CIGRE Study Committee C1

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

WG N° C1.38	**Name of Convenor:** Graeme Ancell (Australia) **E-mail address**: gancell@actrix.co.nz
Strategic Directions #[2]: 7, 10	**Technical Issues #[3]: 2, 3**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 1, 5, 6	
Title of the Group: Valuation as a comprehensive approach to asset management in view of emerging developments	

Scope, deliverables and proposed time schedule of the Group:

Background:

Measures of asset health and asset criticality have been commonly used to prioritize the replacement and maintenance of assets. Asset health indices provide a qualitative indication of probability of failure (e.g. the asset is in poor condition and is highly likely to fail in the next five years) while asset criticality provides a qualitative indication of the consequences of an asset's failure, not only for the asset itself but also for the power system and the environment where the asset is located. For example, the failure of a power transformer can reduce power system security or cause a loss of supply to consumers, cause damage to adjacent equipment or to the environment, and may cause injury to staff or the public. Some of these consequences can be hard to evaluate, and it can be even harder to compare different kinds of consequences across different equipment when prioritizing asset management measures. This WG aims to document current utilities' practices in comprehensive valuations in support of asset investment decision-making.

A business case for replacing, refurbishing, upgrading or maintaining an asset can be driven by one or more of the following factors:

- System expansion
- Reduction in generation dispatch costs and system losses
- Improvement in reliability and security
- Reduction of risk to personnel and members of the public
- Protection of asset value endangered by premature failure or increased maintenance costs
- Reduction of risk of environmental damage
- Obsolescence, e.g. lack of spare parts or a need for increased functionality

The replacement, refurbishment or maintenance is placed within a work program where the work is prioritized against other work on assets, within the same or different asset category. The prioritization of expenditure on assets often requires investments driven by some of the above factors to be compared against investments driven by a different combination of factors. A consistent framework for valuing the risks of asset failure facilitates creation of a more efficient portfolio of investment and other measures, and a better understanding of the impact on an organization's risk profile. Furthermore, it facilitates arriving at an optimal overall risk vs cost ratio.

Expenditure prioritization also needs to consider that individual assets are part of a system of assets. Expenditure to reduce the failure risk or improve the performance of individual assets needs to take into account the impact on the aggregate risk of the system of assets (e.g. a circuit). Expenditure that results in the greatest reduction in aggregated risk per unit of cost will be given a higher priority.

Scope:

The WG will first carry out a survey of international practice in the justification of asset sustainment investments and the management of risk in asset investment decision-making. The survey would include topics such as:

- How asset health and asset criticality are used in expenditure decision making;
- How asset risk management is applied by organizations and in their governance;
- The influence of regulatory regimes on asset investment decision making practices;
- Degree of integration between defining investments for CAPEX (Capital Expenditure) and O&M (Operations & Maintenance) expenditures decision making;
- Degree of integration in CAPEX decision making for different types of assets;
- Degree of integration of replacement/refurbishment capital expenditure (system sustainment) with new assets capital expenditure (system development);
- Use of prioritisation frameworks and criteria (e.g. reliability, safety, etc.);
- Extent of the use of monetization of risk, specifically in valuing consequence of failure, in investment decision making, including descriptions of how valuations are calculated for impacts on corporate key performance indicators such as reliability, safety, environment, asset value, regulatory compliance, customer service, "brand name" protection etc.;
- Risk assessment for high impact low probability events and economic justification for mitigations.

Based on the survey results and discussion in the WG, current practices and recommendations for using valuation approaches and techniques will be documented. The WG will attempt to describe best practices based on the learnings from the survey. Links to other Study Committees' WGs on asset and risk management of specific equipment (A) or sub-systems (B) will be sought, e.g. through including members from such WGs.

The main steps are:

1. Design the survey for the specific topics listed above. This step will have several iterations, including analyzing responses from a test group.
2. Carry out the survey. This will be done through a web based survey application.
3. Analyze the results. There will be follow-up with some individual respondents to clarify responses where necessary.
4. Discuss and document current utility practices for justification of asset investments including valuation and monetization approaches.
5. Derive descriptions of best practice.
6. Prepare technical brochure, Electra summary and tutorial.

Deliverables:

x Technical Brochure and Executive summary in Electra

☐ Electra report

x Tutorial[5]

Time Schedule: start: May 2017 **Final Report**: December 2019

WG face-to-face meetings May 2017 Dublin, Aug. 2018 Paris, C1 Symposium 2019.

Web conferences roughly bi-monthly.

Approval by Technical Committee Chairman: M. Wald

Date: 24/04/2017

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