# Strategic Plan

# of

# Study Committee B5

## "Protection and Automation"

## 2013 – 2022

# Strategic Advisory Group

| | |
|---|---|
| Iony Patriota de Siqueira | Chairman of SC B5 |
| Rannveig S. J. Løken | Secretary and Webmaster of SC B5 |
| Alex Apostolov | Communication Officer |
| Klaus-Peter Brand | Liaison with IEC |
| Mark Adamiak | Liaison with IEEE |
| Simon Chano | Advisor for Protection and Monitoring |
| Richard Adams | Advisor for New Network Requirements |
| Volker Leitloff | Advisor for Substation Automation and Remote Control |

# Presentation

The strategic plan of CIGRE Study Committee B5 – Protection and Automation, or SC B5 for short, sets out the strategic technical directions to be followed by the B5 Committee over the period 2013 – 2022 in order to address the main objectives set by CIGRE Technical Committee. The plan reviews the governance structure of SC B5 and how it relates to the several phases of the strategic planning, starting with the definition of its business, followed by its vision, principles and mission, and ending with the strategic directives from 2013 to 2022. A SWOT (*Strength, Weakness, Opportunities and Threats*) analysis is conducted to avail the threats and opportunities from the external environment, against the internal strengths and weaknesses of SC B5 to define the strategies. These are then detailed in objectives and goals to be achieved in the planning horizon within SC B5.

This document reflects the views of the Strategic Advisory Group (SAG), with reviews and contributions from SC B5 members, to be submitted to the Technical Committee of CIGRE as the Strategic Plan of SC B5. It is the intention of the Chairman and the Strategic Advisory Group to keep it as a permanent and updated view of SC B5 organization and planning, by reviewing it annually during the SAG annual meeting, or when the international scenario of protection and automation technology presents changes that justify a revision.

Iony Patriota de Siqueira

Chairman of SC B5

# Table of Contents

# 1 - Introduction

## Introduction

Strategic planning is an vital requirement for the success of any organization, be it a public or private, profit or non-profit oriented enterprise, independent of its dimension or finality. Within CIGRE, the Study Committee B5 is a worldwide forum for the elaboration and exchange of knowledge and information in order to facilitate the progress of engineering in the field of the power system protection and automation. Strategic planning helps in attaining these objectives.

Study Committee B5 delivers value by means of synthesizing state of the art practices, developing recommendations and disseminating the information on a worldwide basis.
The Committee covers within its scope: principles, design, application and management of power system protection, substation control, automation, monitoring, recording and metering – including associated internal and external communications and interfacing for remote control and monitoring.

Through the contribution of experts from all regions of the world, the Committee provides a global perspective on the issues and challenges facing the protection of electrical power system. SC B5 positions itself as an independent analyzer of different solutions and provider of high quality unbiased publications and other contributions to the electrical supply industry. Its main target clients are:

- Top and medium local management and technical staff of utilities, suppliers and consultants.
- Universities and Research Centers
- Young engineers.
- Standardization Organizations.

This document defines the strategic planning of CIGRE Study Committee B5 – Protection and Automation, linking to its organizational structure and processes. This Strategic Plan sets out the strategic technical directions to be followed by the B5 Committee over the period 2013 – 2022 in order to address the needs of its clients, following the strategies of the CIGRE Technical Committee. In addition, the Plan outlines the governance strategy of the B5 Committee.

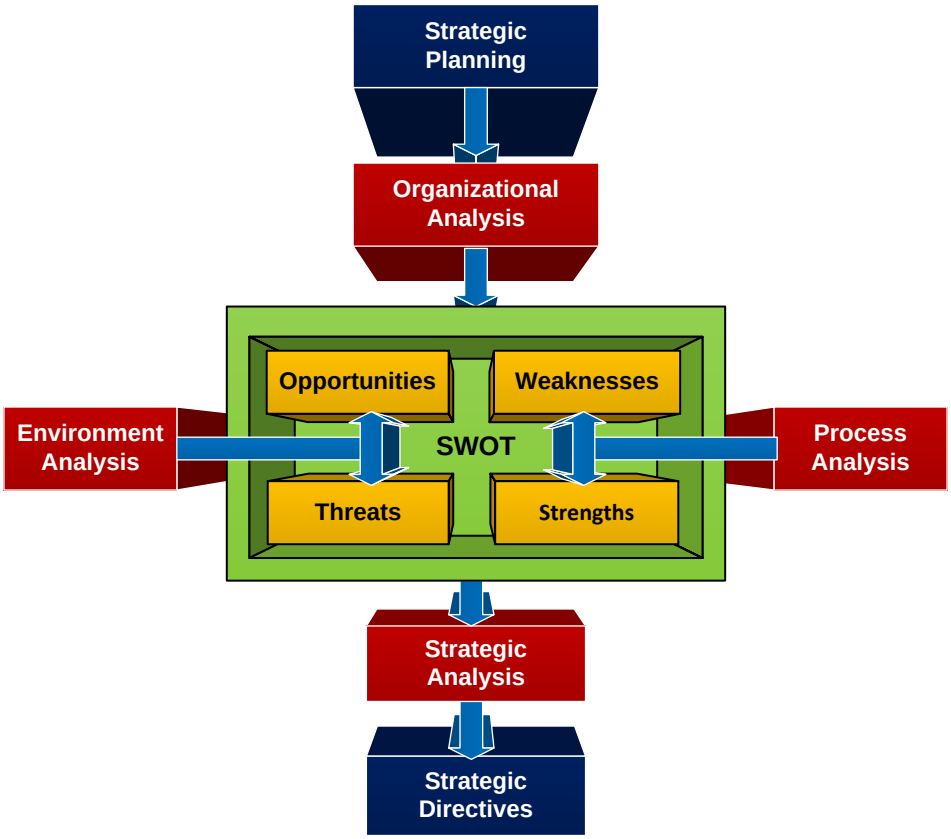
## Strategic Planning

The strategic planning of SC-B5 is the result of several macro processes that link the organizational structure and processes of the committee, to the expertise of its members and external environment aiming to define its strategic directives for the

planning horizon. The following macro processes were considered in the preparation of this plan:

- Organizational Analysis;
- Environment Analysis;
- Process Analysis; and
- Strategic Analysis.

These macro processes are related according to the steps shown on Picture 1.




*Picture 1 – Strategic Planning*

## Organizational Analysis

The Organizational Analysis is a macro process dedicated to a review of the organization and governance rules of SC B5. It contains the description, objectives and responsibilities of each organism in SC B5, and how they contribute to the goals of the committee.

## Strategic Analysis

The Strategic Analysis is the main planning process of SC B5, aiming to support the definition of the business, vision, mission, strategies and directives for the

Committee. It is supported by the macro processes of Environment Analysis, with reviews of the external interfaces, and Process Analysis, with review of the relations to the processes and organization of SC B5, using the SWOT (*Strength, Weakness, Opportunities and Threats*) method, as shown in Picture 1.

## Environment Analysis

The Environment Analysis conveys the examination of the external interfaces and interactions of SC B5. From the external environment this process identifies the threats and opportunities brought by technological evolution to the protection and automation field, and the evolution of the telecommunication, energy market and high voltage equipment that impacts the objectives of SC B5.

## Process Analysis

Process Analysis conveys a review of the internal procedures used by SC B5. The technical and administrative routines of SC B5 are analyzed to uncover its strengths and weaknesses. Major activities, groups and responsibilities are described according to the administrative structure of SC B5.

## Organization

This plan is divided in eight chapters. This first chapter (**Introduction**) summarizes the contents and the process used to generate the Strategic Plan of SC B5, and its division in macro processes.

Chapter 2 (**Organizational Analysis**) reviews the governance structure of SC B5 and how it relates to the several phases of the strategic planning.

Chapter 3 (**Environmental Analysis**) summarizes the opportunities and threats from the external environment, against the strengths and weaknesses of SC B5 in a SWOT matrix, to attain the committee objectives.

Chapter 4 (**Process Analysis**) dismembers the strategies and objectives through the organism of SC B5, describing their inputs, outputs and associated processes.

Chapter 5 (**Strategic Analysis**) describes the results of the planning process, with the definition of the business, vision, mission, objectives and goals of SC B5 from 2013 to 2022.

The last Chapter (**Conclusions**) summarizes the main objectives of SC B5.

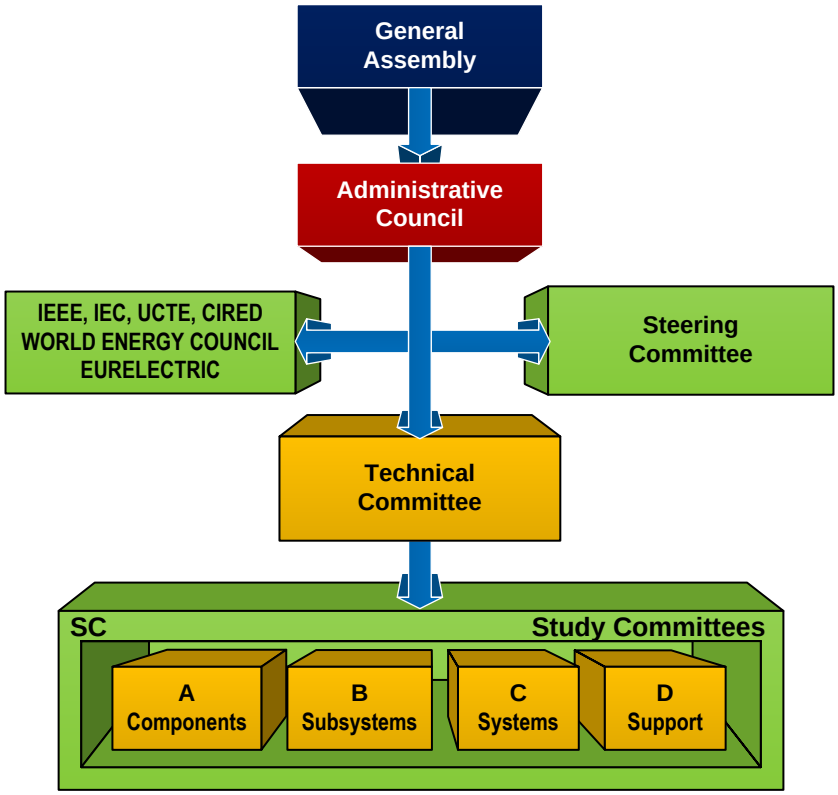
# 2 - Organizational Analysis

## Introduction

The Organizational Analysis identifies the organization and human resources available to SC B5 to attain its objectives. It serves also to associate competences and responsibilities among members and officers of SC B5. This chapter describes the current structure and organization of SC B5, and their relation to the strategic planning.

## Organization

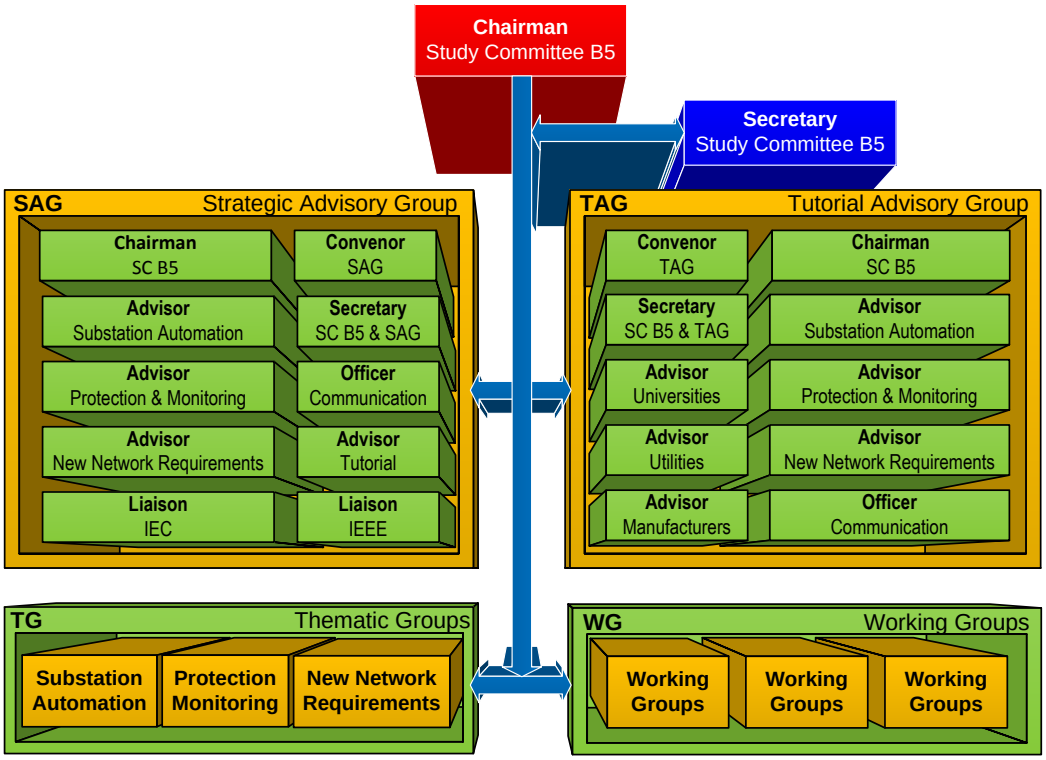
SC B5 is one of the Study Committees of CIGRE, classed in the group of committees dedicated to subsystems, and subordinated to the Technical Committee according to the organization of CIGRE, shown in Picture 2.




*Picture 2 – CIGRE Organization*

## Governance

SC B5 is currently composed of a Chairman, a Secretary, a Strategic Advisory Group (SAG), a Tutorial Advisory Group (TAG), three Thematic Groups (TG), twenty four regular country members, sixteen country observers, and several Working Groups (WG). Picture 3 shows this organization.




*Picture 3 – SC B5 Organization*

## Secretary

The Secretary of SC B5 supports the work of the chairman and the Strategic and Tutorial Advisory Groups with administrative services. The secretary also represents the committee in cases of impediment of the chairman, and serves as webmaster for the SC B5 website.

## Strategic Advisory Group

The Strategic Advisory Group (SAG) advises the chairman about strategic issues related to the activities of the committee. It is composed by the following members:

- Chairman of SC B5
- Secretary of SC B5
- Communication Officer

- Tutorial Advisor
- Liaison with IEEE
- Liaison with IEC
- Advisor for Substation Automation
- Advisor for Protection and Monitoring
- Advisor for New Network Requirements

The Strategic Planning of SC B5 shall be conducted and supervised by the Strategic Advisory Group, with periodic review of the attainment of each directive, and the decision to review the strategic plan.

## Tutorial Advisory Group

The Tutorial Advisory Group (TAG) advises the chairman about the organization and promotion of tutorial activities of the committee. It is composed by the following members:

- Chairman of SC B5
- Secretary of SC B5
- Communication Officer
- Advisor from Universities
- Advisor from Utilities
- Advisor from Manufactors
- Advisor for Substation Automation
- Advisor for Protection and Monitoring
- Advisor for New Network Requirements

The Tutorial Planning of SC B5 shall be conducted and supervised by the Tutorial Advisory Group, with periodic review of the contents and quality of each tutorial, and the decision to review the tutorial plan. The process used by TAG to plan SC B5 tutorials is described in the document “Rules for SC B5 Tutorial”.

## Thematic Group on Substation Automation

The Thematic Group (TG) on Substation Automation organizes the proposals of new Working Groups and Special Subjects related to substation automation for discussion during SC B5 meetings, colloquia and discussion sessions. It is chaired by the SC B5 Advisor for Substation Automation and convenes all Working Group conveners related to Substation Automation and SC B5 members interested in substation automation.

## Thematic Group on Protection and Monitoring

The Thematic Group (TG) on Protection and Monitoring organizes the proposals of new Working Groups and Special Subjects related to protection and monitoring for discussion during SC B5 meetings, colloquia and discussion sessions. It is chaired by the SC B5 Advisor for Protection and Monitoring and convenes all Working

Group conveners related to Protection and Monitoring and SC B5 members interested in protection and monitoring.

## Thematic Group on New Network Requirements

The Thematic Group (TG) on New Network Requirements organizes the proposals of new Working Groups and Special Subjects related to new network requirements for discussion during SC B5 meetings, colloquia and discussion sessions. It is chaired by the SC B5 Advisor for New Network Requirements and convenes all Working Group leaders related to New Network Requirements and SC B5 members interested in new network requirements.

## Working Groups

Working Groups (WG) are temporary groups of experts that develop technical brochures, articles and tutorials about specific aspects of Protection and Automation, as defined by its Term of Reference (TOR) for publication by CIGRE. Once approved in an SC B5 meeting, each WG is chaired by a convener nominated by the chairman of SC B5, and convenes all members nominated by country representatives on SC B5 as voluntary contributors. The WG is disbanded by the chairman after the completion of the activities defined during its creation or after the end of its designed term, eventually with an extension, if the WG has not been able to produce the deliverables.

# 3 - Environment Analysis

## Introduction

The strategies to be followed by SC B5 in the next ten years will be based on an environment analysis, comprising the examination of the external scenarios, mainly the technological and business aspects of electrical power systems, and the internal scenario, including the specific treats of CIGRE and Study Committee B5 on Protection and Automation. This chapter compares the strengths and weaknesses internal to SC B5, against the opportunities and threats offered by the external environments, following the SWOT (*Strength, Weakness, Opportunities and Threats*) method.

## Environment Analysis

The SWOT method is the strategic planning tool used to avail future scenarios of Electrical Power Systems and decide on the strategies to be followed by SC B5 on protection and automation in the next ten years. The strategies are based on the analysis of the external environment, the prospection of probable technological scenarios, and identification of the threats and opportunities that will be faced by CIGRE in the coming years, against the internal characteristics of SC B5, comprising the strengths and weaknesses of the protection and automation communities. The following paragraphs detail the main aspects of these scenarios.

## Scenarios

Protection and automation are among the most active development areas of electric power systems. The simultaneous use of electronics, software and communication to protect and automate electric systems is subject to the rapid change occurring in these areas. To avail the future scenarios that will be faced by protection and automation systems, it is helpful to classify the technological evolution according to the innovations occurring in energy markets, high voltage equipment and secondary technologies used in automation, software and communication, related to protection and automation:

### Changes in Energy Market

- Re-regulation, Liberalization & Unbundling of Energy Markets
- Intercontinental & Global Integration
- Asset Ageing & Optimization / Efficiency
- Electricity as an Energy Carrier
- Environmental & Societal Concern & Regulation
- Integration with Other Critical Infrastructures

- Distributed Energy Resources

**Changes in Primary Technologies**

The following technologies are seen as dominating the next evolution of power systems:

- HVDC Multi-Terminal Networks
- FACTS - Flexible AC Transmission Systems
- Non-conventional Instrument Transformers
- Renewable Generation & Storage on each voltage level including LV and MV
- Ultra High Voltage Transmission Systems
- Hex & Half Wave Transmission Systems
- Unification of Transmission and Distributions Networks
- Distributed Energy Resources

**Change in Communication Technologies**

- Wireless Technologies (Wimax/Wi-Fi/ZigBee/GPRS/GSMS/4G)
- Real Time Network & Synchronization (IEEE1588)
- Telecomm Management Tools (QoS, RSVP,…)
- Diversified xAN Networks (x = M,H,C,B,I,N,L,P,W,VL …)
- Optical Transmission (Fibers, OPGW, …)
- Broad & Wide Band PLC (LV, MV & HV)
- Unification of existing telecom networks for different applications (shared infrastructure)

**Change in Automation Technologies**

- Standardization and Interoperability
- Intelligent (Smart) Electronic Devices
- Process + Station + Intra + Extra Net Integration
- Cyber Security Threats
- Synchrophasors & WAMPS & Data Analytics
- Smart Grids
- Extended and enhanced self supervision and supervision of primary equipment
- Functional Integration

**Changes in Software Technologies**

- Sophisticated modeling software
  - Transient analysis of protection systems
  - Simulation of automation systems
  - Automatic reconfiguration
  - Increased use of real time simulation of the electrical network

- Widespread use of IEC 61850
  - Communication systems for Distributed Energy Resources
  - Functional modeling for substation automation
  - Communication between substations
  - Communication between control centers
  - Communication for synchrophasors
  - Communication for wind power plants
  - Communication for hydro power plants
- Increased use of interoperable techniques
  - SOA - Service Oriented Architectures
  - CIM - Common Information Model
  - COMTRADE - Common Format for Transient Data Exchange
  - Cloud Computing
  - Virtualization & Agent & Distributed Software

**Wide Area Applications**

- WAP – Wide Area Protection
- WAM – Wide Area Metering
- SIP – System Integrity Protection
- Self-Healing Systems
- Remote Access to Protection and Automation Systems
- Remote Testing and Maintenance
- Synchrophasors
- Smart Grid and Future Networks
- Cyber Security for Protection and Automation

**System Analytics**

- Automatic Protection Coordination
- Automatic Protection and Metering Auditing
- Automatic Disturbance Analysis
- Automatic Protection Testing and Commissioning
- Reliability-Centered Maintenance
- Risk, Reliability and Availability Analysis
- Life-cycle and Refurbishing Managing
- Requirement and Design Analysis and Prioritization

**Technical Directions from CIGRE**

As part of CIGRE, Study Committee B5 must also contribute to Strategic Directions (SD) set by its Technical Committee (TC). All TC SDs are related to Protection and Substation Automation Systems (P&SAS) and to the business of SC B5:

- **Direction 1:** The electrical power system of the future
- **Direction 2:** Making best use of the existing power system
- **Direction 3:** Focus on environment and sustainability

- **Direction 4:** Communication on power system issues for decision-makers

## Opportunities

All scenarios are challenging and point to plenty of chances for the protection and automation community to better perform its mission. The following aspects are seen as opportunities, brought by changes in standardization, innovations, management, market, information and telecommunication:

### Standardization

- The introduction of IEC 61850 is changing the whole concept of substation secondary system.
- Increased ability of communication technologies to meet protection requirements
- SC B5 can provide a unique platform for information exchange among users and vendors, and for experience feedback and definition of requirements for P&SAS and protection standardization, in particular IEC 61850

### Technical Innovations

- The advent of Smart Grid is demanding new protection and automation solutions.
- Protection, Monitoring and Control functions can now be integrated into a common system

### Management

- Utilities require comprehensive Life Time Management
- Opportunities to support a better network use
- Possibilities of reducing human errors by a higher degree of automation
- Introduction of new roles, responsibilities and skills in utilities
- Introduction of new collaboration forums in non presential meetings

### Information and Telecommunication

- More, better and standardized data
- Merging of tools and techniques from these fields to protection and automation

### Market

- Rapid increase in distributed generation and deregulation
- New markets and opportunities to the protection and automation professional.

In all these aspects SC B5 offers an excellent forum for learning and establishing networking connections that may return in dividends for those that participate.

## Threats

In spite of these opportunities, many scenarios are seen as threats to the success of SC B5 protection and automation community:

- Overlap with other areas within CIGRE, like telecommunications and control center automation.
- Concurrency with other organizations like CIRED and IEEE.
- Shorter life time of new technologies in protection and automation
- Earlier obsolescence of products and professionals
- Difficulties in absorption and transition to new technical standards
- Difficulties in aggregation of new experts and leaders
- Low value attributed to protection and automation within the utilities
- Low participation of students and professors from universities
- Lack of time from members to dedicate to CIGRE.

These threats and opportunities will be confronted with the strengths and weaknesses of SC B5 through the Process Analysis.

# 4 - Process Analysis

## Introduction

In the Strategic Planning of SC B5, the Process Analysis will convey a critical review of the internal procedures used by the Committee to attain its objectives. From this review the strong and weak points will be identified, as candidates to enforcement or correction during the Strategic Analysis phase.

## Processes

The main processes used by SC B5 to attain its objectives can be classified as internal or external to the committee, according to the responsibility and participation of its officers:

- **Internal Processes**
  - Commissioning of Working Groups to generate technical documentation
  - Convening the activities of Working Groups
  - Promotion of tutorials
  - Organization of internal colloquia and symposia
  - Organization of annual committee meetings
  - Organization of annual meetings of the Strategic Advisory Group
  - Organization of annual meetings of the Tutorial Advisory Group
  - Organization of annual meetings of the Thematic Groups
- **External Processes**
  - Commissioning of Joint Working Groups with other organizations
  - Managing the activities of Joint Working Groups
  - Promotion of tutorials in other organizations
  - Organization of discussion sessions
  - Liaison with IEEE and IEC
  - Participation in Regional events.

## Strengths

Study Committee B5 holds a strong position as a technical forum for the exchange of knowledge about protection and automation. Among the stronger aspects of SC B5 that form its strength as an organization are:

- **Competence**

- The expertise of its members
- The expertise of their organizations

- **Voluntariness**

  - The willingness of its members to voluntary work and collaboration
  - The support of mirror national committees of CIGRE

- **Tradition**

  - The long tradition of CIGRE as a worldwide organization
  - The tradition of SC B5 discussion sessions and colloquia

These aspects should be exploited in the Strategic Plan and Directions of SC B5 for the planning period, against its own weaknesses.

## Weaknesses

Internal weaknesses are related to the processes and resources used by SC B5, mainly due to financial and technical support, and overlap of responsibilities:

- **Financial Support**

  - Lack of financial funding to support the organization of its own events
  - Dependence of voluntary work for its activities
  - Economic limitations due to the world economic crisis

- **Technical Support**

  - Reduced investments in education, research and development
  - Technological gap of utilities with current technical advances

- **Scope**

  - Indefinitions of the exact boundaries with other committees
  - Role to be played in cyber security
  - Responsibilities to automation outside the substation
  - Responsibilities about communication inside substation for automation and protection
  - Limits of responsibilities in wide area protection and automation.

All these aspects impact on the Strategic Analysis of SC B5 and the directions to be followed in the next ten years.

# 5 - Strategic Analysis

## Introduction

Once reviewed the organization, processes and environment of Study Committee B5, the next step of the Strategic Plan is to conduct a Strategic Analysis to propose macro directives, based on its competence and on future scenarios. This chapter describes the result of this analysis, and the components of the strategic plan of SC B5.

## Strategic Plan

The strategic plan of SC B5 joins all the definitions and decisions taken related to the future activities of the committee. It is organized in a hierarchical mode, starting from the statement of its business within CIGRE, and the vision of the future role of the committee in its business area. To each vision statement a declaration of the mission expected from SC B5 is defined, subdivided by several strategic directives that propose forms of actions to attain those missions. The directives are further refined in concrete objectives to be attained.

## Business

Within CIGRE, the main business areas of Committee B5 on Protection and Automation are to analyze and produce:

- Improved concepts of Substation Automation Systems
- Technical recommendations for metering
- Technical recommendations for IEC 61850
- Application of numerical protections and substation automation systems
- Methods to improve the performance of protection systems
- Protection implications of new generation technologies and system requirements.

In these business areas SC B5 guides its actions based on several visions of the future of protection and automation of power systems.

## Visions

Each vision defines a scenario that represents the future situation desired or expected from the SC B5 on protection and automation systems. They translate the perceptions, desires or directions established by the Strategic Advisory Group for the protection and automation industry to help position the committee within CIGRE

and the Protection and Automation community. For the period of 2013 to 2022, the SAG has defined three visions for SC B5:

- Be recognized as the leading worldwide organization on protection and automation
- Be the provider of a global perspective on the issues and challenges facing the protection and automation of electrical power system
- Be an independent analyzer of different solutions and provider of high quality unbiased publications about protection and automation.

Together with the visions of its future, the strategic plan of SC B5 will be directed by one or more principles that represent the ethical and professional values pursued by its members.

## Principles

Among the principles that guide all actions of SC B5, the following standards of behavior were considered:

- Non-discrimination among their members
- Equal opportunities for all opinions
- Collective decisions taken by consensus or voting
- Seek for the truth.

Following the directions of CIGRE, each member represents the collective opinion of their countries.

## Mission

Using these principles and based on the visions of its position within its business areas, several missions are proposed in this Strategic Plan. Each mission defines a macro objective to be attained by SC B5. They contain guidelines defined by the Strategic Advisory Group for the actions taken by the committee within CIGRE. For the period of 2013 to 2022, the SAG has defined as the following main missions for SC B5:

- To synthesize and disseminate state-of-the-art practices and developing recommendations
- For the progress of engineering of power system protection, automation, monitoring and metering.

Each mission will be directed by one or more directives, defined on the strategic plan.

## Directives

The directives selected by SC B5 are macro actions aimed to attain its missions, in accordance with its principles, and the competences and available resources offered by its members. Each directive is related to the vision and future scenarios seen in the protection and automation fields. They are classified as Technical Directions (TD) and Organizational Directions (OD):

- **Technical Directions**

TD1. Facilitate the adoption of new technological solutions

- Providing suitable technical recommendations
- Supporting the subsequent standardization process (ex. IEC 61850 station bus, IEC 61850 process bus, WAxS)
- Assuring that the adoption of new technologies (ex. IEC 61850) do not reduce the current accepted levels of reliability of P&SAS

TD2. Explore new concepts of P&SAS

- Innovative techniques for design & testing
- New possibilities of enhanced communications
- Clarification of requirements from users
- Experience and feedback in IEC 61850
- Awareness of engineering roles and responsibilities
- Implementation and exploitation of process bus
- New requirements and specification for metering

TD3. Improve the reliability of P&SAS

- Improved methods to maintain supply reliability
- New approaches, tools and system to eliminate human errors
- New tools and methods for protections coordination
- Standardization of schemes and functions of protection
- Innovative methods for P&SAS maintenance

TD4. Analyze the protection implications of New Network Requirements

- Protection and automation requirements in the network of the future
- Protection and automation requirements for distributed generation

- **Organizational Directions**

OD1. Improve the operation of Working Groups.

- Better use of web technologies
- Improve the reporting of the WGs to the B5 chairman

OD2. Improve the organization of discussion sessions

- Better forms of discussion sessions

OD3. Increase the dissemination of knowledge

- Increase the organization of tutorials and workshops
- Increase the quality of tutorial and workshops
- Increase the availability of tutorial material

OD4. Improve the quality of published documents

- Better pre-publication reviews

OD5. Increase SC B5 visibility

- Increase the involvement of the younger members
- Increase the participation of members from utilities
- Increase the participation of members from universities
- Increase the participation of members from research centers
- Increase the participation of members from consultancies
- Increase the participation of members from manufacturers
- Increase participation of members in Regional Conferences
- Increase the interactions with other technical organizations.

# 6 - Conclusions

This strategic plan will guide the actions of Study Committee B5 – Protection and Automation, over the period 2013 – 2022. It was derived from a structured analysis of the following macro processes of SC B5:

- Organizational Analysis;
- Environment Analysis;
- Process Analysis; and
- Strategic Analysis.

In addition to the Strategic Directions and Objectives, the plan defines the strategic alignment of SC B5 with CIGRE macro objectives. It covers the period 2013 – 2022 and shall be revised annually during the meetings of the SAG, or when required.