Science & Technology Facilities Council — ISIS

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Experiment Risk Assessment System

When there is exciting science to be done, the last thing scientists want to do is health and safety 'paperwork'.

Before

How did ISIS previously assess the safety of samples used in experiments?

Not scalable for TS-2

- Standard assessments depended just on sample safety's familiarity with material (some COSHH forms)
- Additional separate hand crafted document was generated on a case-by-case basis for high hazard experiments.
- Limited 'reusable' instructions for sample handling
- One member of ISIS sample safety staff completed a 'Sample Record Sheet' (SRA) for each sample in an experiment.
- Very time consuming (~400 SRAs a year)
- With TS-2 instruments coming online this would increase significantly (to ~700 in just a few years)
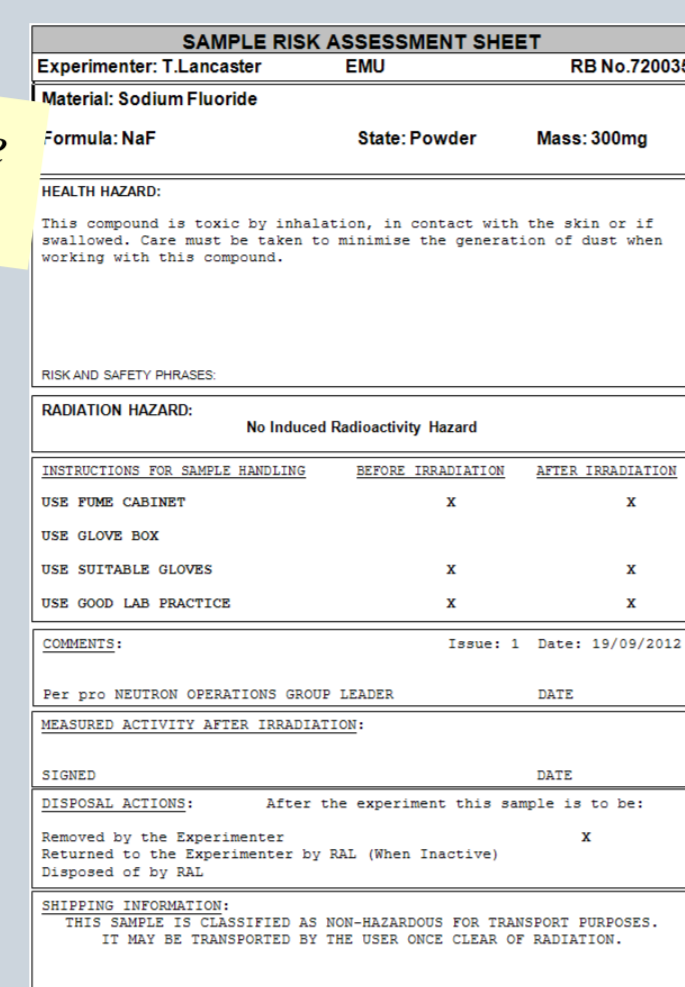
SRA typed in MS Word, printed out and posted to local contacts.

Solution

Step 1 : Make assessments available on our intranet (SharePoint) for local contacts to print themselves.
Step 2 : Replace COSHH and SRAs with a single online system for the user, instrument scientists and sample safety to collaborate on a risk assessment that covered the whole experiment.
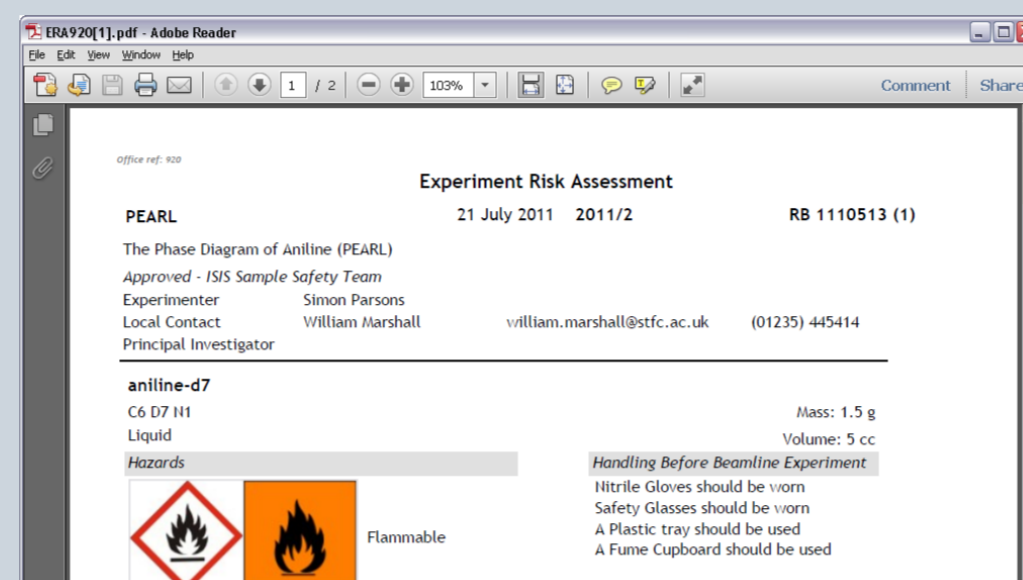
What was the first step moving from a paper based system to an online system?

What was the idea behind introducing Experiment Risk Assessments?

Initially we had resistance from some staff who thought it wasn't part of their job to print them or help complete them.

The introduction of an online collaborative Experiment Risk Assessment was a big change for both ISIS users and staff. How did you introduce the change?

Staged rollout, training, communications plan and bucket loads of technical and scientific support (for users & staff)!

ERA PDF generated automatically and 'point-in-time' copy stored in SharePoint.

Management were fully engaged and gave developers full support which was needed and appreciated!

The system

The new system is now fully web-based and can be accessed via a HTTPS connection. The ERA system architecture supports a front end ASP.Net web application that talks to a SQL Server back-end using Microsoft's Entity Framework. It also uses Telerik Reporting for subsequent PDF generation.

Extra step for sample safety staff.

One ERA can handle many different samples per experiment

Based on the state and selected properties of a sample appropriate instructions for sample handling are automatically generated using a matrix of rules.

Lots of tips built directly into the system to help users and staff complete the form.

Access / available actions based on permissions.

Can handle large numbers of samples that have the same hazards (e.g. samples in a series / different concentrations)

JavaScript used to show/hide questions based on previous answers.

Questions to encourage active participation.

Point-in-time copies and archive of old SRAs on SharePoint for ISIS staff.

Delivered benefits

Flexible – works for an enormous diversity of samples

From hydrogen fuel cells, train wheels, bits of aircraft wing, a grain of sugar, sewage samples, electronic chips, detergents to rotor blades from jet engines, ISIS staff use the ERA system to assess the safety and prepare for a range of experiments across all instruments with an array of samples. Below are just some examples of previous sample types.
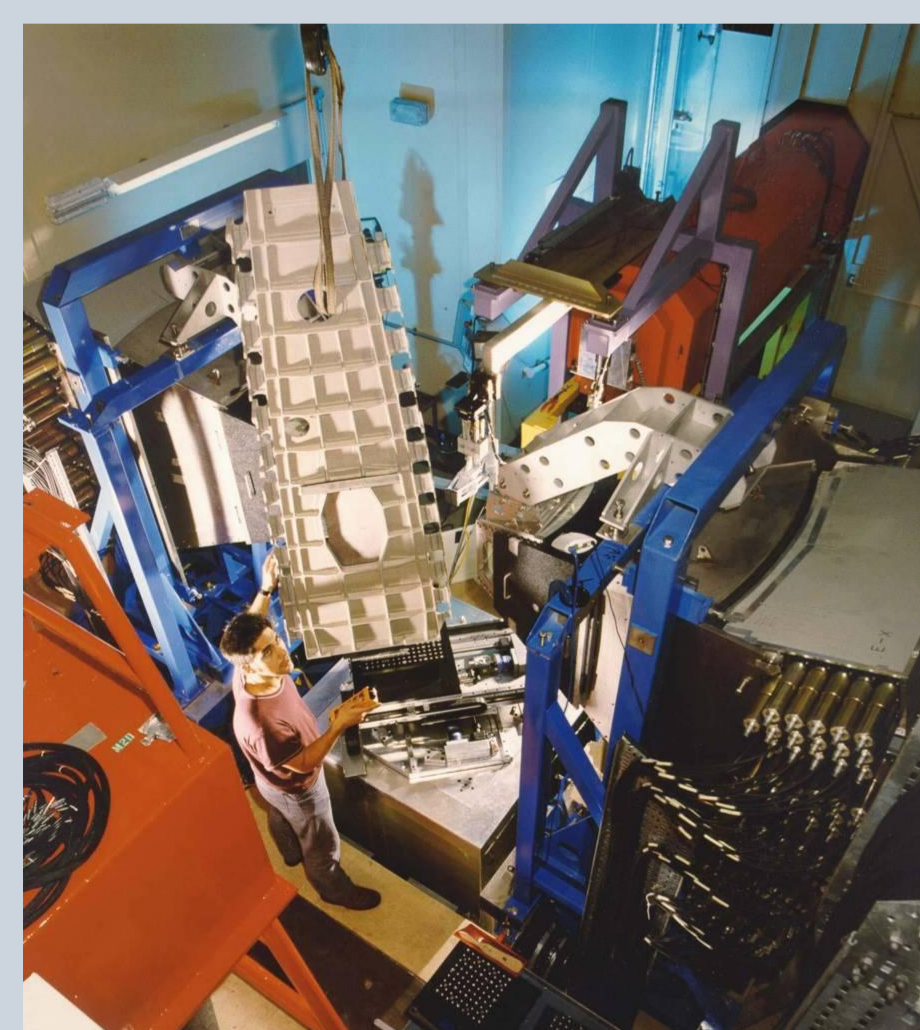
The ENGIN-X instrument: measuring residual stress within friction stir welds on an Airbus prototype wing rib

Rachel Evans (Trinity College, Dublin) preparing samples to study the controlled assembly of cationic polythiophene–surfactant complexes on Loq.
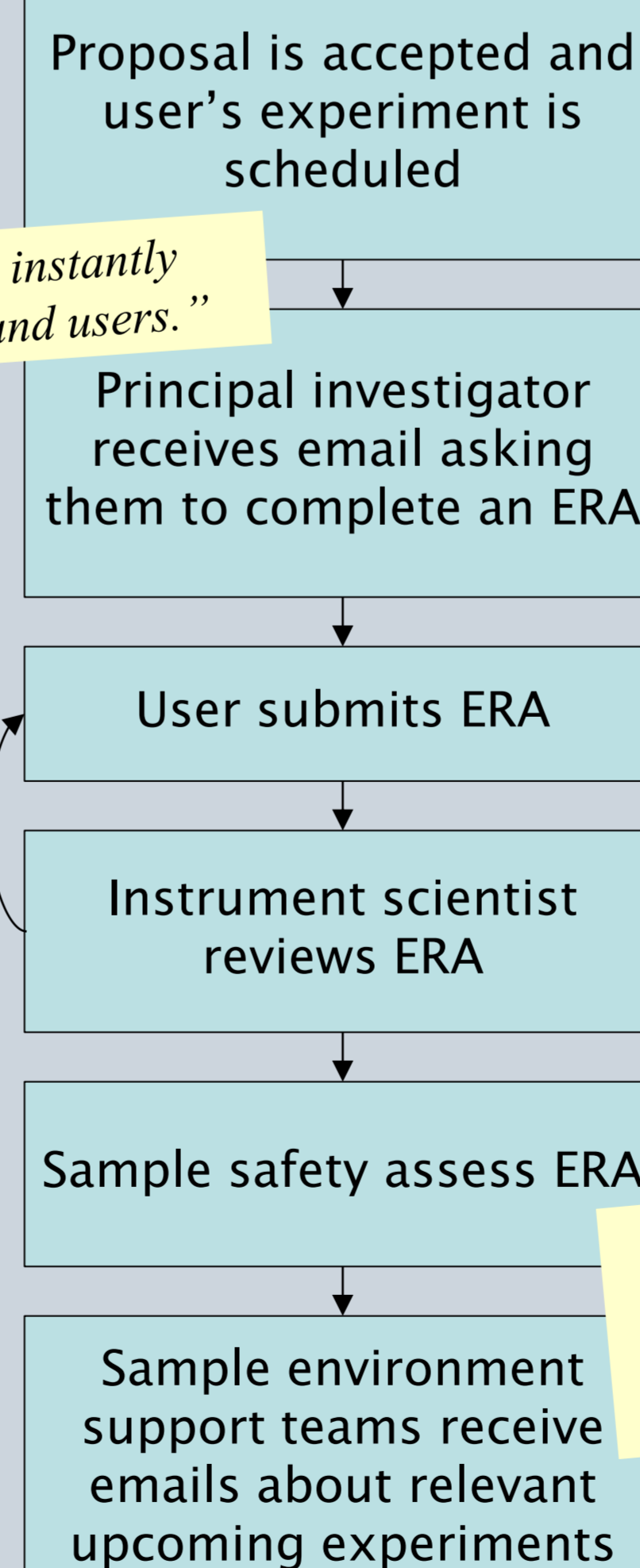
Using ISIS, Chris Marrows from Leeds University and his colleagues have been studying the behaviour of magnetic films. By understanding the exact nature of these thin magnetic layers manufacturers are able to cram more data into ever-smaller spaces.

Professor Stephen Bennington, Chief Scientific Officer for Cella Energy, a spin-out company from the ISIS neutron source.

Consistent – provides a framework for reviewing the safety of both simple and complex experiments

Mix of multiple choice and ability to upload detailed method statements and MSDS (Material Safety Data Sheets) documents means the same system can be used for all experiments.

"When it was first rolled out we had a comment from one member of staff saying 'over my dead body'. A few months, after it had bedded in, the same person said that actually the ERA system 'works really well – it's really easy'!"

Proposal is accepted and user's experiment is scheduled

"Sets up a dialog instantly between our staff and users."

Principal investigator receives email asking them to complete an ERA

The ERA is pre-populated with information e.g. samples from the proposal system. This saves the user a huge amount of work.

User submits ERA

Instrument scientist reviews ERA

Sample safety assess ERA

Sample environment support teams receive emails about relevant upcoming experiments

"Staff are made aware of high hazard and/or heavy samples sooner than previously so they can be better prepared for when the user arrives."

Proportionate – quick to process the 'routine' experiments giving more time to deal with the bespoke/high hazard experiments.

Just a couple of minutes to assess a relatively simple experiment. Only shown relevant questions so removes unnecessary reading.

Early warning – helps staff spot potential issues early

By involving more experts there is a greater chance of identifying hazards. The users know their sample. The instrument scientists know their instrument. The sample safety know about transport of dangerous goods, induced activity. The sample environment team know their kit. Greater chance of someone spotting a need for precautions. The automated email reminders to users to submit in advance also gives all staff a larger window to prepare for the experiment.

"We've reached a sufficient level of engagement with Instrument Scientists and Users on the ERA, that the 'Not Approved' action is no longer required."

What benefits have you seen since the introduction of the ERA system?

Unexpected benefit was the ability for the sample environment teams to look at all ERAs and discover more information about equipment user was expecting. Although the ERA is not a booking tool, it has undoubtedly aided communication between staff and with users.

Looking ahead what are your plans for the ERA system in the future?

Helpful – provides advice on transporting of dangerous goods to RAL

The sample safety team look up the UN number (a unique identifier for the hazardous substance) and classification and enter this into the ERA when it is assessed. This highlights to the user that the sample may need to be transported in a certain way to RAL. This also helps the RAL staff when preparing the sample for its journey off site.

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