



Critical Infrastructure Management

Taking advantage of emerging technology to
reduce operating cost, risk and complexity

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ABOUT THE AUTHOR

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THE TECHNOLOGY *SHIFT*

Technology has changed dramatically over the last couple of years, the way we design, plan, construct, operate, maintain and upgrade large complex assets, critical infrastructure and processing facilities is evolving faster than most organizations can keep up with.

Overview

THE GOAL

Maximizing the availability and performance of your organizations assets; increasing throughput efficiency and safety while reducing operating cost, risk and complexity.

THE CHALLENGE

Often the responsibility for this objective is shared across executives, with different teams such as planning, projects, operations, engineering, maintenance, field services each playing a role.

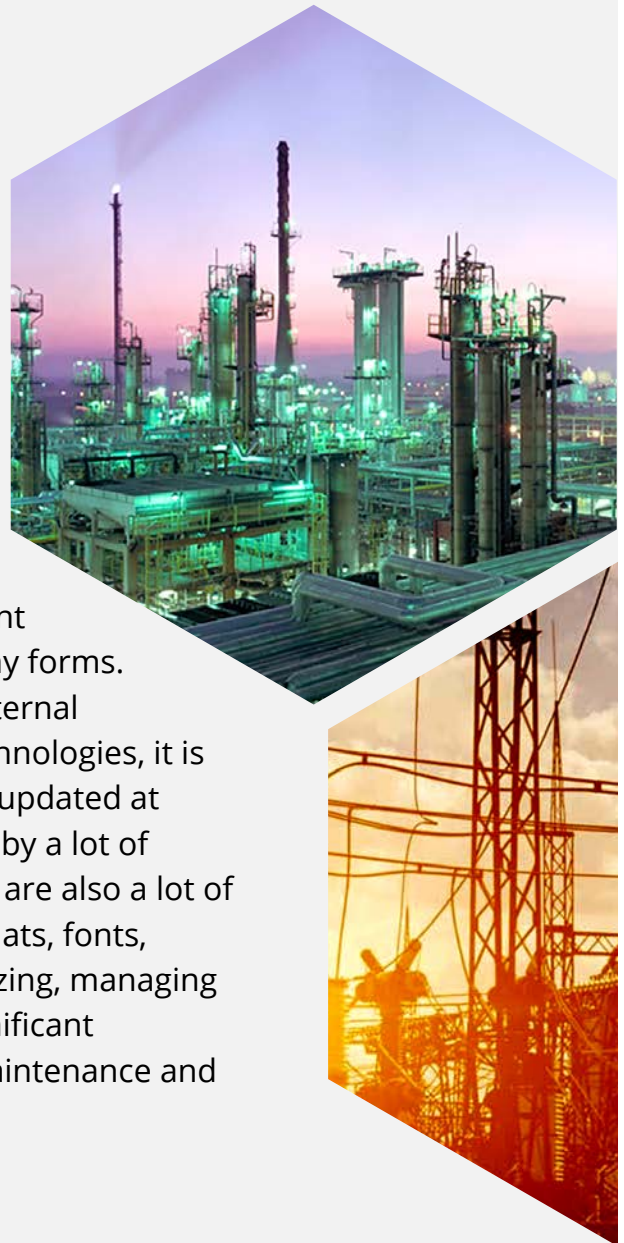
All of these teams rely on having timely access to current asset information. Asset information or data takes many forms. It is produced by a number of different internal and external stakeholders and systems using different tools and technologies, it is provided in a lot of different formats and file sizes and updated at different rates. Because Asset Information is produced by a lot of different stakeholders (staff, contractors, OEM's), there are also a lot of different naming conventions, number standards, formats, fonts, metadata, title blocks and iconology that makes organizing, managing and using this data challenging.... this often causes significant inefficiencies, safety and operating risk, slows down maintenance and can lead to reduced asset availability and performance.

THE SCALE

Most of the worlds critical infrastructure are large complex assets, such as; power stations, natural gas distribution, power transmission and distribution networks, water and wastewater networks, roads, airports, rail networks, hospitals, telecommunication networks, ports, manufacturing & processing facilities and mining operations. When you think about the size and scale of these assets you soon realize the problem is massive and the solution needs to handle very large quantities of data with all of the complexity (size, format, etc) outlined above.

IT'S ALL INTERCONNECTED

Often these assets are interwoven and interconnected in cities creating larger complex multi-stakeholder challenges. Not only do your staff need to know the location and status of your assets, so do others. This throws up challenges around access, control, auditability, compliance, risk management, version control, permitting and planning, etc...



New, Upgraded and Aged Assets




Most of the world's import infrastructure is built and then regularly upgraded, the asset data gets changed and added to over time as assets get maintained, upgraded, extended, replaced, etc.. This is equally important in a site-based asset like a processing plant as it is in a network or linear asset like a power, water, road, rail or telco network. Think about how these networks have and are growing as our cities and regions grow.

For example, the water network in London is hundreds of years old and is constantly updated, in the USA, Hoover Dam was constructed between 1931 and 1936 during the Great Depression and was dedicated on September 30, 1935, by President Franklin D. Roosevelt,

today it provides water to California, Arizona and Nevada. The city of Las Vegas has rapidly grown over the last 15 years into a thriving community with large scale water, power, road and telco networks. In Australia the Snowy Hydro-electric scheme commenced construction in 1949 and was completed in 1974 and now they are planning to double its capacity. Each of these assets has hundreds of thousands of engineering drawings, operations and maintenance manuals and other asset data.

The Journey to Digital Twin



“ Just thinking about all this data, you start to realize that there is an enormous opportunity to merge this data together to create a more holistic view of your assets, operation or network, this is now being referred to as a ‘Digital Twin’. That is a digital representation of your physical assets, site or network. It's the data that creates the digital twin!

Asset data is created during the design process, updated during construction, handed over to the asset owner at commissioning and used to operate, maintain and upgrade the asset throughout its life. Asset data includes things like engineering drawings, 3D models, process diagrams, operations and maintenance manuals, equipment data sheets, safe work instructions, configuration documentation, test certificates, compliance documentation, etc.. Some of this data is fairly static, i.e. it doesn't really change and is most often used as reference material (for example structural drawings of footings or a concrete slab) while other data is constantly used and updated (for example electrical drawings or P&ID's) and often needs to be managed in accordance with government regulations.

There's also operational data, like the data from the control system, other monitoring and alarm systems, IoT sensors, inspection and condition assessment data, planning and permitting data, etc.. This data is more ‘real-time’, it's also created in a lot of different formats and often stored in different systems and used in isolation.

Relatively new technology like drones, IoT sensors and LiDAR are helping to create huge amounts of new rich asset data that should to be stored, accessed, processed and used, often by staff and contractors in the field on mobile devices as small as smart phones and watches.

Five steps to Digital Transformation

So how do you take advantage of emerging technology to drive down operating cost, risk and complexity? There's a lot to consider when you think about the interdependencies.

Five steps or phases that we use when we're helping critical infrastructure and large complex asset owners progress along their digital transformation journey:



AS IS REVIEW

Understand what you've got (quantity, type, format, metadata, standards, versions and history, etc), where its stored (systems, network, local copies, uncontrolled data, duplicate data, paper data), who uses it (staff, contractors, engineering firms, etc), how and where it's used and your compliance and reporting requirements.



TO BE PLANNING

Look at who could / should be using it, how it could be better accessed, used, managed and shared. Then determine how that will improve team and asset performance.



MAKE IT AVAILABLE

Centralize, de-duplicate, organize and improve your asset and operational data, create a single source of the truth and integrate your IT / OT systems so the data is available in your different core systems.



MAKE IT USABLE

Provide your team, contractors and relevant 3rd parties with a platform to access, use, update and manage your asset and operational data while they are doing their work.



MAKE IT VALUABLE

Draw insights from your data, that inform and enable your decision making, operational and maintenance plans, risk management, compliance, reporting and overall performance.

Why should I do something?

The average large complex asset owner has all of the complexity outlined above, they have old assets with old data in old formats that is hard to find, use and manage. So staff and contractors have created local copies (we call them convenience copies), that's why there's so much duplicate data, uncontrolled data and no one knows who's version is the most recent or correct. Or everyone goes to one person when they need to find information. Probably not the most scalable or sensible approach to managing critical asset data. Most asset owners are faced with an aging workforce, this workforce is your tacit knowledge and its on the way to retirement!

Then there's the new technology and data that is being introduced, it's promising, but you will only realize it's full potential when the new technology and new data is properly incorporated into your way of working, i.e. it's accessible, usable and valuable to the majority of your staff, contractors and systems, not just a few.

We've conducted numerous time-in-motion studies, audits, reviews, surveys and business cases to determine the economic impact and value of improving your asset data management.

REMOVING DUPLICATE DATA

Save on data storage costs, save on time it takes to find the right version, stop people working off the incorrect / old data (which can cause mistakes, serious safety incidents and creates rework)

CAPTURING TACIT KNOWLEDGE FROM A RETIRING WORKFORCE

Ensures the knowledge is documented and accessible to everyone who needs it, again this saves time, stops mistakes, improves safety, reduces system failures, and also helps you to attract and retain "digital natives" who expect to access data on their mobile phone and do work remotely.

MAKE DATA AVAILABLE TO STAFF AND RELEVANT THIRD PARTIES.... ANYWHERE, ANYTIME AND ON ANY DEVICE

Reduces data duplication, creates an audit trail, improves compliance and risk management, increases productivity and efficiency, enables faster return to service during unplanned or reactive maintenance and enables remote working, job sharing and business continuity (especially relevant in the current COVID-19 environment)

QUANTIFYING THE SAVINGS AND BENEFITS

It's common for most large asset owners to realize savings and benefits quickly, equating to thousands of dollars a month per asset or site and achieving a payback on their initial investment in 6-12 months.

Where do I start?



Most asset owners have multiple projects, upgrades, shutdowns and operations happening concurrently, so we've developed tools and an approach that fits in with where you are now.

There is no specific preparation required to kick off the process outlined above, we have a team of subject matter experts and partners that have delivered numerous asset data improvement projects, helped our clients adopt our cloud and mobile solutions, manage the integration with your other core systems and manage the business process optimization and change management.

If you'd like to know more about RedEye and how we can help your organization take advantage of emerging technology visit redeye.co or email info@redeye.co



ABOUT

RedEye is an Australian technology company founded in 2012 to help large complex asset owners and critical infrastructure operators improve asset safety and performance. Today RedEye has 6 offices globally and helps our clients manage over \$250bn of large complex assets and critical infrastructure, using our purpose-built cloud and mobile “Asset Data Management” and “Work Management” solutions.

RedEye’s solutions complement and integrate with our client’s ERP, EAM, GIS and other core business systems. All of our clients have solutions like SAP, Maximo, Ellipse, Infor, Oracle, Esri and SharePoint. These solutions aren’t designed to manage asset data, so they adopt RedEye to make their asset data available, usable and valuable.

RedEye’s team and partners have developed deep domain and subject matter expertise delivering numerous asset data management projects and are available to share best practice knowledge, tools and processes.

CONTACT

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