

**What are the challenges in the development of digital substations and how to address the problems caused by the digitalization?**

1. There is lack of skilled resources in both protection and automation disciplines with regard to IEC61850. To address this challenge, we need to develop the resources with the necessary IEC 61850 skills, Operational Technology (OT) skills, etc.
2. Converting traditional/conventional substations into digital substations - the challenge comes where we need to cater for several permutations for both brownfield and greenfield schemes, these schemes need to be designed and maintained.
3. Motivating management to invest into new technology (quantifying benefits of the new technology against old working technology for executive acceptance) – proper cost analysis is required.

Eskom experienced cost savings and reduction in copper cabling by implementing a digital solution in more complex bay types: EHV feeders, and with the Breaker-and-a-Half busbar configuration.

The costs for smaller power transformers (applied in a double busbar configuration), and HV feeders are significantly more expensive to implement using digital technology compared with legacy solutions and hence are difficult to justify. E.g. the price for transformer schemes with digital technology was double the one with legacy solution.

4. Commissioning of additional plant on already commissioned digital substation - re-work that results on in-service plant being interrupted.
5. Complexity of the networks – the need for proper planning in order to simply design options

Our experience is that suppliers create working solutions that are complex and which are difficult to understand and maintain. It is important for the utility to specify or oversee the creation of communication datasets by suppliers, or to complete this work in-house. The utility tends to stick to overseeing design aspects that we understand based on our previous experience, giving suppliers more free rein in other important areas.

6. Cyber security risks – cyber security skills are required.