

NEWS BULLETIN

May 2021

A regular update on DSA projects and people

Robots are the key to a glovebox revolution

DSA engineers are studying how technology can bring about a revolution in the way gloveboxes are operated.

The aim of the Risk Reduction in Box Operations project is to get to a stage where robots can carry out much of the work which is currently done by human hand.

Having people reaching into gloveboxes through ports is a potential safety hazard and has led to incidents in the past.

Tele-operational robotics, where the operator remotely directs machines to manipulate items in a glovebox, is seen as a way to reduce risk and increase productivity on some of Sellafield Ltd's most critical programmes.

Chris Ballard, Sellafield Ltd's Robotics and Artificial Intelligence Programme Manager, believes it may be even be possible to automate some tasks such as re-canning and repackaging of special nuclear materials.

Chris said: "Human-supervised autonomy is where we could end up, which would be a revolutionary change in the way gloveboxes are designed and used and much safer for the people who operate them.

"The outcomes of our work will be transferrable across the NDA estate. And as the equipment we are considering is all at a high technology readiness level and available commercially off-the-shelf, there should not be any serious barriers to adoption."

Chris' 20 strong team include Cavendish Nuclear and Atkins engineers and supply chain robotics experts. Currently, the innovative "study and sandpit" phase is collecting a library of gloveboxes and their characteristics before a down selection process for robotic application. A sandpit to trial the robotic technology to the limits of its capability is also under way. Learning from the study and sandpit will be used in a mark one prototype for further development with the end goal of deployment on site.

Continues on page 2



A Kinova arm is being adapted for glovebox use

Financial update

At end of period 1

DSA spend during 2021/22	£6.3m
Cashable benefits	Not available
Non-cashable benefits	Not available
Schedule benefits	Not available

Health and safety

Hours without a lost-time incident

AXIOM	7,117,376
Progressive	6,046,557
Total	13,163,933

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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.

My Perspective – John O'Brien

John O'Brien, who retires from Sellafield at the end of this month, has done as much as anyone to enable the DSA to fulfil its potential.

He took over as Head of Engineering Design in November 2012, a few months after the alliance replaced the Task Design House and Multi-Disciplinary Design House frameworks as the way to source engineering skills. But The DSA was still regarded by most as resource augmentation, or 'bums on seats' in plainer language.

John, previously Project Engineering Manager on Evap D, set about building relationships with key figures from the DSA partners such as Andy White and the late Neil Proud. Their work alongside colleagues in the delivery areas SMPRO, Retrievals and Major Projects was transformational.

Typically, however, John gives credit to the Commercial teams on both sides for putting in place the incentivisation mechanisms that enabled Sellafield Ltd to draw more fully on the DSA partners' capacity and capabilities.

He recalls: "These changes gave the NDA confidence that the DSA was being used in a more efficient way. No new framework is ever going to work perfectly right from the outset. They take time to mature and bed in. People need to develop trust. "However, even in its early stages the DSA achieved one of the key elements of the first business case, which was to give us secure access to competence and capability in the supply chain.

"And today, I'm pleased to see that it is not standing still. The Optimisation Plan aims to address the misalignment that can arise between design

and implementation. If they can develop much closer relationships with DDP and ISA, I'm sure the DSA partners will continue to have an important role in the future Overarching Acquisition Strategy.

"I really value the DSA. The people involved in it are not just good business colleagues, they are friends as well. I wish them every success going forward in building a long-term, successful partnership with Sellafield Ltd."

John joined BNFL 44 years ago as a mechanical engineering apprentice at Capenhurst, following in the footsteps of his father who was a process foreman at the Cheshire enrichment plant.

His career has taken him to Japan on five occasions and to Lanzhou Nuclear Fuel Complex in China – a three hour flight and a 17-hour train journey from Beijing – where he commissioned a shielded flask that BNFL Engineering had designed and built for China's pilot spent fuel reprocessing facility.

"It was a great experience for both me and another young engineer," John recalls.

"We were greeted by a crowd of 50 people at the train station with TV cameras rolling as if we were royalty. There were banquets most nights with somebody around the table toasting us every 10 minutes.

"Despite this, we managed to retain clear enough heads to complete the task in hand and hopefully played a small part in Anglo/Chinese collaboration."



DSA's flexibility and teamwork cuts £970,000 off cost of trial

Continued from page 1

Chris added: "Tests are being carried out at the robotics and AI lab (RAICo One) in Whitehaven using various technologies, including Kinova robotic arms, which are used by disabled people to feed themselves; virtual reality headsets, which give operators a much better view than they would get through a glovebox port; and haptic gloves, which simulate tactile sensations so that the wearer feels as though they are holding the item being handled by the robot.

"The DSA is fantastic for us because it's so flexible.

It was no problem to bring in Atkins, even though they are not one of the DSA partners. The DSA has enabled us to bring them together with Cavendish and with the SMEs in our supply chain and everyone is working very well together."

The team saved £750,000 – and cut nine months off the schedule – by finding a suitable unused glovebox to use in trials rather than building a fit-for-purpose mock up.

A further £120,000 was saved by using the Whitehaven facility and another £100,000 by collaborative commercial working.

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The NDA HUB: how to get access and what it can do for you

The HUB enables people within the NDA group to come together within dedicated collaboration groups. It also allows estate business units to migrate their intranets into HUB to enjoy integration benefits.

A broad range of content can be created, uploaded and shared including documents, discussions, blogs, events, polls enabling rich interaction within a secure environment (Ecosystem cloud).

The HUB is accredited to hold information up to and including Official Sensitive (OS) in order for you to collaborate across the estate. The sharing of OS information should be approved by your businesses Chief Information Security Officer or Senior Information Risk Owner and guided by your businesses policy on appropriate usage of the HUB. Spaces can typically be thought of as intranet pages where information may be shared with a specific audience in a controlled manner. These spaces can be 'open' to all HUB users.

The DSA group is DSA HUB SL. Groups can be set up as 'members only' where all HUB users can access but must join as members to participate, or

'private' where membership is by approval or invitation only.

Projects – create sub folders as equivalent file share structures within groups. They inherit the Group access arrangements

Categories – This is like creating sub folders within projects. These are a way of ordering content by applying one or more categories. This allows a collection to be brought together and viewed.

To access The HUB visit www.ecosystem.org.uk

Enter your e-mail address and password. If you do not have an account, contact

janine.bell@sellafieldsites.com who will activate an account.

SL and DSA employees will be able to access HUB groups which are classified as 'externally accessible'. They will need to request an invitation from the HUB Group owner. DSA employees are limited to access up to 10 groups.

HUB accounts will automatically be deactivated after two months since your last login.

You must update your personal profile when your account has been approved.

SAFE BY DESIGN – DESIGN CHANGE CONTROL

WHY DOES IT MATTER?

Design Change Process (DCP) can sometimes be overlooked when a change is seen as trivial. This can affect the validity of hazard management strategies.

Overlooking DCP can lead to:

Indirect and direct safety implications.
Full detailed impact of design change missed.
Repurposed/changed designs not having design hazards reassessed.

IT CAN HAPPEN HERE

A recent event highlighted importance of DCP. Adopted trolley design was modified and material was changed for required weight relief. Full design impact assessment overlooked, partially from time constraints. Changes made were seen as trivial. Handle work hardened and sheared during operations.
Indirect Impact: Downtime delayed site hazard reduction mission where the trolley was an essential component.
Direct Impact: Risk of minor injury.

THE REGULATIONS

SLP 1.02.08 – How do I conduct design change control

- Following SLP addresses requirement of BS EN ISO 9001: Section 7.5.3 'Control of documented information'.

Changes to existing designs should be subject to the same rigor as the original design.
Guidance on how to perform a detailed impact assessment can be found in SLP 1.02.08 Appendix 3.

WHAT CAN DESIGNERS DO?

Insisting on and encouraging the use of the design change process

Follow the process to reduce re-work and issues
Design Impact Assessment

Review fully detailed impacts of changing designs
Follow SLP 1.02.08 to avoid incidents occurring

Re-assess Hazards

Re-evaluate original design hazards to ensure no new hazards have arisen. Verify designs with testing and calculations if required.

Links

[1] – SLP 1.02.08

[2] – BS EN ISO 9001: Section 7.5.3

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Kayleigh says innovation should be nothing new for the DSA

Kayleigh Jackson has started work as AXIOM's first ever Innovation Lead.

During a six month rotation, lasting until September, she will be setting up the framework for innovation within the joint venture, as the first step towards enhancing the existing innovation culture.

"You can't create a sustainable culture in just six months but we're going to make a start, building upon the good practice already in place," says Kayleigh. "I will be putting together a route map for innovation and a supporting strategy document, as well as focusing on achieving maximum value from the Delivering Benefits process and also looking for some quick wins.

"Innovation can be defined as the creation, development and implementation of a new product, process or service; where new includes transferring something existing to a different application, for example. The aim of innovation is to improve efficiency, effectiveness and/or competitive advantage, but good innovation always delivers value.

"Innovation should make business operations more competitive, which benefits everyone by making their jobs more secure. That's why it should be everyone's responsibility to make their organisation as innovative as it can be."

In the longer run, Kayleigh's role will be judged on how well it drives innovation and brings about improved design quality and outcomes.

Actively seeking and adopting innovation is a principle of Sellafield's Enterprise Strategy. It is seen by a wide range of stakeholders as a way to achieve improvements, but there remains a lot of innovation capability in the DSA partner companies that could be made more use of.

The Innovation Lead's main job is to act as a focal point for innovation - actively seeking out and identifying opportunities for innovation that will increase productivity and delivery certainty while also improving design quality and project outcomes.

"This new post is about making innovation something that AXIOM does on a daily basis," says Kayleigh. "Innovation needs to be embedded in our culture so that everybody sees themselves as accountable for it."

Among other things, this will mean innovation training packages and inclusion of innovation statements in job descriptions. It will drive greater collaboration between partner companies in and across AXIOM and Progressive, Sellafield Ltd and the supply chain and will aim to make better use of new technologies and ideas which have already been proven to work in other industrial sectors, so there are plans to set up an Innovation Forum to spread knowledge and best practice more widely. In the meantime, one of Kayleigh's first tasks is to ensure that we derive maximum value from the Delivering Benefits process, which records how DSA partners have 'done things differently' in order to identify and make cost or schedule savings. Often these benefits result from applying innovative technologies or approaches to work. Kayleigh says: "We need to get better at capturing and implementing innovation, learning from experience and making it easier to find and refer to.

Subsequent Innovation Lead placements will follow, staffed on a rotating basis by each of the partners, taking the drive for innovation well into the DSA's third five-year tranche.

Martin Lyons, AXIOM Programme Director, said: "Kayleigh's appointment demonstrates our commitment to building upon and enhancing our culture of innovation to ensure we are always adding maximum value to our stakeholders by constantly challenging ourselves and each other to consider and apply innovative approaches and technologies"



Anyone with suggestions for innovation in AXIOM and the DSA is welcome to contact

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Could more heat and less volume be the solution for waste?

The DSA is supporting a waste treatment project which Sellafield Ltd and the Nuclear Decommissioning Authority hope will make a huge contribution towards the UK Nuclear Sector Deal.

The nuclear industry has committed to achieving a 20% reduction in decommissioning costs by 2030. The Higher Activity Waste Thermal Treatment programme (HAWTT) is looking at how Sellafield could play its part by significantly cutting the volume of waste that goes into storage.

A team from Cavendish Nuclear Ltd (CNL) is working with Chris Mounsey, HAWTT Programme Manager, to design and deliver pilot facilities to treat three main types of waste: plutonium contaminated materials, pumpable intermediate level waste, and solid mixed beta/gamma waste. Chris said: "If you encapsulate wastes in grout, you generally end up with an increase in volume. If you thermally treat the waste, there is often a volume reduction.

"This means you don't need as many packages and you don't need to build as many stores.

"Ultimately this will mean a reduction in future liabilities and a saving for the taxpayer."

Thermal treatment is not new – Sellafield's vitrification plant has been processing some wastes since the 1990s.

In other countries including the USA, Japan and South Korea, various processes and technologies are used to melt materials (pictured) and then encapsulate the active compounds in glass.

However, before the UK can go down the same route, pilot plants are needed to show that the process will work in practice, enabling Sellafield Ltd to develop a business case to submit to the Nuclear Decommissioning Authority.

As well as Sellafield Ltd and the DSA, the programme is being supported by National Nuclear Laboratory and the NDA.

If the pilots are successful, thermal treatment could become part of the NDA's Integrated Waste Management Strategy, opening the way for it to be used to process waste from other NDA sites and from other nuclear operators in the UK.

The pilot plants, which will be built on the Sellafield site, will be full-scale but not full volume. So, for example, they would be able to



process 200-litre drums of PCM but not at the rate expected of an industrial scale facility.

"We need to show that thermal treatment can be cheaper for the taxpayer in the long run," adds Chris.

"As well as designing and building plants, we're also looking at how to develop the wider capabilities needed, including getting the right people to operate the plants and ensuring that we have the skills to carry out sampling analysis, radiometrics and glass chemistry."

The Cavendish team began work on concept design in January and the next stage will be preliminary design for the three pilot facilities, one for each main waste type.

The ambitious target is to get all three up and running by 2025, giving enough time to establish the viability of thermal treatment – and most importantly that it will reduce decommissioning costs – before the UK Nuclear Sector Deal deadline in 2030.

Stephen Davison, Cavendish Nuclear's DSA Programme Manager, said: "The implementation of these active pilot systems could be key enablers for the eventual transitioning to full industrial scale facilities and to investigate to what extent thermal treatment could be utilised to treat higher activity waste.

"RED Engineering will be undertaking the design for the PCM waste stream whilst CNL will be undertaking that of the pumpable sludges waste stream. Having taken the learning from both streams, the aim is to involve CNL in developing the design for mixed beta/gamma waste as well."

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Full steam ahead as constructability review praises pilot project

One of the DSA’s Alliance Designed Delivery (ADD) pilot schemes has received great feedback following a constructability review.

The review concluded that the project – to replace a low-pressure steam supply line and refurbish the plenum area in the legacy Fuel Fabrication Plant – had benefited from close collaboration between the DSA team and the installation contractors. This is a key feature of the ADD approach.

Roy Pemberton, chair of the constructability review, praised the decision to re-route the steam pipeline to avoid the asbestos ceiling as “a positive example of application of construction design management principles”.

The design change removed the need to remove the asbestos ceiling, saving time and cost and removing a potential hazard.

The DSA team from AXIOM engaged with Cumbria Nuclear Solutions Ltd (CNSL), the installation contractor working under the Decommissioning Delivery Partnership, from the start of their work. “The strong relationship between the teams has been crucial and this collaboration is at the heart of what ADD is looking to achieve,” said AXIOM’s Mike Houghton.

A previous design (not undertaken by the DSA) was produced in isolation from construction and did not take into account some constructability issues, including the strip-out of the existing system and



associated ancillary equipment. CNSL has been involved in liaising with plant construction, asbestos surveys, the constructability review, and ongoing review of the design packages.

The ADD approach ensured that all known risks were addressed in the design phase. Flaws in the previous design were mitigated and methodologies were developed on plant for the strip-out and installation phases.

This has increased the likelihood that the project will be delivered to cost and schedule, without the need for rework during construction. It will also ensure that no legacy equipment will be left for decommissioning and that space can be utilised for other projects.

Why DB forms matter

The DSA’s Delivering Benefits process helps the alliance’s customers to achieve their efficiency targets.

By capturing benefits in this way, we demonstrate the value of the DSA to internal and external stakeholders such as the Nuclear Decommissioning Authority. It also helps to underpin cost and schedule efficiencies.

The Delivering Benefits process makes another valuable contribution: disseminating learning from experience throughout Sellafield Ltd and the wider supply chain.

This enables engineers and others to identify potential improvements to projects and processes, to share good practice and innovation, and to drive the right behaviours within the organisation.

How’s the DSA doing?

Work to supply chain	Work to SMEs
27%	9%
Hours in education	Customer feedback score
83	98%

(Figures for Period 1, 2021/22)