SPADE

Graduate Project Overview

Harry Sullivan
ISIS Design Division
2nd Dec 2022
Sustainable Accelerators Workshop

UKRI Science and Technology Facilities Council

Sustainable Principles and Advice for Design & Engineering

What is SPADE?

- Aim of the project is to compile a set of **sustainable design guidelines**, to help engineers make environmentally **sustainable choices** on projects.
- Largely focussed on ISIS and the supporting infrastructure at ISIS – with a view to expand into broader areas in future.
- Overall objective is to inform designers and give them the tools to implement best sustainable practices, **reducing carbon footprint and waste** on projects.

Meet the team

Sarah Hanrahan
Data Analyst
SPC

Harry Sullivan
Mechanical Design
ISIS

Callum McDonnell
Mechanical Design
ISIS

Natalia G Cadiente
Mechatronics Design
ISIS

James Cox
Electrical Design
ISIS

Oliver Poynton
Vacuum Engineer
ASTeC

Ayo Akintola
Cryogenics Engineer
ASTeC

Project Sponsors

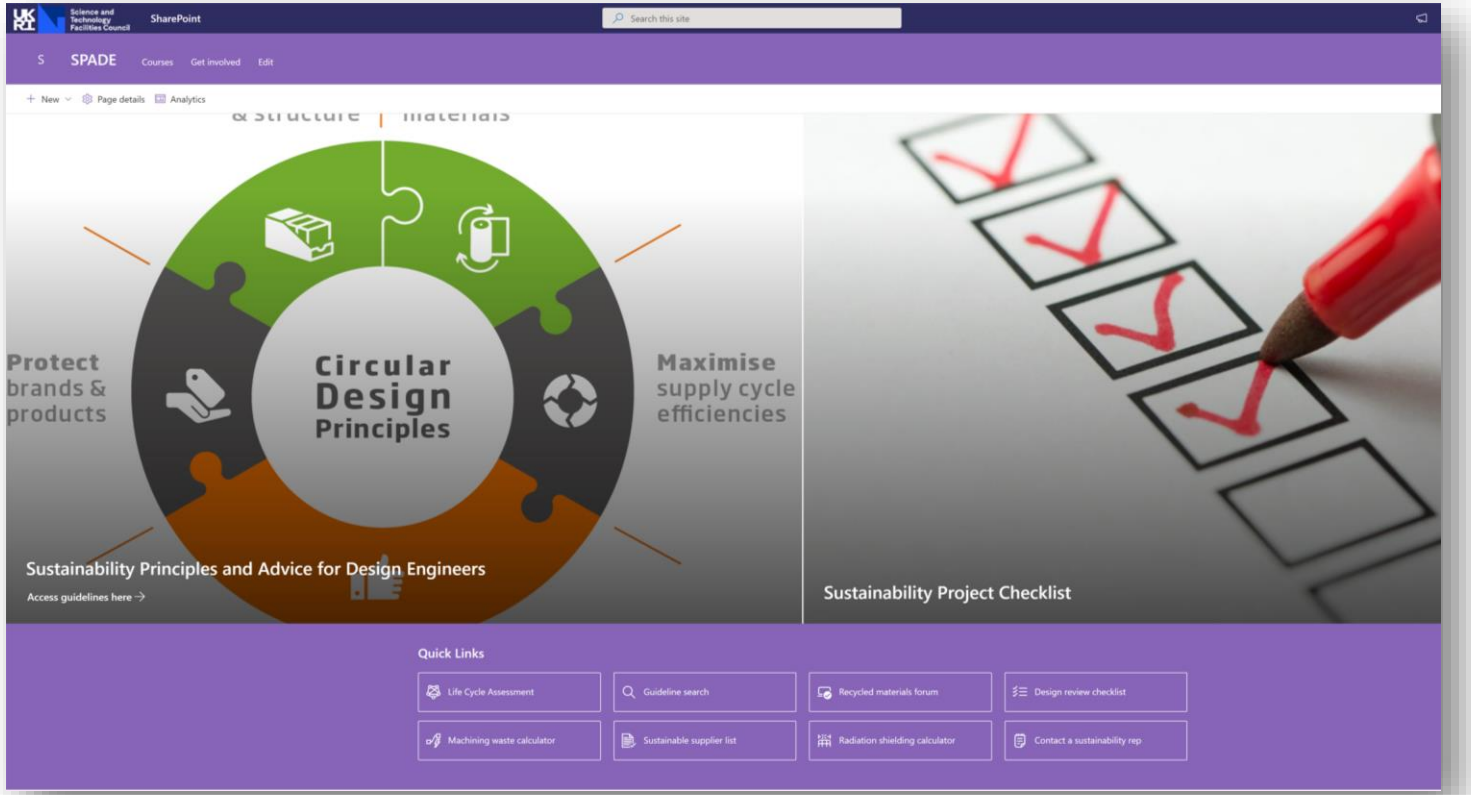
Ben Shepherd
MaRS Group Leader
SA Lead

Ben Withers
Mechatronics Design
IDD Sustainability

Project plan

SharePoint site

- Front page provides overview of the site and general summarised sustainable principles
- Navigation to specific guidelines, sustainability checklist and quick links to sources inside the site and external – *such as the ISIS sustainability hub*

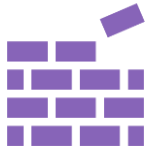


Project Checklist

- Quick access checklist for engineers to run through on projects to verify they have broadly considered sustainable options

Future planning

- For site to stay relevant it will require input beyond our current March end date
- Currently exploring option for this to be taken on by the ADP
- Alternatively will look to set this as a continuous improvement graduate project for the next cohorts



Materials

Electrical systems

Manufacturing

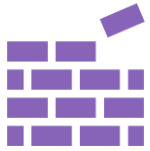
Vacuum

Shielding

Cryogenics

Quick Links

- Life Cycle Assessment
- Guideline search
- Recycled materials forum
- Design review checklist
- Machining waste calculator
- Sustainable supplier list
- Radiation shielding calculator
- Contact a sustainability rep



Materials

- LCA software testing
- LCA case studies for range of applications
- Software comparison table
- Recycling materials tips

Manufacturing

- Best practices for design for manufacture
- On site waste management study
- Encourage communication between designers and workshop
- Sharing excess material between workshops/sites

Quick Links

Life Cycle Assessment | Guideline search | Recycled materials forum | Design review checklist

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Shielding

- Overview of shielding design process at ISIS
- Comparison of shielding materials & techniques
- Design tips and case studies for improving sustainability
  - Modular shielding
  - Designing for end of life
  - Standard shielding on long instructions
- Emerging technology

Electrical systems

- Sustainable suppliers
- Standardising parts
- General design guidance
  - Appropriate ratings & efficient design
  - Panel cooling
  - Grouping component orders
  - Designing Standby/Off option into systems

Quick Links

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Vacuum

- Design guidelines covering:
  - Sustainable materials
  - Vacuum pumps
  - Vacuum science
  - Energy saving
- Basic calculators covering:
  - Pumping speed and time
  - Energy Usage
  - Outgassing estimates

Cryogenics

- Guidance on sustainable operation
- Minimising heat leak
- Reducing required cooling power
- Calculator for key parameters:
  - Conductive heat load
  - Radiative heat load
  - Liquid to gas conversion

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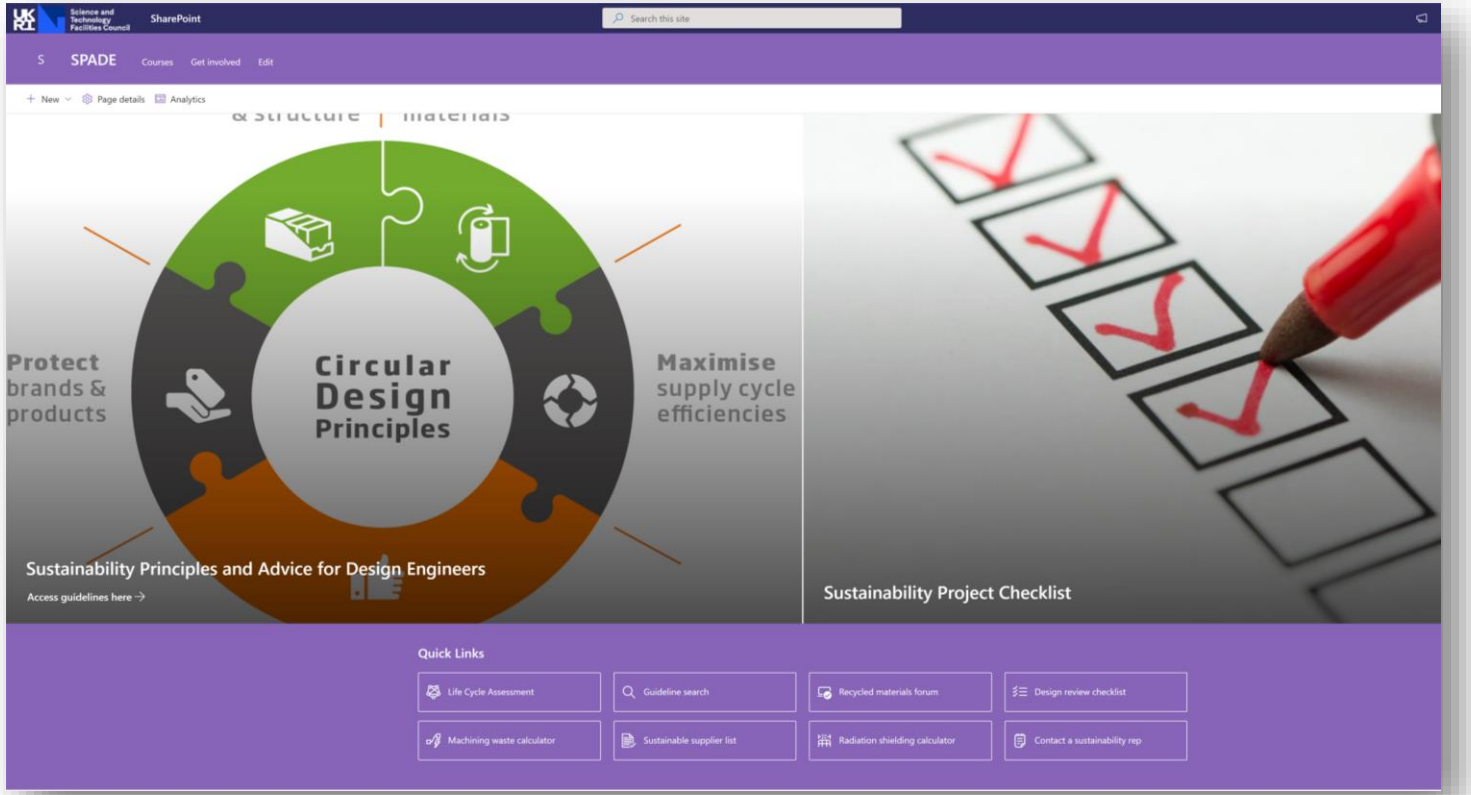

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Progress Summary

- Scoping out phase started – dialogues opened with different areas (Workshops, Operations, Neutronics, Procurement, Design)
- Conducting independent research into topic areas
- £10,000 funding secured from ESCF to deliver the project
- Software licenses for Ansys Eco-audit secured for January
- Logo and branding underway with the graphic design team

Get Involved!

We want to hear from you:

- Any expertise or knowledge on sustainable design in engineering
- Feedback on guideline topics or additional ideas
- Case studies of implemented sustainable practices
- Ongoing and previous research into sustainable design principles
- Interested in contributing to the site and sharing your work!

Science and Technology Facilities Council

ISIS Neutron and Muon Source

Contact us at:

SPADE@stfc.ac.uk

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Questions?