Data handling procedures of different transmission system operators from around the world

Data collection and future needs to account for the continuous growth of sensing data in control rooms

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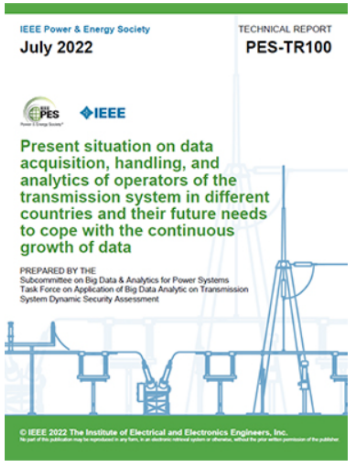
Technical Reports

- "*Present situation on data acquisition, handling, and analytics of operators of the transmission system in different countries and their future needs to cope with the continuous growth of data* (TR100)", **July 2022**, Available to download from the PES Resource Center.

Present situation on data acquisition, handling, and analytics of operators of the transmission system in different countries and their future needs to cope with the continuous growth of data (TR100)



Posted:
12 Jul 2022

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Video Length / Slide Count:
Pages: 79

Presently transmission system operators are tackling challenging dynamic issues in

Report Highlights

- Over 30 authors (academia, industry, government)
- 11 utilities interviewed from 9 countries
- 79 pages

Objective of survey

Investigate data handling procedures of different transmission system operators from around the world with sensitivity on

- geographical location
- particular circumstances such as climatic conditions,
- topography,
- public policies, economic restrictions

Methodology of survey

1. Current ways of data handling in *[country]:* Infrastructure, processing, applications, long-term
   - Which data is currently collected (and-in use) for system operation?
   - Which type of devices and how many do collect data?
   - How is the inter-connection managed? *Emphasis on high resolution time-stamped data from PMUs/WMUs*

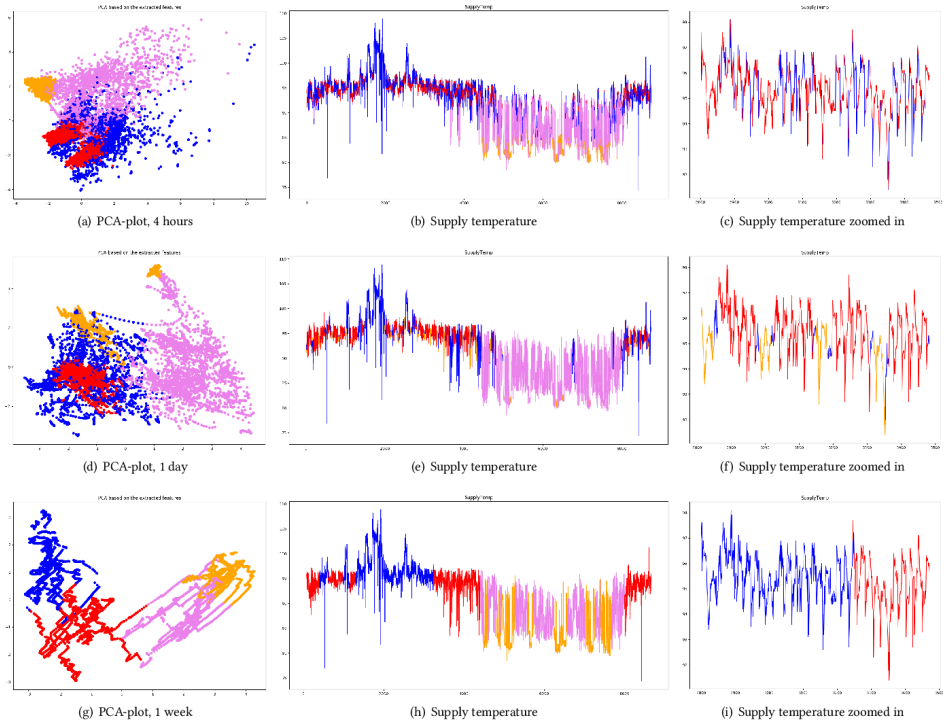
2. Current data-handling challenges in *[country]*
   - What are the major challenges towards an **effective data infrastructure** including collection and storing? *e.g missing standards, amount of data, lack of access to data, invalid data, dimensionality*

3. Ongoing activities in *[country]*
   - What are the ongoing activities for addressing the above challenges?
   - Which projects/initiatives are you aware of?

4. Current *[country]* needs
   - *Could you indicate what type of applications are currently missing in the control room, and which you would like to have? (indicate as many as possible)*
   - *What is the reason of lacking such applications listed before? (e.g. lack of data or technology, unrealistic to implement, policy constraints, economical constraints, etc.)*

Data processing

Multivariate data has different time and space granularities depending on the acquisition techniques such as SCADA systems, PMU devices, or meteorological information



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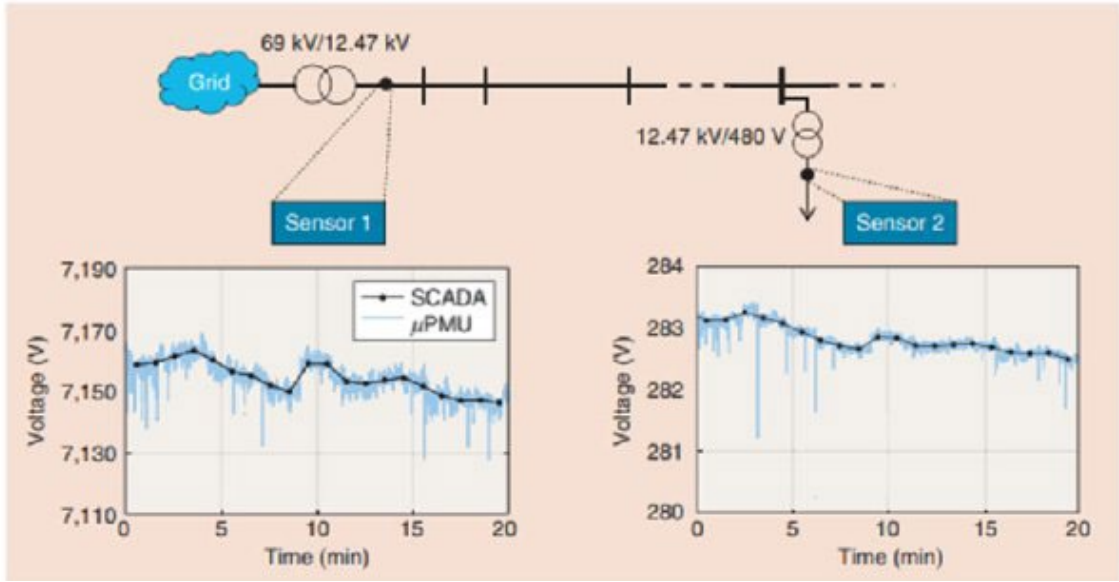

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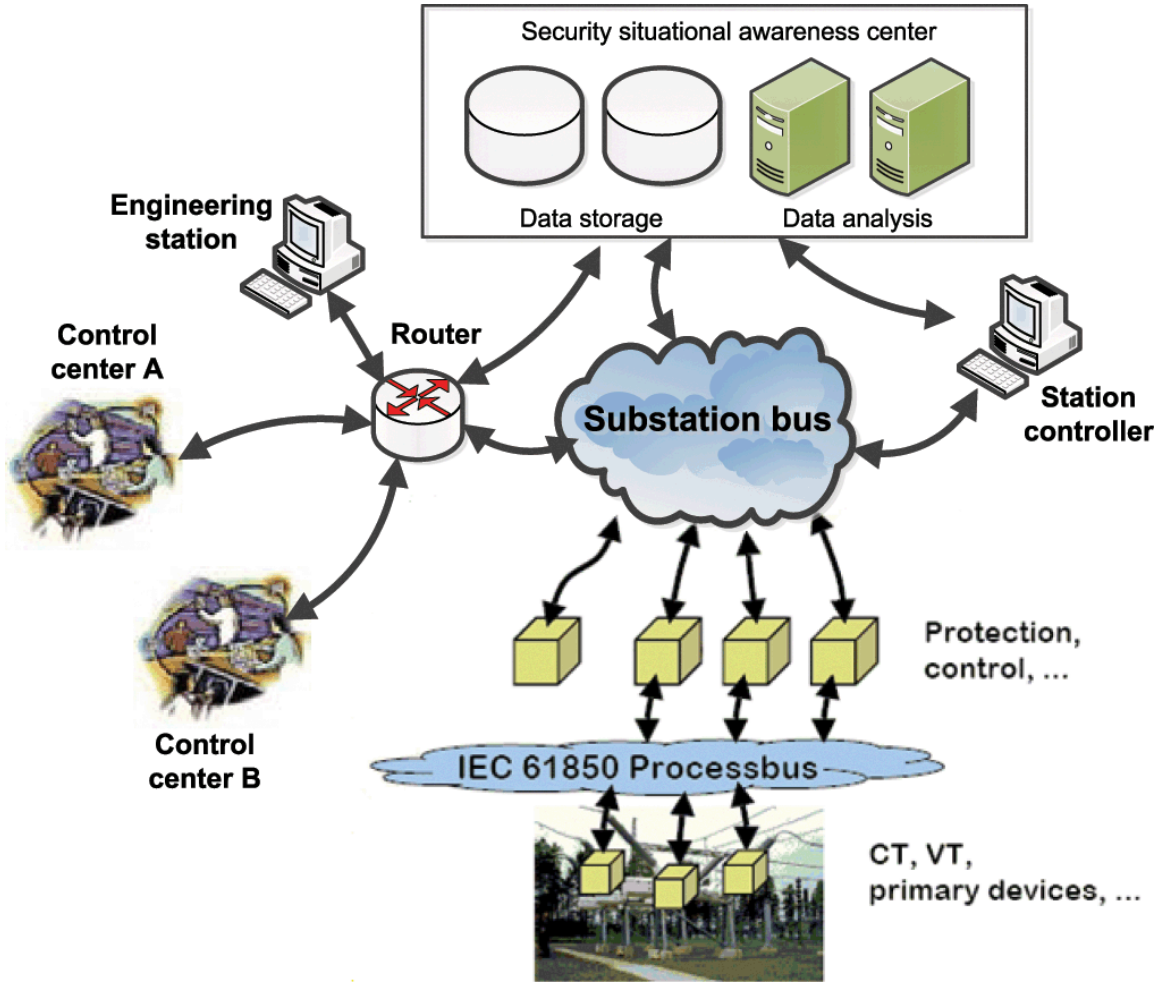
Importance of data processing

prerequisite

Availability and reliability of the collected data

stable and sustainable system operation



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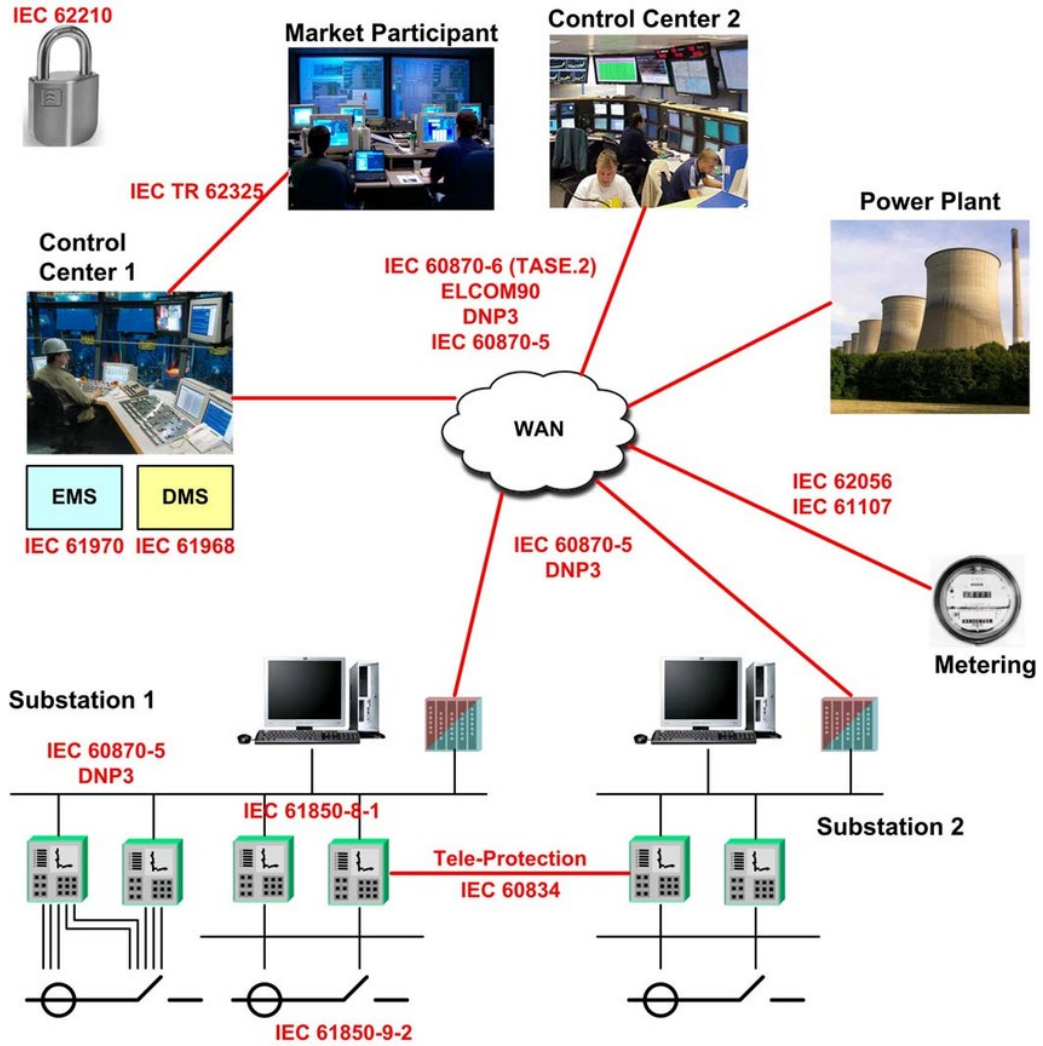
Need for protocols, and communication infrastructure

- Wide-area situational awareness needs faster protocols and communications media
- **Communication infrastructure is the main limitation** in some cases



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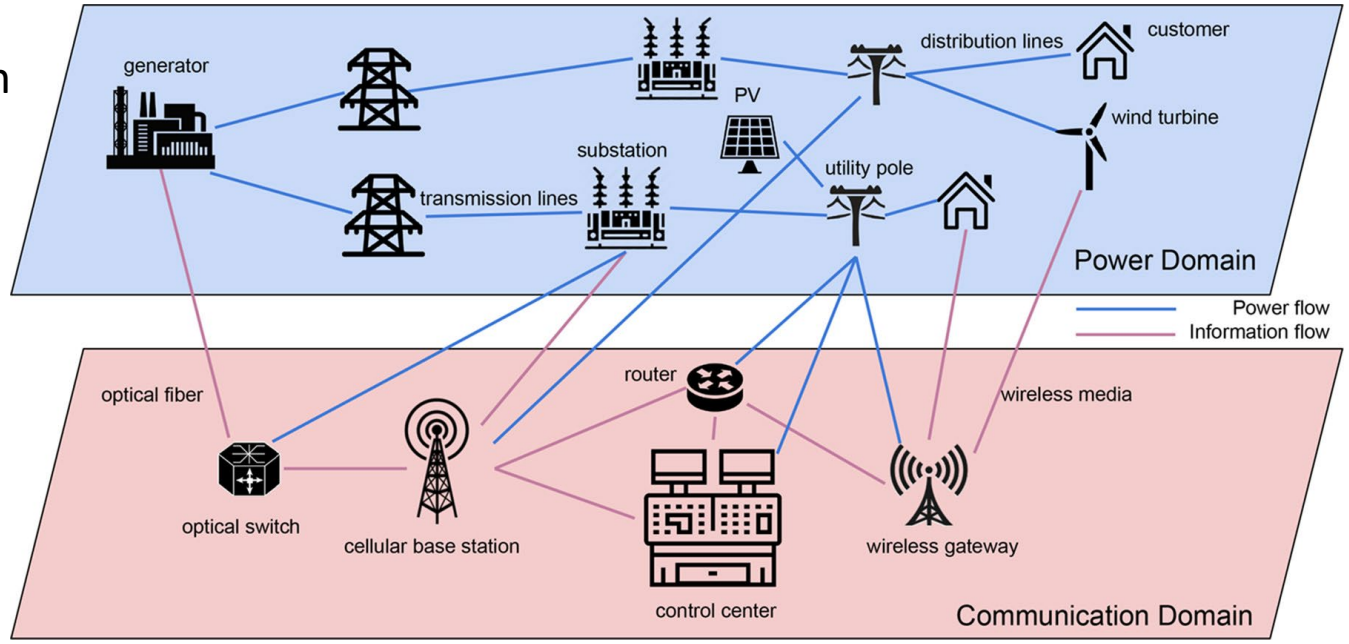
Information exchange is needed

- **High interdependence of data** across different stakeholders (DSOs, generators, and neighboring TSOs)

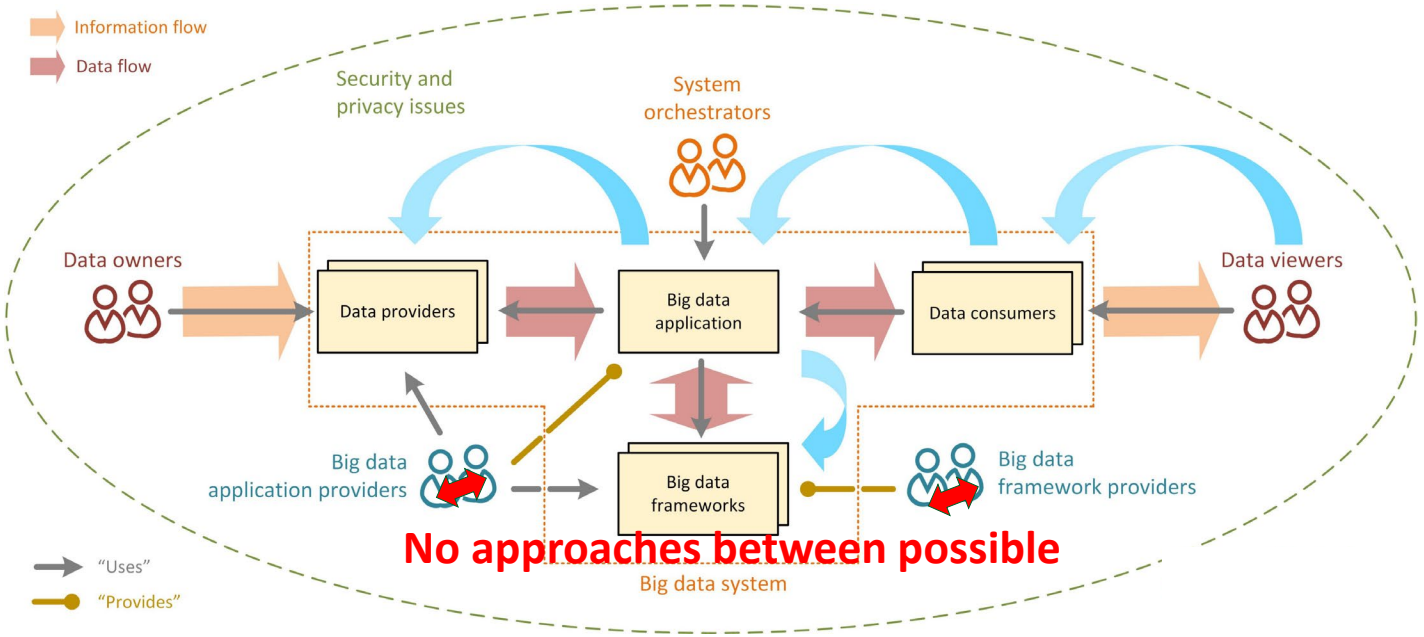
- **Information exchange** between the different actors is compulsory to profit from these data sources



Liu, X., Chen, B., Chen, C., & Jin, D. (2020). Electric power grid resilience with interdependencies between power and communication networks–a review. *IET Smart Grid*, *3*(2), 182-193.

Standardization is needed to develop solutions between companies

- Currently, data is processed using standard and proprietary IT solutions from different vendors **tailored to their needs.**
- **Standardization of some of these tools** is needed to develop solutions that can be **adopted among companies.**



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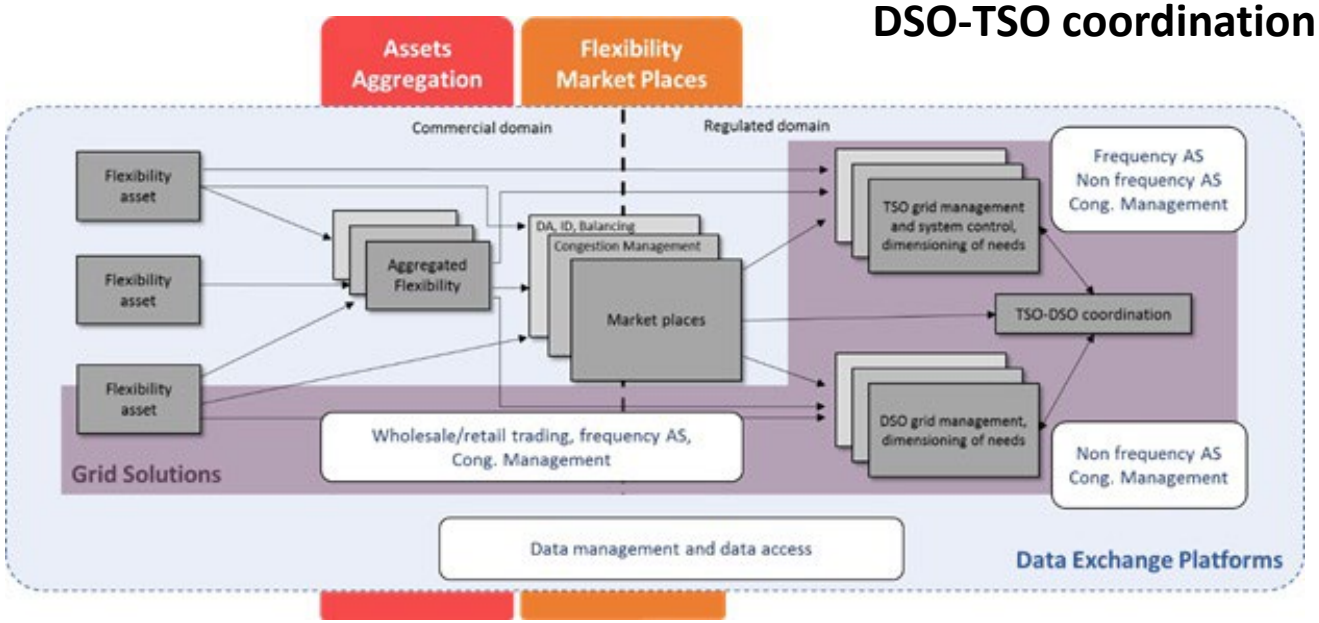
Differences globally in data sharing

- In north and south America, information exchange is restricted although the power systems are interconnected.

- In Europe some information, tools, servers, and applications are shared among TSOs

DSO-TSO coordination



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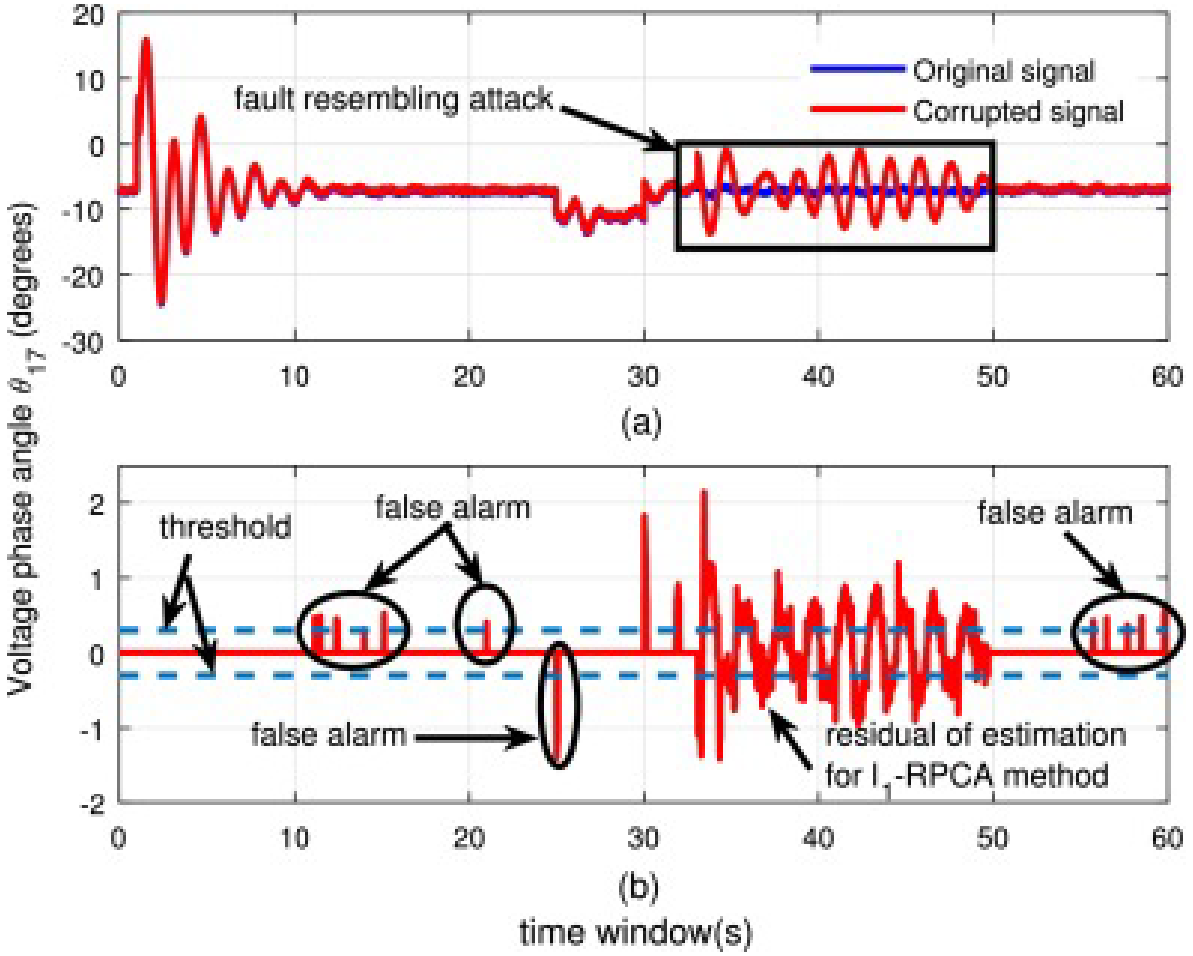
Standard ENTSO-E Communications Document: Real-Time data exchange on Electronic highway.

Challenge: Reduce corrupted data



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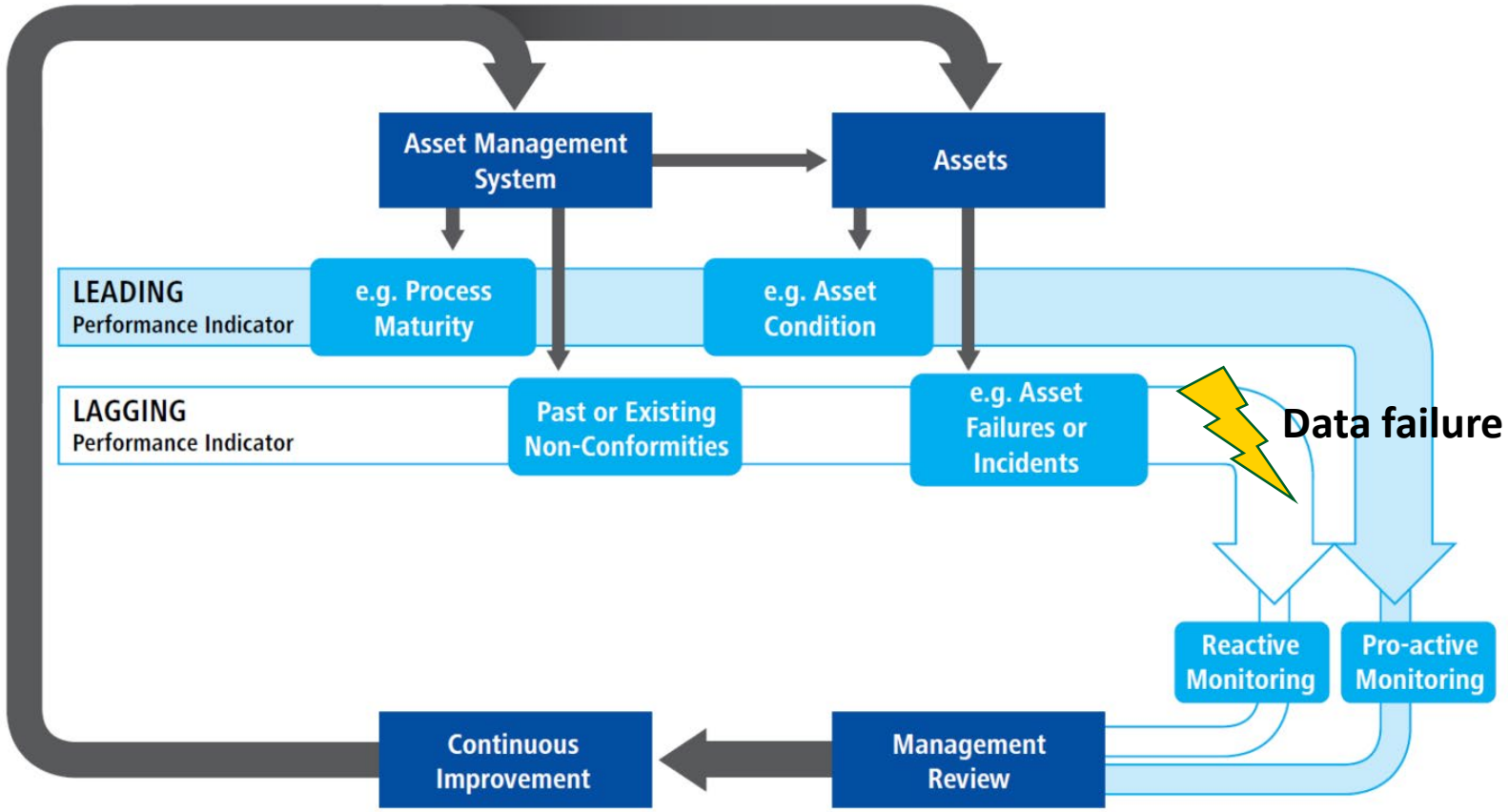
Challenge: Analysing system performance

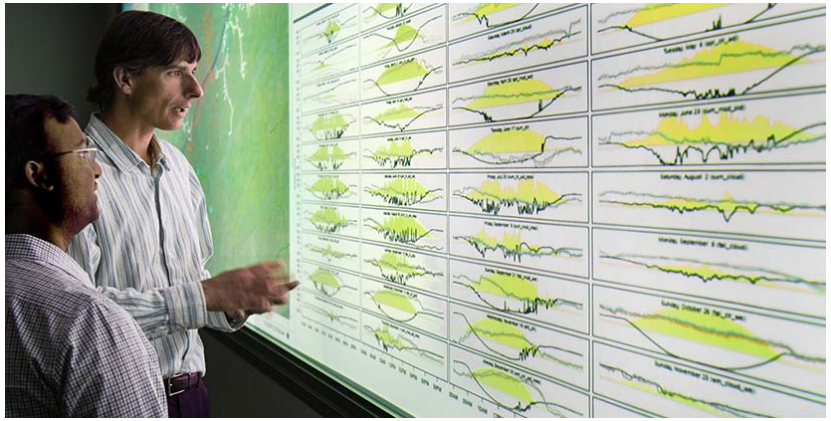
Distinguish between asset failures, application failures, or data failure



Institute of Asset Management (IAM) publication: "Asset Management – an Anatomy" https://theiam.org/knowledge/asset-management-an-anatomy/, https://www.power-grid.com/executive-insight/the-martial-art-of-asset-performance/#gref accessed 20/07/2022

Lack of data analytic tools in control rooms

- Most of the surveyed system operators agree on a current **lack of data analytic tools** operating in their control rooms.



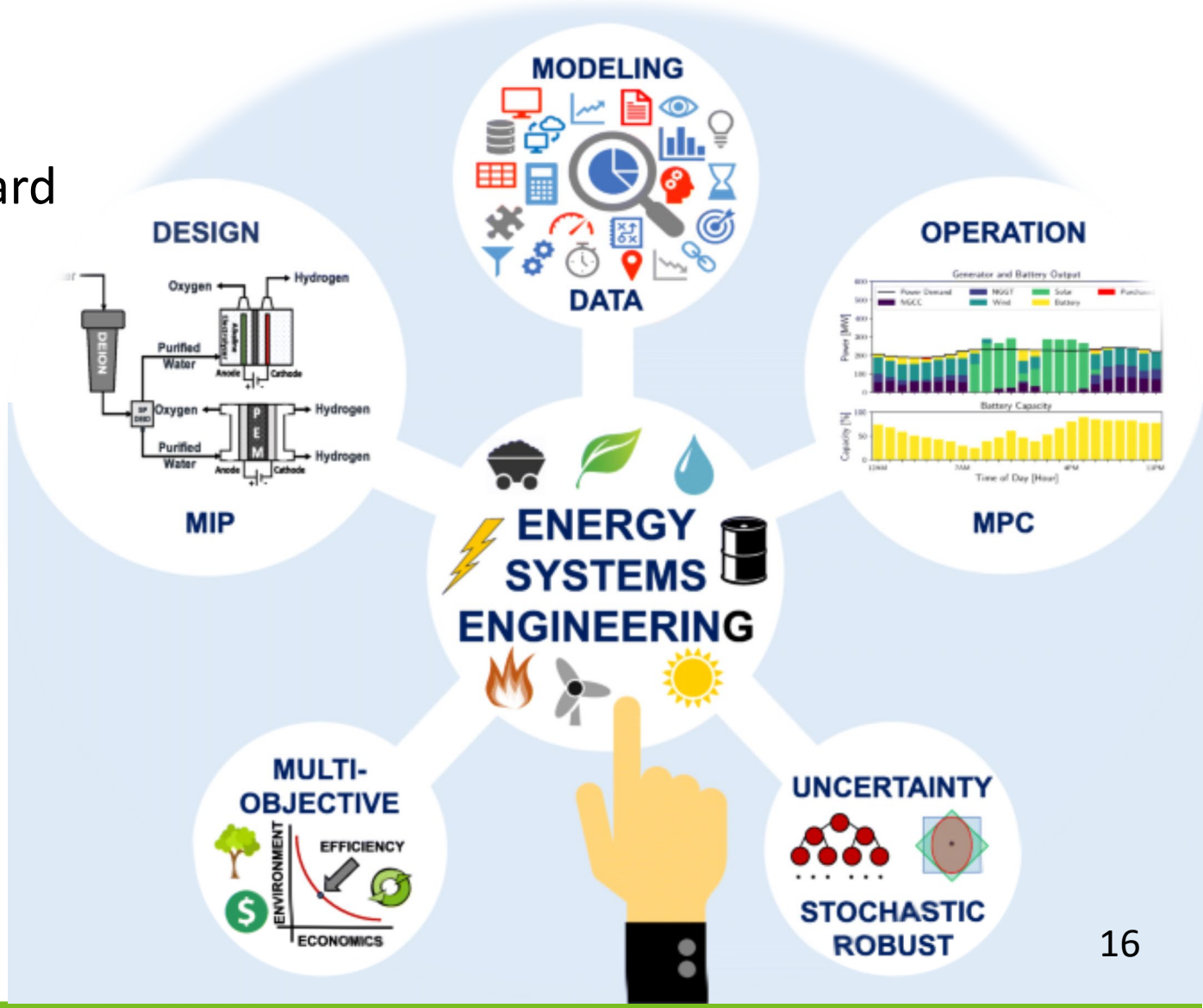
https://www.nrel.gov/grid/power-systems-operations-controls.html, accessed 20/07/2022

- Advanced tools make only sense **if the information exchange among these tools is standardized.**

Standardize information exchange → **Data analytics tools**

Training and development on data analytics

Common barrier among utilities toward the implementation of advanced analytical tools in control rooms.



Conclusions

- Need to enhance data handling and advanced algorithms in control rooms.

- Approaches should be (1) interpretable and (2) communicate their limits so SOs and utilities can
  1. reduce the training need of personnel, and
  2. take immediate actions,
  3. to avoid additional costs caused by the supervision of skilled data handling experts.

Thank you

Contact & References

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