

## **Regional integration of technology management in the ESI - the electricity utilities' contribution to NEPAD**

**Paul Johnson FSAIEE**

**Chief Consultant, Technology Standardization Department, Eskom**

### **Introduction**

In South Africa, the reconstruction and development programme (RDP), while establishing principles at government level, relied on the various sectors of industry to make development a reality. In the case of the ESI, this was through the electrification programme.

The New Partnership for African Development, NEPAD, while establishing principles at governmental level for development of our continent, will require the active participation of industry to make the aims of NEPAD a reality. Among the issues identified for the successful implementation of NEPAD is the need for arrangements for the efficient allocation of national and international resources[1]. It is proposed that while some structures already exist in the ESI locally, regionally and continent-wide, a coordinated effort will be required if the ESI is to make best use of the resources, skills and experience in the industry in supporting implementation of NEPAD.

This paper examines some of the existing structures for managing technology in the ESI in Africa, and considers what the South African ESI in particular can do to ensure that its own structures for the management of technology in the restructured ESI are integrated with these, in support of NEPAD.

### **Today's environment**

Because of the autonomous management structures of the many electricity utilities, it has not been necessary to have an integrated approach to the management of technology. However, in some specific areas where a deliberate strategy has been followed for specific elements of technology management, such as the NRS project to establish common technical standards, benefits have been evident.

As the industry restructures locally and as similar restructuring (unbundling, corporatization, privatization) is occurring in utilities across Africa, it becomes more and more apparent that deliberate strategies to ensure the efficient management of technology are needed. Technical skills are increasingly being stretched and the challenges of electrifying the continent will be present for decades to come. Access to electricity, with the provision of other services, is seen as a key enabler of economic, social and environmental development, but is unprofitable in the short to medium term. Meanwhile utilities are being pressured to privatize and unbundle in order to secure foreign investment in the industry.

Experience elsewhere in the world has shown that international participation of utilities in the areas of technology research and standardization (Cigré and IEC committees, for example) drops dramatically when restructuring occurs. These areas are too frequently seen as "unnecessary overheads" or those in a position to effectively contribute –trained experience engineers- are just too stretched with operational matters and restructuring to participate. Once participation lapses, the effort required to motivate getting involved often becomes too great.

Furthermore, when competition is introduced, utilities that in the past may have shared technology freely find they are restricted as they may be "giving away" their competitive advantage, where such technology may be used to provide a better customer service than the competing utilities.

At the IERE Africa Forum (November 2001), a speaker from the World Bank notes that “ *System development seems to be more expensive in Africa than in other regions, .... USD 500 to 1000 per connection. On that basis, the objective of most governments to double access to electricity by the end of the decade may cost as much as USD 12 to 25 billion to connect 25 million new users.... More cost effective technology will need to be developed.*” [2]

Specific projects in support of NEPAD at the level of establishing the Pan-African grid, are already being planned. These projects will lead to transmission interconnectors such as those planned for the western corridor, in conjunction with the integration of INGA power station. These projects while ambitious, are able to proceed through bilateral agreements and joint ventures using well-established technology. At the distribution level, even the modest objective of doubling access to electricity over 10 years mentioned above is an enormous challenge. Finding alternative, appropriate, optimized solutions for the application of grid and non-grid technologies to provide these potential customers in a geographic area greater than the combined area of the USA and India requires an integrated approach.<sup>1</sup> The industry is faced with a skills shortage, and technology is still largely imported from Europe and elsewhere outside Africa, and often designed for conditions very different from those in Africa. HIV/AIDS is expected to increasingly take its toll on staff availability, noting that in some countries in our region the average life expectancy is around 40 years and has decreased in recent years!

The local development, standardization and commercialization of prepayment metering technology, which now is applied in some 17 countries across Africa gives an indication of what can be achieved when technology is successfully managed.

How best can the South African ESI contribute to managing the technology used in the African ESI? Herein lies the challenge and opportunity for utilities to make an active and practical contribution to the New Partnership for African Development.

### **What activities comprise the management of technology?**

The management of technology can be regarded as a cycle of inter-related processes:

- Fundamental and applied research
- Design
- Development
- Production
- Maintenance and operation, and
- Usage,

which collectively are driven by the integrated application of knowledge, people, tools and systems. (See figure 1) [3]

In practice it requires the interaction among researchers, planners, designers, standards engineers, equipment suppliers, project engineers, commissioning and maintenance staff. Structures are required to enable such interaction to be coordinated and to happen effectively.

### **What formal structures are already in place in Africa?**

#### **UPDEA**

The Union of Producers, Conveyors and Distributors of Electrical Energy in Africa (UPDEA) is an Association of electricity utilities with some 30 member utilities from some 26 countries throughout the continent. Its headquarters are in Abidjan. The presidency of UPDEA is rotated on

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<sup>1</sup> The five largest countries in Africa (Sudan, D R Congo, Algeria, Libya and Chad, have a combined geographic area greater than that of the USA)

a three-year term, and significantly the presidency for the current 2003-2005 term is held by Eskom, South Africa.

At the strategic level it provides a forum for Chief executives from utilities to interact with each other and with external organizations. At this level its recognition by the AU is significant. The AU has established an African Energy Commission, which looks to UPDEA to provide direction for the application of technology.

#### **Scientific committee**

UPDEA's technical arm is the Scientific Committee. The president of this committee for the present three-year term is VRA, Ghana. Study Committees covering aspects of technology and operational management comprise representatives of the member utilities.

There are currently six study committees:

- Standardization
- Operations, maintenance and development
- Rural electrification
- Customer service (includes quality of supply)
- Human resources
- Restructuring and financing

UPDEA has the potential to significantly contribute to the aims of NEPAD and the African Renaissance, but challenges such as communicating effectively across the continent, language barriers and political rivalry are real and need managing. In terms of using the UPDEA structure to cooperate in the management of technology, finding the right people with appropriate experience and the time and willingness to participate effectively is probably one of the biggest challenges. South African participation is formally through Eskom's membership. It is proposed that whatever local structures are developed to manage technology, these should be integrated with, and provide input to influence the direction of the projects and activities of these UPDEA study committees.

#### **PIESA**

PIESA has a specific focus on sharing technology among utilities in the East and Southern Africa – the current focus is distribution, and currently has 8 national utility members Eskom (SA), Zesa (Zimbabwe), Zesco (Zambia), Escom (Malawi), SEB (Swaziland), LEC (Lesotho), SNEL (D R Congo), UEDC (Uganda), with the AMEU as an observer member.

The Power Institute for East and Southern Africa, (PIESA) is a relatively young Association of utilities with a vision to be the catalyst for sustainable regional co-operation in expanding the electricity distribution industry in that region

Its prime OBJECTIVE is to stimulate the electrification of the region, which is to be achieved through:

- Encouraging membership participation from all regional electricity distributors and supporting industries
- Centralized integrated information on technology related to the distribution of electricity
- Continuous capture of experiences of members to improve efficiencies (feedback loop)
- Encouraging the use of local resources and the manufacture of equipment for use in the distribution industry
- Optimization of technical equipment specifications and codes of practice for the regional environment
- Promotion of applied research in areas that are relevant for the effective performance of the members

- Developing a culture of technology transfer and skills development among members
- Developing strategic alliances and partnerships in research, industry and manufacture and other similar organizations
- Compilation of standards and guidelines to minimize the impact on the natural environment
- Being flexible to respond to the needs of an evolving Electricity Distribution Industry
- Facilitating dialog relating to the Electricity Distribution Industry.

It currently functions through five working groups:

- Standardization
- Reduction of non-technical and revenue losses
- Low cost electrification
- Power systems analysis, and
- Environmental management.

Working groups comprise nominees from the participating utilities. AMEU is technically an observer member, and Eskom Distribution provides some support. The main driver is Eskom Corporate. The challenges are similar to those described for UPDEA and a consolidated approach is needed to ensure the SA industry supports the process.

## **Structures in South Africa**

### **SAPURAB**

Within SA there is the South African Power Utilities Research Advisory Board (SAPURAB), which comprises representatives of the wider stakeholders in technology relevant to ESI including academic institutions and other research bodies. It has the following objectives:

- To preview and review the broad based research direction proposed by Eskom.
- To identify research drivers.
- To identify research opportunities of relevance to the Electricity Producers, Transmitters, Distributors and End Users.
- To advise on the relative allocation of research funds.
- To advise on research priorities.
- To advise on research contractors.
- To promote the development of Electricity Industry research.
- To facilitate local, regional and international research co-operation.

### **ESLC**

The Electricity Suppliers Liaison Committee (ESLC), comprising representatives of the AMEU, Eskom and the SABS established its own brief:

a) to develop electricity supply industry standards, with the aim of

- standardizing components
- rationalizing the range of equipment and material used
- optimizing the technical requirements for minimum life-cycle costs
- assisting the development of the local market

b) to provide a forum for discussing issues of common interest in respect of the electricity supply industry in South/Southern Africa, where no other appropriate forum exists.

c) to facilitate changes to regulations, codes of practice, etc., where appropriate, by making recommendations to Government Departments, and other statutory bodies.

The ESLC recognizes the standardization activities of PIESA, and some integration of the PIESA and NRS standards is already underway. Such integration could be extended to the other elements in the technology management chain.

## **AMEU**

Standing committees and functions of the AMEU provide fora in which technology management is facilitated. Specific examples are the training and engineering committees. It is understood integration with Eskom in these areas is already underway. Noting that the AMEU membership is not confined to South Africa, but covers Southern Africa, there is an opportunity to forge linkages with neighbouring utilities through the AMEU membership of PIESA. For example utilities in Namibia, which do not have membership of PIESA currently. Recognizing the ESI's support for NEPAD, as mentioned in the introduction, these wider southern African linkages should not be lost in migrating to a REDs environment.

## **TESCOD**

Technology in the electricity distribution business in Eskom is managed through what is known as the TESCOD process [Technology Steering Committee of Distribution]. The structures to manage this process were established in the early 1990's, primarily to ensure best practices evolved in support of electrification.

Earlier this year a proposal was put to the AMEU representatives on the ESLC by Eskom Distribution to become involved in this process formally. This would be a significant step towards integrating technology management locally. The benefits of co-operation in the area of standardization, as one element of technology standardization has generally been regarded as positive, and by becoming involved in the whole technology management process further mutually benefits can be expected. Such an integrated approach within the SA EDI provides the basis for effective participation in regional activities, and is proposed as necessary step for an effective contribution of our industry to NEPAD, as well as to effectively pool resources for direct local benefit. Such an initiative could effectively form the basis for an Industry Association for the SA EDI.

TESCOD operates with a structure based on the CIGRÉ model of study committees. A key aspect is that study committees provide for representation and active participation of operational staff in the process. This ensures buy-in to implement changes in the application of technology and direct feedback into on-going research, design and development with a view to continual improvements in the application of technology.

Studies committees cover technology areas of both primary plant and secondary plant. For example, planning, maintenance management, lines and cables, substations, land development, protection, control, metering, telecommunications. [4]

The ESI and specifically in the context of EDI restructuring, the future REDS could well find themselves without any structure to manage technology unless a conscious effort is made to put a structure in place. While this would lead to an unhealthy situation in the local industry, it would also leave the REDs without a framework within which to effectively participate in the regional activities (PIESA and UPDEA).

It is suggested that while the EDI is still in the "hurry up and wait" stage of restructuring, the proposal of Eskom distribution to involve the AMEU membership in the TESCOD process should be actively encouraged. While there has been good participation for many years in the area of standardization, through the NRS working groups and the ESLC, this only addresses one link in the chain of technology management.

Engineers and technicians both from technical support functions and the operational areas could then have the opportunity to be involved in and influence the research, design and development activities, as well as using TESCOD as a forum for coordinating the implementation of standards, maintenance and operation. This would not only be mutually beneficial, but also provide the framework for efficient participation of the SA EDI in the regional structures such as PIESA and

UPDEA. In considering such cooperation, it needs to be understood by the managers who direct staff to be involved that the mutual benefits only accrue if the technical staff can have such activities included in the job descriptions or job compacts, and budgets.

It is suggested that some formal agreements also need to be facilitated within the local industry stakeholders to ensure that staff in the local regulated ESI, whether they are local government employees, or employees of parastatals or corporations, are appropriately empowered to participate in these pan-African activities. Without such empowerment, participation will remain a low priority, un-coordinated, and only undertaken by specific self-motivated individuals.

## **Conclusions**

The management of technology in the ESI locally should not be overlooked in the restructuring process.

The AMEU members participation in the Eskom distribution TESCO process will provide vehicle for moving to a future consolidated technology management process.

Coordination of the management of technology locally with pan-African Associations, such as PIESA and UPDEA will enable the SA ESI to effectively contribute to NEPAD.

Empowerment of the participating employees is essential for sustained and effective participation.

## **Acknowledgements**

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[1] Duncan Mbonzana, Managing Director, Office of the CEO, Eskom

[2] Mr. A Covindassamy, World Bank USA. *Energy in Africa: what is its future?* - Keynote address, IERE Africa Forum Sustainable development of Electricity in Africa. Cape Town, South Africa, November 2001

[3] A Bekker, Eskom Distribution Technology

[4] Ian Ferguson, Eskom Distribution

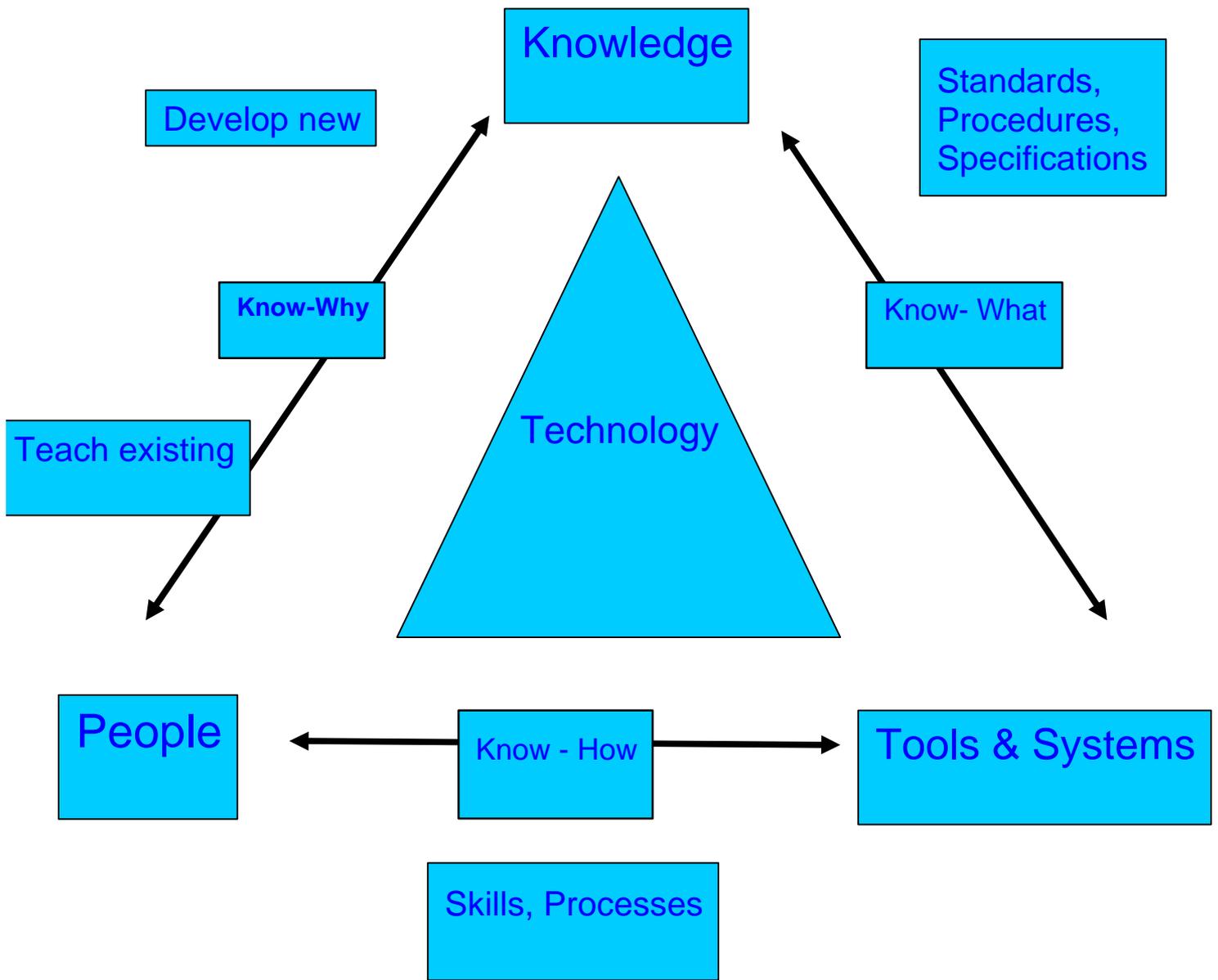


Figure 1 – Technology management triangle