Strategic Priorities for Information Systems Issues

Members

Robert Evans, Convenor (AU), Kjell Arne Barmsnes (NO), Aleksandar Car (RS), Göran Ericsson (SE), Mogamat Ziyaad Gydien (ZA), Jan Ing Konrád (CZ), Jeongjoon Lee (KR), Naoko Mori (JP), Christophe Poirier (FR), Ari K. Silfverberg (FI), Jens Tobias Zerbst (SE).

Introduction

CIGRE Study Committee SCD2 covers both Information Systems and Telecommunications issues as they relate to Electric Power Utilities (EPUs). The scope of the Information Systems arena includes both operational systems such as Energy Management Systems (EMS), Distribution Management Systems (DMS), Generation Management Systems (GMS) and generic SCADA, Smart Grid and Networks of the Future applications as well as business systems such as market, maintenance management (MMS) and business applications. Overall issues such as cybersecurity and information system governance are also very important scope examples.

The purpose of this WG D2.01 report is to describe the current strategic priorities for SCD2 in the Information Systems arena.

SCD2 Working Group WG D2.01 conducted a global survey in 2013 to determine the priority operational and business information systems issues for EPUs.

The survey was distributed by WG D2.01 and SCD2 members. A number of SCD2 members further distributed the survey to their own CIGRE National D2 Committees or their CIGRE National Committee members and either sent back collated or individual results.

There were 44 separate formal responses received representing 18 countries. The breakdown of respondents per country is shown in Figure 1.

The breakdown of the Electric Power Utility (EPU) sector background of the respondents is shown in Figure 2. Note that the total number of respondents in this chart is greater than the number of formal respondents because some of the companies represented cover several EPU sectors due to vertical integration.

Respondents were asked to rank the importance of each issue according to the following rating scale shown in Table 1.
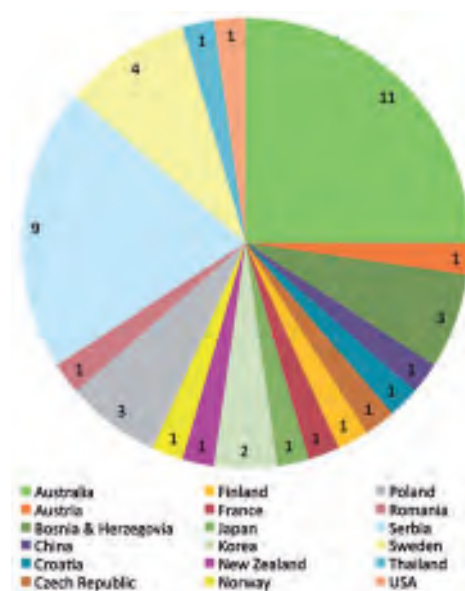

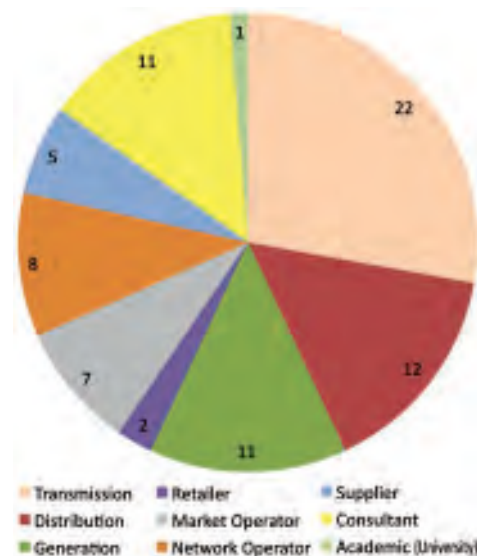Figure 1 – Country origin of survey responses

Figure 2 - Sector representation of survey responses

RATING SCALE	
Number	**Meaning**
0	Not important – waste of resources
1	Slightly relevant but low in priority
2	Reasonably relevant but not high in priority at the moment
3	Worthwhile topic for a CIGRE Working Group
4	Very worthwhile topic for a CIGRE Working Group
5	Highest priority topic for a CIGRE Working Group

Table 1 – Rating scale used in survey

The raw scores across all respondents were added up to form the totals for each issue. The higher the score, the more important the issue is with respect to the survey population.

Results

The results of this survey are presented in Table 2. Only the highest priority issues are shown.

The data were also analysed from the perspective of separate utility segments to see if the priorities were different. Although the same issues were still highly ranked in the list, the priority order varied. No predictable observations could be made.

Analysis

The results have been represented according to potential themes in Figure 3.

The purpose of this process is to prioritise the most important themes that could form the basis for new SCD2 working groups. It

is unlikely that there would be the resources available to start more than 2 or 3 new working groups and hence this analysis restricts itself primarily to the first 4 themes. However as each theme is developed, further sub-issues may be added to the scope of these themes.

Theme 1 – Cyber security for evolving EPU business and operational practices and risks.

EPUs are moving in new operational directions as a result of changing business practises and the opportunities and pressures presented by evolving mobility technologies. Additionally there is general growth of the cyber threat landscape. This theme, the highest ranking one, includes the following streams:
1. Secure remote control of critical infrastructure
2. Secure use of mobility technologies for operational and business purposes.
3. Cyber security incident response by EPUs.

The first two topics deal with two issues where many EPUs are trying to decide how to act. Is it possible for EPUs to securely go down these paths and if so what would be the appropriate reference models and other controls that would lead to solutions with acceptable risk?

Some of the lower ranked themes (Case studies – mobility and applications and issues - mobility) could potentially be partially covered in subtopic 2.

It is proposed to establish a successor to the current WG D2.31 with parallel streams covering a number of these subtopic areas. WG D2.31 will complete its work at the end of 2014.

The model of establishing a number of parallel streams within the overarching cyber-security working group has proved •••

| Issue - Long Name	Score
Remote control of critical infrastructure - cyber security reference models and controls.	168.5
Emerging Smart Grid Applications and Issues. (Evolution beyond Advanced Metering)	166.5
Cyber-security reference models for securing information systems against new vulnerabilities caused by mobile devices and social media systems.	163.0
Situational aware prioritization and presentation of large amounts of information for trading and SCADA applications	161.0
Case studies on the EPU use of SOA (Service Oriented Architecture) and CIM (Common Information Model)	158.5
Reliable access to mission critical data	154.0
Case studies for the use of mobility devices and applications	152.0
Integration of communications and Information Systems both operationally and in design. (Including organisational structures, skillsets, cultural issues)	149.5
Cyber security response by EPUs - framework for a tool that EPU operators can use to automate their response to a cyber-initiated threat.	147.5
New operational and business applications and issues for EPUs caused by the explosion in mobile device technologies (iPads, iPhones, Androids, etc.) and social media systems (Facebook, Twitter, etc.)	146.5
Management of privacy issues in the Smart Grid	144.0
Use of IEC 61968 (CIM for distribution systems)	138.5
Efficient data structures	137.0
Processing vast amounts of data	126.0

Table 2 – Summary of ranked survey results
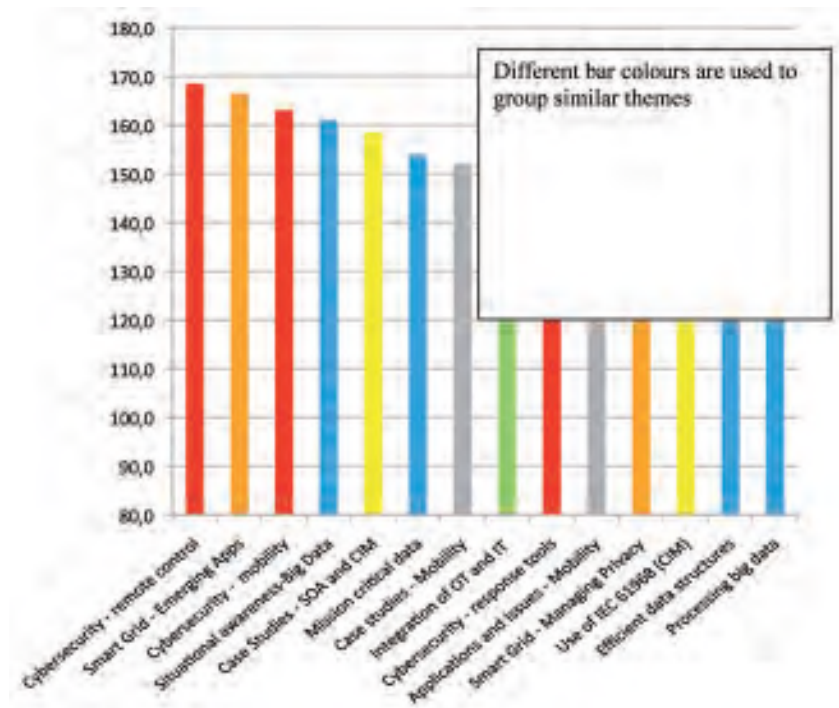
Figure 3 – Thematic grouping of survey results

successful with the SCD2 security working groups in establishing a critical mass of specialists for the exchange of ideas while still covering a number of specific topic areas.

WG D2.31 is currently covering the topic of remote access for maintenance purposes as one of its study streams. This will form an important input for the study of remote access for control purposes.

The third cyber security topic is about equipping an EPU with the tools to deal with a major cyber-initiated event. What tools exist or could be developed to make it easier for EPUs to recognise and respond to increasingly complex cyber security threats and to manage their incident response?

Some other cyber security topics suggested in the survey include;

➤ Management issues encountered by members in the PKI design for smart metering components, certificate security addressing communications security. The question of certificate management is relevant to mobility devices and the principles could be included in the main cyber-security working group scope.
➤ Security of market bidding systems exposed to the internet. Again this topic is similar to some of the security principles for remote control access, and this stream could be expanded to: "Secure access for remote control of critical infrastructure and for remote trading on market systems."

Theme 2: Emerging smart grid applications and issues

Emerging Smart Grid applications is the next most important theme, and in reality close in score to the cyber security one.

This theme drew out several suggestions for possible smart grid applications and issues to cover. Some examples are quoted from the survey;

➤ Data integrity and integration between systems, e.g. rating information feeding automatically from asset systems into SCADA or market platforms.
➤ Network applications such as detection of loss of neutral, phase identification, voltage profiling, reverse power flow (solar), power utilisation factor.
➤ Customer management, billing, responding to customers.
➤ Detection, analysis and prevention of transient and dynamic events in smart grids. The high complexity of smart grids (lots of intelligent devices and elements exchanging information in real time) can cause effects unknown in the "traditional" grids. Techniques and tools to identify, analyse and prevent these events need to be developed.

There is a related subtopic relating to the need to deal with privacy issues in relation to the Smart Grid.

Theme 3: Situational aware analysis and presentation of EPU operational and trading data.

This topic brings together four of the data themes impacting EPUs.

EPUs are being bombarded by a massive growth of data which is different from conventional IT data in that much of it needs to be analysed in real time to enable effective operational or trading decisions to be made.

At the SCD2 session in the CIGRE 2013 Lisbon Symposium, there

was a very interesting presentation Advanced Utility Analytics with Object-Orientated Database Technology1 which demonstrated that by using Phasor Measurement Unit (PMU) data and object orientated database technology, situational awareness of the 2003 Cleveland separation in USA could have been created up to an hour before the situation became irreversibly unstable.

Control room SCADA, smart grid applications or trading applications are other potential sources of large datasets requiring real time or near real time processing and situational aware presentation to enable decision making in critical situations.

There were supportive comments in the survey about this theme.

Theme 4: Managing EPU information systems complexity and costs including the EPU use of SOA (Service Oriented Architecture) and CIM (Common Information Model)

This theme is important to several respondents and could form the basis of a future working group. There were several working group volunteers for this area.

There were quite a few comments requesting the sharing of actual case studies in this topic area.

The work done by WG D2.24, EMS for the 21st Century 2, is an important reference for this topic area.

It appears to be an area where a number of EPUs are currently working and there would be benefit in forming a working group to share knowledge if a critical mass of members and a convenor could be attracted.

Strategic direction

As a result of this survey, the following strategy is presented as the strategic direction for the formation of SCD2 information system related working groups in 2014/2015. It is possible for some of these themes to be combined or remain as single topics depending on the availability of resources.

Working Group "A": Cyber security for evolving EPU business and operational practices (including mobility and remote control).
- Secure access for remote control of critical infrastructure and for remote trading on market systems

- Secure use of mobility technologies for operational and business purposes.

Working Group "B": Emerging smart grid applications, issues and case studies.

Working Group "C": Situational aware analysis and presentation of EPU operational and trading data.

Working Group "D": Managing EPU information systems complexity and costs including the EPU use of SOA (Service Oriented Architecture) and CIM (Common Information Model)

Working Group "E": A framework for EPU operators to manage the response to a cyber-initiated threat to their critical infrastructure.

Working Group "E" has already been formed (WG D2.38) under the convenorship of Dennis Holstein (USA).

It has been decided by SCD2 to delay the formation of Working Group "A" until later in the year when WG D2.31 completes its current work.

Request for working group members and convenors

WG D2.01 is seeking volunteers for any of the proposed (and current) working groups, including expressions of interest for convenors for Working Groups A, B, C, and D. Please email any expressions of interest to the WG D2.01 convenor, Robert Evans via email address rob.evans@snowyhydro.com.au .

Once leadership and critical mass for a proposed working group is established, the Terms of Reference will be expanded to reflect the specific capability of the available resources and submitted for Technical Committee approval via the SCD2 Chairman.

Technology is continually changing in the information systems arena and hence the priorities require regular reassessment. The reader is invited to send any views on emerging priorities in the information system area to a WG D2.01 member or the convenor so these can be used as an input to the next cycle of the strategic plan development. ■

References

Advanced Utility Analytics with Object Orientated Database Technology, Paul Myrda, John Simmins, Bert Taube, CIGRE Lisbon 2013 Symposium paper 144.
EMS for the 21st Century – System Requirements, CIGRE Technical Brochure 452, WG D2.24, Published February 2011.