

DIGITAL TRANSFORMATION FOR THE AGING UTILITIES INDUSTRY



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EXECUTIVE SUMMARY

Utility companies are facing two difficult challenges: a massive, aging infrastructure and a legacy workforce set to retire within the next decade.

This situation is stressed further by a necessary push to incorporate new technologies and energy sources.

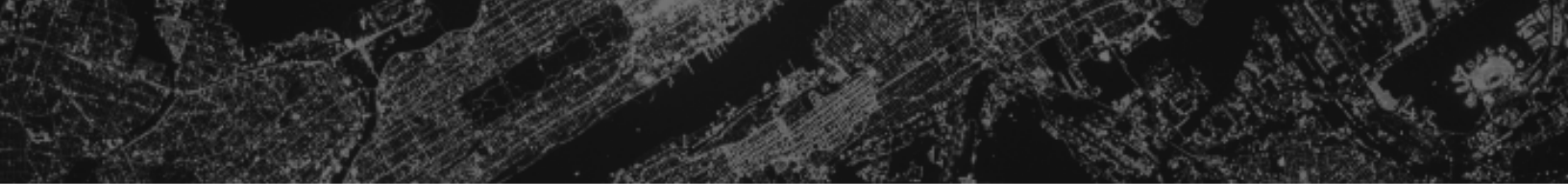
With heavy strains on competing operational and capital expenditures, addressing any of these issues individually will be insufficient. Providers who wish to remain competitive must use a broad brush when ideating and executing a solution.

To address the challenges of an aging infrastructure and workforce, utilities must employ cloud systems to connect field and office, integrate map-based data management tools, and improve training and field work with smart devices.

A single platform that can speak across systems will increase efficiency and reduce costs.



**THE CURRENT
UTILITIES
LANDSCAPE**



The utilities grid was built for the twentieth century. Utility providers are now at a tipping point - serving more customers than ever before through an outdated infrastructure.

The modern electric grid generates 1 million megawatts from roughly 7,300 power plants. Transmitting this power requires 200,000 miles of high voltage cables and 5.5 million miles of distribution lines.¹ In addition, the natural gas underground pipeline network stretches more than 2 million miles.²

In total, the U.S. utilities market serves roughly 155 million households and over 300 million total customers. Maintaining this massive infrastructure makes up the largest operating expense for most utility companies.

The traditional utility business model is based on predictable consumer demand and a stable rate-of-return on physical assets. Yet, the energy market is in flux. Resources and pricing models are changing, and the average household spends less than 4% of their budget on energy costs - down from 5.1% in 2010.³

To remain competitive and keep profits in line with expectations, utility companies are rethinking their portfolios. Decisions on how and when to update critical utility infrastructure will be central to this process in the coming decades.

INFRASTRUCTURE IN THE U.S.
IS OUTDATED AND RECEIVED
A **D+ GRADE** FROM THE
AMERICAN SOCIETY OF
CIVIL ENGINEERS.





AN AGING INFRASTRUCTURE

Infrastructure maintenance is the single largest operating expense for utility providers. ⁴

The current energy grid in the U.S. is valued between \$1.5 and \$2 trillion dollars.⁵ Yet, over 60% of the distribution grid in the US was built prior to the 1980s. This infrastructure is out-dated and recently received a D+ grade from the American Society of Civil Engineers.⁶

As physical assets deteriorate over time, they pose social, environmental, and financial risks. Asset updates are expensive and often reactive, making it difficult for utilities to keep pace with advances in technology.



ELECTRIC ASSETS HAVE EXCEEDED THEIR OPTIMAL LIFECYCLE

In 2015, the U.S. Department of Energy found that:

- 70% of transformers are 25+ years old
- 60% of circuit breakers are 30+ years old
- 70% of transmission lines are 25+ years old ⁷

The raw materials required to replace or upgrade these components are costly, and prices reflect global demand. For example, iron, steel, and copper have sustained price increases between 50% and 150% since the early 2000s. ⁸

Developers spent a record \$22.2 billion on electric transmission in 2018, up 25% from 2013. ⁹

With energy demands on the rise and traditional pricing structures in flux, providers simply cannot afford equipment and service failures.

REPLACING LEGACY GAS PIPELINE WILL TAKE GENERATIONS

Over half of the existing gas mainlines in the U.S. were laid in the 1950s and 1960s, with an average gas main age of 33.8 years.¹⁰

Gas utilities are actively repairing and updating this grid each year. Over the past decade, an average of 5,600 miles of pipeline were replaced annually - tripling total expenditures between 2009 and 2017.

This system is based on use models from the 1970s, and the current pace of replacement relies on outdated methods and routines.¹¹ At the current rate, the Rocky Mountain Institute estimates that replacing every pipe would take 230 years.¹²



A RETIRING WORKFORCE

More than 25% of utilities workers will have begun the process of retiring in the next 5-10 years.¹³

In addition to the challenge of aging infrastructure, utilities also face a looming retirement crisis. Management teams must find ways to both capture a wave of outgoing knowledge, while also training new recruits. As 72% of employers already report having trouble hiring qualified candidates, this may be easier said than done.¹⁴



CAPTURING OUTGOING LEGACY KNOWLEDGE

Digitizing legacy knowledge before it departs is crucial for operational success in the coming years.

Utility employees often stay with the same company for most of their career, which allows them to develop legacy knowledge. This knowledge is often undocumented and unique to each senior employee, making transfer difficult.

Lineworkers and similar skilled field positions can take up to seven years to train, and in some parts of the country the ratio of apprentices to retiring workers is less than 10%.¹⁵ As a result, roughly 75% of utility repair, replacement, and installation is currently outsourced - a costly and unsustainable solution.



ATTRACTING NEXT-GEN TALENT

By 2025, millennials will represent 75% of the total workforce.¹⁶ Utilities must compete for this next-gen talent by digitizing operations and adopting corporate responsibility into hiring campaigns.¹⁷

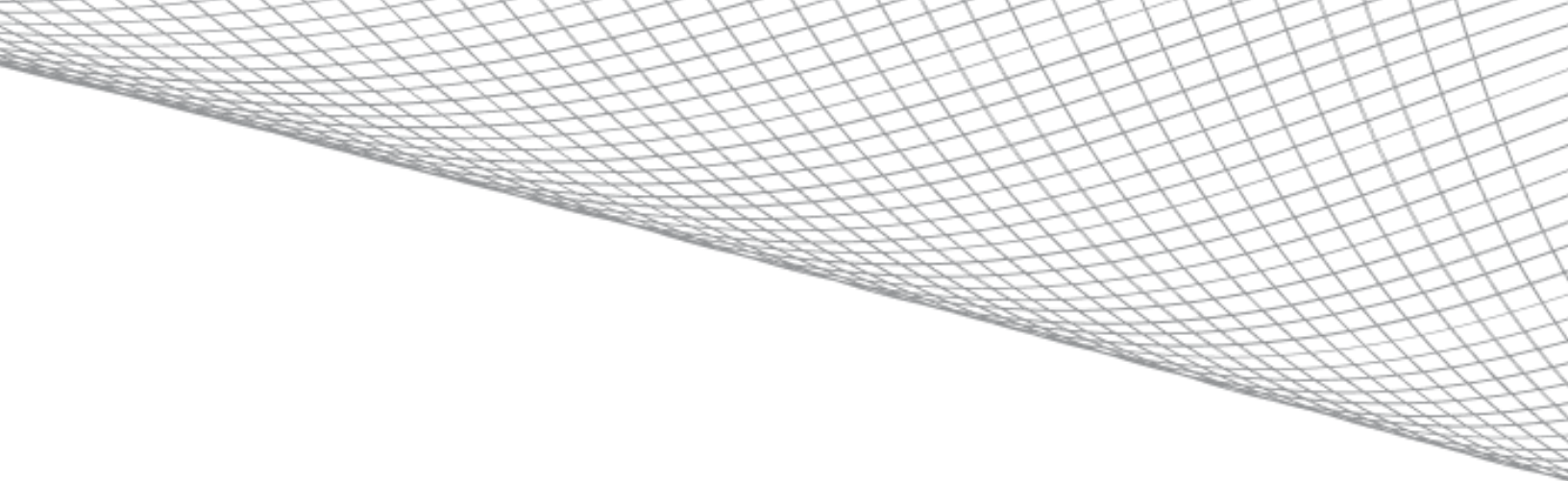
Digital solutions can help improve the hiring process and close the skills gap. One approach is to increase senior employee buy-in through reverse mentoring, in which technology uptake is led by younger workers.¹⁸

Utilities must also match their messaging to the industry's future. For example, millennials are more likely to respond positively to jobs in "energy" rather than "oil and gas."¹⁹

Proactively aligning hiring practices and messaging to the perspective of a younger workforce¹⁶ will help attract technology literate candidates who are excited to work in a dynamic and impactful field.



ADDRESSING UTILITY CHALLENGES WITH DIGITAL SOLUTIONS



When addressing the challenges of an aging infrastructure and a retiring workforce, providers who wish to remain competitive must use a multi-faceted approach.

There are two primary ways a utility can address the operational challenges covered here: increase the efficiency of processes and expenditures, or explore ways to decrease costs wherever possible.

Modern technological advancements provide a multitude of options, though it's important to note that no single technology offers an all encompassing solution. Like the push towards digital transformation as a whole, it's vital that utilities look to solve these challenges through a holistic approach.

An effective strategy will reflect the context of each specific utility, but will ideally include cloud-based software and storage, geospatial data management tools, and smart devices.

CONNECTING FIELD AND OFFICE WITH CLOUD SYSTEMS

Information moving between the field and office must be accessible in real-time across multiple devices.

Utility companies still rely on paper and local hardware to collect and transfer data. These tools create opportunity for errors and lost data - often leading to delays, rework, and lengthy completion timelines.

Modern cloud services allow for near instant data syncing. From blueprint updates and on-site photos, to inspection status - these real-time updates eliminate the lag caused by hand between analog and digital systems.

Instant updates improve workflows and increase transparency for all stakeholders. In fact, equipping field technicians with synced mobile devices can increase productivity by 27% and reduce repeat visits to field sites by 60%. This means reduced costs and a better return on investment (ROI).

Another benefit of cloud systems is that most are data agnostic. This means organizations can import and export data in any file type, which helps breakdown silos between previously implemented software platforms and other systems of record.

MAP-BASED DATA CAPTURE AND MANAGEMENT TOOLS

Map-based asset management systems enable users to instantly view entire job sites and an asset's full history.

Utility companies control and operate tens of thousands of assets, dispersed across state and regional territories. Traditional inspection methods have relied on cost-intensive routine cycles, which are often slowed by incomplete documentation.

Providers cannot afford construction and maintenance errors based on imprecise or outdated information. In the past two decades, roughly 2,000 people have been injured due to errors during excavation - errors that could have been avoided with up-to-date data.

Mapping databases are revolutionizing utility inspections by making accurate information - both current and historical - more easily available.

Other geospatial tools such as mobile-friendly GIS, drones, and IoT devices can help teams to capture and share data in real-time. This granular, highly sophisticated level of data capture will become increasingly central to effective field operations in the future.

IMPROVING TRAINING AND FIELD TOOLS WITH SMART DEVICES

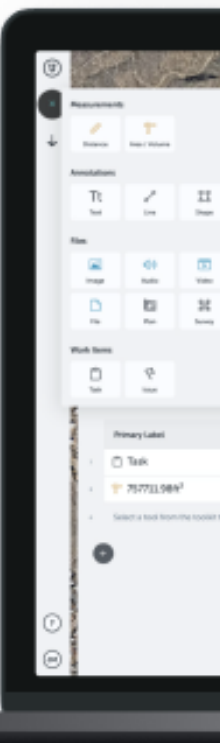
By 2023, the U.S. will need an estimated 29,000 trained lineworkers to maintain the electric grid.

Line and field workers are highly skilled individuals that require years to train. With an increasingly sophisticated smart grid and the introduction of renewables, preparing the next generation of utilities workers will require intuitive and agile training technologies.

Smart devices can be utilized in the field to ensure frictionless information delivery. Interactive digital tools improve the training process by providing realistic simulations, report and compliance scenarios, and simultaneous introduction to field tools.

Field teams can use smart devices to attach multiple media forms, including photos, video, and audio notes to an asset history. This helps to ensure data availability and continuity, while providing transparency for all stakeholders.

In some cases, intuitive digital interfaces can reduce onboarding time to less than 48-hours, ensuring that there is no downtime for new hires.



CONCLUSIONS

Business as usual is no longer an option. Hiring a new generation of field crews and equipping them with the right technology is now an imperative to solve the problem of an aging infrastructure and workforce. This is a billion dollar challenge that demands action.

Innovations such as cloud systems, map-based data digital tools, and smart devices will be critical - offering numerous key benefits:

- a.** Improved field-to-office workflow
- b.** Connected information silos
- c.** Increased inspection and clearance rates
- d.** Reduced training times
- e.** Expanded reporting and efficiency metrics

Utility companies of all sizes face serious challenges in the coming years, and a piecemeal approach will not be enough. In order to effectively adapt to the technological transformation already under way, companies must pursue an all-encompassing approach aimed at cutting costs and increasing efficiency wherever possible.

ENDNOTES

Prepared by Ryan C. Edwards, PhD

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ABOUT UNEARTH

Uneath is a map-based project management software designed to increase productivity in the built-world. With custom digital toolkits and location-based organization, Uneath is a new take on asset, workflow, and field service management.

Cloud-based and mobile-friendly, you can use Uneath to capture data in the field and connect distributed teams. Share data seamlessly and watch as updates sync across all devices in real-time. With all project data in one place, teams can access vital information quickly - streamlining task completion and reducing issues and delays.

Connect teams, data, and assets -

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2901 3rd Avenue, Suite 520
Seattle, WA 98121
206.257.2682
info@unearthlabs.com