CIGRE Study Committee C2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG N° C2.39	**Name of Convenor:** Jayme Darriba Macêdo (BRAZIL) **E-mail address**: jayme@ons.org.br
Strategic Directions #[2]: 1 and 2	**Technical Issues #[3]: 5**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 1, 3, 4, 5	
Title of the Group: Operator Training in Electricity Grids at Different Control Levels and for Different Participants/Actors in the New Environment	

Scope, deliverables and proposed time schedule of the Group:

Background:

Today power systems worldwide are becoming more and more complex, and can be characterized by a high and expanding penetration of distributed generation, mostly from renewables, into the transmission and distribution networks. Apart from the inherent uncertainty associated ditributed resources, new operation issues concerning adequacy, and the need for flexibility, stability and resilience also come to the focus. Emergence of new markets and services (joint use of reserves, Demand Response, Virtual Power Plants, storage, etc.) are calling for additional regulation, control structures and interaction schemes between the participants/actors, which often cross the national border. Rapid introduction of electronic based devices and systems within the basic infrastructure segment (like FACTS, HVDC, SVC, STATCOM) and within measuremment, protection and control segment (like Intelligent Electronic Devices, PMU, smart meters,etc.), together with the number of new control center applications (like advance dispatching tools, Dynamic Line Rating, Wide Area Monitoring System, Geographical Information System, lightning detection systems, RES forecasting, etc.) add to the overall complexity and makes daily work of the transmission and distribution system operators more demanding. Given the increased tasks related to regional coordination, balancing and the interoperability between distribution and transmission systems, the training program for employees in charge of real-time operation must address at least aspects related to coordination of inter-TSO operations, market arrangements and transmission-connected (DSOs and Significant Grid Users - SGUs) issues.

The amount of data received and the pace of increased control centre applications represent a new challenge in relation to the recent past, not only in the operation of the systems, but also in the tasks of Operator training. There is a risk that an over-dependence on these systems may result in decreased capability or readiness to react of operators, thus requiring more training.

To minimize these effects, TSO/ISO/DSO and other participants/actors operator training practices have to be revised and improved, with new training environments introduced, probably based on advanced distributed grid simulation. Any new training environment clearerly has to be adequate to address existing and future challenges.

Scope:

The main scope of work of this WG will be focused on **operator training at different control levels and for different participants/actors in electricity grids exposed to new challenges. It will define basic requirements for new training environment**, it's content, delivery and training tools, preferably of the **distributed grid simulation type**, all using a systematic approach framework aimed at operator better decision making in this new environment.

In line with the above motivation and background, based on CIGRE earlier work presented in TB 524 (2013) and more recently in TB 677 (2017) and TB 700 (2017), the new WG is planning the following:

1. Considering the future environment and conditions that operators will need to control/operate, including future operational and regulatory issues, among which: regional cooperation, TSO-DSO interaction, EU Network Codes, and what will be the possible challenges.
2. Considering the binding requirements to fulfill policies and regulations in force.
3. Identifying the future complexities for operational decision making and daily operators work, what type of training environment including training tools will need to be available to improve the process.
4. With a current level of complexity in mind, and more so for the near future, it is expected that such a training environment will be (in part) based on distributed grid simulation methods and tools. WG will try to define basic requirements for such an environment and distributed grid simulator.
5. When this operator training environment has been specified, what is the final assessment process for operator Evaluation/Certification.
6. Identifying approaches and solutions for effective joint training at different control levels and for different participants/actors, employing above training environment.
7. Identifying other non-technical training is essential for operators (soft skills, like stress management, motivation, responsibility, communication, leadership and negotiation; knowledge of English, etc.).
8. Training for operation resilience increase (definitions and needs for training), including practices in emergency and restoration states.

During the work phase, every activity from the list above will be developed and prospected in more detail. Methodology planned for execution of the activities specified will be based on:

- Domain search and analysis
- Internal WG survey about existing experiences regarding challenges in training
- Possible improvements in training environment and tools
- Drafting requirements, findings and conclusions
- Brochure and summary drafting and their revision when needed.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☐ Electra report

☒ Tutorial[5]

Time Schedule: start: August 2018 **Final Report**: December 2020

Approval by Technical Committee Chairman:

Date: 18/03/2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit 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 direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit