Project FAITH

Technology to Enable the Modular Manufacture of SMR Components

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Programme

Project FAITH

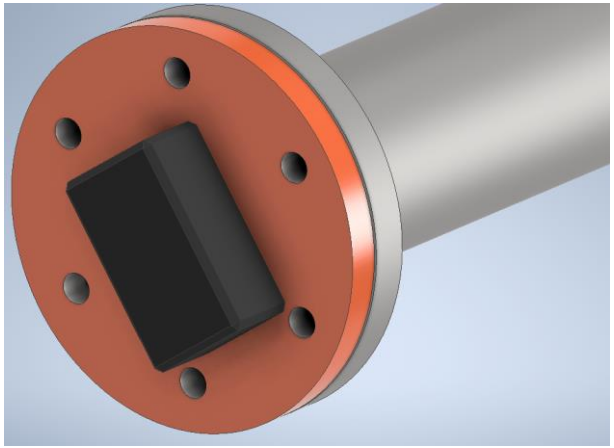
Introduction to Eleven-I Ltd

The FAITH rig

Verification and Validation

V&V preservation solutions

Other project outcomes



Project FAITH

Project FAITH is a BEIS funded collaboration of NNL, GE-Hitachi and Cammell Laird.

“Project FAITH (Fuel Assemblies Incorporating Thermal Hydraulics) is a cross sector project harnessing Cammell Lairds modular shipbuilding approach and NNL’s nuclear expertise to create a modular thermal hydraulics rig.

The rig is to be suitable to conduct groundbreaking experimental research with direct links back to industry. This project will show innovation as it will challenge the norms within the nuclear sector to create a rig which can prove the benefit of cross-industry modular approaches in time, budget and health and safety.”

From BEIS Press release. Advanced Manufacturing Materials competition: phases 2A and 2B successful projects Published 10 July 2020

Eleven-I Ltd

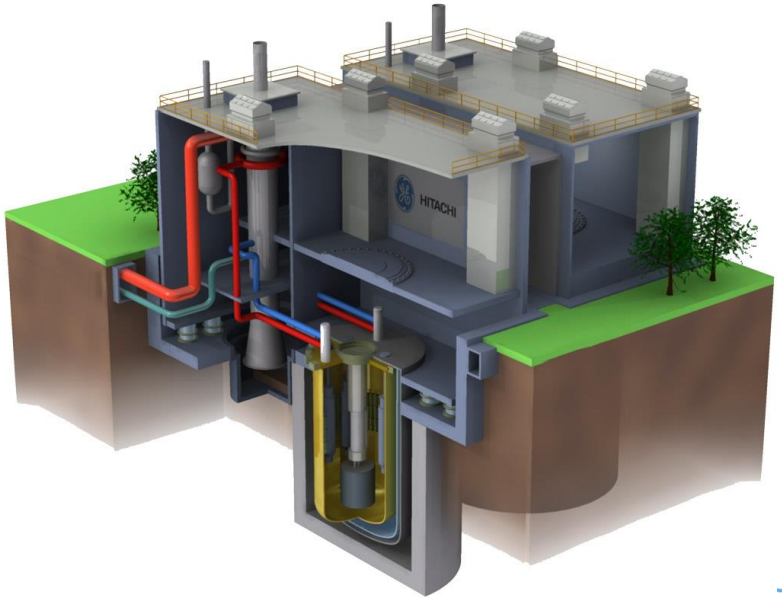
Eleven-I is an SME set up with the goal of utilising sensor technology to provide bespoke monitoring and analysis services.

We are a small team of scientist/engineers.

Our office/lab is near Glossop on the edge of the Peak District.

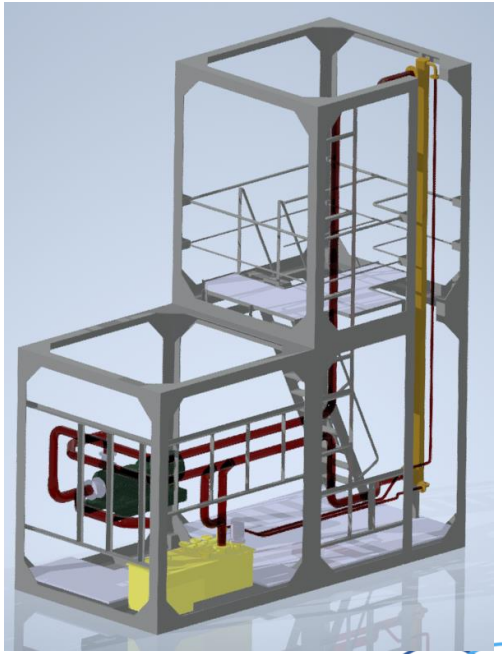
We are always up for a chat/coffee/bike ride…

How do we go from factory to facility? How can technology help?



The FAITH rig

- Test vehicle for modular assembly.
- Temperature controlled
- Three modules
- Built and assembled at CL-Birkenhead and shipped in sections up to NNL-Workington.
- Eleven-I are providing instrumentation to preserve the V&V processes.



Verification and Validation

"**Verification**. *The evaluation of whether or not a product, service, or system complies with a regulation, requirement, specification, or imposed condition. It is often an internal process.* "

"**Validation**. *The assurance that a product, service, or system meets the needs of the customer and other identified stakeholders. It often involves acceptance and suitability with external customers.*"

Can technology be used to simplify the life cycle verification and validation processes?

What invalidates V&V? Transport Time Environment Forces

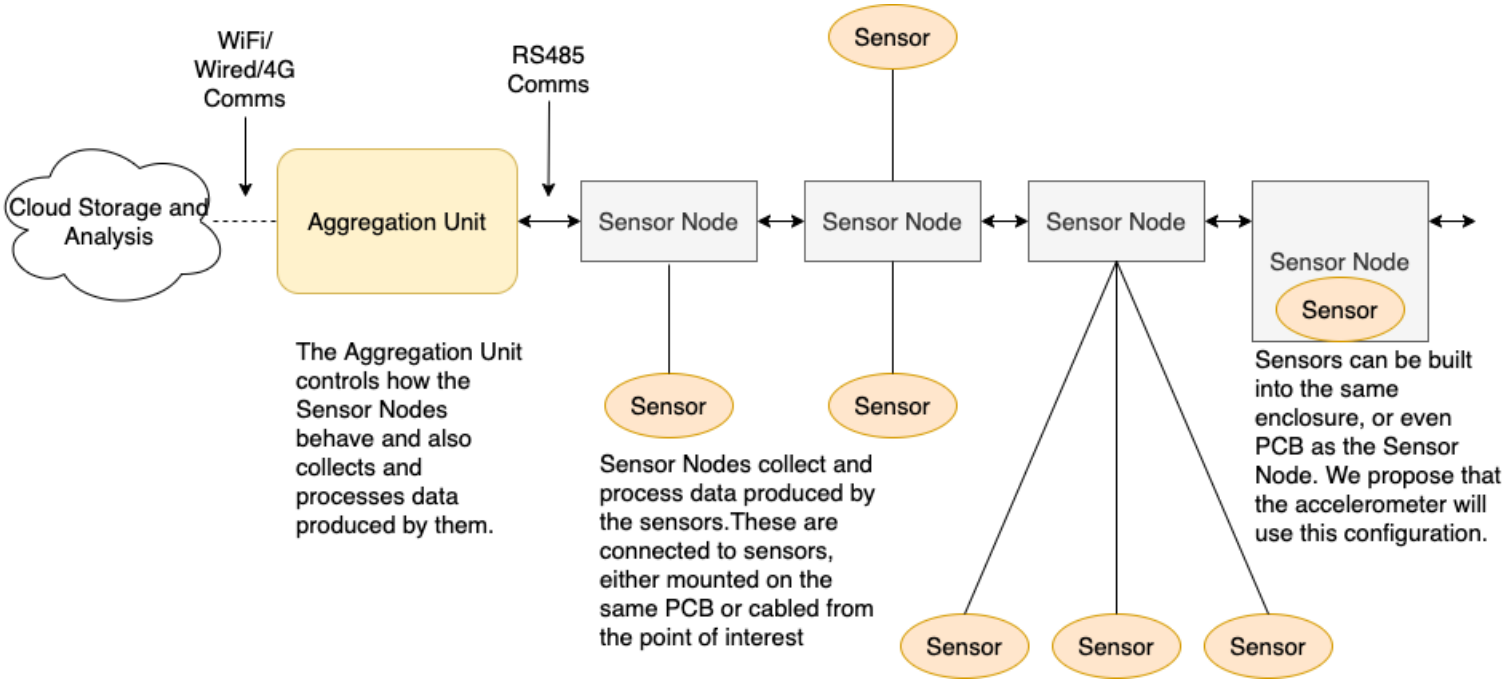
Can technology be used to preserve V&V? What are the barriers?

V&V preservation solutions

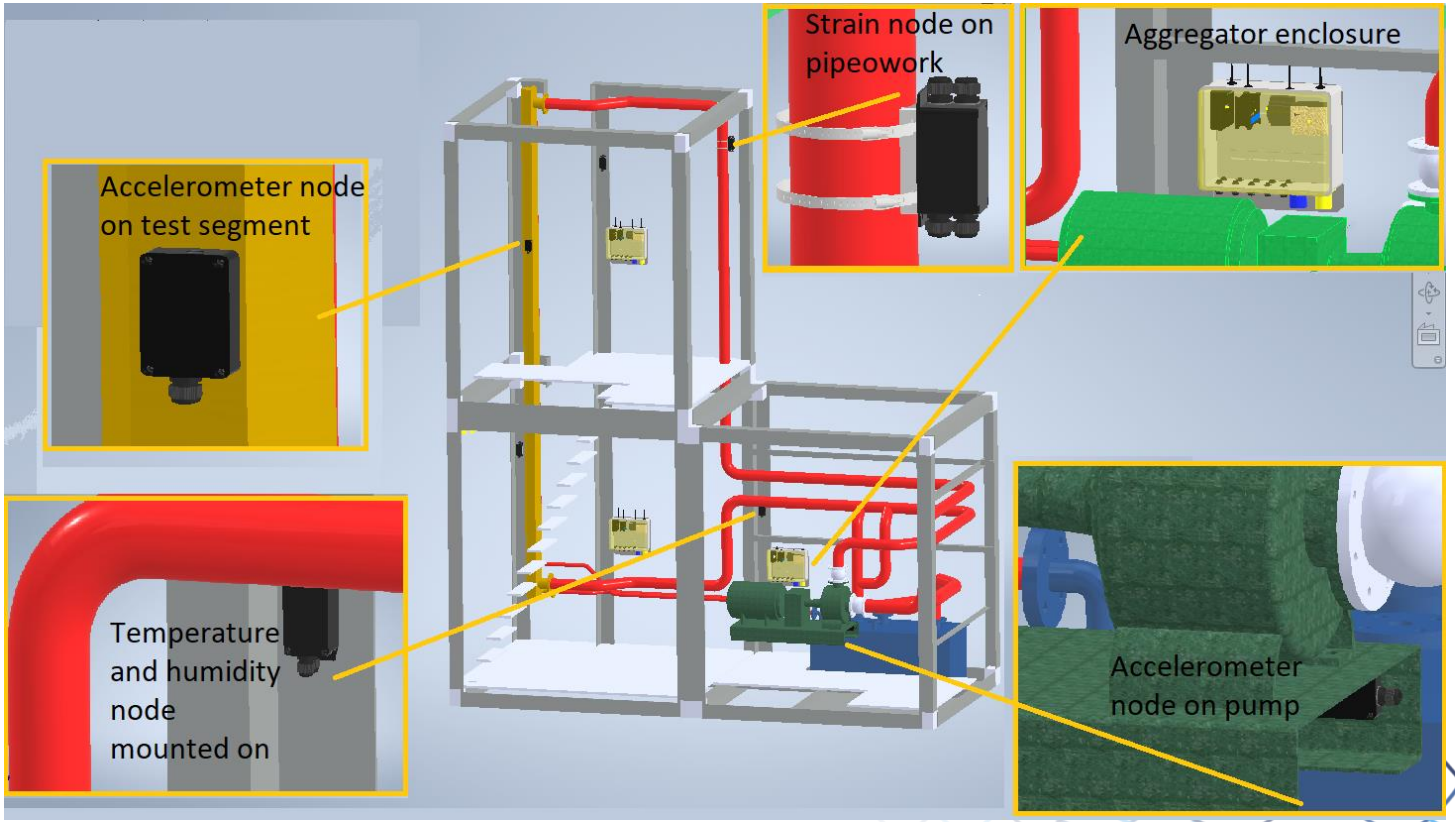
- Accelerometers- 3 axis MEMS
- FME covers that log time and date of fitting/removal
- Environmental sensors- Temperature, Humidity, Pressure
- Location-GPS
- Strain
- Simple binary inputs

All parameters are stored locally and uploaded securely to a cloud server, to form a part of Life Time Record.

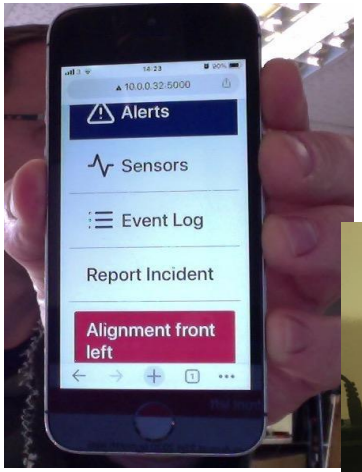
System diagram



Examples of sensor locations

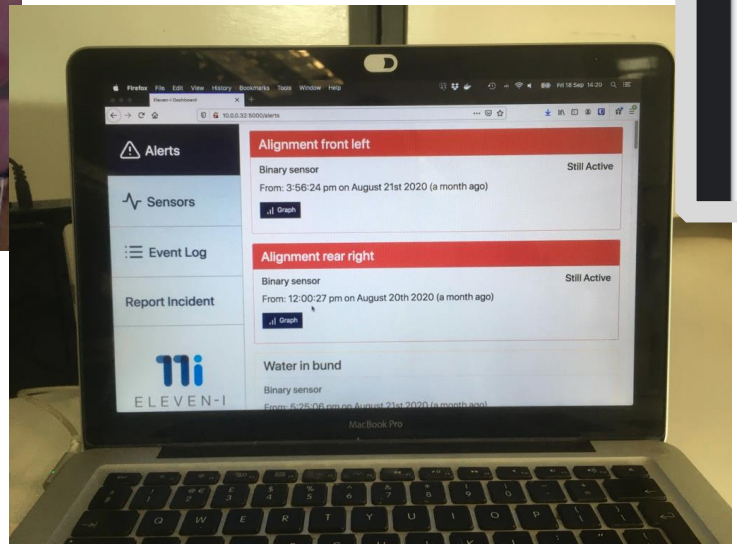


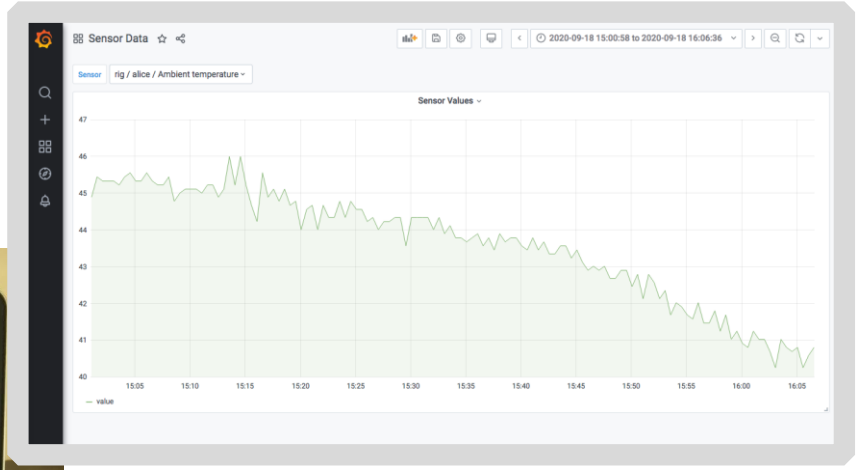
Human Machine Interface



Mobile

Desktop



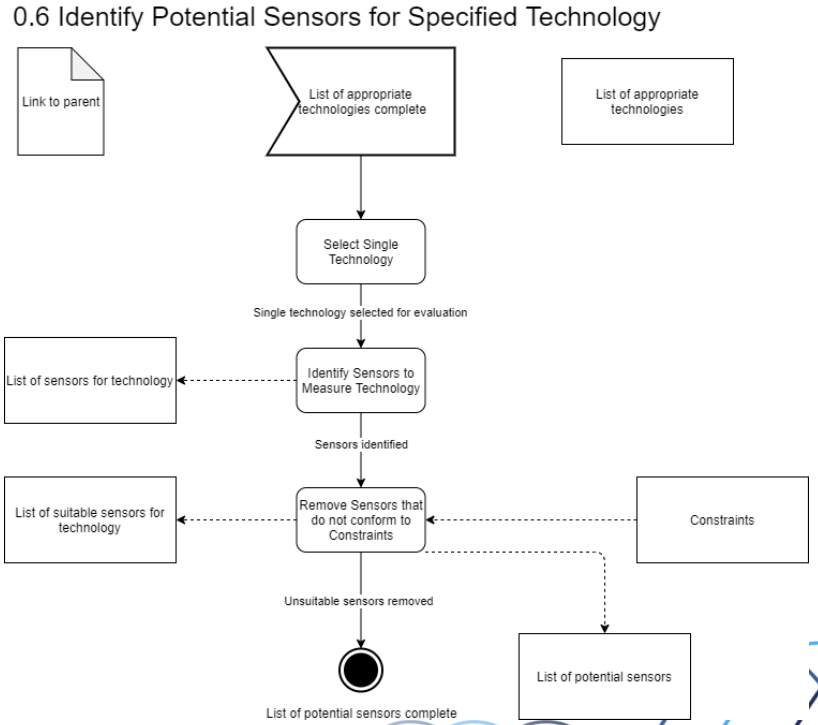


Automated data processing & presentation

Capturing of the design process

One of the project outputs is a detailed SysML diagrams of all the stages needed to design a V&V assurance system.

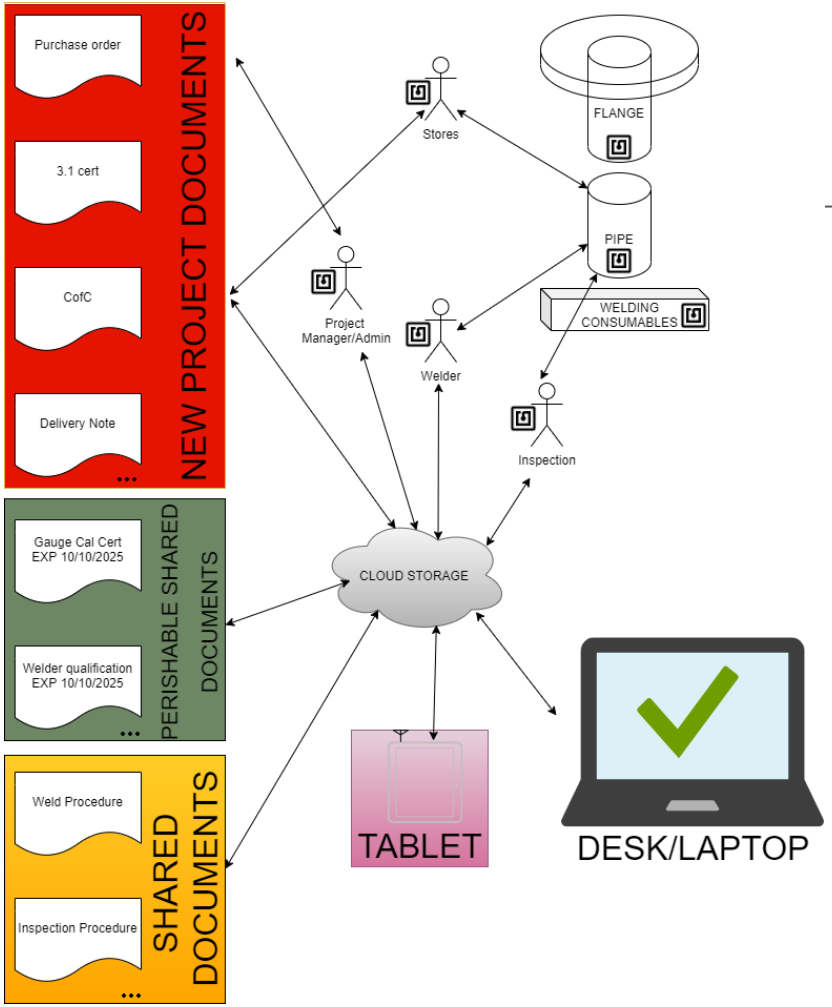
(please get in touch if this of interest)



Other outputs from the project

Augmented reality- Using AR to help guide operators through a build sequence. Make it easier to know what good looks like.	Electrical systems- can they self diagnosing any error, faults or damage
Machine Vision- to explore if machine vision can be used to capture the correct installation of parts. Capture the build including buried/hidden parts.	Thermal integrity- technological solutions to the integrity of thermal insulation systems
Traceability- using digital technology to simplify the QA process by exploring the barriers such as document security	Smart wrench- simple integration of intelligent tools into a quality assurance process.

Traceability



Implementation of a simple RFID tag system and secure document database to roll out an effective QA system based on an existing paper system.

Uses local tablets/phones to capture information as processes are performed and confirm that up to date documents such as procedures are used.

Machine Vision/Augmented reality

“READ THE MANUAL” used to be a phase shouted across the labs in the 1990’s.

The idea is to make the assembly instructions so available that the process is less likely to be done wrong. We are using the process of assembling a simple flange to demonstrate what is possible.

Machine vision can be used to capture changes and record them. Processes that are impossible to validate later can be documented automatically.

Get in touch...

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Always up for a chat.

Follow us on linkedin.