

A regular update on DSA projects and people

DSA project creates digital design tools for site planning

An experimental DSA project which began nearly nine years ago has become part of Sellafield’s critical digital infrastructure.

Geographic information systems (GIS) are now regarded as essential digital design tools for many aspects of site planning. They even helped to ensure a COVID-safe return to work on site by providing data to plan pedestrian flows and identify pinch points.

Dr Richard McGrath, who now leads Sellafield Ltd’s Geospatial and Strategic Spatial Planning Team, initiated this area of work in 2012 as a DSA specialist when he was working for AMEC (now Jacobs). The initial idea was to create an intranet-based platform to store ‘one-truth’ information and enable better informed decisions.

The GIS system allows users to click on any building represented on a digital map and immediately see a pop-up containing detailed information which can range from the number of people working in an office block to the nuclear inventory in a storage building.

It also provides access to safety case information and real-time data about weather conditions and radiological dosage measurements throughout the site.

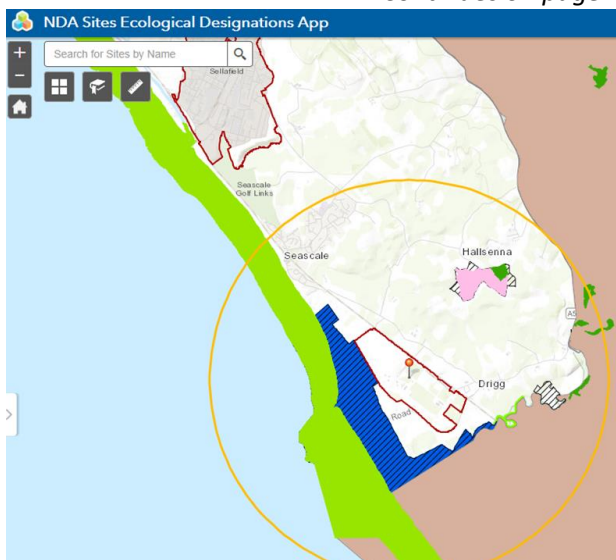
Dr McGrath, who became a Sellafield Ltd employee four years ago, said: “For complex sites with hundreds of buildings, spread over a large area, it becomes vital that information is provided in a spatial context. But gathering that information,

presenting in one place and making it readily available can be quite a challenge.”

The database is constantly improved – most recently with high-resolution aerial imagery, drone footage and a “Sellafield Street View”, which has enabled people working from home to examine specific parts of the site down to a 4cm resolution. The platform reaches about 5-6,000 individual users per month who are searching for one-truth information.

A virtual tour has been created, which was used during the early days of the pandemic to introduce nuclear minister Nadhim Zahawi MP to the site.

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Example GIS ecological data for West Cumbria

Financial update

At end of period 12

DSA spend during 2020/21	£111.2m
Cashable benefits*	£2,837,844
Non-cashable benefits*	£8,062,607
Schedule benefits*	85.8 months

Health and safety

Hours without a lost-time incident

AXIOM	7,035,999
Progressive	5,944,583
Total	12,980,582

*Approved and draft

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The DSA now has a home on the NDA Hub. It can be found here: <https://ecosystem.org.uk/groups/dsa-hub-sl/>, but to get access, please email janine.bell@sellafieldsites.com who will invite you. Lots of useful information will be uploaded in the next few weeks.

Tank you! No need for LFE, so time and money is saved

One month has been cut from the schedule and costs reduced by £15,478 thanks to a DSA team's efficient handling of documentation relating to the resuspension and emptying of Site Floc Storage Tanks 5 and 6.

The resuspension equipment for each of the primary sludge tanks was designed up front and activities were included in the schedule for an update of the manufacture drawings at the end of the project, reflecting changes from the engineering query process.

A similar activity is recorded in each of the schedules for the update of installation drawings and technical installation procedures.

Bethany Parr, Mechanical Lead Engineer, said: "An opportunity has been highlighted whereby the majority of this scheduled work can be removed and the associated changes documented in the Lifetime Records information.

"No updates to drawings will be made apart from the CAT 1 drawings necessary for configuration management."

The update work would have taken two weeks for each tank, including checking and approval, but since these are the last two tanks in the building to be emptied, the Learning From Experience gained during the work does not need to be fed into any future manufacture and installation documents and the duration on schedules for these activities can be saved.

Any dismantling of the equipment, once resuspensions are complete and all tanks are emptied, would be unlikely to happen in reverse order based on the risk of contamination on pipe internals.

New instructions for the removal and disassembly of any on-plant installations will be documented by the teams in post-operational clean out.

'Effectively, we're creating a RightMove app for nuclear sites'

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"The feedback was really positive," said Dr McGrath. "The minister made the point that the information he got in one hour would have taken a day if he'd visited in person."

Supported by Clare Baron, a Senior GIS Data Analyst and two of her colleagues at Jacobs, Dr McGrath is now creating GIS spatial datasets for other Nuclear Decommissioning Authority sites. The DSA team's services are informing how Sellafield Ltd is developing the business case for an enduring NDA Group GIS capability, which would introduce a step-change in the way that the NDA tracks information on its sites and reports progress to the government and other stakeholders.

"In the early days we were a project that had to keep justifying its existence but Sellafield Ltd has since recognised that GIS is a 'business as usual' capability.

"Now that the NDA is considering potential future uses for its nuclear sites, they can see the value of accurate and timely GIS data.

"Effectively, what we're doing is creating something like the RightMove app for potential future users of nuclear sites, whether that is EDF or a developer of small modular reactors.

"The system shows land ownership, utility connections, sites of special scientific interest, marine protected areas or national parks, flood risk, ecological designations, and so on. And the NDA will be able to demonstrate how sites are changing using time-lapse photography."

It's not the first time that others have tapped into Sellafield's experience in this area. In 2015, Dr McGrath and members of his team made three visits to Japan to help TEPCO staff build a GIS to assist the clean-up of the Fukushima site. GIS is a key enabler of intelligent asset management because it can be used to create digital twins for analysis of degradation, maintenance requirements and other critical aspects of looking after buildings, plant and equipment.

And it even proved its worth during the pandemic, when Dr McGrath was called on to analyse traffic flows and pinch points in order to determine the risk areas for the spread of infection. The GIS team was instrumental in understanding and presenting the positive case data and impacts to the business. It also helped Cumbria County Council to deliver a Community Hub App to help local volunteers to manage support for vulnerable people.

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SCP corrects old error and avoids £1.2m rework costs

The SIXEP Continuity Plant (SCP) is being built alongside Sellafield's Site Ion Exchange Effluent Plant (SIXEP) to provide a back-up for the vital task of cleaning liquid effluents before discharge to sea. The project is being delivered through the Programme and Project Partners, with design work undertaken by an integrated DSA team.

The new plant is based on the existing SIXEP design, but while the latter has been in operation it has become clear that the original design of the universal vessels (UVs) was inadequate – resulting in the failure of support brackets leading to permanent bed plate deformation.

Utilising their expertise and experience, the DSA design team identified modifications to the SIXEP UV design to cope with the complex forces and stresses being generated.

The suitability of the revised design could only be underpinned following the execution of a more detailed finite element analysis (FEA). As the design of the UVs was a critical path activity, the FEA was executed in parallel with completion of the UV design pack.

There was a risk that if the revised design proved unsuccessful, the UV design pack would be equally undermined. This would mean further repeated cycles of design modifications – causing increasing costs and delays – until a solution could be found. As a result of the high level of experience and skills brought to bear by the design team, the modifications proposed were successfully underpinned and the design of the UVs progressed without delay. This meant that potential re-work costs of £1,217,107 were avoided.

Helen Price, AXIOM SCP Project Manager, said: "This has shown the importance of learning lessons from previous design failures and the benefits of employing a highly experienced and skilled design team. We avoided significant potential rework costs and delays by producing a successful revised UV vessel design and getting it underpinned in a timely manner."

Andy van Schaick, Commercial Category Manager, said: "This excellent example of project and risk management is what the DSA is all about and shows how its expertise complements the PPP model."

SAFE BY DESIGN – Assessing COTS equipment risk

WHAT?

- To reduce costs and design time, Sellafield Ltd uses a lot of COTS or MOTS equipment.
- Frequently, this equipment is not used in the application that it has been designed for.
- When used in hazardous environments, failure of equipment can be more likely, or can result in greater consequences than the original supplier will have considered.

IT CAN HAPPEN HERE

- A piece of COTS equipment was noticed in poor condition recently on a plant. A worn part could have led to a loss of containment.
- While the maintenance procedure for replacing the part was understood, the risk of this fault occurring had not been highlighted specifically.
- Preventative maintenance could have avoided this.
- To address this, the frequency of maintenance has been increased to ensure the part is replaced before it wears out.



THE REGULATIONS

Health and Safety at Work Act 1974, PUWER & Machineries directive.

When we put a CE marked piece of equipment into service **in an application not considered by the original supplier**, we cannot assume that the equipment is suitable for use in our application, without further assessment.

WHAT CAN DESIGNERS DO?

- Risk assessments considering the equipment lifecycle including degradation, maintenance and decommissioning.

Where failure could result in a serious consequence then a FMEA process may be appropriate to define a preventative maintenance schedule that always keeps the equipment in a safe state – do not wait for the fault to occur.

Links

<https://slportal.ssa-intra.net/pub/SC020/00326/SLMS%20Documents/SLSP%201.02.07.19.pdf>

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DSA collaboration boosts Systems Thinking capability

The DSA is playing a key part in helping Sellafield Ltd to improve and formalise its approach to Systems Thinking and Systems Engineering. This includes updates in processes and procedures as well as capability development within the Project Systems Engineering Management Centre Of Expertise and extended community of practice. Since October 2019, Cavendish Nuclear has been collaboratively engaging to increase awareness, knowledge, skills and qualifications with regards to Systems Thinking, which is a way of addressing complex and uncertain problems by recognising that the world is a set of highly interconnected technical and social entities which are hierarchically organised and produce emergent behaviour.

Systems Thinking is an essential skill in Systems Engineering, which is all about creating and sustaining successful, purposeful systems.

As part of its business transformation, Sellafield Ltd has recognised the important role this can play in defining and delivering business and mission needs.

It has established and facilitated a group learning and continuing professional development programme to promote Systems Engineering knowledge and skills with reference to International Council on Systems Engineering INCOSE Systems Engineering Handbook (and associated international standards).

Cavendish Nuclear has been an active participant in this process since the first cohort and has shared in the success which has been delivered. The Sellafield Ltd INCOSE CPD programme has been refined for subsequent cohorts and has adapted to the new way of working (using MS Teams and curated content on the NDA Hub). But, in spite of moving from face-to-face meetings to remote collaboration and learning, the process and desired outcomes have remained the same. To date 53 people have taken part, including 11 members from Cavendish Nuclear.

Significant delays have been encountered with people's ability to take the exam but even so, 10 people have received formal INCOSE Certification and the value of this is being recognised.

John O'Brien, Sellafield Ltd's Head of Engineering

Design Capability, said: "I am pleased to see the growing numbers of personnel that are developing knowledge and awareness of Systems Thinking/Engineering. I see this as one of the key areas (if not the biggest) for driving improvements in successful project delivery."

Andrew Stoker, Cavendish Nuclear Senior Engineering Manager, said: "It is clear from John O'Brien's endorsement how important Systems Thinking is to the future successful delivery of work within Sellafield Ltd.

"Collaboration should be regarded as a key factor in maximising the benefits and opportunities going forward.

"So, the manner in which Sellafield Ltd and Cavendish Nuclear have come together and collaborated to improve develop and formalise Systems Thinking knowledge and skills in a group learning environment is an extremely positive sign for the DSA and successful business delivery going forward.

"Cavendish plans to continue development, application and improvement where engaged across the Sellafield Ltd portfolio.

"Sellafield Ltd has recognised the important role Systems Thinking can play in defining and delivering business and mission needs.

"Effective practice through enterprise, programme and project tiers will drive progress and success against Sellafield Ltd's strategic objectives."

How's the DSA doing?

Work to supply chain	Work to SMEs
27%	11%
Hours in education	Customer feedback score
2089	98%

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Framework integration boosts the DSA's value ADD

Alliance Designed Delivery (ADD) is a DSA initiative designed to pioneer a fresh approach to integrating design and implementation.

Last year, the Nichols Review of the DSA called for greater integration with other frameworks from 2022 onwards, as part of a whole lifecycle approach that is focused on overall outcomes.

Currently, the way most projects work is that the DSA is contracted to deliver the design which is then installed by another framework, with little interaction between the two.

In conjunction with Sellafield Ltd and as part of the DSA Optimisation Plan, a set of pilot projects have been set up to test how new ways of working, including early contractor input and joint incentives, can influence project outcomes and how these can become a 'business as usual' part of DSA delivery.

The intent is to enable the integration of the design and implementation phase, to base joint incentivisation on project outcomes and, ultimately, to integrate the management of the projects.

One of the key concepts of ADD is to utilise the existing contractual arrangements for each of the frameworks: DSA; Operations Site Works (OSW); and the Decommissioning Delivery Partnership (DDP). The approach to incentivisation is to understand the mechanisms available within those contracts and then to identify an aligned incentivisation on a task by task basis. The DSA is

often incentivised on design deliverables but with ADD, incentivisation is focused on the outcome of the delivered task.

Four pilots have been identified across the Decommissioning and Site Management programmes.

These offer a representative sample of the types of work the DSA performs and include interactions between AXIOM, Progressive, DDP and OSW. The purpose of these pilots is to enhance collaboration between design and implementation, develop effective approaches to incentivising on outcomes, and to identify and deliver on the benefits anticipated through the frameworks working together collaboratively.

The pilots currently underway are: a plenum refurbishment in Special Nuclear Materials; a steam and plenum refurbishment in the former fast breeder reactor fuel production plant; security projects in Special Nuclear Materials; and the THORP Cooling Towers project.

Each of the pilots are subtly different, but the common and most expected benefits are fewer changes between design and implementation, improvements in safety, reduction in overall delivery times, and lower costs.

The pilots are running in parallel, so learning from experience is being collected each month and shared across all the pilots on a live basis.

Say hello to our new starters

Andrew Kelshaw has joined AXIOM as Area Engineering Manager working on the Decommissioning Encapsulation Plant. His previous role was UK Controls and Instrumentation Discipline Manager with Worley (formerly the Jacobs Energy, Chemicals and Resources business). Although he has just three years' experience in the nuclear industry, Andrew has worked on instrumentation design, engineering and engineering management for 37 years in the pharmaceutical, chemical, food, petrochemical, power, nuclear and upstream oil and gas industries. This has included both office and site environments together with considerable experience in site construction and commissioning activities. He has also found time for acting – in 1989 he appeared as an extra in Coronation Street!

Natalie Rimmer has joined the AXIOM Central Team in a new role as Reporting Co-ordinator, where she will be responsible for managing the AXIOM reports going forward as well as supporting the Central Project Controls function.

Natalie will also be looking into improvements in our reporting, tools and systems. She has been in the nuclear industry for six years and in her previous role worked as a project manager in asset management.

Adam Hall has rejoined AXIOM as Senior CE&I Engineer working on Small Power and Lighting Design.

And finally, AXIOM has said a fond farewell to Peter Myers, who has retired after more than five years as Quality Manager.

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