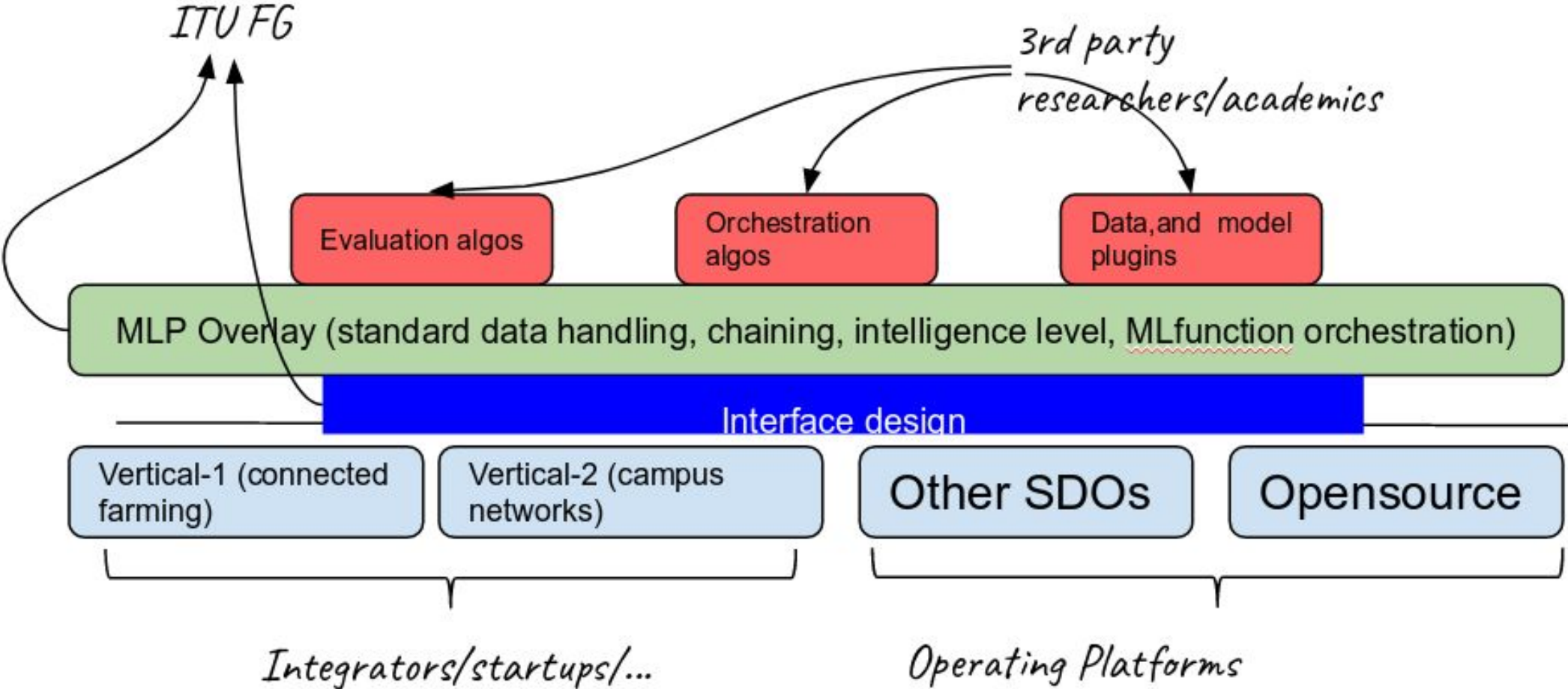
 Symbol for **ITU T Y.3172** ML Pipeline

MLFO: ML Function orchestrator

DM: Data Model



# What can we do together? (ecosystem)



# ITU T FG ML5G Student projects!!

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- FG ML5G is offering **projects for students** in the area of ML in 5G.
- Student focussed:
  - **Select problem statements** which are relevant for the technical areas related to ML in IMT 2020.
  - Use guidance from a **wide network of experts** in the FG.
  - Make **friends** across the globe.
  - Get a (**shiny**) certificate at the end of successful completion of the project.
- A list of **20 projects** are available in ML5G-I-144R2
- **4 countries** participating currently (India, Brazil, Nigeria and Zambia)
- How to join?
  - Send mail to [vishnu.n@ieee.org](mailto:vishnu.n@ieee.org)
  - Join the ITU mailing list **fgml5g-students**



# References

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- Use cases document from FG ML5G  
<https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/input/ML5G-I-118-R9.docx?d=wc3704ffae74f4bc58291b82ad52aae1c>
- Data handling framework document from FG ML5G  
<https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/input/ML5G-I-148.docx?d=w586c00bd18f54a10a2a976bb048ea512>
- ML marketplace integration document from FG ML5G  
<https://extranet.itu.int/sites/itu-t/focusgroups/ML5G/input/ML5G-I-146-R1.docx?d=w062a5090123342af832d3cde0d9c8bea>
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**Thank you**

