

# ITU FG AN

## Focus group on Autonomous networks

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Independent expert

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*Presented during: "Scottish Autonomous Networked Systems", 12 - 13th December 2022*

<https://scot-ans.github.io/>

*Slides are **public***

# Agenda

1. ITU FG AN current work

- who are we?
- Use cases
- Architecture
- PoC

2. Our Scottish Connexions

3. Our wishlist for 2023

# FG-AN: Overview

- ITU-T Focus Group on Autonomous Networks was established by ITU-T Study Group 13 at its virtual meeting, 17 December 2020.
- The Focus Group will draft **technical reports and specifications** for autonomous networks, including exploratory evolution in future networks, real-time responsive experimentation, dynamic adaptation to future environments, technologies, and use cases.
- The Focus Group will also identify relevant gaps in the standardization of autonomous networks.

The primary objective of the Focus Group is to provide an open platform to perform pre-standards activities related to AN.

**FG-AN Management team**

**Vice-Chairmen**

Xu Dan  
China Telecom, China

Salih Ergut  
Turkcell, Turkey

Gyu Myoung Lee  
KAIST, Korea

Vishnu Ram OV  
Independent Expert

Cao Xi  
China Mobile

**Chairman**

Leon Wong  
Rakuten, Japan

**Working Groups**

WG1: Use Cases and  
Requirements Analysis

WG2: Architecture and Core  
Technical enablers

WG3: Proof of Concepts

Yongsheng Liu  
China Unicom

Song Xiaojia  
China Mobile

Paul Harvey  
University of Glasgow

Liya Yuan  
ZTE

Alfons Mittermaier/ Shabnam  
Sultana (Highstreet technologies)



# FG-AN Deliverables

Use Case & Requirements for Autonomous Networks

Submitted to SG13 and published as Suppl 71 to Y.3000 series

Trust in Autonomous Networks

Submitted to SG13.  
Work item created in Q16/13

Architecture Framework for Autonomous Networks

submitted to SG13


Trust in Autonomous Networks (Part 2)

Build-a-thon, PoC

In progress

Gap analysis, components, reports

# Use cases

 INTERNATIONAL TELECOMMUNICATION UNION  
TELECOMMUNICATION STANDARDIZATION SECTOR  
STUDY PERIOD 2017-2020

FOCUS GROUP ON AUTONOMOUS NETWORKS (FG-AN)  
AN-O-013-R1  
**Original: English**

Question(s): N/A  
Virtual, 1-3 September 2021

**OUTPUT DOCUMENT**

Source: Editors  
Title: Use cases for Autonomous Networks

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International Telecommunication Union

## ITU-T Technical Specification

TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU  
(28 October 2021)

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ITU-T Focus Group on Autonomous Networks

**Technical Specification**  
**Use cases for Autonomous Networks**

<https://www.itu.int/en/ITU-T/focusgroups/an/Pages/default.aspx>

ToR: Terms of reference

Parent group: ITU-T Study Group 13

### Deliverables:

[Link to use cases](#)

- Use cases for Autonomous Networks
- Architecture framework for Autonomous Networks
- Trustworthiness evaluation for autonomous networks including IMT-2020 and beyond
- Proof of Concept (PoC)
- Gap analysis
- Definitions glossary

# Process: Editing Use cases deliverable (1/2)

- “A collection of use cases were presented and elaborated during FG-AN meetings. These use cases have been collated into a draft use case report.”
- 40 Use cases
- 30 mentors across the world
- 143 requirements in total
- 90 pages
- 10 months of weekly agile editing
- Output transmitted to ITU-T SG13, and published as ITU-T Y.Suppl 71, “Use cases for Autonomous Networks”  
07/2022

1. FG AN use case Contributions

2. Call for mentors

3. Refine the use case, derive requirements

4. Publish in template

5. Review and finalise

# Sample use case description: FG-AN-usecase-027: "A digital twin for your robotics apps"

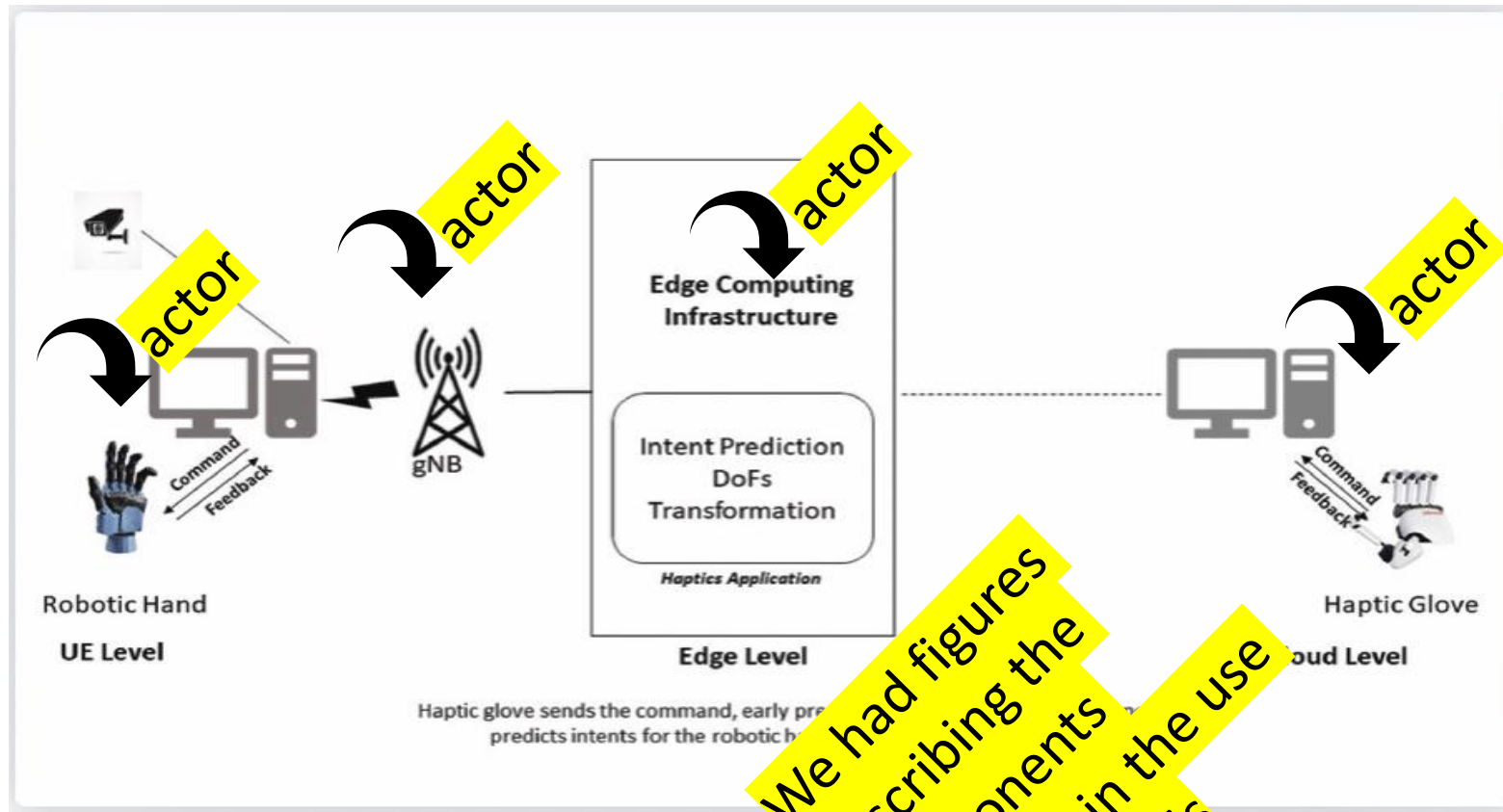
- A haptic glove controls the robotic hand.
- Edge based hosting of AI model along with Time series Labeled Datasets on slip detection and crumble detection.
- 5G base station

We had text descriptions of the use cases like this

Additional ref:

[https://bhartischool.iitd.ac.in/build\\_a\\_t\\_hon/index.html](https://bhartischool.iitd.ac.in/build_a_t_hon/index.html)

[FGAN-I-289-R5]



We had figures describing the components involved in the use case like this



# Sample use case: FG-AN-usecase-027: component figures

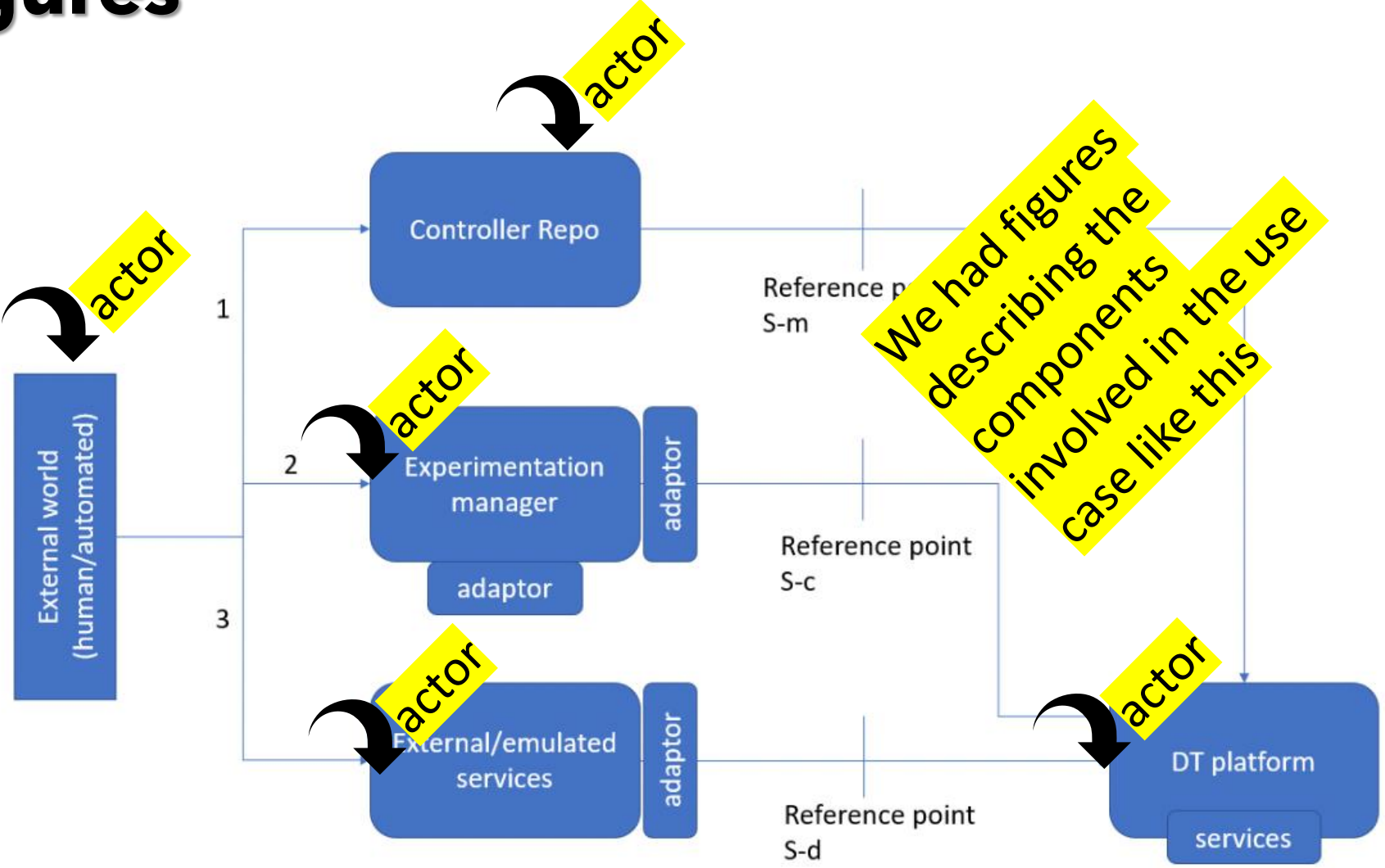


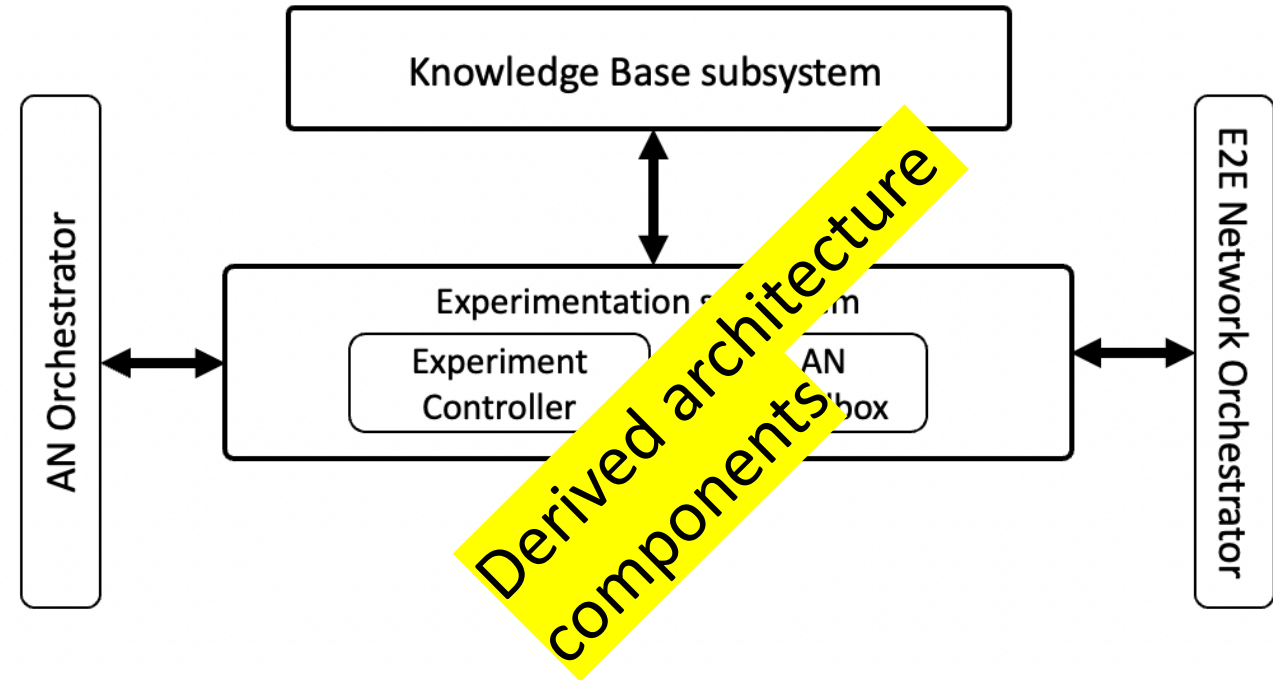
Figure 18: Possible components for experimentation as a service

References:  
[FGAN-O-013-R1]

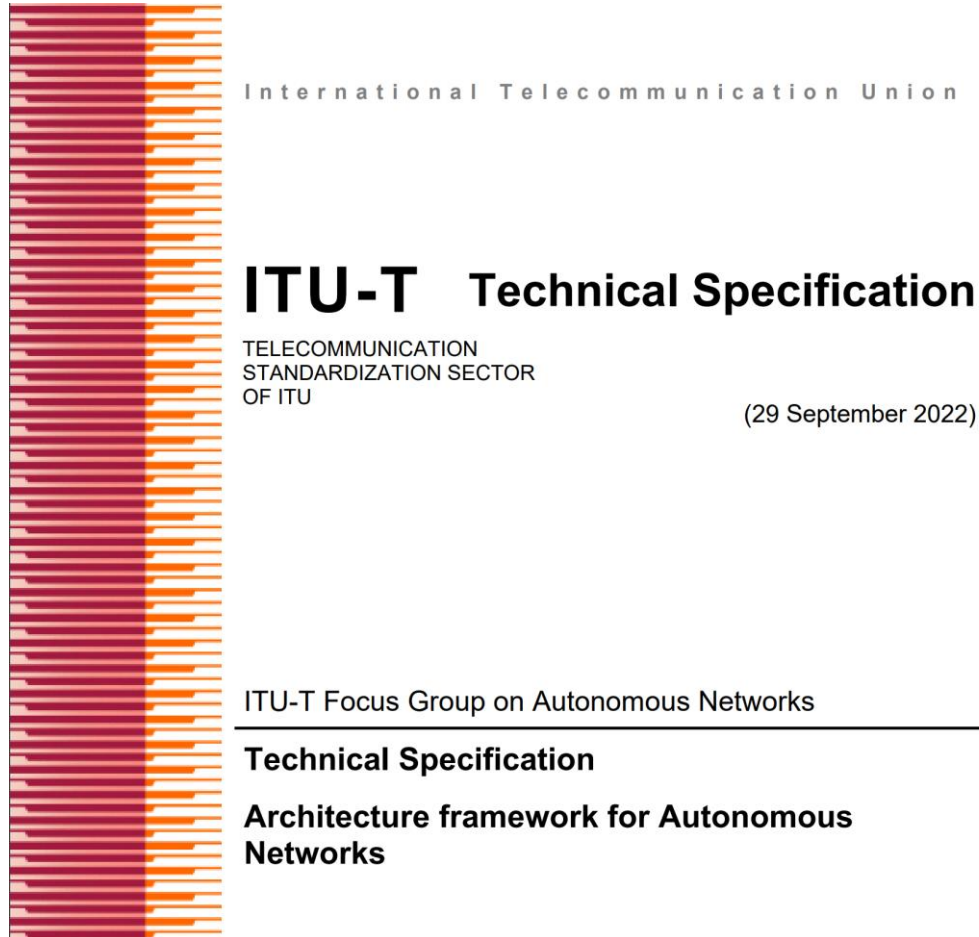
# Sample use case: FG-AN-usecase-027: Architecture Lessons learnt

- **Critical** requirements

- AN-UC027-REQ-002: *It is critical that AN-triggered experiments and adaptations are tested using corresponding simulator settings in DT and the impact in simulated environment is evaluated.*
- AN-UC027-REQ-001: *It is critical that AN enable import of simulation environment into DT, trigger simulations in DT and validate the results, especially the use case specific closed loops.*



# Architecture framework



## FG-AN

ITU-T Focus Group on Autonomous Networks was established by ITU-T Study Group 13 at its virtual meeting, 17 December 2020. The Focus Group will draft technical reports and specifications for autonomous networks, including exploratory evolution in future networks, real-time responsive experimentation, dynamic adaptation to future environments, technologies, and use cases. The Focus Group will also identify relevant gaps in the standardization of autonomous networks.

The primary objective of the Focus Group is to provide an open platform to perform pre-standards activities related to this topic and leverage the technologies of others where appropriate.

ToR: **Terms of reference**

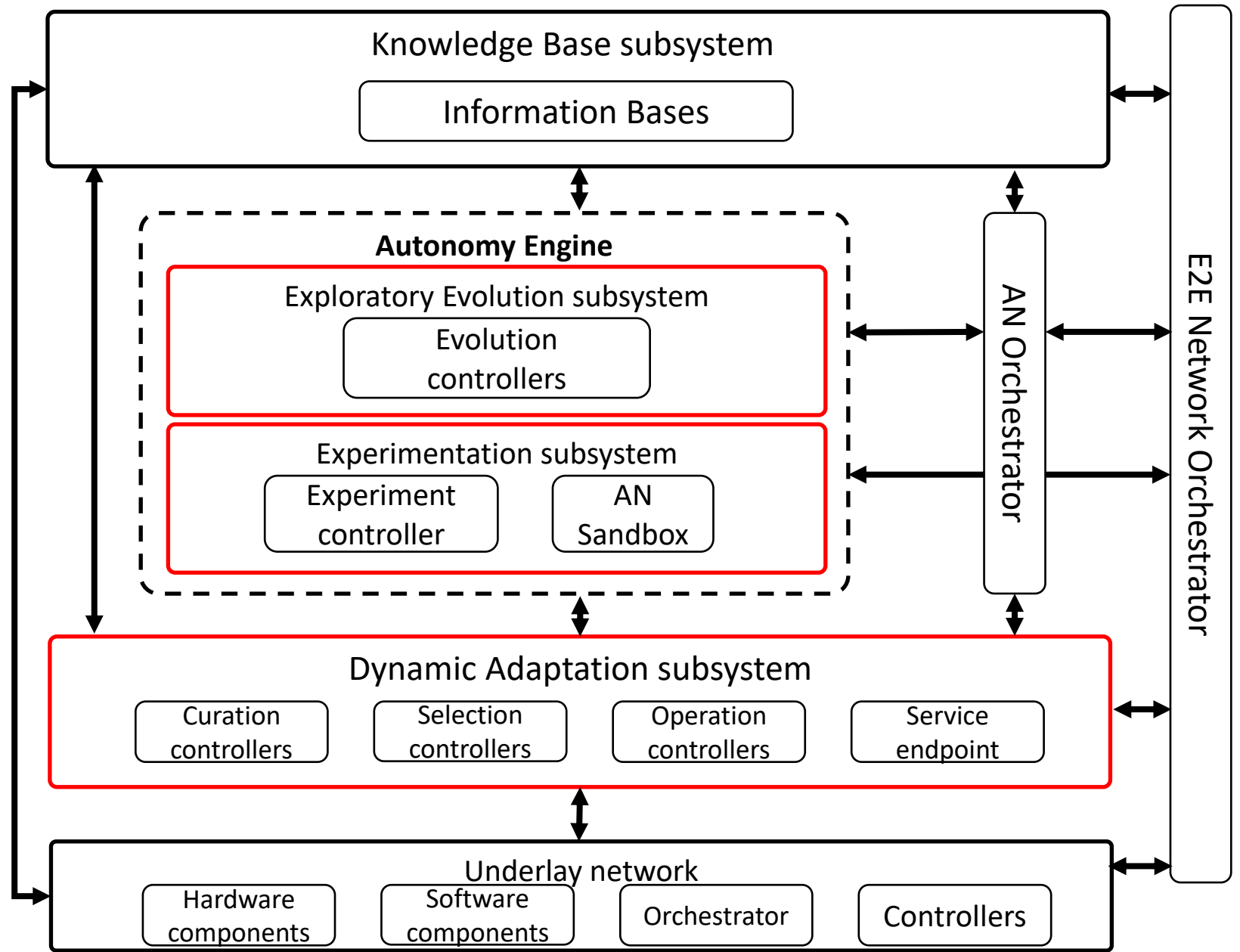
Parent group: **ITU-T Study Group 13**

### Deliverables:

- **Use cases for Autonomous Networks**
- **Architecture framework** [Link to architecture framework](#)
- **Trustworthiness evaluation for autonomous networks including IMT-2020 and beyond**
- **Proof of Concept (PoC)**
- **Gap analysis**
- **Definitions glossary**

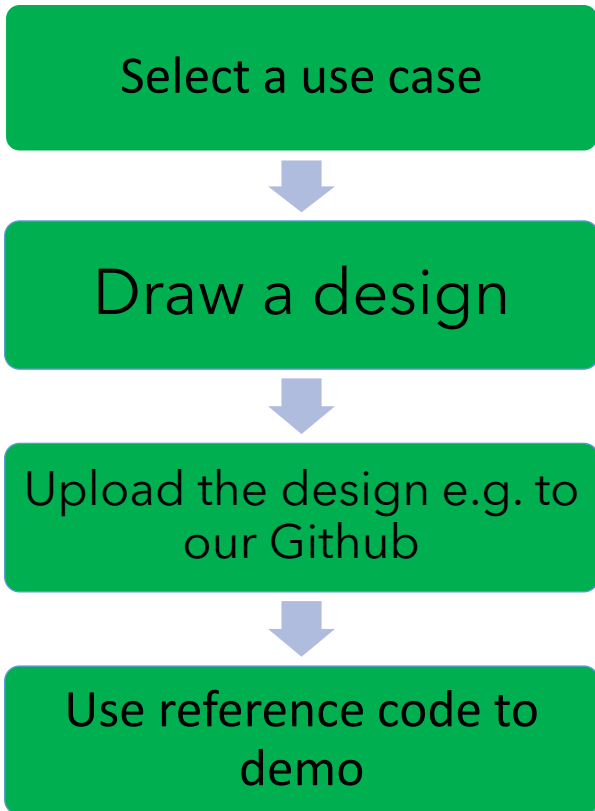
<https://www.itu.int/en/ITU-T/focusgroups/an/Pages/default.aspx>

3 Key Concepts



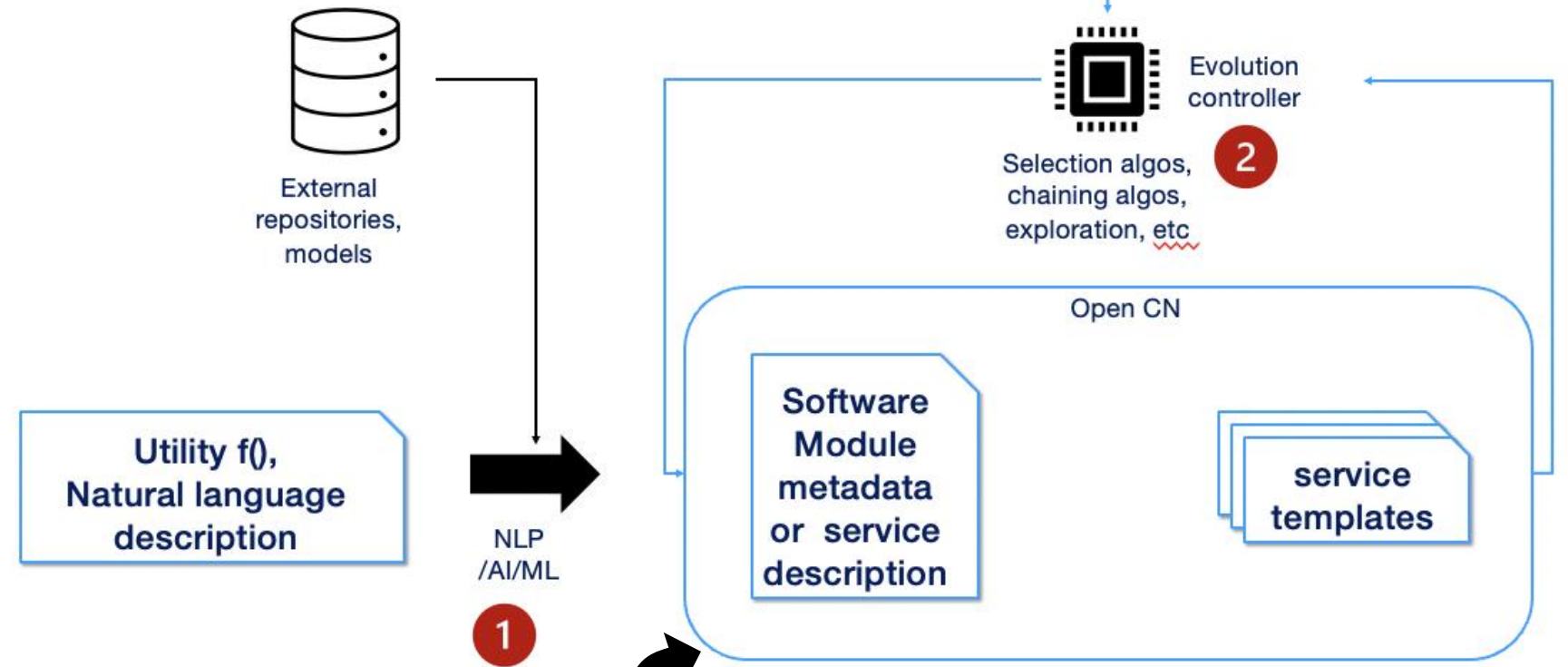
# Sample use case : PoC lessons learnt

Challenge problem statement



e.g. Hugging face

e.g. pipelines



Can we get use case representations in here?

# ITU FG AN Build-a-thon 2022

- ITU Reference code used Neo4j Aura DB and Google colab.
- The **actors** in ITU use cases were represented **as nodes** and the neo4j **relationships** captured the use case **interactions**.
- All **40 ITU use cases** with **300+ nodes** and **500+ relationships** were provided.
- A public Jupyter notebook was provided with helper classes, which can **add nodes** (use case actors), **add relationships** (use case interactions) and **properties** (use case characteristics)

<https://challenge.aiforgood.itu.int/match/matchitem/68>

11 teams submissions from

**India, Japan, Egypt, Costa Rica, Nigeria and UAE.**

Reference code: <https://github.com/vrra/FGAN-Build-a-thon-2022>

All reports are available from:

<https://extranet.itu.int/sites/itu-t/focusgroups/an/input/FGAN-I-289-R6.docx>



**ITU Events**

**AI for Good**  
Machine Learning  
in 5G Challenge

**Grand Challenge Finale**  
*Awarding innovations in artificial intelligence and machine learning for future communication networks*

**Tuesday, 14 December 2021**  
13:30 - 15:30 Geneva (CET)

[aiforgood.itu.int](https://aiforgood.itu.int)

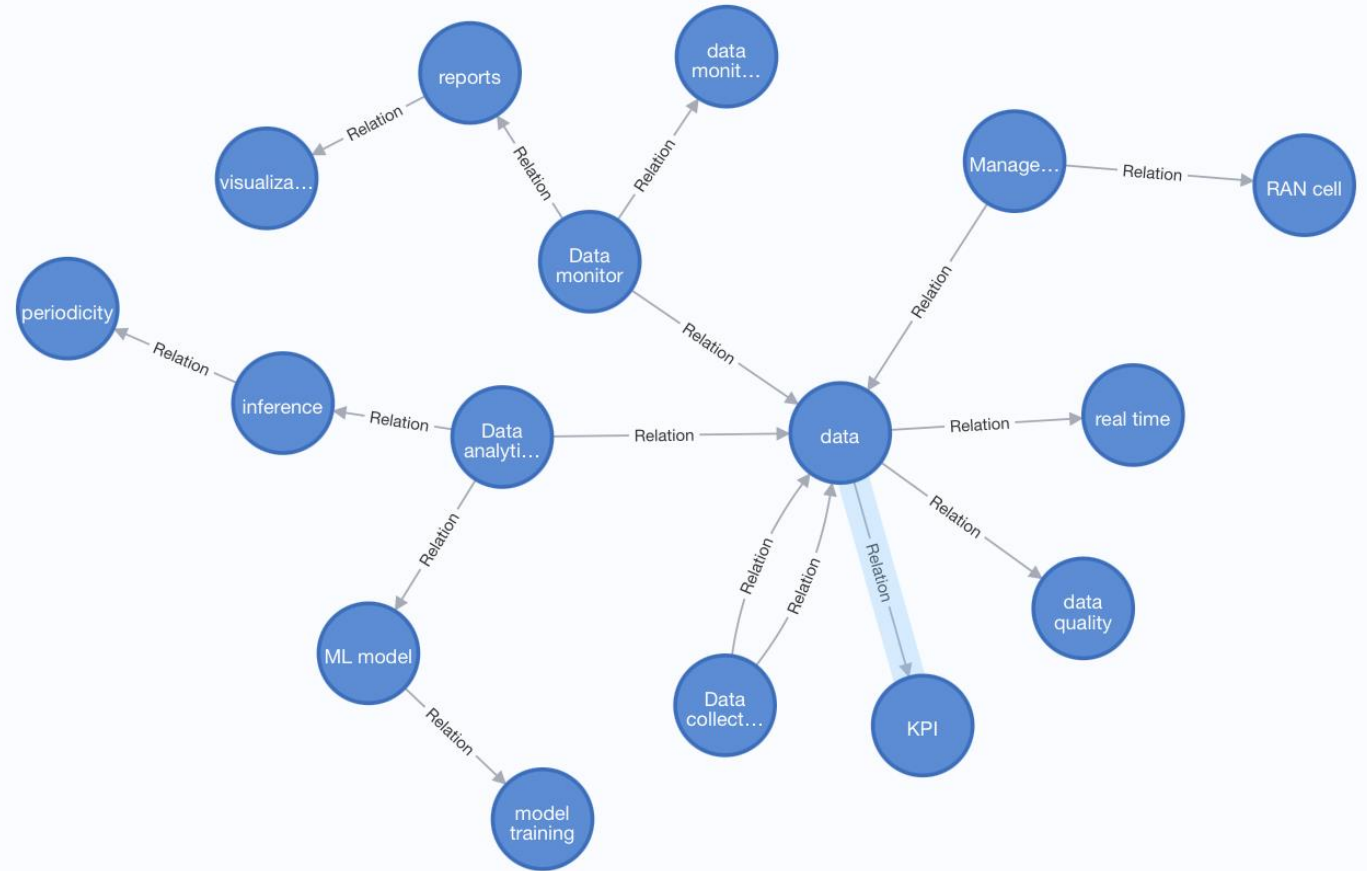


# FG-AN-usecase-006: China Telecom

\*\*Graph below is generated from [notebook](#)

For each use case,

- we got **graphs** like this,
- rich source of information,
- Can be transformed into service representations such as (TOSCA) YAML
- Can be **deployed** as services using orchestrator



MATCH (n) where 'usecase\_006\_cat2' in labels(n) return n

# The Scottish Connexion



← Tweet



**UofG News**  
@UofGNews



Teams from around the world took part in the final of the @ITU Build-a-thon 2022, an #autonomousnetworks competition.

@jhebus of @UofGEngineering mentored the winners, and @lumisota of @GlasgowCS was part of the judging panel. Dr Stephen McQuistin

Professor Muhammad Imran of the James Watt School of Engineering, gave us encouraging words to motivate the participating teams while opening our workshop 2.0 in September 2022

Paul Patras helped us out guiding us with the Challenge at our management board.

[https://www.gla.ac.uk/news/headline\\_896338\\_en.html](https://www.gla.ac.uk/news/headline_896338_en.html)

**Prof. Qi Wang, University of the West of Scotland**

R&D and standardisation activities on end-to-end network slicing over 5G/6G networks has led to a new ITU-T standard:

ITU-T Recommendation Y.3182 (2022),



INTERNATIONAL TELECOMMUNICATION UNION

**TELECOMMUNICATION  
STANDARDIZATION SECTOR**

STUDY PERIOD 2017-2020

**FOCUS GROUP ON AUTONOMOUS  
NETWORKS (FG-AN)**

**AN-I-020**

**Original: English**

Question(s): N/A

Virtual, 2-4 February 2021

**INPUT DOCUMENT**

**Blesson Varghese**

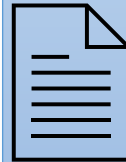




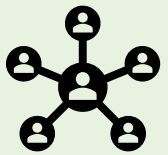
# What is our wish list in 2023?



A technical report which digs into the details of components in evolution, experimentation, adaptation



Deploy, test and report from partner hubs



Use case representations and transformations



Increase the coverage and Gamify the challenge

Local hubs and partners in multiple countries



Thank you!

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