UIIC
UTILITY IMAGERY & INSPECTION CONSORTIUM

PHOENIX, AZ

2023
SUMMIT
SUMMARY

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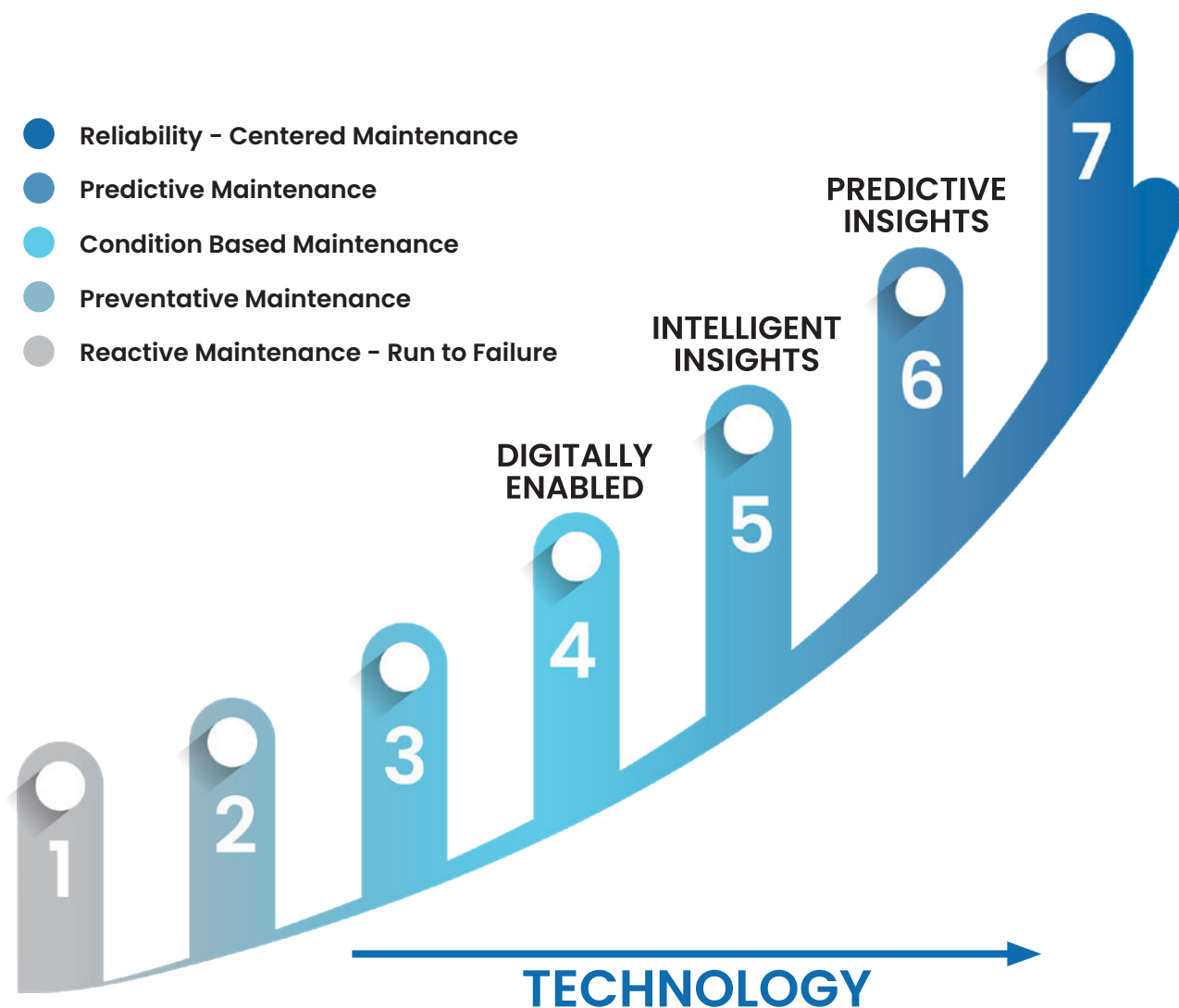**SUPPORTING PARTNER**

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Scaling the Maturity Curve

UTILITIES TACKLE IMAGERY & INSPECTION CHALLENGES AT THE UIIC SUMMIT

INTRODUCTION

Solution providers convened at the inaugural Utility Imagery & Inspection Consortium ("UIIC") Summit in Phoenix, Arizona. The discussions centered around the challenges, successes, lessons learned, and drivers behind the burgeoning utility imagery and inspection space. Participants were lively and offered a glimpse into a utility market segment poised to leverage a bounty of new technologies and processes that are beginning to yield measurable improvements in reliability and safety and will ultimately change how utilities manage their infrastructure for operational and financial improvements.

This white paper provides a summary with highlights from the Summit, which weave the theme Scaling the Maturity Curve into many of the sessions and activities. For reference, a copy of the UIIC Maturity Curve is below.

● Reliability – Centered Maintenance

● Predictive Maintenance

● Condition Based Maintenance

● Preventative Maintenance

● Reactive Maintenance – Run to Failure

PREDICTIVE INSIGHTS

INTELLIGENT INSIGHTS

DIGITALLY ENABLED

TECHNOLOGY

Figure 1. The UIIC Maturity Curve

DAY ONE

Under the Summit's theme of Scaling the Maturity Curve, the two-day Summit opened with a workshop that ran for the entire afternoon. The workshop kicked off with presentations from Avista and Salt River Project, sharing their I&I journeys.

Nick Lasko from Avista, a favorite among UIIC members and participants with his colorful anecdotes and frank opinions, shared some lessons learned from his group's I&I exercises in eastern Washington. The initial benefit of their use of drones is providing a faster and better data collection method that is much more accurate, and easier to deploy than helicopters. Looking beyond the traditional T&D uses, Avista is also using drones for inspecting and assessing generation facilities, and for shoreline imagery, producing 3D models.

Nick also shared how they are now proving the efficacy of using drones for emergencies and storm restoration. In one case, a helicopter couldn't find the cause of an outage for several days; Nick and his team found the cause in a few hours and were able to rapidly dispatch a crew to fix the problem.

Next up, **Jason Gunawardena and Rick Hudson of Salt River Project** provided some insights into how their I&I program has rolled out. One of the key points they drove home is the need for coordination across multiple groups and organizational boundaries for successful I&I operations. They call this approach TEAM, "Time Efficient Asset Management." This approach has yielded numerous results, including inspection efficiencies to the tune of going from one inspection per day to over a hundred per day. They are using infra-red cameras, as well as high-def cameras in their I&I operations. They also mentioned that Salt River Project has been proactively notifying customers of their I&I operations, which has made for a more seamless approach to getting quality inspections completed in a timely manner.

The SRP team sees their I&I successes to date as a platform for moving forward with new use cases. They are looking at moving into storm damage/restoration, vegetation management, fire mitigation & assessment, and GIS verification. This last one, GIS verification, could very well prove to be of huge business value, helping realize more value from GIS investments.

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Daniel Anderson of Black & Veatch, followed up the utility discussions with a presentation of a new US Department of Energy initiative called the Grid Resilience and Innovation Program, or "GRIP." GRIP has three pillars: distribution data standardization; large-scale smart grid data collection; and catalyzing the ecosystem.

Noting some of the challenges around utility data collection and standardization, Daniel walked the Summit audience through the basic tenets and benefits of the DoE's GRIP initiative. GRIP's fundamental mission is a national effort to create standards, with open access and interoperability between utility and private industry. There is also an expectation of cost reduction of up to 90%, by leveraging industry buying power, while increasing equitable access to all utilities. Additional benefits include: a data capture schema, and a distribution asset physical data schema, that will provide consistency across multiple service providers or utilities to create pipelines to feed multiple use cases and numerous enterprise, engineering, and AI/ML applications. The business applications focused on GIS, ERM, SAP, pole loading software, CAD, vegetation management, risk analysis, and asset condition/maintenance studies are expected to benefit as well.

The GRIP initiative is part of a larger ($62 billion) DoE grid modernization program. It provides $3.9 billion for the data collection standardization efforts that will be rolled out over a five-year period, and is designed to provide 50% cost-sharing for data collection standardization efforts at utilities.

The workshop wrapped up with a panel consisting of the speakers from Avista, SRP, and Black & Veatch. This was an opportunity to dive deeper into the topics covered throughout the workshop. Salient points from this panel discussion included:

There are challenges when standardizing data. Some are using any data they can "get their hands on", which is less than ideal when training models for AI/ML applications. Standardized data collection is a must.

Value from I&I programs come in many forms. This can often start off when meeting regulatory requirements. A key benefit to providing imagery, that was never available previously can be found when making it accessible to field crews and engineers. This can quickly open up use cases that may not have been originally intended. Nick from Avista provided an example of this with their efforts in monitoring a gas line that is beneath a lake, where they are going to use a drone to pull a sonar sensor through the water to monitor the health of the pipeline.

Sometimes quantifying I&I program value can be difficult. For instance, how is value assigned for accidents that never happened because of drone usage? Jason from SRP noted that using drones is also helpful for limiting the time that crews need to spend in the higher crime areas of their service territory.

Staffing & training for I&I programs is taking on many different approaches. One utility is using their corporate pilots to fly drones; other utilities are training linemen to fly drones. There are also examples of where some of the skills needed for an I&I program are often contracted out. A model that appears to be proving successful involves the pairing of a drone pilot (in-house or contracted out) with a subject matter expert (typically a lineman or an inspector). This combination has proven to be extraordinarily efficient in not only identifying problems, but allowing for issues to be immediately addressed. Day One of the summit wrapped up with Ken Maness, UIIC Executive Director, providing a look at where the UIIC has gone since its inception eighteen months ago and what is in store for the coming year and beyond.

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Looking ahead to UIIC events and activities, **UIIC Executive Director Ken Maness** called out the organization's Second Annual Symposium, currently being planned for late 2023. After the Symposium's launch with Oncor in Texas in 2022, the 2023 edition promises to be a great event for I&I leaders and professionals. Ken also announced the continuation of the popular Center of Excellence Virtual Meetings that will be held each month throughout 2023, plus a new feature being launched in 2023: The UIIC Labs, an opportunity for I&I professionals to interface with solution providers and their technologies and solutions.

DAY TWO

Day Two of the Summit kicked off with a keynote address from **Jordan Evans, a NASA Aerospace Engineer** who has been part of the team that has delivered a rover to Mars. He shared how the rover is sending back images and will soon send samples from the surface of the Red Planet too.
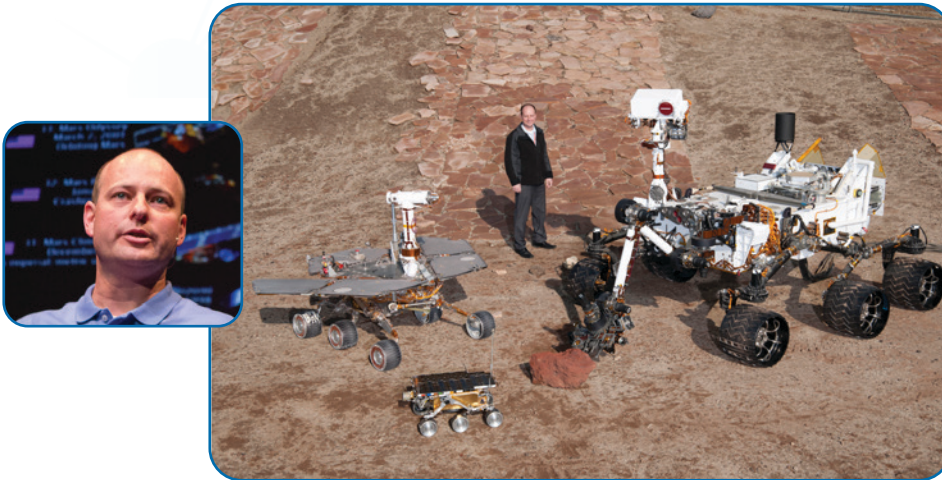
Jordan paralleled the Mars project journey with the UIIC's maturity curve. This is particularly relevant for Summit attendees in that, like utilities, NASA tends to be a risk-averse culture that needs to be carefully navigated to move forward with innovation and progress.

Two big take-aways from Jordan's keynote include their three components for success: perseverance, daring and questioning; and Jordan's "Traits for Highly Successful Teams," summarized here:

INTELLECTUAL CURIOSITY
Ability and desire to learn new things

ABILITY TO SEE THE BIG PICTURE
Yet get into the details

ABILITY TO MAKE SYSTEM-WIDE CONNECTIONS
Help others to understand them

EXCEPTIONAL TWO-WAY COMMUNICATOR
Listen, talk, and write

STRONG TEAM MEMBER AND LEADER
Leadership...not management

COMFORTABLE WITH CHANGE
And excel with it

COMFORTABLE WITH UNCERTAINTY AND UNKNOWNS
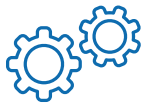Quantify and accommodate uncertainty (probabilities/statistics)

DIVERSE TECHNICAL SKILLS
Ability to apply sound technical judgement

PROPER PARANOIA
Expect the best, but plan for the worst

APPRECIATION FOR PROCESS
Rigor and knowing when to stop

SELF-CONFIDENCE AND DECISIVENESS
Short of arrogance

What utility has a huge, diverse service territory that includes the highest and lowest points in the continental US? If you guessed Southern California Edison (SCE), you are correct! It is against this backdrop that **Craig Stenberg of SCE** walked us through the utility's efforts in "laying the groundwork" for their I&I program.

In 2015, SCE executives asked, "do we use drones?" These were the humble beginnings of SCE's I&I program. By 2018, a small group of linemen were trained to use drones. Today SCE has over 170 drone-qualified linemen and their I&I program has evolved to the point where they are currently performing asset inspections, as well as regulator-mandated fire mitigation programs. In providing an example of their confidence in their I&I program, Craig pointed out that for some of their imagery efforts, the ability to spot a cotter pin on a transmission tower is their baseline for knowing they have the requisite quality of imagery.

Craig noted that their program is not without its challenges, many of which the audience acknowledged that they share. Top challenges included the image resolution, the volume of data needing to be stored, the inability to geo-tag the aircraft position, the availability of airspace in key areas of interest, and the data density and its consumption rate by human interaction. On this final point, Craig noted the need to be able to ingest and review the volume of data as it is collected. You do not want to find yourself in a position where an incident (like a fire) has occurred, and you have the data to have prevented the incident but were not able to act on that data due to its volume running into the limits of human review. This is where trained AI/ML application models can save the day.

In what he called "developing the machine," Craig pointed to how SCE is looking to grow their I&I program from its current capabilities. Two initiatives where SCE remains focused are in the areas of asset inspections utilizing AI and beyond-visual-line-of-site ("BVLOS") Both of these areas will help to expand SCE's ability to collect, review, and act; through the use of imagery.

Craig was followed by **Rami Alygad of Arizona Public Service** who shared how APS is "connecting the dots" from the executive suite strategic goals to the "boots on the ground" I&I tasks. He started by providing the APS high-level vision and goals: getting to 100% carbon-free by 2050 and putting the customer at the center of all they do. These goals drive many of their other priorities, including how they execute their I&I program. Rami also noted that the company's risk-based decision process, which can be summarized as being "not if, but when" is a big part of executing their key strategic priorities. APS's I&I efforts are reflective of this approach.

Looking specifically at T&D, APS leadership has identified their top four focus areas: safety, reliability, risk management, and customer experience, all of which are directly supported by their I&I program.

Their four main T&D I&I use cases are asset inspection, vegetation management, emergency management (including wildfire mitigation), and GIS data integrity. Drones are also used in substation inspections and in monitoring large construction projects. Echoing similar challenges among the summit attendees, Rami called out some of their challenges, One being organizational. They have been collecting imagery and LiDAR through their forestry department, which has not always received attention around value and return on investment ("ROI"). For example, these images and data were often not utilized in several use cases in their T&D organization. Rami also noted the limitations

In a session called It's a Bird, it's a Plane...It's Your Utility Hard at Work, Summit attendees again heard from **Jason Gunawardena and Rick Hudson of Salt River Project (SRP)**. In this hands-on session, attendees were able to get an overview of how SRP is using different technologies to improve inspection processes. Included were a step-by-step review of how the SRP team built their own manhole inspection processes using a variety of tools meshed together to produce a system that improves safety and increases the viability of images captured.

The afternoon of Day Two kicked off with **Mike Kelly of Evergy** providing a glimpse into the future with a presentation and discussion on how they are moving into an era of using AI/ML as part of their overall I&I approach. Mike cautioned the audience that this does not happen overnight, and reflecting on some of the presentations and discussions from earlier in the Summit, noted that to ensure a higher likelihood of I&I success:

- Developing and executing on standard data collection procedures is critical.

- Determining what you are looking for and letting this drive your sensor specs (as opposed to a one-size-fits-all approach) will help in making better equipment decisions.

- Starting with asset defects that are easier to identify, and building the program and capabilities from there, is a great way to score some wins to build on as the program matures.

Mike continued to provide some information on Evergy's current I&I program, including a demo of how they are using their software platform. They are currently inspecting their entire transmission system and have flown and inspected over 2,000 miles of transmission lines and assets. Note that this is currently being flown with helicopters.

As mentioned in numerous discussions and presentations at the Summit, Evergy is also looking to tackle I&I work organizationally. In their case, the analytics team "owns" the project and its budget and, accordingly, has the contract with their solution provider. Mike's group is the service provider for the data collection piece of the project.

Two final points that Mike made are:

- Don't go it alone – collaboration with other groups brings other capabilities to the project, and this is especially true when moving up the maturity curve to use AI/ML for I&I.

- Have a data storage/transfer plan identified before you start any I&I initiative as it is easy to fall behind on managing data as the project grows in scope, putting progress and business value at risk.

Next up was a session live streamed in from our colleagues in Australia. The Summit audience heard from **Solomon Foster of TasNetwork**, who shared how their state government, Tasmania, is spearheading a data and image sharing program that is yielding benefits for the utility as well as other entities across the state. **Angelo Fiurma of Essential Energy** then shared specifics of their digital twin efforts. **Edmund Li of Endeavour Energy** then told the audience about some of the different use cases using LiDAR at Endeavour. What is clear from these presentations is that pushing the technology envelope can yield benefits if approached with the proper goals, both near- term and long term. The importance of planning should not be overlooked. Additionally - the collaboration and cooperation between various stakeholders can accelerate I&I programs, especially when addressing the high-cost data and image collection processes.

The Summit finished strong with a panel discussion, Reflections of Scaling the Maturity Curve, featuring **Phillip Marshall of TECO** and **Mike Miller of WEC Energy**. A topic that resonated with both the panel and the audience was around the value proposition for I&I programs. The panel agreed that there are different drivers behind value propositions. Regulatory and reliability mandates along with the need to manage massive infrastructure investments come to the foreground. An interesting concept explored the correlation of all I&I activity to risk management which at the end of the day, is what gets senior management's attention.

The discussion then raised the question of how utility leaders set priorities in terms of funding and supporting I&I programs. Drawing on some earlier research performed by UIIC, the panel moderator noted that there are different priorities based on the circumstances that are specific to any given utility. A fast growth utility has different needs than a slow growth utility. High growth utilities are challenged with just trying to keep up with the work. These utilities will face less emphasis on maintenance because the resource priority is on serving new growth and load. They will also benefit from close coordination between new construction and maintenance of existing facilities. A second example might be based on a utility's historic performance. If reliability is in the top quartile incremental gains will be more expensive. Conversely, if you are in the bottom quartile your focus on reliability would yield larger gains. One final example is related to how different utilities may have different financial pressures. Is there a CapEx vs. OpEx challenge? Will specific actions benefit investors or customers?

Thie CapEx vs. OpEx argument is often central to how priorities are established and ultimately how programs are funded. Mike at WEC pointed out that they are often positioning a lot of their I&I work as being core to extending asset life, thus creating an opening for the utility to capitalize its I&I activities.

A few highlights from the panel and the audience commenting on where the I&I space is headed over the next three years:

- Regulatory drivers are likely to expand, with I&I activities correspondingly expanding.

- BVLOS regulations will evolve to meet more of their needs, enabling new capabilities.

- AI/ML as part of an I&I program is where the market is heading, the group agreed that this is the "holy grail" for I&I program.

- Using drones, especially with IR capabilities, will become more of the norm for substation inspections, minimizing human intervention to improve safety and efficiency of inspections.

The panel ended by pointing out that engaging with other utilities, both at the Summit along with future opportunities to meet both live and virtually will be key to keeping the momentum going for their I&I programs and for the I&I space overall.

With the conclusion of a successful Summit, we are looking forward to the upcoming Center of Excellence Virtual Meetings, our 2023 Symposium, and the new UIIC Labs. Visit the UIIC here for more information and be sure to get engaged with the UIIC staff.

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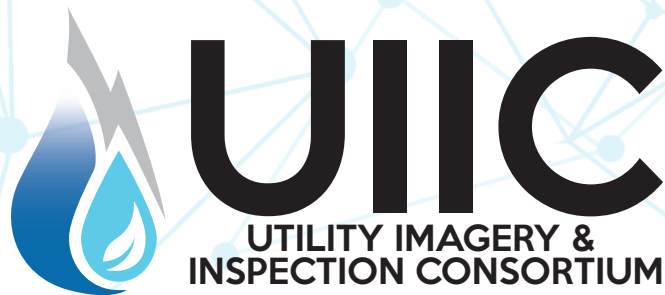
ABOUT US

Membership-based organization for utilities and solution providers to:

- Share **BEST** practices

- **IMPROVE** business processes

- Provide analytic development for the **BENEFIT** of utility leaders & professionals responsible for maintenance & management of infrastructure

Membership in and engagement with the UIIC is a critical step for a utility to:

- Successfully **UNLOCK VALUE** from information in its imagery, operational data, & business processes to deliver critical operational & predictive Insights to **IMPROVE RELIABILITY, SAFETY & FINANCIAL PERFORMANCE**

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