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EUROPE

POWERING NUCLEAR INNOVATION

Engineering low-carbon solutions for a net zero future

AtkinsRéalis

CONTENTS

FOREWORD

Here to make the extraordinary a reality

Digital innovation is a phrase that is thrown around a lot in the nuclear industry (and perhaps all industries) but often in a vague and intangible sense. Certainly, there are aspirational applications of technology that haven't quite been borne into existence, but there is a need to be more realistic, practical, and outcomes-focused when talking about 'digital innovation'. Innovation is real at AtkinsRéalis, and we champion digital ways of working across our Nuclear & Power business.

Our collaborative approach to invention became even more solidified in September, when Atkins, SNC-Lavalin and Faithful + Gould rebranded under one umbrella to become AtkinsRéalis. This was an inflection point in our history, and this shared identity has only enhanced our sense of unity, tightened our global reach and boosted our team spirit through having one shared goal. We are set up to work collaboratively across time zones with our Lava Labs – immersive experience hubs with the latest digital tools – bringing together sectors, regions and expert teams effortlessly, with seamless integration to tackle the most complex of client challenges on a global scale.

I'm more and more excited by opportunities to embed innovation seamlessly into the way we deliver work. With each new project, the chance to start from scratch and implement digital innovation first, leaves us and our clients able to reap the rewards later. It's inspiring to see all of these technologies applied in new ways and watching our teams create new ways of solving problems. For instance, since 2021, through our reality capture data (including laser scan point clouds, aerial drone imagery and 360-degree images and videos), we saved 14,544 travel hours, equivalent to 265 tonnes of carbon, and over £1million in travel costs.

Through our development of these tools, we're now able to offer Virtual Site Access (VSA) – a comprehensive technology suite allowing remote access and monitoring of sites – that's evolving at a brilliant rate. Implementing these digital-first changes shows just how much of a difference an innovative technology-driven approach can make.

At AtkinsRéalis we pride ourselves on our culture that fosters innovation and encourages creativity and the opportunities we offer for development. Not only are ways of working changing, but so are career paths, and we're adapting to enhance our teams' experiences and give them what they need to thrive. We champion inclusivity in our workforce because we value diversity in skills, in thought and in approaches. As we like to say: **different makes a difference.**

Keep reading this magazine to see how we're already digitally engineering a better future across our nuclear business, from safety, to sustainability.

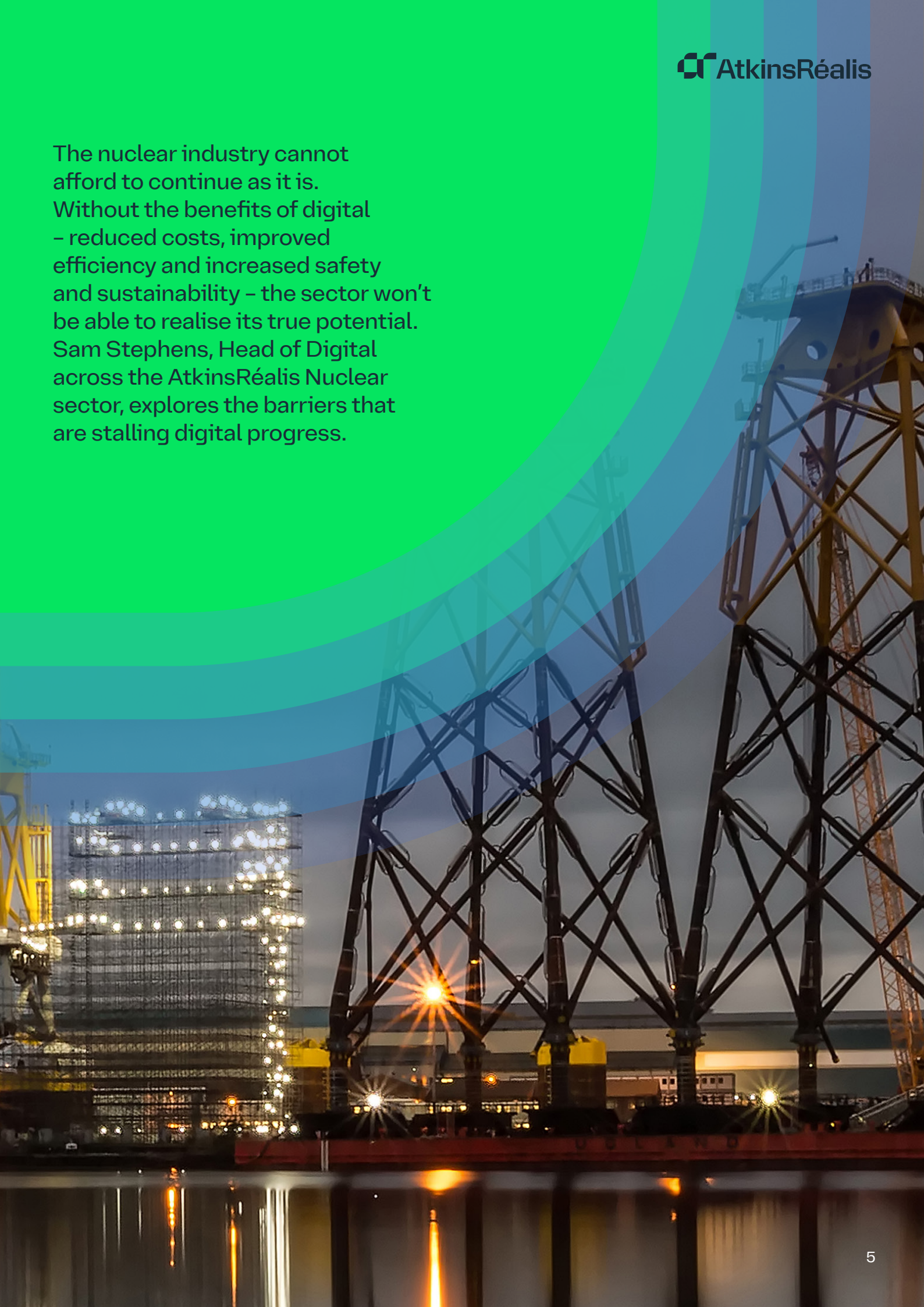
If you'd like to join our team of game-changers digital or not – click here to view our current opportunities, or join our talent community to register your details

Chris Conboy
Managing Director, Nuclear and Power, EMEA, AtkinsRéalis

Nuclear Future: The Power Lies in Digital Transformation

Sam Stephens
Head of Digital, Nuclear at AtkinsRéalis

The nuclear industry cannot afford to continue as it is. Without the benefits of digital – reduced costs, improved efficiency and increased safety and sustainability – the sector won't be able to realise its true potential. Sam Stephens, Head of Digital across the AtkinsRéalis Nuclear sector, explores the barriers that are stalling digital progress.



The UK aims to fully decarbonise its energy system by 2035, but this will require a five-fold increase in new electricity generation built each year. That's up to 16GW of new generating assets built each year, every year, which is an unprecedented feat and equal to what was built in the five years between 2017 and 2021.

Nuclear has been identified as a crucial player in achieving net zero, however we now need to find ways to not only increase the pace of new build developments but also extend the useful life of existing plants.

The answer lies with digital transformation. Digital can make a difference at every point of the nuclear lifecycle, and so it's imperative we embrace these tools and the benefits they bring. But several barriers stand in the way, many of which involve changing attitudes.

Focus on ROI, not upfront cost

Take business models, for example. Adoption of digital tools requires an upfront cost, which could lead to a perception that digital is expensive. But that's not the reality.

Commercial models often don't recognise the benefits of digital; so they need to be viewed through a longer-term lens.

If a digital twin strategy is developed and implemented during the design phase of a nuclear power plant, for example, the data can also be harnessed throughout the operational, maintenance and decommissioning phases. Likewise, if you're going to invest in robotic systems to sort and segregate radioactive items, it's more cost effective to purchase it sooner rather than later, so you're getting the most use for the cost.

Reviving a sense of urgency

Digital transformation should be an urgent priority, as the nuclear sector has much to achieve in a very short time. Many decision-makers dislike uncertainty as much as high costs and the dramatic changes instigated by the pandemic may leave them craving processes and solutions they know and can trust, deterring them from further investments.

Instead, the focus should be on further accelerating the digital adoption catalysed by the pandemic and embracing the benefits these technologies have provided.

For example, the need to keep on-site personnel to a minimum during the pandemic strengthened the business case for the use of reality capture technology. This had been incubated over the previous decade and provided off-site staff a detailed view of the plant without needing to leave their desk.

These types of solutions have now become business-as-usual tools, fuelling improved efficiency, better worker safety and reduction in travel-related carbon emissions.

There is much to learn from the rapid progress made over the last few years, which only came about thanks to the sense of urgency and necessity the pandemic brought.

The power of incentives

Clearly decision-makers need to change their mindsets, and a way to support this could be government incentives or mandates.

This approach proved successful with the introduction of the UK's Government Construction Strategy in 2011, which mandated that all firms working on government projects must be building information modelling (BIM) level 2 certified by 2016.

Over time this became an industry-wide standard and has led to the UK being viewed as a global leader in this area.

With mandates, or incentives that lower risk or take high upfront costs out of the equation, significant value can be unlocked. For example, government encouragement towards the handover of design and construction data and establishment of an operational digital twin could reduce operation, maintenance and decommissioning costs and maximise low-carbon generation. We want to see nuclear become the industry that leads the UK to its net zero goal while minimising costs to the consumer.

A culture of fear

Another barrier to digital transformation is fear, particularly in areas such as AI, robotics and cyber security.

Many working in the nuclear industry – particularly those later in their career – approach robots and AI with caution, believing they'll make their work more complex or perhaps replace their role entirely.

This is far off the mark. Robots are being introduced to work alongside, or 'augment', rather than replace workers - lowering the risk of undertaking the most dangerous tasks and freeing up staff from mundane, repetitive jobs to work on more creative or subjective tasks. The scale of the net-zero challenge means that we need every available tool in order to cost effectively deliver programs of work on new build projects, generating assets and in decommissioning.

There is also a fear moving to digital will introduce new risks from cybercriminals. The reality is, according to Verizon's 2022 Data Breach Incident Report, 82% of breaches involved the human element, for example using social engineering techniques such as phishing to trick users into installing malware. It's not the digital technologies that are risky, it's the people operating them.

Upskilling

Many of the barriers to digital transformation can be overcome through education and communication. Training will help staff better understand how new technologies will benefit both them and the business, as well the industry at large. Equally as important is investing in upskilling and reskilling workers to use them effectively.

With an unprecedented build rate required to keep the lights on and a looming skills gap, we can't really afford not to embrace digital. Success though, will be down to people and work culture more than business models and the technology itself. Involving staff throughout the digitalisation process, will grow, not only their confidence and comfort with new technologies but likely generate greater advocacy of your digital transformation projects.

Digital Transformation: The Game-changer for Sustainability

Catherine McQuade
Assistant Mechanical Engineer

Sustainability is no longer a ‘nice to have’ but crucial if organisations are to meet the UK’s net zero target by 2050. Catherine McQuade, Assistant Mechanical Engineer at AtkinsRéalis, outlines how digitalisation is supporting industrial sites to accelerate decarbonisation and meet their safety and sustainability goals.

Energy-intensive industrial sites are some of the most challenging to decarbonise, but the abatement of their carbon emissions is essential for achieving net zero.

We see three key types of carbon emissions that represent the majority of CO_2 produced throughout an industrial site's lifecycle: embodied, operational and people.

Embodied carbon is in the building materials we use, such as steel and concrete. Operational carbon is emitted during the working life of a facility due to heating, cooling and industrial operations. People carbon is the emissions associated with our own movements and activities, such as the carbon dioxide emitted from commuting to work or a site visit.

With an uphill climb ahead, we need to find new ways to speed up all forms of decarbonisation. We believe the answer lies with digital transformation.

Digitalisation accelerates decarbonisation

This is because digital solutions can assess and address each of the three types of carbon emission. For example, implementing intelligent building information models (BIM) throughout the lifecycle of a site - from the development of a new-build project to decommissioning - you can quickly calculate embodied carbon associated with concrete or steel structures across sites. Similarly, internet of things (IoT) sensors and data analytics can combine to highlight areas of large energy consumption – aka operational carbon.

While embodied and operational carbon represent a significant proportion of the overall carbon footprint, they're difficult to influence on a daily basis. But in recent years, and particularly since the pandemic, we've seen digital tools offer new ways of working that reduce the emissions associated with supporting operations and maintenance on industrial sites; the people carbon.

For instance, during the design and construction of a new site or in decommissioning projects, adoption of paperless technology makes it possible to view digital drawings on a mobile device. This not only reduces printing, improves accurate data retention and increases the speed of decision making, but also enables remote expertise to be leveraged more efficiently and increases collaboration.

Laser scan point clouds, aerial drone imagery and 360° images and videos previously captured, also provide users with new ways of visiting sites virtually, either on their own or with their wider team, using virtual reality (VR) or augmented reality (AR) Livestreaming, on the other hand, allows one person to go to inspect and survey a site. Connected via a video call from anywhere in the world, they can then relay information to the rest of the team.

Using technology in this way offers both cost and carbon savings. As an example, recently, for a nuclear decommissioning client, we polled how long it takes engineers to drive to the site, and collated this information in a live dashboard. Based on the 23 livestreams they conducted across three buildings, we calculated savings of 490 hours in travel time, £24,500 in associated travel costs and 7224kg of carbon[1].

Further, since April 2021, we have been analysing access to site survey data for all our nuclear and power clients, via our cloud-based survey platform, CIRRUSinsite. By measuring how many people 'virtually access sites' through the platform, we estimate that, in the last two years, clients have collectively saved over £1m in avoided travel costs and almost 300 tonnes of associated CO_2 emissions.

Using CIRRUSinsite to quantify how many times people access a site remotely and how long they spend there, it's also possible to calculate how many future site trips have been saved.

This approach has helped our clients slash carbon emissions and makes it easy to see why site walkdowns, installation, factory acceptance testing and support for operations and maintenance, are now regularly being done with only one individual or a small team on plant.

Knowledge retention and sharing

With an ageing workforce, it is also important to find ways to pass on the knowledge of experienced staff to new recruits and ensure decarbonisation isn't slowed down.

One way of doing this is through immersive training, making use of VR and AR, which can be stored in a central repository and accessed by all relevant staff. This enables the transfer of critical information while also reducing the time spent by experts on training new recruits.

The technology doesn't have to be complex or expensive – video walkthroughs by plant operations teams, for example, are simple to create but invaluable; saving someone from trawling through an old 30-page document. And with advances in transcription software, these can become searchable libraries providing valuable insights into a facility's history.

Benefits of digital transformation

It's clear the adoption of digital tools can have a real, measurable impact on carbon emissions and sustainability. But the benefits don't end there.

Digitalisation will not only support and speed up the journey to net zero, but also improve workplace safety and bring financial gains, helping organisations remain competitive and profitable during a challenging transition.

1 Calculated using time taken to travel to and from sites and going through security, multiplied by average graduate engineers salary and average CO_2 emissions per hour of driving.

Robots Could Reduce Decommissioning Timelines by a Generation

Robert Marwood
Technical Director, Robotics and Technology

AtkinsRéalis

Robots have the potential to transform nuclear, accelerate the decommissioning process and bolster the workforce says Robert Marwood, Technical Director, Robotics and Technology at AtkinsRéalis.

As the second lowest emitter of CO_2, second only to onshore wind, nuclear has a key role to play in the net zero energy system of the future. But to fulfil its full potential, the sector needs to realise the advantages of cutting-edge robotics.

Robotics will enable nuclear to overcome many of the challenges it faces, from skills shortages and extending the useful life of existing plants, through to safely speeding up capacity growth and decommissioning.

Overcoming nuclear's skills shortage

Extensive manpower is required across all stages of the nuclear lifecycle, from design and development through to operations, maintenance and decommissioning.

This is currently cause for concern, as the sector is dealing with an expanding skills gap caused by an ageing workforce. A third of the nuclear industry's workforce is expected to retire in the next 15 years; and a recent report from AtkinsRéalis found that as skilled staff are leaving the workforce they're not being replaced.

Increased automation can help bridge this growing gap in the labour supply, with robots taking on tasks that can be automated to free up the human workforce.

Not so risky business

One of robotics' biggest benefits in nuclear is its ability to reduce risk by removing humans from dangerous situations, such as exposure to radioactive materials. This might be by fully automating a task or enabling people to undertake this work remotely.

In a number of instances, robots are already being tested and used to complete hazardous tasks within nuclear plants. Mobile robotics enable virtual site access and data collection, keeping workers out of high-risk areas.

Improved efficiency

By augmenting people with robots you can also improve efficiency, lowering both time and cost. For instance, human workers can only undertake tasks in certain areas for a maximum of two hours a day due to radiation dose time. With the introduction of robots, time on site can be increased and tasks completed faster.

In terms of decommissioning, if robotics could offer a 20% schedule saving over a 120-year programme, the overall timescale could be reduced by a generation. Accelerating this process would also free up real estate for new nuclear plants sooner.

For new advanced and small modular reactors, there are opportunities to include robotics in the plant design from the outset, targeting the 'dull, dirty or dangerous' tasks that can be automated by using solutions such as Autonomous Mobile Robots (AMRs) or collaborative robots.

Enabling remote operations

Another example of how robotics can improve worker safety is reducing the risk of glovebox operations by removing humans from the hazardous task of operating and decommissioning gloveboxes used for processing waste.

We've been working to integrate state-of-the-art hardware and software with Kinova's collaborative robot arm to create a functioning prototype capable of performing glovebox operations. Our vision is that the glovebox operator, removed from the high-risk environment, can instead operate the robotic arm via haptic feedback controllers or virtual reality systems from the safety of a control centre.

Currently in R&D at Sellafield, the prototype has shown to be capable of characterisation, size reduction, cleaning and object manipulation and is on track for first deployment by 2024. The remote operation solutions developed also have the potential to reach far beyond gloveboxes, with application in waste retrieval and reactor maintenance.

Waste management gains

Robotics also have a crucial part to play reducing time and costs related to waste management.

Industrial robots can be deployed to decrease the size of plant waste using laser cutting. It's not a new technology, but developments that make it possible to use in the specialised nuclear industry, mean its ground-breaking with regards to cost reduction and improved safety.

The potential costs savings of this size reduction cannot be overlooked. For example, our recently commissioned fuel skip laser cutting module can cut two fuel skips and pack them into a third, saving two thirds of the eventual intermediate level waste (ILW) volume. With each skip approximately $1m^3$ in size, every two skips size-reduced equates to a saving of circa £100,000.

Robots could then also be used to decontaminate these skips using techniques such as laser ablation. Reducing 100 such skips from ILW to low-level waste (LLW) would equate to £4.25 million saved.

We've also developed a sort and segregation solution, which was initiated as part of the 'Sort & Segregation of Nuclear Waste' competition run by the UK Government's Nuclear Decommissioning Authority (NDA), Magnox, Sellafield and Innovate UK. We are now working closely with clients towards a fully mobile autonomous system that can transform commercially off-the-shelf hardware and software into state-of-the-art robotics systems and effectively and efficiently sort and segregate radioactive waste.

Our sort & segregate solution utilises machine learning, sensor algorithms and robotics to create a system that can automatically identify and sort objects from an unorganised mass of diverse radioactive waste objects and segregate them into the appropriate waste stream. The solution has the potential to greatly improve operator safety, speed up decommissioning and reduce the cost of waste storage.

The lifetime cost of nuclear storage is high, so if were able to more accurately sort and identify different materials and even assess whether its suitable for cleaning and recycling, we could reduce the amount of space and time required for nuclear storage and disposal.

Robotics at the heart of digital transformation

As the UK moves closer towards its goal of net zero energy generation by 2035, the nuclear industry needs to embrace digitalisation and not get left behind.

Robotics has a crucial role to play, not only in supporting and speeding up your organisation's journey to net zero, but also improving workplace safety. There are also financial gains, enabling your business to remain competitive and profitable during a challenging transition.

The nuclear industry is a difficult environment to implement robots, but it has a high potential for opportunities and rewards. Some early adopters are already realising the power of robotics and are leading the way by trialling the latest solutions. Unlocking these benefits will truly transform the sector.

Four Ways Virtual Site Access is Improving the Human Experience of Working in Nuclear

Candice Long
Digital Solutions Engineer

Virtual Site Access doesn't only improve safety, but that is a key reason to implement it, says Candice Long, Digital Solutions Engineer at AtkinsRéalis.

My first experience of how technology could positively impact safety came about in the form of a VR driving simulation – there was a rig with all the controls set up exactly as they would be in real life and when I put on the VR headset I was suddenly behind the wheel of a vehicle, driving in a virtual world. Now, I know with how quickly games are advancing nowadays this doesn't seem to be anything of great significance, but I couldn't help but look at it from the perspective of Safety Advisor, which was my initial discipline before I made the jump into Digital Solutions.

To me, this VR experience sparked all kinds of ideas around how you could give people the opportunity to operate machinery or to walk round a dangerous site without them ever having to be in a scenario where they'll be putting themselves or others in a high-risk situation.

A new development from AtkinsRéalis, Virtual Site Access (VSA) is an essential tool for anyone who needs to manage or access a site remotely. Virtual Site Access works by utilizing site data to provide the information teams to virtually 'visit' a site. VSA is improving the human experience of working on nuclear projects in a number of ways:

1. Fewer site visits, fewer risks

By capturing site data, processing and sharing it on a cloud-based platform, teams and clients can get regular site updates without having to send someone to look. Not only do sites pose risks to safety – namely through radiation exposure – but one of the main causes of risk to employees is in fact travel to and from site. By reducing the need for in-person visits, fewer people are put at risk and safety is prioritised.

2. Automation frees up technical resource

Data sharing from site is smoother and happens more quickly with VSA's integrated delivery method, meaning teams can get the data they need to progress what they need to be working on. By automating data management and security desensitisation, technical teams have more free time to focus on value-driven tasks and pursue opportunities for innovation.

3. Remote, flexible working

With secure-cloud-based data management, data can be accessed securely from anywhere, so individuals can collaborate more easily long-distance and have greater flexibility in where they choose to work. Instead of being chained to site, they can work from home, juggle childcare and family time more easily, and still feel like they have the same information-rich experience as being on site.

4. Faster collaboration, better decisions

Teams can make faster and better-informed decisions with access to site data that previously would have been difficult to access or gather or would have required travel to see. By transferring data securely and remotely, accurate information can be provided quickly in situations where it's crucial to make the right decisions at the right time.

The Rise of Mobile Robots: Ensuring Safety and Innovation in Nuclear Site Clean-up

David Marquez-Gamez
Mobile Robotics and IoT Lead for AtkinsRéalis

Robotics might seem like a novel technology but they're making headway in the nuclear industry, says David Marquez-Gamez, Mobile Robotics and IoT Lead for AtkinsRéalis.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BostonDynamics
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In the world of robotics, there's a ground-breaking shift happening, and it's not just about innovation; it's about safety, efficiency, and environmental responsibility. At AtkinsRéalis, we are at the forefront of this change, deploying cutting-edge mobile robots to transform the way we approach hazardous tasks. One such trailblazer in our arsenal is Spot, the quadruped robot from Boston Dynamics. What might seem like a novelty to some is proving to be a pivotal force, redefining the future of nuclear site clean-up.

Spot is the 4D principle in action

The 4D principle in robotics states: if a job is dirty, dull, dangerous, or dear, let a robot handle it. Spot embodies this principle by taking on tasks that are perilous for humans. Instead of replacing people, Spot augments human capabilities, allowing them to focus on more meaningful, safer, and cleaner tasks. By deploying Spot into hazardous areas, we're not only ensuring the safety of our workforce but also significantly enhancing efficiency.

Livestreaming Building Surveys

In a pioneering move, Spot recently facilitated a live-streamed on-site inspection at the iconic Calder Hall Reactor Administration Building within Sellafield, which housed the iconic reactor control room where some of the pioneers of UK nuclear power ran the world's first full-scale commercial nuclear power station and fed low-carbon electricity into the UK power network for over 40 years. Traditional inspections would have been unsafe due to the presence of asbestos and other hazards. Spot, equipped with advanced sensors, allowed our clients to direct the robot in real-time. This not only provided instant survey data but also saved valuable time and resources. The ability to view the footage omnidirectionally adds a new dimension to the inspection process, enhancing the overall understanding of the site.

Spot is about more than just collecting data... Spot can fetch

In an active area at Sellafield, Spot showcased its versatility by not only surveying the site but also directly removing waste and cleaning active cells. Typically, this task would have required workers to wear protective gear, limiting their working time due to safety protocols. Spot, with its robotic arm and array of sensors, enables remote operation, ensuring the safety and comfort of the workers. This innovative approach not only enhances safety but also reduces waste generation, making the clean-up process more sustainable.

A Glimpse into the Future

Nuclear site clean-up is a challenging endeavour, often demanding work in hazardous environments. Our mission at AtkinsRéalis is to continually develop new methods to assist our clients in achieving their decommissioning goals. By incorporating mobile robots like Spot, we are ensuring that our nuclear legacy is cleaned up efficiently, keeping humans out of harm's way and offering exceptional value for money.

These projects exemplify the synergy between humans and robots, painting a promising picture for the future. With innovation leading the charge, we are creating a clean and safe environment for future generations. The era of robotic pioneers has dawned, and together, we are rewriting the narrative of nuclear site clean-up, one innovation at a time.

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HERE TO MAKE THE EXTRAORDINARY A REALITY

To us, digital is more than just a label. It's fundamental to our way of working. It has the power to transform outcomes, when combined with every element of the engineering process: our people, our data insights and our technology.

Integrating digital expertise with our decades of engineering excellence and our expert global teams, means we can design solutions that work across the entire project life cycle, and at scale. Like never before, we can unlock the full potential of our engineering expertise and help us to disrupt the status quo, for the future, and for the better.

People. Data. Technology. should never be just about digital. It's about creating cutting-edge solutions that offer increased predictability and certainty; to maximize whole-life asset value, improve commercial performance, achieve sustainability goals and reduce environmental impact. Because everything is connected.

Watch our Digital film

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Digital Twins: Conquering the Double-sided Challenge of Nuclear Decommissioning

Poppy Harrison
Engineer, AtkinsRéalis

With greater data management, comes greater accuracy, which is key to solving some of the challenges of legacy infrastructure, says Poppy Harrison, Engineer, AtkinsRéalis.

We live in an increasingly virtual world. For engineers, this digital realm can offer real-world value in bringing increased accuracy to planning. Moving from unstructured legacy data to a 'single source of truth' model can bring together old knowledge of a site and freshly generated data to plan projects with much greater safety and efficiency.

This approach has clear benefits for the nuclear sector, where sites operate over decades, and hazards are at the forefront of everyone's minds. By creating digital twins, steps in the decommissioning process are first planned out virtually, allowing the physical task to be performed more efficiently and reducing the need for staff to enter hazardous locations.

What is a digital twin?

The definition of 'digital twins' is wide. Extending from basic reality capture with laser scanning and photogrammetry, right up to autonomous solutions, with machine learning and AI. However, for nuclear decommissioning, we see much of the benefit and value-add comes from lower-level reality capture and virtual mock-up elements. Digital twins don't have to be 3D models. They can simply be a digital representation of a physical asset or process.

How legacy sites create challenges

Legacy sites pose some unique challenges. Over the decades, change has been constant and a lot of site knowledge is held in the heads of its workers. Inevitably these workers move on or retire, meaning you could potentially lose all that knowledge. It's essential, therefore, to capture that data and understand how and why an asset is in its current condition–the digital golden thread.

Where site changes were recorded, in the UK nuclear decommissioning sector this was often done before anyone could guess how data would be used today, creating a huge amount of unstructured information from assets that have been operational for decades. This creates a double-sided challenge: you may have too little data, or a wealth of unstructured data that's difficult to manage. Constructing useful information in these scenarios requires thought about what is recorded, how it is structured and how it is represented.

Digital twins can help manage the decommissioning process

On a nuclear decommissioning project, it's in the ability to precisely plan site interventions that digital twins really show their value. With a data-rich, visualisation-forward digital twin, stakeholders can virtually interact with their site to reduce costly and time-consuming processes in the planning phases. We also see in decommissioning that digital twins can help stakeholders to better understand waste streams and overall asset liabilities.

Taking a cloud-first approach to developing digital twins can allow a coordinated model to be accessed from anywhere, without the environmental impacts and inconvenience of travel to site. The accuracy and centralised information of digital twins can also help project management stakeholders provide more accurate forecasts and greater certainty of projects costs.

Improving safety, digitally

Traditional risk management on a nuclear project includes wide safety margins on any movement of scope. But with a lot of uncertainty, planning can be overly conservative, using additional tolerances that you might not need. Digital twins allow you to remove some of that conservatism and be more certain in your design, scheduling, and pricing.

By their virtual nature, digital twins can reduce the need for a physical presence on site, which cuts down time workers spend in areas of high radiation. They can also bring together data to give more precise predictions of the dose a worker may receive, providing more accurate safety margins which ensures lower risk and lower costs to the operators and, in the case of much of the UK fleet, the taxpayer.

Visualising the 3rd and 4th dimensions

On a congested, frequently reconfigured site, planning a load path for equipment moved around a facility can be challenging. An unanticipated obstacle might block movement of a load, causing delay, additional costs and radiation exposure.

The precise measurements used to build a 4D digital twin (time and space) can reduce the risk of unanticipated obstacles and allow informed decisions to be made before carrying out the physical task. For instance, if you've got a large component and there's a routing concern, you can digitally rehearse the route in advance.

Within the nuclear sector alone, there will be plenty of demand for a 'single source of truth' on assets. By 2030 - 2035, it's estimated that globally there will be around 50 to 100 reactors moving into decommissioning. We see complex and challenging legacy sites as prime examples where we can showcase the cost savings and benefits of digital twins in nuclear decommissioning-creating a safer physical reality, grounded in a growing digital reality.

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