CIGRE Study Committee C2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG [1]N° C2.42	**Name of Convenor: Antoine MAROT (France)**
Strategic Directions #[2]: 1,2	**Sustainable Development Goal #[3]: 9**
The WG applies to distribution networks: ☒ Yes / ☐ No	
Potential Benefit of WG work #[4] : 2, 3, 4	
Title of the Group: The impact of the growing use of machine learning/Artificial Intelligence in the operation and control of Power Networks from an Operational perspective	

Scope, deliverables and proposed time schedule of the WG:

Background:

As the complexities of operating a modern power grid grow, more and more parties within the end to end energy lifecycle are turning to either machine learning or Artificial Intelligence - AI to assist in managing these complexities, given the digitalization of the system and larger computational resources. This is true from consumers and large-scale users being offered services to manage their energy usage to suppliers and generators utilising advanced algorithms to optimise their portfolio. Also new entrants are more likely to be from non-traditional energy background who could be not so familiar with utilising advanced computational techniques.

This utilisation is not just limited to the downstream operations, distribution and transmission utilities are also exploring the usage of these new technologies to optimise their demand and generation forecasting to outage planning or to help operators with decision making support tools.

In the financial markets, in which the use of Machine Learning/AI has become the norm, both the World Economic Forum (WEF) and the British Financial Stability Board have issued concerns about the growing usage of the technology, and its elimination of human judgement. The loss of the human in the loop is reducing operational understanding of the impact of potential outcomes decided by the AI.

Therefore, it is becoming critical and operationally important to all to understand the level of maturing and adoption of these technologies, their requirements, potential future growth areas and the risks and impact of their usage. We need to better understand which information are being used to making operational decisions resulting from a Machine learning/AI process, to better understand and manage any associated risk and impacts.

Scope:

The aim of the WG is to create a TB that will inform the industry concerning the potential impact on system operations of the current state of the art related to the technologies above mentioned, where the industry wants and needs to move to, what the future holds and how operationally we may take advantage of these technologies as well as understanding their risk and impacts. The scope of works includes the following:

1. An impact assessment on System Operations and Operators of this usage and the identification of key associated risks.

2. What is their potential for assisting in Decision making in System Operations and any vulnerabilities they need to overcome? Comparisons with ongoing developments in other industries would be considered.
3. What are their requirements in terms of digitalization, data and IT processes and which new practices are needed?
4. Capture any operational learning or experiences so far so that all can share and take advantage of this knowledge.
5. What are the current trends for further development in this end to end energy cycle and the technology?

Remarks: Undergoing D2.52 WG "Artificial Intelligence Application and Technology in Power Industry" will bring complementary perspectives to this C2.42 WG. Those two WGs will maintain a liaison with one another to share updates and develop any relevant collaboration.

Deliverables:

☒ Technical Brochure and Executive Summary in Electra
☒ Electra Report
☐ Future Connections
☐ CSE
☒ Tutorial
☒ Webinar

Time Schedule: start: January 2022 **Final Report**: January 2024

Approval by Technical Council Chairman:

Date: December 14th, 2021

Notes: [1] Working Group (WG) or Joint WG (JWG), [2] See attached Table 1, [3]See attached Table 2 and CIGRE reference Paper: Sustainability – at the heart of CIGRE's work. [4] See attached Table 3

Table 1: Strategic directions of the Technical Council

1	The electrical power system of the future reinforcing the End-to-End nature of CIGRE: respond to speed of changes in the industry by preparing and disseminating state-of-the-art technological advances
2	Making the best use of the existing systems
3	Focus on the environment and sustainability (in case the WG shows a direct contribution to at least one SDG)
4	Preparation of material readable for non-technical audience

Table 2: Environmental requirements and sustainable development goals

	CIGRE selected the 7 SDGs that are the most relevant to CIGRE. In case the WG work refers to other SDGs or do not address any specific SDG, it will be quoted 0.
0	Other SDGs or not applied
7	**SDG 7: Affordable and clean energy** Increase share of renewable energy; e.g. expand infrastructure for supplying sustainable energy services; ensure universal access to affordable, reliable, and modern energy services; energy efficiency; facilitate access to clean energy research and technology
9	**SDG 9: Industry, innovation and infrastructure** Facilitate sustainable infrastructure development; facilitate technological and technical support
11	**SDG 11: Sustainable cities and communities** Increase attention on sustainable and resilient buildings utilizing local (raw) materials, power for electric vehicles, strengthening long-line transmission and distribution systems to import necessary power to cities, developing micro-grids to reinforce the sustainable nature of cities; protect and safeguard the world's cultural and natural heritage; reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and waste management
12	**SDG 12: Responsible consumption and production** E.g. Promote public procurement practices that are sustainable; address reducing use of SF6 and promote alternatives, encourage companies to adopt sustainable practices and to integrate sustainability information into their reporting cycle, address inefficient fossil-fuel subsidies that encourage wasteful consumption
13	**SDG 13: Climate action** E.g. Increase share of renewable or other CO_2-free energy; energy efficiency; expand infrastructure for supplying sustainable energy; strengthen resilience and adaptive capacity to climate-related hazards and natural disasters; integrate climate change measures into national policies, strategies and planning; improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
14	**SDG 14: Life below water** E.g. Effects of offshore windfarms; effects of submarine cables on sea-life
15	**SDG 15: Life on land** E.g. Attention for vegetation management; bird collisions; integration of substations and lines into the landscape

Table 3: Potential benefit of work

1	Commercial, business, social and economic benefits for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical directions
5	Guide or survey related to existing techniques; or an update on past work or previous Technical Brochures
6	Work likely to contribute to improved safety.