Welcome:

Joe Sczurko
Executive President,
Strategy and Development

Fast foreword!

I am fortunate to get the opportunity to meet many of our customers representing different end market sectors. In these valuable sessions, a very common request is “we’d like to see engineering and technical services firms be more innovative in bringing solutions to our problems that reduce cost, increase productivity, and improve quality.”

Across our business we are driving technological changes to develop and deploy innovations at many levels. Some of our innovations solve specific issues, some advance our technical delivery in multiple areas, and others create a positive transformation of our service or step change in performance for our customers. In addition to our own investment, we often collaborate with our customers and other partners to bring innovations that add value. It’s not always easy to make cost, productivity, and quality improvements, but some of our best solutions have come from the most challenging technical applications, site conditions, and performance requirements.

This issue highlights how digital technologies and innovations are reshaping the future of energy. Digitisation and the energy transition are red hot topics across all our end markets. Here, you will see examples where data, information management, and digital technology can have a significant impact on energy assets, energy management, and energy efficiency.

Digitisation offers new ways to collect, monitor, and record data. True innovation comes when we extract value from the mountain of data to improve asset performance. I know you will find our articles thought-provoking and great examples of the innovation our customers demand.

We are driven by the need to solve your challenges and improve your business. Please contact us to explore how Wood can help you meet the future.

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Contents

04. Future proof
We’re dedicating more resources through a structured approach to innovation.

06. Automated assets
The platform of the future will run itself.

08. Going the extra mile
Creating a data ecosystem to optimise downstream delivery.

10. Well integrity
Get to know your wells a bit better with our industry-standard software.

12. Taking control of tomorrow
Two highly specialised fields are bringing nuclear facilities up to date.

14. Catching the waves
Making best use of all the data your facility produces.

16. Suspended animation
Pressing pause might be better than stopping operations.

18. Mining the future
Why creating a digital supply network will unlock the future for mining.

20. Turning the tide
Clean energy potential is waiting just off the coastline.

22. News in brief
A quick update on developments.
Our journey into the future is getting faster than ever. The pace of change across all our industries is forever increasing and we face continuous pressure to evolve and adapt.

Wood holds leading positions in many industries, mainly for our experience and technical tradecraft, and we have blended this with technologies either through strategic partnerships, key acquisitions or internal development. With the new pace of change we recognise the need to become more disruptive, to invest heavily in developing game-changing technologies, the systems and tools that will not just improve but completely transform our services.

With this in mind Wood has created a new digital and technology team, taking a more strategic look at developing technologies that we can feed in to our service lines.

The spirit of innovation burns brightly across all our services, my role is to harness this to revolutionise our business.

Our digital and technology capability is structured to develop improvements across the asset life cycle, exploring solutions for connected design, connected build and connected operations. In each area we will look at both near-term solutions and far future technologies. Strategic partnerships will still be a key component, we need to make the best use of our abilities, upskilling if possible but drawing on the experience of others where appropriate.

In the design stage there is tremendous potential to enhance our performance and reduce costs for our customers. Collaborative technologies will help us share and review solutions with a much wider audience, refining our concepts and targeting design challenges before they reach the later stages of development.

At build-level, enhancements to project management and construction support will capitalise on the efficiencies created at design stage. New software and hardware solutions will transform workflow through construction and into commissioning.

Connected operations will leverage our outstanding automation knowledge. Control systems allow us to operate remotely, gathering and processing data, not just across assets but across entire infrastructures, connected facilities and networked ecosystems that can predict and respond, optimising schedules through machine learning, monitoring equipment to maximise operations and prevent failure.

Innovating across these themes will transform our customers’ assets.

One of our greatest strengths is our diverse skillset and we will be creating project teams from right across our service range, working without boundaries to develop new and exciting possibilities.

Wood’s main goal is to develop and offer solutions to our customers’ biggest challenges, investing our resources for your success. I’m very excited about what we can achieve.

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Shifting horizons
Over the last thirty years the oil price has dipped below $20 and soared above $150, in these choppy waters offshore investment has been sorely tested and although nobody can predict prices with any certainty, the average is trending downwards. To remain viable, the industry must continue to cut unit costs. Most of the easy hydrocarbons have been found and exploited and, despite the evolving energy mix, oil and gas is set to remain in demand. The oil and gas industry needs a significant transformation to future proof its operations.

A challenging answer to a challenging question
One solution is to develop fully unmanned assets. Wood is approaching this challenge from a number of perspectives, leveraging its experience to introduce standardised and modular designs, automate processes, and control assets remotely. In any direction, the final result is a completely unmanned facility.

Converting existing platforms to unmanned status is unlikely but new assets can be designed from the outset for unmanned operation.

The future is here
Wood has a large portion of this capability already; our engineering is world-class, and we have designed satellite facilities and lightweight topsides. We have a very experienced automation and control team, we understand sensors and monitoring. We have the software to interpret the enormous volumes of data a facility generates, and we understand operations, maintenance and integrity.

In such a high-risk industry our solutions must carry a high level of assurance, we must be confident of performance and reliability.

To ensure this we draw on proven technologies, combining the best of our experience across many industries. We know it can be done because we have used all the components in other areas.

Automated assets
The platform of the future will run itself.
Human factors – moving the workforce to safe ground

Industry knowledge, sector and asset experience are still vital ingredients here, but by automating an asset we can effectively take people out of harm’s way. The maintenance crews of the future are ‘grey collar’ workers, combining practical knowledge and technical capability to solve problems remotely.

With the right mix of design, robotics, monitoring and control systems nearly all operations can be automated and controlled from onshore.

Maintenance is more challenging, material and equipment selection has a bearing on how reliable and effective the facility will be, minimising but not removing the need for maintenance. A comprehensive monitoring and analysis programme can identify future failures and simple plug-and-play items can reduce turn-around times. With an optimised design, much of this may even be automated or delivered through remote operations.

Step change in safety and cost

With no human presence offshore, safety performance will be drastically improved and large areas of traditional asset design can be removed. Living quarters are unnecessary; utilities can be minimised and major elements of comms and safety systems are no longer needed. The various life-support systems need to sustain human presence can be all but eliminated.

Without a doubt, automating some processes and systems is an excellent way to reduce costs; we believe the platform of the future is modular, flexible, and fully automated. And with significantly reduced unit costs, there should be no barriers to future exploration.
Wood has capacity to cover the process from the upstream production phase, but we are focusing on a six-step journey (midstream and downstream retail):

1. Receiving terminal
2. Pipeline and tank cars (rail)
3. Dispatch terminal
4. Tanker trucks
5. Fuel station of the future
6. Corporate control center
Going the extra mile for the last mile

Our fully integrated system tracks production from platform to pump.

The ‘last mile’ as it’s known concerns the final journey oil takes from the main receiving terminal, through the storage and distribution networks, to the petrol station and your car’s gas tank. It’s a long mile!

Mexico is one of the top consumers of refined hydrocarbons in the world. Average fuel sales per gas station are over 5 million litres per year. Mexico has great need for additional infrastructure and operational monitoring and automation.

The refinement, storage and sale of fuel is a complex and varied system with many different requirements and challenges. Wood has been working closely with companies such as Cisco, EY and IBM to develop a solution that allows operators and suppliers to automate, monitor and control their product across the whole inventory.

Our solution leverages monitoring and data capture technologies to create an internet of things (IoT) across the refined hydrocarbons midstream and last mile journey, connecting every component along the way so operators can track their product, maintain consistency, fast track it through the distribution network, increase safety and security, monitor for leaks, manage inventory, comply with regulatory and corporate reporting requirements, and optimise operational costs and sales.

We aim to offer a complete end-to-end integration of the supply chain by bringing together best in class IoT, cognitive intelligence, custom business solutions and industrial project delivery excellence. We will achieve this by calling on the proven excellence of top tier companies to complement Wood’s operational and engineering expertise, as the onsite and on-project face of our ecosystem.

Maximum security, minimum leakage
Across miles of pipework and hundreds of interfaces the potential for leaks is high. Our advanced monitoring systems (fibre-optics, sensors, algorithms, drones) integrate to form part of the IoT ecosystem, helping operators keep a close eye on supply lines and detect leaks before they become a major problem. Automated drones save time and reduce risk in the inspection process; so problems can quickly be identified and solved. Our advanced leak detection can differentiate between a corrosion leak or a more serious breach to help operators respond appropriately.

Efficient distribution – running on empty
Oddly enough, the best state for a petrol station is to be almost out of fuel. Having large amounts of product sit at the end point of the process is not the most efficient way to run the system. By connecting tankers and filling stations into the same ecosystem we can optimise delivery schedules.

Like many parts of the world, Mexico has a mixed distribution system, with products being shipped by road, rail and pipeline due to challenges with geography and infrastructure. Compared to pipelines, moving fuel by rail is up to 6 times more expensive and tanker trucks can be up to 14 times more expensive, so again an integrated system helps operators reduce distribution costs.

Clarity and control
Visualisation is a key component of the system, so users can see at a glance when the system is running smoothly and where there might be bottlenecks or leaks. Use of simulations and virtual models through our Advanced Technology Centre allows users to test new configurations, modifications and expansions or even completely new systems before committing investment.

Beyond the forecourt
The IoT ecosystem can extend right through the forecourt – tracking customers to determine their buying habits, managing delivery times to reduce disruption and feeding back into the distribution system to optimise future inventory levels.

Reputation management
This fully integrated system offers many benefits across the whole supply chain, improving visibility, consistency, quality, security and efficiency, and ultimately enhancing reputation and profitability. Through our long experience with operating assets and automating processes we know the value of integration, this fully integrated ecosystem across the whole supply chain has the potential to unlock massive value for operators along the last mile.
Well integrity, new perspectives

Wood’s market-leading well integrity data management solution is leveraging advanced analytics to provide new perspectives on customers’ data.

Well integrity incidents are not a new thing. From the Spindletop gusher in 1901 that blew for nine days at a rate of 100,000 barrels of oil per day, to more recent high-profile incidents such as Macondo, B Könlin and Aliso Canyon, the management of well integrity is a fundamental requirement of good operator stewardship.

As an industry we take a proactive approach to managing well integrity, as well as carrying out detailed analyses of incidents to support improved legislation and best practices. The ISO-16530 standard defines well integrity management as “the application of technical, operational and organisational methods to prevent the uncontrolled flow of fluids at the surface or across subsurface formations throughout the life cycle of the well.”

Wood’s iWIT software has been specifically developed to help operators comply with the technical, operational and organisational requirements of such standards, and includes a range of advanced engineering capabilities.

These include:
- Operating limits calculations
- Completion schematics
- Corrosion and erosion rate prediction
- Leak rate calculations
- Reliability and performance monitoring
- Risk management
- Annulus pressure management
- Barrier envelope visualisation
The software has been evolving since 2006 in collaboration with the industry and is used by operators worldwide. Accounting for more than 14,000 wells in the system, we can confidently say that we are the market-leading well integrity data management solution.

Recent developments to the software include the business intelligence reporting tool (BIRT) that enables users to interactively and dynamically query the software to unlock valuable perspectives on the underlying data.

With a deeper understanding of their data, users can make more informed decisions to optimise maintenance schedules and see the influence of various operating conditions (for example, pressure, temperature, flow rates and fluid composition) on well performance.

Our team of data scientists has also reviewed the results of millions of valve functions and leak tests and applied CRISP-DM (cross industry standard process for data mining) to create a machine learning model that has been used to help predict valve failures. This foresight allows the operator to mitigate failure and reduce unplanned downtime.

We are now looking at combining these outputs through our monitoring and analysis systems to optimise well performance and create better yield and flow for customers.

A recent UK Oil and Gas Authority report highlighted that of all the shut-in wells on the UK continental shelf, 42% are due to well integrity issues.

An SPE paper (ref SPE/IADC-189389-MS) written by one of our customers describes how iWIT data has been used to safely continue operating water injector wells with maintained injection at approximately 6,000 BWPD sustaining production of around 4,000 BOPD (over $80M).

If this is analogous with the rest of the world then there are significant and compelling economic drivers for better understanding well integrity data.
Taking control of tomorrow

By marrying two rare skillsets, Wood has come up with a compelling proposition for upgrading control systems in the nuclear sector.
Nuclear sites have a long lifespan and many of their operating plants and facilities rely on ageing control and protection systems, which need replacing.

For safety reasons and to ensure uninterrupted operation, it is essential that upgrading or replacement is a seamless changeover from the old to the new.

At nuclear power plants, replacing obsolete systems can have significant implications for the safety case and cause lengthy and expensive outages. Because of this, Wood has worked to find ways to minimise impact on energy generation when replacing systems.

The replacement of high-integrity control systems at two of EDF Energy’s UK power plants – Heysham 2 and Torness – provides an excellent example of how such a fleet critical project should be tackled. At both stations the fuel routes were originally controlled by a bespoke system dating from when they were built in the 1980s.

The aging system presented significant reliability issues, a major risk in a component that is fundamental to the safe and reliable movement of fuel and components, and essential for the continued operation of the reactors.

A phased solution avoided the need to shut down the reactors and delivered an immediate improvement in reliability prior to full migration of the the code to new Siemens programmable logic controllers. A process was created to migrate and validate the code against a dynamic model and test environment, which allowed full off-site testing.

Having completed migration and off-site testing, it was possible to reduce the on-site installation and testing to a minimum, thereby reducing plant outage significantly.

Combining our specialist knowledge in nuclear with the deep understanding and wider sector experience of our automation and control (A&C) business enabled us to win a 10-year, $66 million control systems framework with Sellafield Ltd, the UK’s largest and most complex nuclear site.

The framework covers all stages of system design, manufacture and assembly of equipment, obsolescence management and maintenance support to project work and decommissioning.

Sellafield has some ageing but safety-critical control systems that need to be seamlessly replaced with modern equipment. This fits well with A&C’s capabilities, particularly as a leading Main Automation Contractor (MAC) in oil & gas and their experience of simulation and virtual commissioning environments in automotive, so Wood was very well placed to respond to the challenge.

Applying ideas from one sector to bring innovation and business transformation to another is a major differentiator.

Our work to keep Sellafield’s significant control system infrastructure running smoothly for many more years will provide a great springboard to future opportunities, particularly in digital systems.
To stay on top of your integrity programme you need to catch, assess and make best use of the waves of data your facility produces.

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### Tack the changes
The changing flow as a gas field is tapped often means the compressor stations feeding the pipelines must be modified. Different loads, new compression or changes to operating pressure create new problems from vibration and pulsation. Changes to the various input and output loads can cause a station that has run smoothly for decades to suddenly develop vibration problems.

The best way to ensure any changes do not result in excessive vibration and fatigue failures is to measure vibration levels within the station, however, measuring and analysing vibration throughout a station can be challenging. Most stations do not operate at a single steady state. Each compressor has multiple load steps, variable operating speeds, and some compressors shut down under certain operating scenarios. Combined with changing pipeline pressures, the number of possible operating scenarios becomes overwhelming.

### Explore every channel
A typical station may require anywhere between 50 and 240 channels of simultaneous vibration and pulsation measurements. Wood’s vibration specialists typically spend a day setting up transducers and mapping channels before they are ready to press the record button. The multichannel analyser records how the entire station reacts during different scenarios, including capturing transient events. This produces more reliable data and gives the operator greater freedom from needing to sustain specific and often difficult operating scenarios while the measurements are taken. One aspect of our multi-channel vibration assessment approach that our clients like is that it provides operational freedom. With fewer channels, operators must try to hold a specific operating scenario steady while transducers are moved around. This can be problematic for them, and in some cases impossible.

Another aspect of our multi-channel vibration assessment approach valued by our clients is the ability to capture transient events. This is impossible with fewer channels.

Tests can usually be completed in one day, but more complex troubleshooting cases may require up to three days of data collection.

This is much more efficient than using the simple 2-4 channel analyser, which can take weeks to work through. By collecting multichannel information across the same time period, it is easier to account for changing conditions across the whole system, which could give misleading readings when measured separately over a longer time period.

### Turn up the volume
The time challenge is replaced by a volume one; 240 channels measuring a myriad of operational settings generates a mountain of data that is difficult to process. To overcome this challenge, Wood has developed an advanced post-processing software tool called PostPro. Data on vibration, pulsation, revolutions per minute (RPM) and process conditions is compiled into an aggregated database. The software then creates anomaly reports, listing the measurements and their values relative to applicable guidelines.

The tool also flags RPMs with high vibration amplitudes in a ‘speeds to avoid’ chart, which allows operators to run equipment at safe speeds until corrective action is implemented.

### Reliable solution, reliable results
PostPro can collect, process, analyse and present hundreds of gigabytes of vibration test data in a short amount of time, providing a valuable advantage for facility owners. The overview of key information helps vibration analysts and operators make meaningful and timely conclusions and determine appropriate actions to ensure safe operation and optimise long-term reliability.
Suspended animation

Sometimes an asset needs to be shut down for a period of time. This might be due to a connecting facility needing repair, or a change in financial or operational circumstances. Shutting an asset down allows the operator to minimise costs and risk during downtime and reactivate in future when circumstances change.

Conventional shutdown involves flushing systems, cleaning vessels and pipework, refilling with preservation fluid, fitting new isolations and preserving rotating equipment and electrical systems. These are extensive activities with additional safety and integrity risks.

Pause for thought
In a study to challenge the conventional approach we proposed suspending most of the asset and infrastructure with the production fluids in place. A shut-in, rather than a shut-down. By leaving most of the fluids in place and the system under pressure the asset could be paused without all the associated shutdown tasks.

The workarounds
Not all parts are so easy to pause. The flare system could not be isolated, so our engineers developed a method that used residual gas from the field to keep the flare working. This feature was specific to the asset so other facilities could support a more complete suspension.

Isolating the benefits
The usual approach of isolating, cleansing, flushing and inerting involves substantial offshore activity with additional manpower carrying out less familiar work. Breaching containment, confined space entry and hazardous material disposal are just some of the high-risk activities which can be avoided with the shut-in method.

In a system designed to handle oil and gas, the introduction of air or, ironically, preservation fluids can accelerate deterioration, materials designed to be resistant to production fluids can be subject to corrosion or cracking risks when exposed to air or steam cleaning. Provided the system does not rely on active corrosion control such as inhibitor injection, suspending with process fluids maintains the system in its ‘as-designed’ state with lower risk of inadvertent damage during suspension.

Because of the complex interactions between materials, process chemicals and production fluids, input from our corrosion specialists was essential in developing this shut-in approach.

Start again
Recommissioning the system means going through the same activities again and the potential for leaks, where the system has been breached to install isolations or where parts have been subject to pressure changes, is increased. The shut-in approach effectively maintains the system in operational status, making it much easier to restart.

Shutting down costs
Major cost savings can be achieved by reducing or removing the need for cleaning and preservation, through equipment and manpower. In our test project the estimated costs were USD $21 million for shutdown, and $10 million to recondition and start-up. The Wood solution offers a potential saving of $7 million. Our solution can be implemented from the control room, reducing manhours, cost and risk for people and the asset.

Pause and resume
For this project, it was determined that suspended operations for up to 12 months were acceptable, beyond which the case for investing in a full cleanout and assessment is stronger. This method is not a universal solution for all systems, but we believe where appropriate to the asset it is an innovative and cost-effective solution for suspending operations.

No need to stop your operation, just press pause...
Mining the future

Mining gets digital: why creating a digital supply network will unlock the future for mining.

The role of technology in mining is changing. In the past, we witnessed changes in mining and processing technologies; mining equipment became larger and new mines more isolated as ore is depleted and mineral grades decrease. While these changes have been significant, they have been gradual. The approaching wave of technological changes to our industry promises to be faster and more disruptive as mining companies seek new performance levels for efficiency and mineral recovery.

Mining companies across the globe are under pressure from capital markets to provide returns that can compete with industries in very different investment groupings. As automation and big data enter the arena, corporations are competing to leverage these approaches for greater return on investment.

Automation has brought us 3D, 4D and 5D processes, bringing current planning and future scheduling into the industry with the further possibility to work in parallel across continents – this has lowered project costs and reduced risks. The next wave of digital innovation will not replace these technologies or specialists - it will integrate them. We have been automating workfaces for decades in nuclear, automobile manufacturing, oil and gas, and of course mining.

Global equipment and control systems manufacturers are supplying modular components that are easier to add to overall control systems, and as automation spreads across workfaces, a need has become apparent: the role of the main automation contractor (MAC).

Wood’s mining and minerals solutions previously supported mining operations and mineral processing; innovation from automation and control along with our broader capability across maintenance, operations and environmental services now makes it possible for us to offer deeper support to customers in their drive to the future mine. As our expertise grows, further horizontal integration of our services will become possible – this means greater savings and increased earnings for our mining customers.

Customers can draw on this to implement intelligent operations that optimise production, reduce costs, increase efficiency and improve safety. Digital technologies will help transform core processes, manage maintenance to reduce downtime, improve administrative support processes and enable more informed decision-making.

The next step is to make more efficient use of these systems, as well as the data they provide, to drive tangible improvements in the performance of the processes, while taking advantage of the total value of the data and previously undetectable correlations within. Data points under the traditional magnifying glass may have no relation, however, when advanced data analytics techniques are applied, process modifications are detectable and can be implemented to improve performance.

The ability to act on the data, applying advanced algorithms and automation to translate decision and actions from the digital world into movements in the physical world helps deliver measurable value.

According to a recent paper from the World Economic Forum and Accenture, digitisation could bring more than $425 billion of value for the mining industry, customers, society and environment by 2025. Customers use the insights from data analysis to reduce capital expenditures, respond to changing project requirements on the fly and optimise mine planning to integrate real-time changes.

The technologies to make the digital mine a reality are within reach. To thrive in the future, the conversation between mining companies and their EPC/M providers must move to a more collaborative footing. The exciting challenge for tomorrow is how to design, build, integrate and embed systems that will future-proof the next generation of mining.

Find out how we can help.

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Mining the future

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Wood differs from other EPC/M service providers in the mining industry by bringing automation systems and advanced asset management into projects at an early stage as a uniquely experienced MAC.
Turning the tide on energy

The €20 million flagship Enabling Future Arrays in Tidal (EnFAIT) project, led by Nova Innovation in collaboration with eight other organisations, including Wood, has received approval from the European Commission to proceed to its next stage after a successful first full year.

A sound proposition
The world’s first grid-connected offshore array of tidal energy turbines is located in Bluemull Sound off the Shetland Islands in Scotland. As the independent technical and commercial expert on the project, Wood’s clean energy team is commissioned to verify each stage of the development process from project engineering design to operation in the tidal stream environment.

As reliable as the tides
The European Union-backed tidal energy project aims to prove that the reliability and availability of tidal energy arrays can be significantly increased and that the cost of tidal energy can be reduced by at least 40%. Tidal energy has the potential to diversify the global energy mix even further and places the UK and Shetland right on the front line of this industry.

Clean bill of health
The European Commission’s approval for the project to progress to its next stages follows a review by three independent technical experts to confirm that the project has progressed as planned and put in place the key ingredients for success.

Over the next four years, the EnFAIT project will extend the Bluemull Sound array to six turbines and demonstrate that high array reliability and availability can be achieved using best practice maintenance regimes. The layout of the turbines will be adjusted to enable array interactions and optimisation to be studied for the very first time at an operational tidal energy site.

Over the next stages of the project, Wood will be responsible for verifying the commissioning and operational performance of the turbine array installed at the site. We will also be responsible for verifying that the decommissioning of the turbines is carried out safely, as well as capturing and disseminating lessons learnt for the benefit of the wider industry.

For more information, please contact robert.clayton@woodplc.com
We’re pioneering new ideas and technologies in many different markets. Here are a few of our latest developments.

**STEM success**

**Shifting horizons**

Wood is fully committed to developing and encouraging the engineers of the future.

When one young engineering student was dreaming up a new idea for a civil engineering project to enter in the UK’s National Teentech competition, she and her teacher called on us for support. One of our principal engineering consultants, a long-time STEM ambassador, helped her to generate an innovation based on a child’s toy. The student developed the project and, after presenting to an audience of scientific peers at the Royal Society, she won first prize.

At 18 years old, Siana Zhekova is a promising student studying maths, physics and engineering at Cambridge University, and already has a patent CV.

Wood is now funding the development of her design, for a portable, rapid deployment emergency rescue bridge, into a full-size prototype. We look forward to reporting on the next stages, and to see Siana achieve her full potential.

**Data angling**

**In the field, and in the river.**

Wood’s St. Louis, MO, Kennesaw, GA, and Novi, MI offices combined efforts to implement an effective set of complementary technologies for collecting, managing, and evaluating biological data on the cleanup of the Kalamazoo River.

Fish collection techniques including electrofishing, box netting, and other methods coupled with Wood’s FIN fish collection and datalogging field tablet application have proven to be a cost-effective solution for collecting and digitally managing biological data.

The FIN app, developed by Wood, integrates seamlessly with EQuIS and ArcGIS data management and visualization platforms allowing teams and customers to review progress and data in real-time. Positioning data allows anyone to revisit collection locations, saving time and money over traditional, hard-copy methods that require substantial data post-processing and manual entry into spreadsheets or databases.

These same collection technologies paired to other apps can be developed and used on a range of projects seeking cost effective ways to understand industrial impacts to waterways, and other aquatic ecosystem dynamics.
Bringing harmony

Professor Nawal Prinja, Wood nuclear technical director, explains how the industry is embracing change.

The nuclear industry needs to reduce the cost of generating power to fully contribute to minimising climate change as part of the global energy mix.

The UK’s Nuclear Sector Deal, announced earlier this year, calls for a 30% reduction in the cost of new build by 2030. Alongside this economic requirement are demands for greater safety. The combined challenge of increasing safety and reducing cost can only be met by introducing innovative, disruptive technologies.

Standardisation is paramount for the successful industrialisation of any technology. Historically, for various political and commercial reasons, the nuclear industry has worked in a more insular manner than the aerospace, automotive, finance and IT industries. With harmonisation of industry standards, those sectors have raced ahead in implementing innovative technologies. Examples are blockchain, which is set to revolutionise supply chain economics, and the development and adoption of immersive augmented reality and virtual reality that are transforming gaming and entertainment.

Site specific data such as atmospheric conditions, cloud cover and drone imagery will be leveraged by these models to enable the business to make better and more efficient predictions relating to condition and performance.

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Three main stakeholders must work together: nuclear regulators, standards development organisations (SDOs) and industry partners.

One important area of focus is codes, software programs used to assess reactor safety or to simulate accident conditions. These codes can be very different across the more than 30 countries with nuclear facilities. Understandably, some of these differences arose due to industry practice, local laws and acceptance of risk. But, surprisingly, as the laws of underlying physics are universal, there are technical differences too.

The good news is that groups from many countries along with nuclear regulators are working together to identify and align the critical codes for nuclear safety.

SDOs from six countries have created a code convergence board to reduce any divergence in codes in future. A codes and standards task force, run by the World Nuclear Association, is also working closely with the SDOs and the nuclear regulators to find ways to increase harmonisation and achieve standardisation of designs.

Prof Prinja is at the forefront of efforts to bring about international standardisation in the nuclear industry as chairman of the Mechanical Codes & Standards Task Force in the CORDEL working group of the World Nuclear Association.
Challenge us!

We’re positioning ourselves to support the markets and industries of the future. Anticipating the challenges they will bring is an exciting part of our strategy. Share your problems with us and we’ll work with you to answer the challenge.

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