

SmartGrids WG2 Network Operations
Coordinator: Tahir Kapetanovic

Minutes of the Workshop of 7th April 2006

Chair: Tahir Kapetanovic

Rapporteur: Remigiusz Warzywoda

**Key note Speakers: Magdalena Wasiluk-Hassa, Joao Baptista, Carlo Sabelli,
Bernd Michael Buchholz, Ronnie Belmans, Jürgen Schmid**

The scope of the workshop on SmartGrids Network Operations has been presented by T. Kapetanovic. The focus is on the key Network Operations research topics from the draft SRA¹ (Table 1).

Research topic	->2015	2020+
1. Seamless SmartGrids	▶ ▶	
2. Development of ancillary services and balancing markets	▶ ▶	
3. Global regulatory framework for SmartGrids	▶ ▶	
4. Advanced real-time forecasting techniques	▶ ▶	
5. Architectures/tools for operation, restoration, defence plans	▶ ▶	
6. Efficient, secure and reliable data / information exchange	▶ ▶	
7. Long distance power supply chain	▶ ▶	▶ ▶
8. Sustainable power supply incl. low-level dispatching	▶ ▶	▶ ▶
9. Advanced operation of the high voltage system	▶ ▶	▶ ▶

Table 1: Network Operations research topics in the first draft SmartGrids SRA

The topics from the Table 1 are discussed within the scope of the following key aspects:

1. Vision of the SmartGrids Network Operations in the future
2. Customer needs and opportunities in light of Network Operations

¹ The scope of the WG2, work and deliverables so far and the details of the initially identified research topics in the first draft SRA are contained in the Annex 0, "00_WG2_sra_presentation_off.ppt"

3. Evaluation of the cost-effective validation projects
4. Risks and solutions to secure success of the Network Operations projects and research topics

The workshop is organized into four sessions in which each of the above four key aspects is discussed. The discussion in each session is opened by a short keynote. The results of the discussion are recorded in the minutes and will be used (as the inputs from the Network Operations) in the further development of the SmartGrids SRA.

Workshop Topic 1: The Network Operations Vision – sharpening our insights

The keynote of the Topic 1, *“Do you share the Vision for Electricity Networks of the Future and how might the vision be refined ?”* has been presented by Magdalena Wasiluk-Hassa, Joao Baptista and Carlo Sabelli.

The experiences from the present network operations practice have been summarized. The restructuring of the electricity supply industry as the consequence of liberalization and market opening leads to higher general demand on “more” transmission and distribution. The effects of the increased distributed and intermittent generation, cross-border trade and changed behaviour are visible in the increased congestions, more stress of the network, more demand for balancing and reserve services. In order to meet the market needs and maintain the operational security of the network, a number of issues need to be addressed accordingly, including among others: new models and tools for strengthened cooperation of TSOs and DSOs, changing the way distribution networks are operated, giving the grid users (customers) more active role e.g. in demand response and balancing services, harmonizing operational concepts, introducing a supra-national coordination centre for the specific control needs of the very large synchronous areas.

The keynote presentation is contained in the Annex 01, “01_Workshop2_Vision.ppt”.

Discussion

- A question was raised and needs to be investigated, whether the electricity systems of the future will be large synchronous areas or desynchronized islands?
- SmartGrids shall further focus on the flexibility and accessibility.
- SmartGrids shall concentrate on resolving the problems of loop flows and operational security of the supply.
- We need adequate equipment which means costs – the important question to be answered, in particular within the framework of the liberalized market is, how to cover the costs?
- It was proposed to put Point 5 of the present Network Operations SRA (Architectures /tools operation) on the top of the list of priorities to start with the research work.

- First architecture and tools shall be defined than the tools evaluated (among others communication requirements, grid codes, etc.).
- Standardized communications shall include not only protocols but also applications, human communication and coordination, etc.
- We are solving problems of the future with “today tools”, we shall use better tools, i.e. try to identify what tools will we have available in the future
- We shall not be solving the problems of today. Our task here is to identify the ideas and long term research visions / needs, we shall not focus on the details.
- We shall extend and broaden our considerations of both transmission and distribution networks. We might have a situation where for economic and market reasons we need to enlarge and interconnect bigger systems, whereas the operational security conditions might prevent us from that.
- More focus on distribution, regulation and interfaces between transmission and distribution
- The question was raised on who will be network operator in the future electricity networks → the future network operator needs to become a service provider. Migration to that new model of network operation needs to be considered appropriately

Finally, we shall consider also how much the business model (e.g. large synchronous area vs. smaller islands) impacts the network operations of the future.

Workshop Topic 2: The Customers of Network Operations – anticipating their needs and opportunities

The keynote of the Topic 2, “*Are the needs of customers adequately identified and how will these differ in the future from those of today? Are the strategic topics aligned with these needs and is the ranking proposed consistent with the user’s priorities?*” has been presented by Bernd Michael Buchholz.

Customer needs and opportunities in relation to network operations have been highlighted, assessing also how the customer expectations might be affected. The issues addressed include prices, reliability of supply, voltage quality, service quality, bearing in mind particularly the different roles and responsibilities of various players in the liberalized electricity markets.

The keynote presentation is contained in the Annex 02, “02_Workshop2_Customers.ppt”.

Discussion

- Economic incentives and drivers for the customer must be considered appropriately – economic drivers will finally guide the customer behaviour.
- The costs of generation and thus impacts on what generation is run will obviously impact the network operations and thus make it dependent on the customer behaviour (i.e. as the generators are indeed customers for network operations)
- We need further to investigate how to ensure that renewable energy generation becomes more firm in their bids and participation e.g. in balancing markets. For that, probably the appropriately designed financial tools to incentivise the renewable generation appropriately might be needed to be implemented in line with the adequate regulatory framework.
- Addressing small customers: Average small customer is used to have certain level of quality and reliability and will in the future for that need more frequent information (i.e. advanced / intelligent metering system). What a consumer in the future needs most is motivation, but as said already, this is mainly the issue of financial / economic effects, Furthermore, this issue is addressed in the WG3 too.
- Customer in principle require low prices for electricity and reliability. The question is raised how SmartGrids will be operated if the prices increase and/or differ drastically; this would require a thorough economic analysis.
- Who is the Network Operations customer in 2020? Customer will change. Generators are customers. Distribution companies are also customers of network operations (at the transmission level) and otherwise, the TSOs might even become customers in certain aspects of network operations, of the distribution grid operators. There exists a strong need to identify customer and more generally stakeholders in 20 years. There is then a related need on research of changed network operations under the changed customer needs.
- Impact of smart metering (AMM, AMR) on network operations is discussed together with the WG3.
- Customers want also stable prices. One thesis is that the most of customers in the future will probably be the same as today or have at least the same kind of requirements. Impact of the dynamic tariffs needs to be considered in the future network operations models.
- Stakeholders of the future should help customers. Agregator (energy service provider) should give some services to the customer → this will be addressed together with the WG1 and WG3.
- All customers presently get the same level of quality of supply. Can we make different levels of quality of supply ? Not all the customers desire / need the same quality → to be addressed also with the WG1

- Consider using demand and generation in balancing → this is partly already covered in the Network Operations parts of the SRA.

Finally, a proposal was raised that we should try to define Power Quality that everybody is interested in (distribution) . Not to be “too good” (to costly) but also not “too bad”.

Workshop Topic 3: Evaluation Projects – achieving cost-effective validation projects

The keynote of the Topic 3, “*What are the characteristics of a successful validation project, how might it best be structured as regards collaborative partners, funding, location and so on?*” has been presented by Ronnie Belmans.

The issues addressed in the keynote include: research into grid operation and getting to a R&D portfolio, stakeholders expectations, strategic and economic benefits, relation of R&D to legal / regulatory framework and regulators and finally, future organisation of R&D.

The keynote presentation is contained in Annex 03, “03_Workshop2_Validation_Projects.ppt”.

Discussion

- The question of relating the cost of investments to the social costs of network operations aspects has been raised.
- Efficient measures / methodologies need to be applied for the practical project evaluation.
- It is obvious that a successful project must have clearly defined output and deliverables – this has already been emphasized and considered in all the inputs and proposals in the present SRA draft, i.e. only those topics were considered potential “candidates” where clear output/goal orientation was identified.
- We shall avoid any misleading “pre-conditions” like e.g. consortium vs. only one company as a pre-condition for consideration of a particular proposal. Therefore, a twofold view is necessary:
 - We shall on one hand consider the project size and its value for as wide as possible audience and/or number of stakeholders
 - We shall not, on the other hand neglect a specific project just because of its (small) size
- Some workshop participants see that the workshop and discussion is largely oriented towards network / system operators – however not only TSOs/DSOs, but also many other different parties are (and will be even more) involved in the network operations today and in the future.

- One of the key issues is whether SmartGrids and related Network Operations would be able to accommodate (connect efficiently and successfully) generation based on renewable sources to the grid.
- Since not all kinds of projects are able to deliver in all scenarios, we must very sharply and clearly define which projects are absolutely necessary for as wide as possible scope of visions (of SmartGrids Operations in the future) – therefore, the project must be integrated and coherent; one important criteria shall be whether the project related to as many as possible scenarios.
- A question has been also raised on how to increase renewable generation to a maximum – SmartGrids Network Operations cannot have such an objective, but non-discriminatory treatment of all users for grid access and connection must be ensured at all times. This seems a more fundamental issue that needs to be considered in all related discussions and projects.
- We need to identify which projects need to be tackled first. Some ordering should be done. First we have the list. Then we have to think what have to happen first. If we start all the projects in the same time we will have huge mess → ordering and prioritizing will need to be done after the pre-selection of the projects
- System operators have options available to implement (quickly) if the future goes in different direction. As an opposite of doing large investments it might be better to wait to make right investment in the right time → we will not start huge projects based on some scenarios that have low chances to happen.
- We shall also consider, how industry can use the results. We are not considering Network Operations only for the European network operators. Results can be used and implemented by the industry in different and efficient ways.
- We shall make network operations cheaper and more efficient - for example operate network to reduce losses. In that sense, selecting a project that does not contribute to increased efficiency shall be skipped.
- We shall obviously think globally, but try to act practically at the local and regional level.
- In that senses, we shall address Showstoppers – i.e. most important priority issues first. This is also closely related to the appropriate sequence of the events.
- Finally, also carbon reduction potential (e.g. reducing losses, etc.) of a project needs also to be considered in the definition of selection criteria.

Workshop Topic 4: Risks & Solutions – securing success

The keynote of the Topic 4, “What are the risks that may prevent the realisation of the vision of SmartGrids Network Operations and how might the SmartGrids Flexible Framework best be developed to eliminate or minimize those risks?” has been presented by Jürgen Schmid.

Discussion

- One of the biggest risks tackling the e.g. architecture and tools first is in having again the “same club of players” doing it as has been doing it before.
- It is further important to involve the people with the appropriate and needed skills, which will be able to conduct and successfully complete the project.
- We need to consider at the same time both, the future prospects and technology
- On general level: for projects but also for the deliverables education is important.
- Architecture is one of the priorities in the scenarios. Maybe it would be good to have several scenarios and than work each of them in detail through, with the system operators.
- We have to take into account ICT aspects, i.e. also consider the insecure or not known changes in ICT technologies on the development and future of SmartGrids network operations.
- We can manage the risks better when we analyse the required outputs, i.e. we have to be output oriented – as already emphasized this aspects has been already carefully considered in the System Operations discussions within the scope of the SRA draft so far.
- How we get on from where we are now to the vision → we need to have the roadmap - how do we implement, when and what, in which timeframe. No project should be proposed without clear migration path (“we cannot switch the Network Operations off and then upload the new version ...”)
- Make sure that demonstrator projects share the same architecture and are coherent with other projects too.
- We are presently considering regional markets. One of the important views to avoid risks is ensuring coherence and common approach throughout a region for the defined project.
- As appropriate, the link shall be established with other organizations like e.g. CIGRE.

In relation to the Network Operations topics and in line with the discussions of the workshop, a conference on “Power System Vulnerabilities and the Role of ICT” on 15 June 2006 has been



announced by Mr. Stefanini of the JRC. The conference details are enclosed in Annex 04 "04_flyer_conference_060615.pdf"

The discussion has been concluded by T. Kapetanovic.

The summary and highlights of the WG2 workshop (presented to the GA in the afternoon after the workshop) are contained in Annex 05 "05_Workshop2_Rapporteur_highlights_060407.doc".