

**Grid Resilience and Reliability Empowered Through  
Predictive, Preventive, and Protective Technology Framework  
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## **SUMMARY**

The 1996 Western North America blackouts impacted 7.5 million people across United States, Canada, and Northwest Mexico. Thousands of people were trapped in airports. No phone service. People irate with sweltering heat. The cause behind one of the worst power outages in North American history ? Exceeded grid capacity on a particularly hot summer day [1]. Incidence like this are the driving forces that calls for Grid Reliability and Resiliency.

Digital Transformation has come long way and utilities are finding ways to apply digital transformation for a healthier grid.

The audience will learn about how historical data of the Utility can play an key rôle in predictive, prescriptive, and protective analysis of Grid assets and help grid to ensure they have better reliability and resiliency insights.

The Grid Reliability and Resiliency Technology Framework- GRRTF model will help audience understand how AI and ML models can be applied to historical data and get real time insights and help Utilities to operate better.

Incidents such as Earthquakes happened in last few years, the ground conditions, Tsunami, and High wind forecast, Vegetation Impact, and over loading substations and transformers for unplanned and illegal commercial and residential apartment constructions that would drive Utility does not meet the reliability and resiliency goals.

## **KEYWORDS**

GRRTF- Grid Reliability and Resiliency Technology Framework

AI- Artificial Intelligence

ML- Machine Learning

MXrass- ManageX Research as a Service

MXdoc- ManageX Documentation Management Services

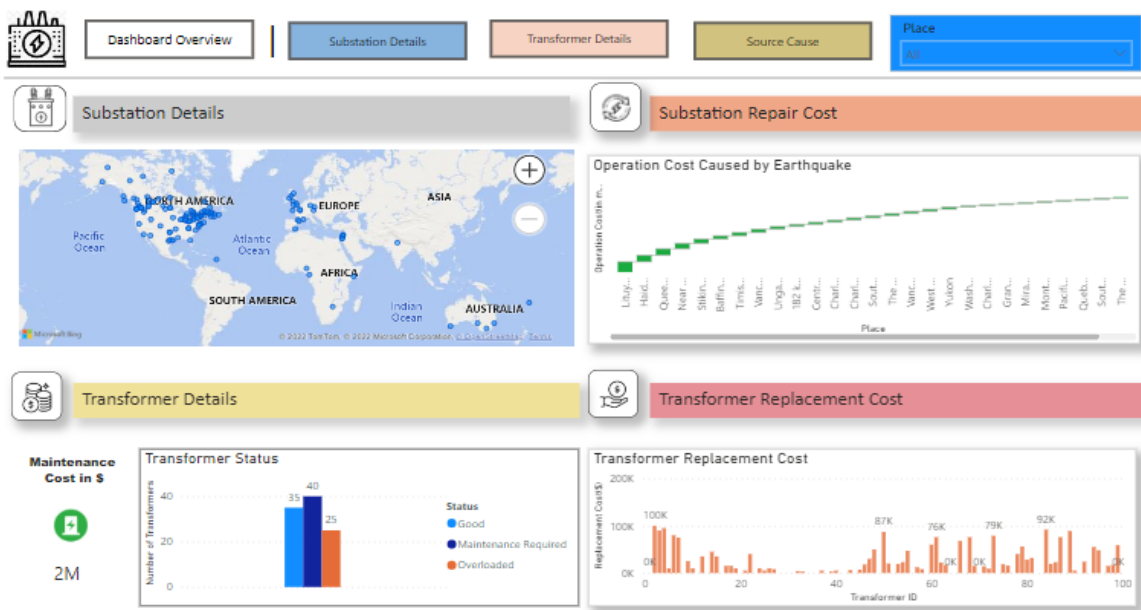
COVRS- Connected Workforce, Optimization, Visualization, Risk Mitigation, and Sustainability

## Agenda

- ❖ Objective of the Paper.
- ❖ Understanding the GRRTF.
- ❖ Mandatory Requirement for GRR- Planning, Monitoring, and Maintenance for Grid Safety, Security, and Reliability.
- ❖ The Problem Statement.
- ❖ The Solution Framework Sample.
- ❖ Live Demo.
- ❖ Conclusion.

## Objective of the paper

The objective of the paper is to educate the audience on portals-based approach to have healthier grid reliability and resiliency through a technology framework where historic data is given tremendous importance. Historic data includes natural disasters caused (Includes earthquake, Tsunami, High Winds, Continuous heavy rainfalls and landslides, Fire, and Vegetation impact on the Grid), and Operational Impact such as overloaded substation and overloaded transformers.



## Understanding the GRRTF.

GRRTF uses historical data of substation and transformers and other assets and apply Artificial Intelligence and Machine Learning models to the historical data. For this paper I have used historical data reference sites [1]

1. [Important Canadian Earthquakes \(nrcan.gc.ca\)](https://nrcan.gc.ca)
2. From Saturday through to Tuesday, Environment Canada recorded staggering wind gusts ranging from 80 km/h to in excess of **136 km/h**. The community of Pangnirtung, home to around 1,500 people, was the hardest hit, with a peak

gust of 136 km/h, which Environment Canada says was the all-time record for the community. [June 15th, 2022](#)

3. MXraas [iii] was used for historical data research and to build GRRTF, MXraas is Terawe Corporation product and is a Cloud Infrastructure readiness product that would deploy infrastructure needed to conduct research on historical data and build resiliency and reliability portals for the Grid.
4. Substation mapping for sample pilot was used from this location [Blackspring Ridge Wind Farm Substation :: Western Pacific \(wpe.ca\)](#)<sup>iv</sup>
5. [List of earthquakes in Canada - Wikipedia](#)<sup>v</sup>

### **Mandatory Requirement for GRR- Planning, Monitoring, and Maintenance for Grid Safety, Security, and Reliability.**

The three major mandatory requirements and there could be many more important documents,

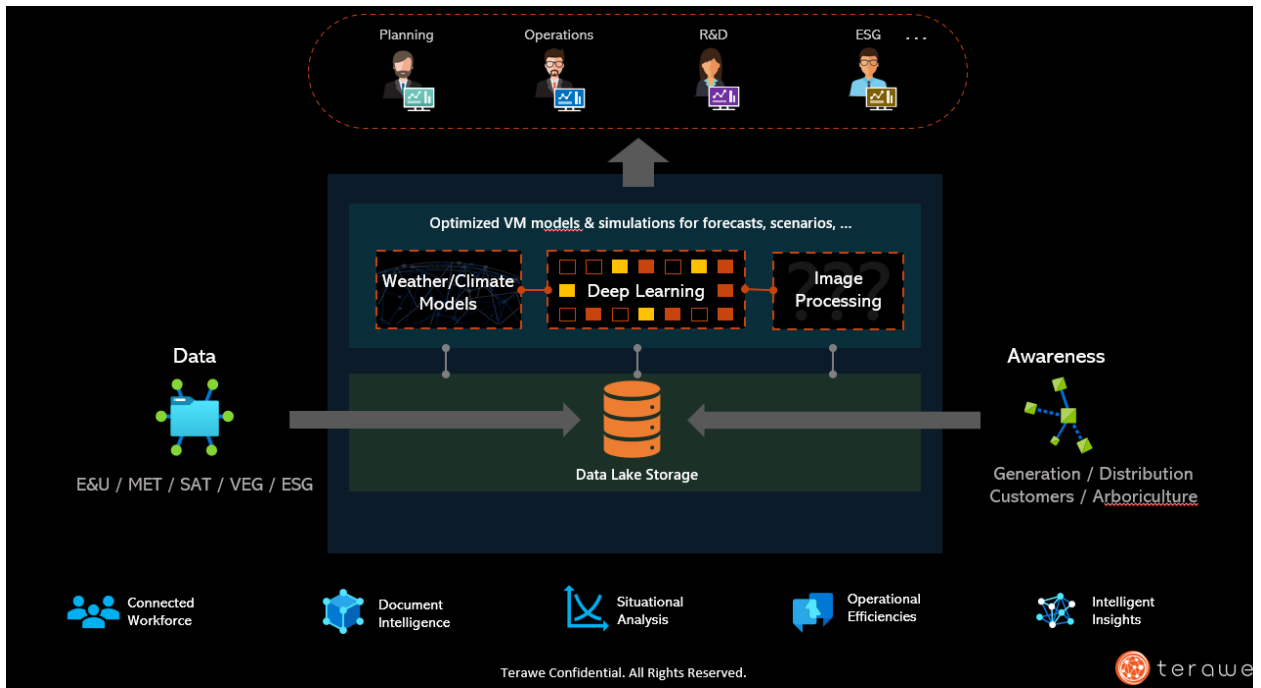
- ❖ Have a complete documentation on how you ensure grid reliability and resiliency, because Utilities are imposed with huge penalties for blackouts and outages.
- ❖ Have a complete documentation on how you would predict events, protect grid, and prevent grid from unexpected natural disasters including high winds, fire, earthquake, Tsunami, etc.
- ❖ What is your 3 year- 5year- 10year plan and how you plan to put technology to maximum utilization and benefits to stop events happening that effect Grid immensely.

MXDoc [vi]- ManageX documentation is An Azure based documentation that will help grid to access and manage documents better way related to grid resiliency and reliability with heavy security build around these documents using Azure Sentinel and Azure AD, more over help grid avoid paying huge penalties or fines for not having a plan towards zero issues with Grid Reliability and Resiliency and help better documentation in place.

### **The Problem Statement**

Utilities quiet often ask themselves Is there one technology that can empower and ensure Grid Reliability and Resiliency, and more in particular how can I predict, prevent, and protect grid to have a healthier Grid Operations and Ensure better customer services by reducing outages and blackouts?

# The Solution Framework



COVRS [Mi] model developed by Terawe can be applied deeply to the above model for better results, COVRS integrate coordination and communication, Optimization, Visualization, Risk Mitigation and Management and Sustainability all under one umbrella.

## Live Demo



## Conclusion

- ❖ Historical Data are critical to apply AI and ML models to have better prediction for preventive, prescriptive, and protective Grid Resiliency and Reliability Initiatives.
- ❖ Data Accuracy and Cleansing can lead to better results.
- ❖ People, Process, and Technology integration through COVRS plays a key role in having right documentation, plans, and data models for better visualization.
- ❖ MXraas and MXdoc help you with better research and documentation platform

## BIBLIOGRAPHY

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[<sup>i</sup>] Source: *The Path to Grid Reliability and Resiliency? Renewable Energy* | by Faiza Haq | Build Edison / Medium

[<sup>ii</sup>] Important Canadian Earthquakes (nrcan.gc.ca)

[<sup>iii</sup>] MXraas Manage X research as a service

[<sup>iv</sup>] Blackspring Ridge Wind Farm Substation :: Western Pacific (wpe.ca)<sup>iv</sup>

[<sup>v</sup>] List of earthquakes in Canada - Wikipedia

[<sup>vi</sup>] MXDoc Terawe's award winning documentation management platform for Utility documents.

[<sup>vii</sup>] COVRS- is a Terawe Process for Utilities to have better results with the data and how to put the data to maximise data intelligence and rich insights to data, data includes. Historical, Current and Future(Predictive data)