



The future grid

Engineering Dreams

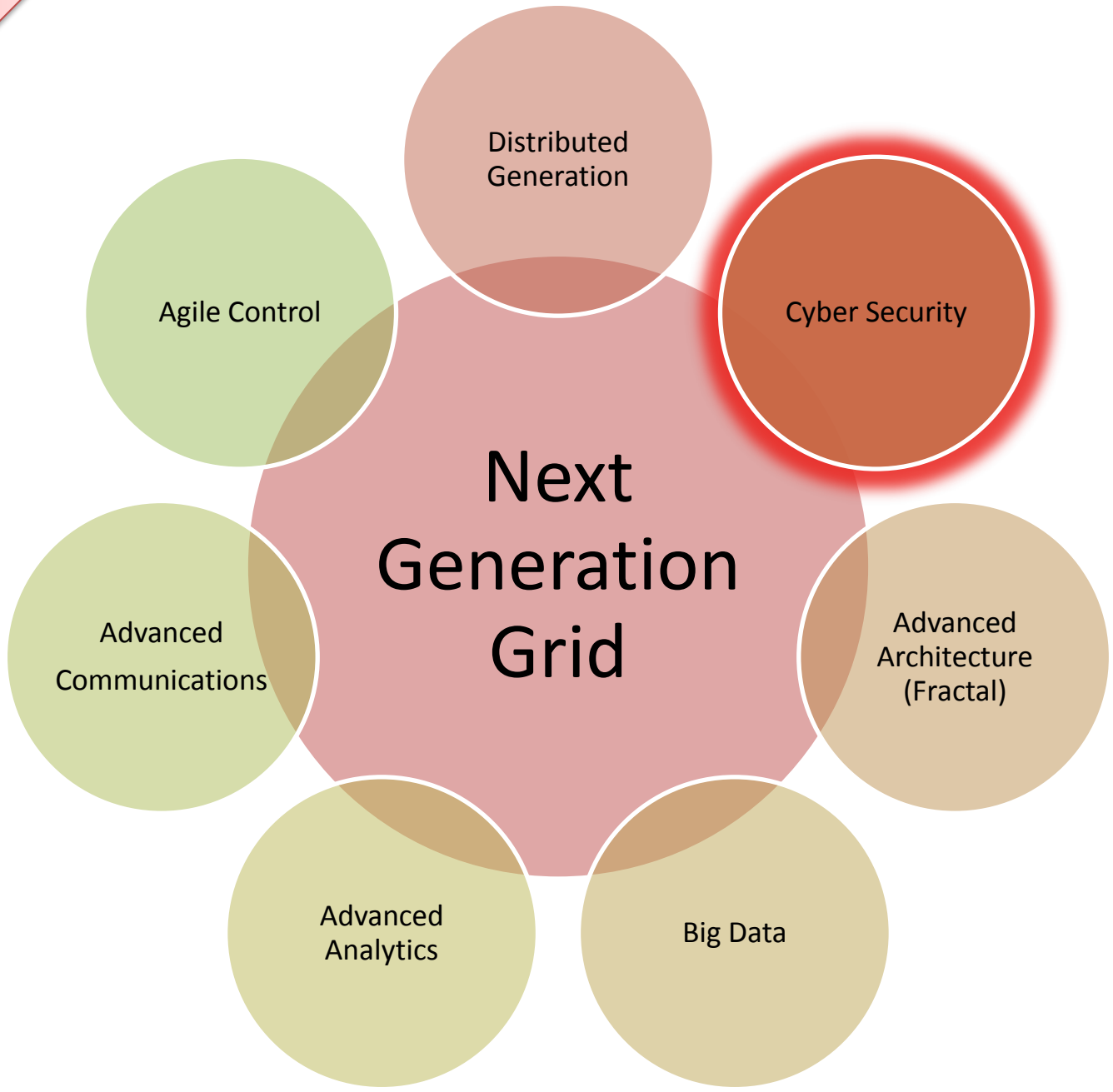


NRECA

A Touchstone Energy® Cooperative 

Do we need a new grid?

FOUNDATIONS



NO

- The grid is an amazing achievement and it works exceptionally well
- It is recognized as the greatest engineering achievement of the 20th century by the National Academy of Engineering



We could sustain reliable and cost effective delivery of electricity through basic maintenance and extension using conventional technology

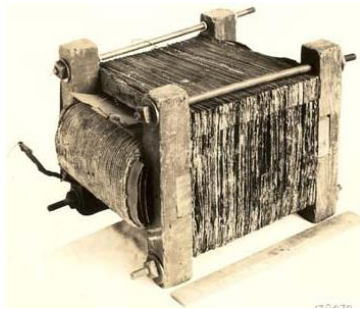
But ... that's not the way engineers do things

- From the first – engineers and utilities have asked – *how can we do it better?*
- Every component and every procedure has been relentlessly refined, relentlessly polished.

Engineers Dream

Past, Present, and Future

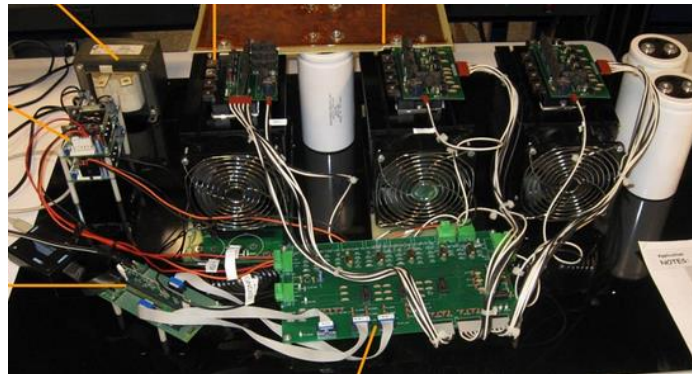
1883 first deployed transformer



Current distribution transformer



**The future? solid state transformer,
Dynamic voltage control at the edge.**



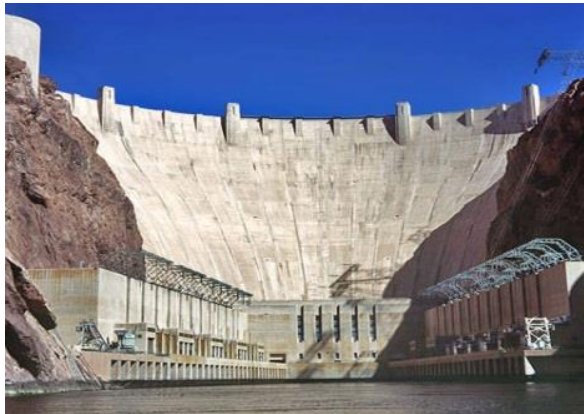
The grid “evolves” in small steps

- “The mother of every chicken is a chicken, the daughter of every chicken is chicken” Richard Dawkins
- --the grid looks the same, day to day, but over time it is essentially reinvented
- This is true because:
 - The grid is immensely complex – vastly beyond “simple” things like the Apollo program.
 - Different portions of the grid are independently configured and controlled – there is no “Deus ex machina”.

Will the future grid be smart?

YES, the grid will be smart

- *Smart is the alternative to big.*
- When the grid was first built, it was all about expansion – more power, delivered ubiquitously



- When you reach a limit, you built MORE
- Why we still focus on more, but the first thought now is getting more from what we have.

FOUNDATIONS

