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FG-AI4EE D.WG1-06

Neutral navigational matrix for AI driven technologies for smart sustainable cities

Working Group 1: Requirements of AI and Other
Emerging Technologies to Ensure Environmental
Efficiency

Focus Group Technical Specification

ITU-T



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Neutral navigational matrix for AI driven technologies for smart sustainable cities

Summary

AI and blockchain are revolutionizing every aspect of society. The capability and performance of these technologies will substantially improve and expand in the next decades, from enhanced AI prediction, rising AI assistant and automation in all aspects of operation, boosting transparency, further decentralized networks, further blending between physical and digital computing, further security concerns and more. It is crucial to anticipate the policy, procedure and environmental frameworks needed to ensure the sustainability and accessibility of these technologies.

This document offers a matrix [Annex A] that covers all relevant definitions related to AI and blockchain, including the latest EU regulations and documents on the topics. This matrix offers a tool for policymakers and private sector stakeholders to gain an understanding of the implementation of AI and blockchain technology policy, as well as the existing regulatory framework. It aims to be used as navigation tool to orient regional and city planning and the planning and development of their basic security-sensitive infrastructures in the landscape of AI and regulatory approaches, for instance.

Keywords

Matrix; Artificial Intelligence; Blockchain; Smart Sustainable Cities;

Note

This is an informative ITU-T publication. Mandatory provisions, such as those found in ITU-T Recommendations, are outside the scope of this publication. This publication should only be referenced bibliographically in ITU-T Recommendations.

Change Log

This document contains Version 1.0 of the ITU-T Technical Specification on “*Neutral navigational matrix for AI driven technologies for smart sustainable cities*” approved at FG-AI4EE sixth meeting held in Ålesund, Norway, 1-2 December 2022.

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Neutral navigational matrix for AI driven technologies for smart sustainable cities

Introduction

The Neutral Navigational Matrix (NNM) is the first flexible and modular constructed tool for Artificial Intelligence for Environmental Efficiency (AI4EE) of Smart Sustainable Cities (SSCs), to help the relevant stakeholders to navigate their AI and Blockchain related programs and projects between the fields of technologies and domains on the one hand, and the main regulatory systems on the other hand to identify and find possible options to reach the goals of SDGs and the best ways to approach the optimal Key Performance Indicators (KPIs).

1 Scope

This document contains, in annex A, a high-level impact matrix that aims to support policymakers, city planning authorities, project managers, private sector companies, parliamentary or governmental bodies, lawyers, scientists, and any other relevant stakeholders, in developing and evaluating regulation and legislation concerning AI, and assessing the implication of different AI and blockchain solutions on the city's scale, to orient city smart sustainable city planning.

The objective of this matrix is to provide the necessary tools for relevant stakeholders to determine the most impactful AI and blockchain solutions to improve the environmental performance of these technology solutions and prioritize solutions and design possibilities that are the best aligned to the values of the United Nations Sustainable Development Goals and the United for Smart Sustainable Cities KPIs U4SSC [2021], and FG-AI4EE D.WG1-04 [2021].

2 References

- | | |
|--------------------------|---|
| FG-AI4EE D.WG1-04 [2021] | List of Key Performance Indicators (KPIs) for small and medium enterprises to assess the achievement of sustainable development goals http://handle.itu.int/11.1002/pub/81a36bd6-en |
| FG-AI4EE D.WG1-09 [2021] | A method for Intuitive Human interaction with data model (ML & AI etc.),
http://handle.itu.int/11.1002/pub/81a36bd9-en |
| FG-AI4EE D.WG1-10 [2022] | Guidelines on the Use of Digital Twin of Cities and Communities for Better Climate Mitigation Solutions,
http://handle.itu.int/11.1002/pub/81cf9006-en |
| FG-AI4EE D.WG1-11 [2022] | Best practices for Graphical Digital Twins of Smart Cities
http://handle.itu.int/11.1002/pub/81ac7747-e |
| U4SSC [2021] | United for Smart Sustainable Cities (U4SSC)
https://u4ssc.itu.int/u4ssc-kpis-report/ |

3 Definitions

3.1 Terms defined elsewhere

None.

3.2 Terms defined in these Technical Specifications

These Technical Specifications defines the following terms:

3.2.1 All technical terms used in the Neutral Navigational Matrix are defined there.

4 Abbreviations and acronyms

These Technical Specifications use the following abbreviations and acronyms:

AI	Artificial Intelligence
AIA	Artificial Intelligence Act
EU	European Union
ICU	Intensive Care Unit
KPI	Key Performance Indicators
NNM	Neutral Navigational Matrix
SDG	Sustainable Development Goal
SSC	Sustainable Smart Cities

5 Conventions

None.

6 Structure of the Technical Specification

6.1 Objective of the Matrix the Neutral Navigational Matrix [Annex A]

The objective of the matrix is to provide the necessary tools for relevant stakeholders to determine the most impactful AI and blockchain solutions, to prioritize solutions and design possibilities in order to improve the environmental performance of AI and blockchain, in compliance with the pursuit of the Sustainable Development Goals.

The excel document in Annex A covers all relevant definitions related to AI and blockchain, including the latest EU regulations and documents on the topics at the time of the publication of this report [2022].

The matrix can be used as navigation tool to orient city planning in the landscape of AI and regulatory approaches, for instance.

This is a tool for policymakers and private sector stakeholders to gain an understanding of the implementation of AI and blockchain technology policy, as well as the existing regulatory framework.

6.1.1 Structure and use of the Neutral Navigational Matrix (NNM)

The scientific classifications used by the Neutral Navigation Matrix (NNM) are of Canadian origin [b-Canadian Policy Horizon] and in use by the Austrian government “Forschungsatlas – Zukunftstechnologien” as a member of the EU and host of UN institutions in Vienna.

1. The NNM is a comprehensive, reliable, flexible, modular and multi-dimensional navigational tool, that combines the strengths of dashboard and scorecard-type tools, to guide program or projects on environmental efficiency and smart sustainable cities (SSCs) using emerging technologies, such as AI and Blockchain. This matrix can enable fast, basic evaluation and give quick oversight, to identify where, between the normative and ethical approaches, such programs or projects are located. More specifically, this matrix is a tool that can efficiently

evaluate for Risk-Acceptance, Data-Transparency, Data-Ownership, ethical or formal regulations regarding different technological fields, for any environmental efficiency projects aimed to advance the sustainable development goals and smart cities planning.

2. The modular structure of the matrix guarantees reliability and flexibility. It allows for this tool to be adapted and updated as necessary, to assess:
 - a. The current legal and regulatory status of AI and Blockchain in terms of formalized laws and legal acts;
 - b. The ever-changing conditions of the growing layers of data volume;
 - c. The future capabilities of computing power and increasing simultaneity, with the increasing possibilities to "connect everything to everything";
 - d. Any other classifications of technology fields or technological domains, if useful or necessary for policy purposes or for specific business or administrative policies in applying environmental efficiency principles.
3. The NNM combines the capabilities of dashboards and scorecards that both present information at a glance, graphically or by structured reports as referred to in other FG-AI4EE deliverables such as D.WG1-09 [2021], D.WG1-10 [2022], D.WG1-11 [2022]. This tool allows to access information on administrative or business options, opportunities, or performance by assessing and measuring the critical performance factors of programs or projects on environmental efficiency and SSCs for the SDGs.
4. The reports of dashboards and scorecards are not meant to replace traditional financial or operational reports, and the NNM does not replace and does not touch the normative and regulatory definitions and systems, however it is noted that they can be contradictory in some cases. Likewise, the NNM does not touch or replace Key Performance Indicators (KPIs) or AI taxonomy. Over the course of time all legally binding AI taxonomies will undergo some changes when under the scrutiny of regulatory processes. Especially in the coming months, when the EU Artificial Intelligence Act (AIA) and afterwards the European and national newly formed AIA authorities start their work, they will develop a new binding administrative and legal system on AI. This will be globally answered by equivalent legal and regulatory policies and actions by the leading powers in the global competition. Any kind of AI has a Dual-Use character (e.g. civil and military/humanitarian law), at least for some of the global super-powers, and AI can always be a case of export – restrictions.

6.1.2 Neutral navigational matrix structure in detail

6.1.2.1 The levels

- Level 1 corresponds to the data development globally or regionally from below Zeta 1 to expected Zeta 37.
- Level 2 corresponds to the computing power in estimation along “Moore’s Law,” when developing into light and Quantum Computing.
- Level 3 corresponds to the Malik – Law of Simultaneity, i.e. “Everything with Everything connected”.

Levels 1 – 3 are important when a specific piece of legislation refers to them, which will be the case for any type of legal risk assessment in the coming years.

All these factors are discussed in legal documents, like the EU White Book on AI, but – as of today (2022) not formally integrated in legally binding regulatory systems.

6.1.2.2 The Technological Fields and Domains

It is important to keep the three levels of the NNM in mind, when browsing through the structure of the color – coded technological fields and domains:

- Neural Network Computing
- Extended Cognition
- Neural Interfaces
- Augmentation
- and so on...

These color-coded technological fields include the 88 chapters of the Canadian Policy 13 [b-Canadian Policy Horizon] used by the Austrian Government and can be replaced by any other legally reliable taxonomy on technological fields, for example by NATO, or the Chinese Academy of Sciences. This flexibility is a major benefit of the modular construction of the NNM.

It might even be an advantage, when a city planning authority in Riyadh, Mumbai or Singapore compares different versions of our NNM, parallel using European, US or Chinese Taxonomies on technological fields or domains.

6.1.2.3 The AI taxonomy

The taxonomy is based on the common European working definitions as used in preparing the 9th EU Framework Program on Research, and their Normative and Regulatory chapters including the Dual – Use fields regarding the DG Space and Defense [link to reference incoming]. Therefore, they can be used likewise in all kinds of applications within the EU according to the Artificial Intelligence Act (AIA), as well as on applications regarding international humanitarian law.

6.2 Guidance on the use of the matrix the neutral navigational matrix [Annex A]

This matrix incorporates the state of the art of AI systems worldwide, and hence offers a global image, claiming that it is a tool that can be used by policymakers, city planning authorities, project managers, private sector companies, parliamentary or governmental bodies, lawyers, scientists, and any other relevant stakeholders to develop and evaluate regulation and legislation concerning AI.

This matrix combines AI taxonomy, with latest AI regulations, and can be used as a tool to navigate and orientate planning process on project related to on AI and the SDGs. Taking the example of an urban planning authority, this matrix can be used to answer to public tenders. This tool lays between reporting and towards KPIs: The second step would be to use the KPIs.

6.3 Use cases illustrating the use of Neutral Navigational Matrix:

The city planning authorities around the world, and from different regions, taking example from Riyadh, Mumbai or Singapore, can run their programs or projects of SDGs on SSCs into the respective technological field and look for the normative systems and regulatory frameworks that apply to this particular field.

This is methodically similar to medical scorecards in the use of a triage system, when e.g. patients have to be transferred – maybe prioritized – from traditional hospital units to special intensive care unit, for example for Covid-19 patients.

In these medical scorecards, you operate within your system of medical *lege artis* standards (and the equivalent for medical treatments *lege artis* would be the KPIs in the world of SDGs on SSCs as well as the formal legal system of laws and regulations) and in your regional medical care and hospital system. Both can and do change over time, as medical science is constantly evolving, just as hospital

organizations change from time to time. However, you have a valid and neutral navigation map or matrix, both in the example of medical triage and when you align your AI4EE projects or programs in their respective technology area or domain with the regulatory system for AI.

Annex A

Neutral Navigational Matrix for AI driven Technologies for Smart Sustainable Cities

(This annex forms an integral part of these Technical Specifications.)

[Excel document]

Bibliography

[b-Canadian Policy Horizon]

Canadian Policy Horizon (2013)
<https://horizons.gc.ca/en/resources/>

[b-EU]

9th EU Framework Program on Research, and their Normative and Regulatory chapters including the Dual – Use fields regarding the DG Space and Defense, from discussions and debates held at the European Union level.
