

Digital transformation of the electric utility sector: Benefits, pitfalls, & costs

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Introduction

Digitalization is driving significant transformation in the electric supply industry, making data more available to decision support tools and predictive analytics, supporting digital twins, and enhancing collaboration. In this article we will look at some of the possible benefits that may be accrued, along with some of the pitfalls and costs on the digitalization transformation journey.

We need to be clear on the definitions, or we can start to confuse the issues [1]:

- Digitization: conversion of analog/paper records to digital format

- Digitalization: turning analog processes into digital ones, often automated
- Digital transformation: reshaping organizations via digital technology

Computerization has been generating data for decades. The drive to “big data” with its “5 V’s” (velocity, volume, veracity, variety and value) has underscored the need to take care of and manage that data as an asset to the organization. Data needs to be curated and managed or the benefits of a so-called “data lake” become lost in a “data swamp”. Also, the strategic asset management plans of the organization need to address data: its creation, storage, access, life cycle, security, and so on.

Some organizations have a data governance policy to set out their strategic approach to data, which also allows them to simultaneously take input from and address the needs of key stakeholder and end users. If a data governance strategy does not fit the culture and traditions of the organization however, there may well be trouble in the implementation stage. As management guru Peter Drucker notes: “Culture eats strategy for breakfast” [2].

But let’s say our data governance strategy is sound. Is there a positive return on investment (ROI) in delivering the strategic goals? That will depend on the benefits we can accrue. Box 1 gives an example of a successful digital transformation.

Note there is no requirement for a “single source of truth”, but it may make life easier to have one once data migrations begin happening in the digital transformation effort. Similarly, there isn’t a cloud solu-



tion requirement since an on-premises solution may be preferred for security. The transformation is to support the organization, not prevent it from operating as usual. Box 2 gives an example of a more challenging transformation, but also a successful one.

Digital transformation benefits

A successful data governance strategy has several possible benefits:

- Data that can be trusted as to its veracity from being audited, curated, and managed as a valued asset
- Strictly controlled, secure access and usage of sensitive data
- An ability to demonstrate and maintain a compliance posture that reduces any risk of financial penalties
- Data security that can be more effectively managed via creation/edit/use/



The definition of project success is especially important since the project strategy is directly influenced by it

- deletion audit trails
- Analytics and AI tools that can be applied with greater confidence
- A greater ability to apply software releases across the organization seamlessly
- Improved decision making, communication, and collaboration between elements of the organization that work from the same data
- Operational decisions in areas such as load management or condition monitoring evaluations that are less complicated and time consuming to make
- Flexibility for applications and scalability for increases in data volume
- Consistent data and common tools that enable applications of digital twins for designing smarter workflows and planning, and know if the twin is trustworthy and reliable and not an “evil twin” [3]

None of these benefits will come about by chance. Each requires effort in particular areas.

Actions

Generally, achieving benefits in a strategic initiative comes down to success in three crucial areas:

- 1) Assessments
- 2) Definitions
- 3) Delivery

Assessments identify where we are now, areas for improvement in the current situation as well as opportunities for improvements through new approaches, new technology, and new tools.

Definitions clarify where we want to be and the specific goals to achieve that will get us there, the ways and means that will fuel data governance and in turn bring about data quality. Which measurands to apply, what the data governance policies will be, how cyber security requirements and other matters like data update frequencies all come in to play and need to be defined. The definition of project success is especial-

ly important since the project strategy is directly influenced by it.

Delivery is critical. A best practice is to engage key stakeholders at all stages of planning and implementation. Solutions imposed ‘from on high’ or by 3rd parties tend to fail in practice by lacking staff buy in and results may be highly disappointing [4].

In general, start small and actually implement some digitization, some data curation, and some initial audits. Find the low-hanging fruit which can be useful and yield a relatively “quick win” and allow folks to celebrate success. Then keep going; learn, improve, just move forward.

Costs

There are the obvious costs, but also some that may be less obvious yet more substantial:

Customer Y is a US based utility serving 1.6 million customers across two states via over 16,000 km of transmission lines, over 97,000 km of distribution lines, and with 5,000 employees. Uniting two original companies has been a challenge, with different procedures and inconsistent data/records meaning legacy EAMs did not support either the new organization’s needs or ambitions.

Solutions identified: include data silo consolidation; a new single EAM; and a means to include field work planning/management consistently in the EAM. Their approach to data governance was people-centric across the organization, involving all stakeholders through communication, transparency and engagement. They also, very sensibly, tackled the problems piecemeal, allowing for incremental successes, rather than trying to ‘eat the elephant’ in one go.

Pitfalls can be avoided, but doing so requires planning and forethought, good communications with all stakeholders, and collaboration.

- Digitization is not free. Transferring data from paper records could have diminishing returns. Evaluate if the data is valuable, if the work is worth the effort, given the expense.
- Standardizing data formats, data models, units of measure, and so on, are also vital to ensuring data quality is adequate. There are costs associated with translating data from old to new formats and verifying the quality.

Customer X is a large utility in the United States, comprising 10 operating companies and over 12,000 employees in six US states, with >38,000 km of transmission lines between 69 kV and 500 kV. Systems had grown organically in individual companies yielding multiple data silos, little to no integration of data sources, disjointed and sometimes incompatible processes which lead to difficulties in finding common approaches and consistent operations. The operating companies had a history of doing things ‘their way’ and had some inertia in moving to a more transparent and collegial culture. Involving people throughout the digitalization process was key for a successful digitalization strategy because, as Drucker notes: “Culture eats strategy for breakfast.”

Solutions identified included: consolidated data resources and “Ruthless standardization” of processes from the bottom to the top; an Enterprise Service Bus (ESB) layer on top of all data repositories to make access uniform and consistent; a corporate responsibility and transparency initiative (Employee, Environmental, Social, and Governance). Implementing solutions was not without challenges but the digitalization strategy has shown positive ROI.

- Data storage, whether in the cloud or on premises is going to be a significant cost; reducing data duplication can reduce the cost of storage by up to 25% [5]
- Training will likely be required so that staff can continue to perform their function using possibly new tools and new data sources to improve decision making
- System maintenance and upgrades will be a significant cost, especially to new and more efficient technologies, hence the need to build in flexibility and scalability at the outset

As costs mount up, a clear business case helps yield a positive ROI.

Pitfalls

Some of the pitfalls we have seen in digitalization transformations include:

- Not getting ‘buy in’ from key stakeholders at the outset and coming up against a form of cultural inertia which fights any ‘change’
- Lack of understanding of the data needs of decision makers: availability and reliability of data, algorithms and analytics are key to good decisions but may be underrepresented in initial plans
- Underestimating costs of data hygiene and data curation: we have seen one initiative spend over 80% of their budget on data hygiene, with an ongoing 20% subsequently in a never-ending activity
- Not treating data as a valuable asset
- Not understanding that the world around us is changing rapidly: the growth in big data from renewables, smart meters, monitoring and increased sampling of operational data provide a huge amount of data

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communications with all stakeholders, and collaboration.

Conclusions

There are benefits to be had in the digitalization and digital transformation of electric utilities, but there are also some significant risks. Any digitalization project requires clear aims, an auditable and justifiable business case, and detailed management to ensure the project aims are addressed and realized.

In some cases, this is exactly how things go, in others it’s more disappointing. Preparation is key, as proper planning helps prevent poor performance. Start with the question: what do we want at the end of this project that we don’t have now?

Acknowledgement

With many thanks to colleague Joe Stevenson for his kind comments and guidance.

References

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- [4] <https://www.achieveit.com/resources/blog/strategic-planning-failure-why-it-happens-and-how-to-avoid-it/>
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There are benefits to be had in the digitalization and digital transformation of electric utilities, but there are also some significant risks

“If you don’t know where or what your data is, you don’t know your future as an organization.”

- Satya Nadella Microsoft CEO

“There were 5 exabytes of information created between the dawn of civilization through 2003... ..but that much information is now created every two days.”

- Eric Schmidt

Executive Chairman at Google (2008)

Today’s estimate >400 million terabytes every day!

Authors



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