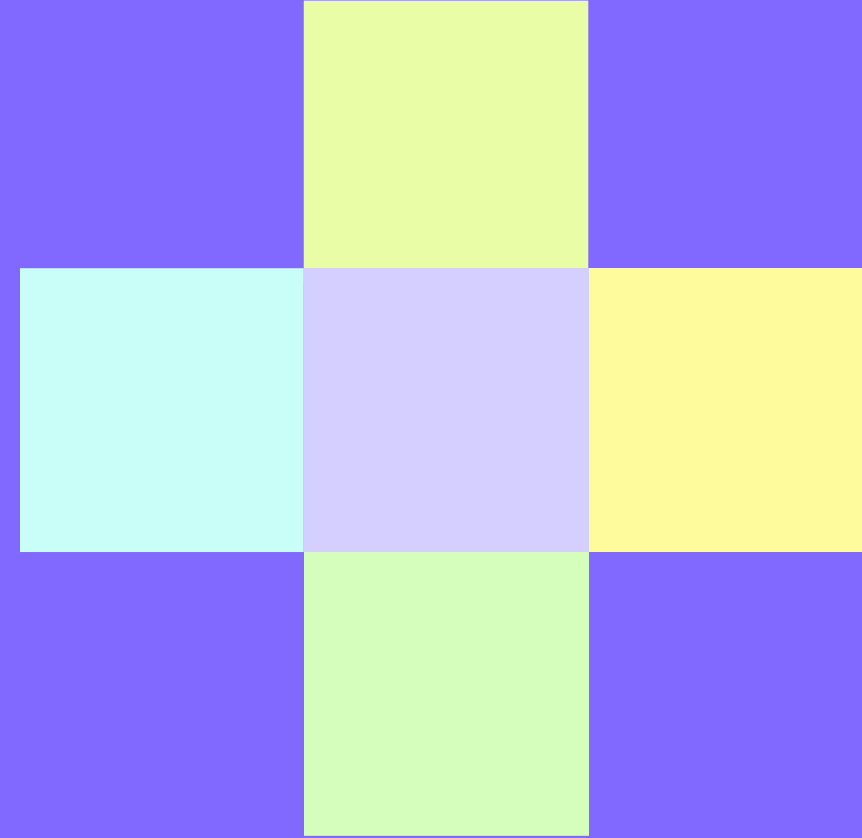


Digital Twin Consortium

Digital Engineering

*Looking at the true state of
digital twin maturity*

Dr David McKee



Initial focus areas

1. Maturity Assessment Framework
2. Digital Threads
3. Lifecycle of Digital Twins

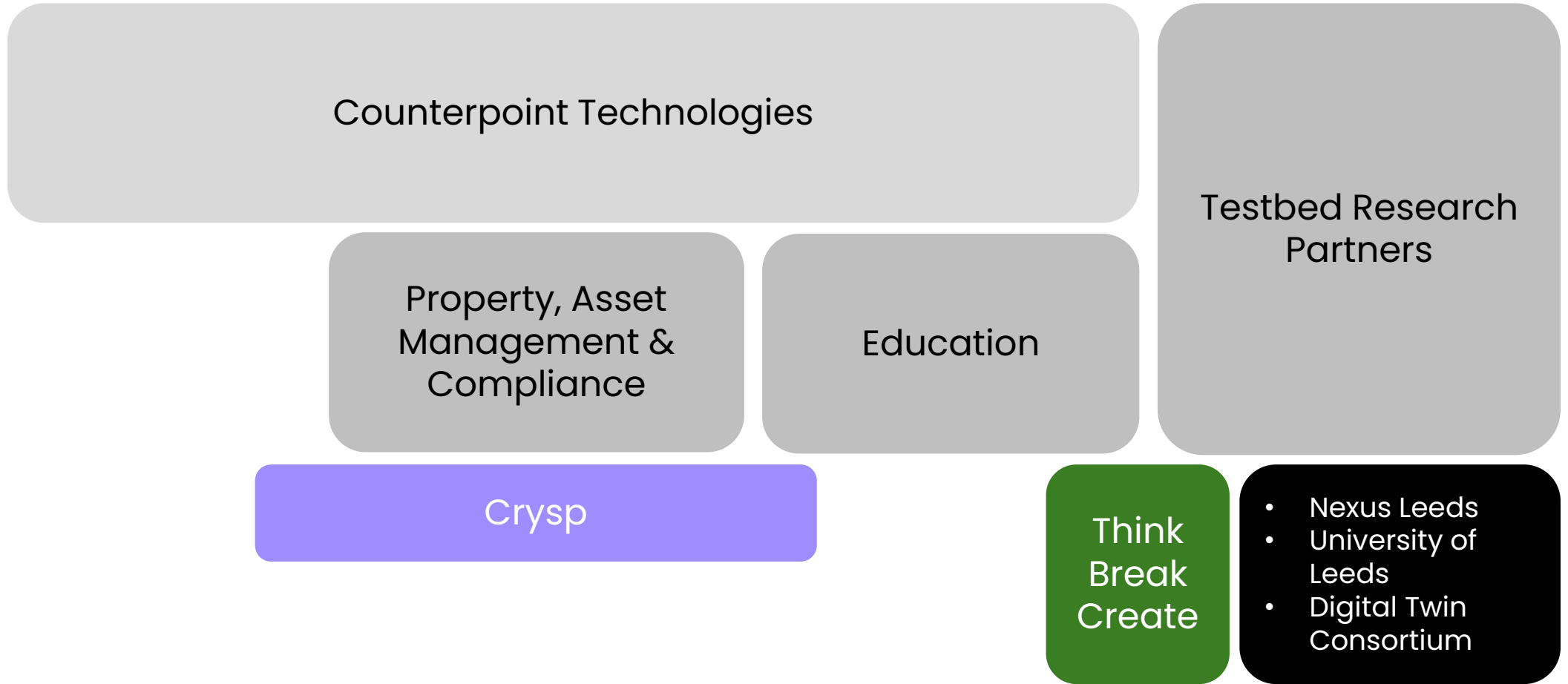
01 Who we are



Counterpoint Technologies

Helping founders thrive [*without the funding treadmill*]

01 Who we are



Counterpoint Technologies

Property, Asset Management & Compliance

Education

Testbed Research Partners

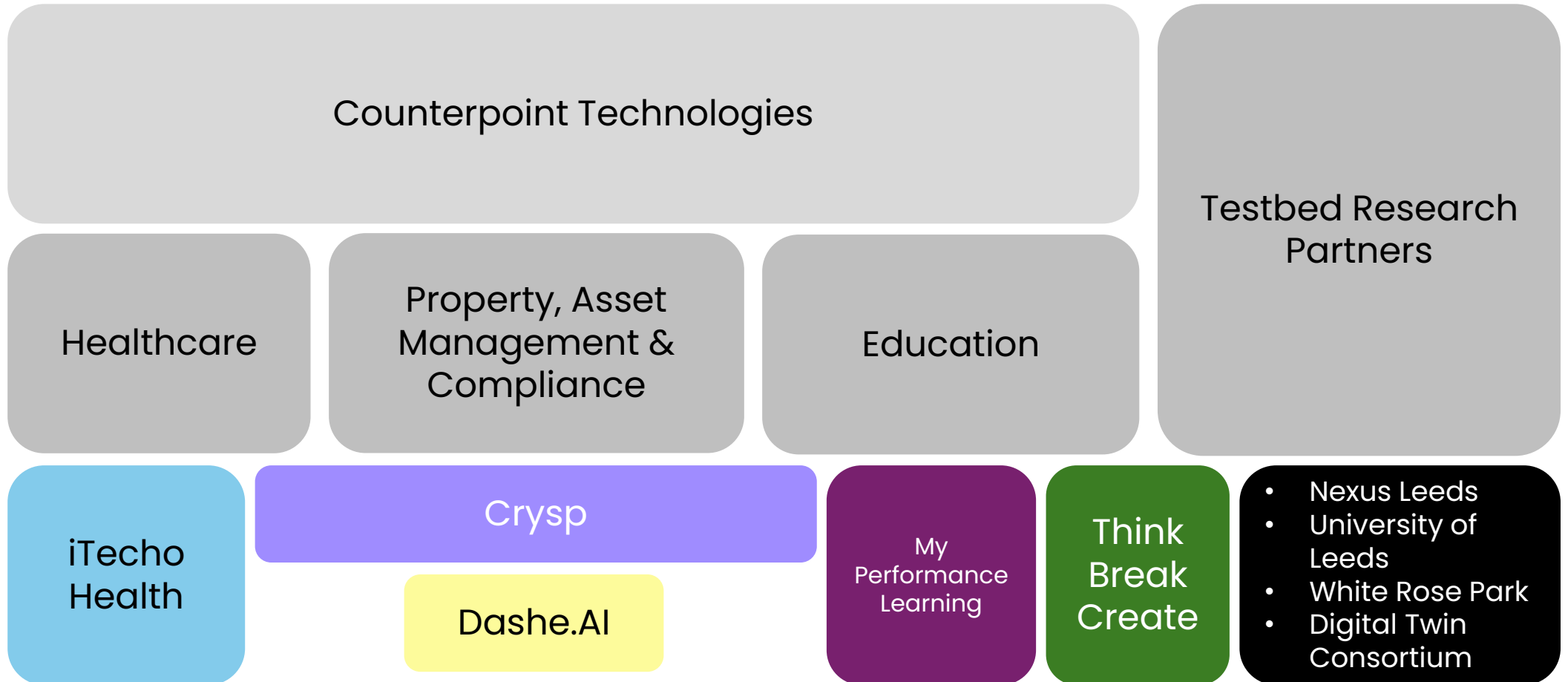
Crisp

Think Break Create

- Nexus Leeds
- University of Leeds
- Digital Twin Consortium

Spin-out from MIT REAP programme

01 Who we are



*Spin-out from
MIT REAP
programme*

01 Who we are



Counterpoint Technologies

Healthcare

Property, Asset, ESG
Management &
Compliance

Education

Testbed
Research
Partners

iTechoHealth

Crysp

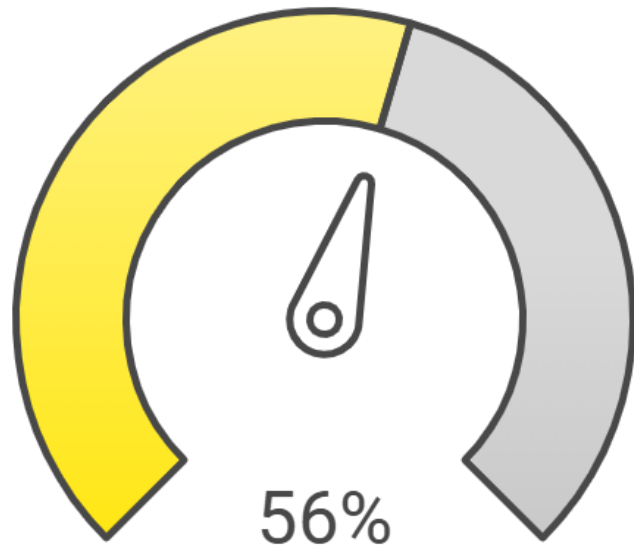
Dashe

My
Performance
Learning

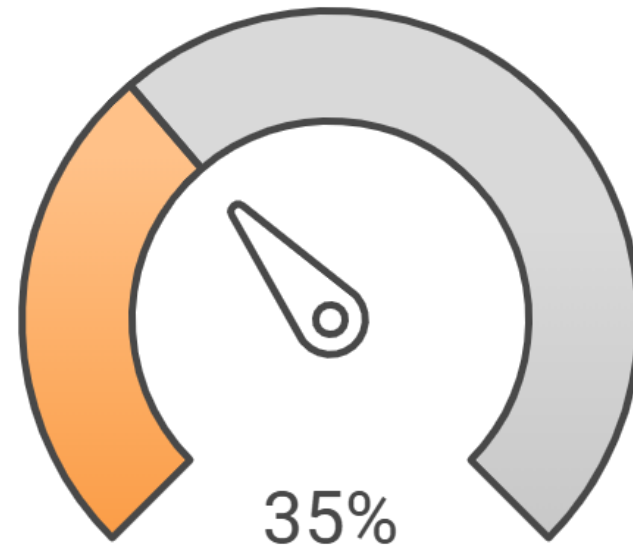
Think
Break
Create

Nexus Leeds
University of Leeds
White Rose Park
Digital Twin
Consortium

02 Maturity assessment



EU Citizens with Digital Skills



Organizations with Successful Initiatives

03 Digital twin definition

A digital twin is an integrated data-driven virtual representation of real-world entities and processes, with synchronized interaction at a specified frequency and fidelity.

04 Digital twin definition

A digital twin is an integrated data-driven virtual representation of real-world entities and processes, with synchronized interaction at a specified frequency and fidelity.

- Digital Twins are motivated by outcomes, driven by use cases, powered by integration, built on data, enhanced by physics and scientific principles, guided by domain knowledge, and implemented in dependable and trustworthy systems including IT/OT/ET and business processes.
- Digital Twin Systems transform business by accelerating and automating holistic understanding, continuous improvement, decision-making, and interventions through effective action.
- Digital Twin Systems are built on integration and synchronization, use real-time and historical data to represent the past and present, and simulate predicted futures.
- Digital Twin Prototypes use data to model and simulate predicted futures before being integrated and synchronized with the real-world entity or process.

05 Digital thread definition

A digital thread is a bidirectional, dependable and trustworthy interconnected information system that links multiple dimensions, including structure, behavior, space, time, and lifecycle stages.

06 Digital thread definition

A digital thread is a bidirectional, dependable and trustworthy interconnected information system that links multiple dimensions, including structure, behavior, space, time, and lifecycle stages.

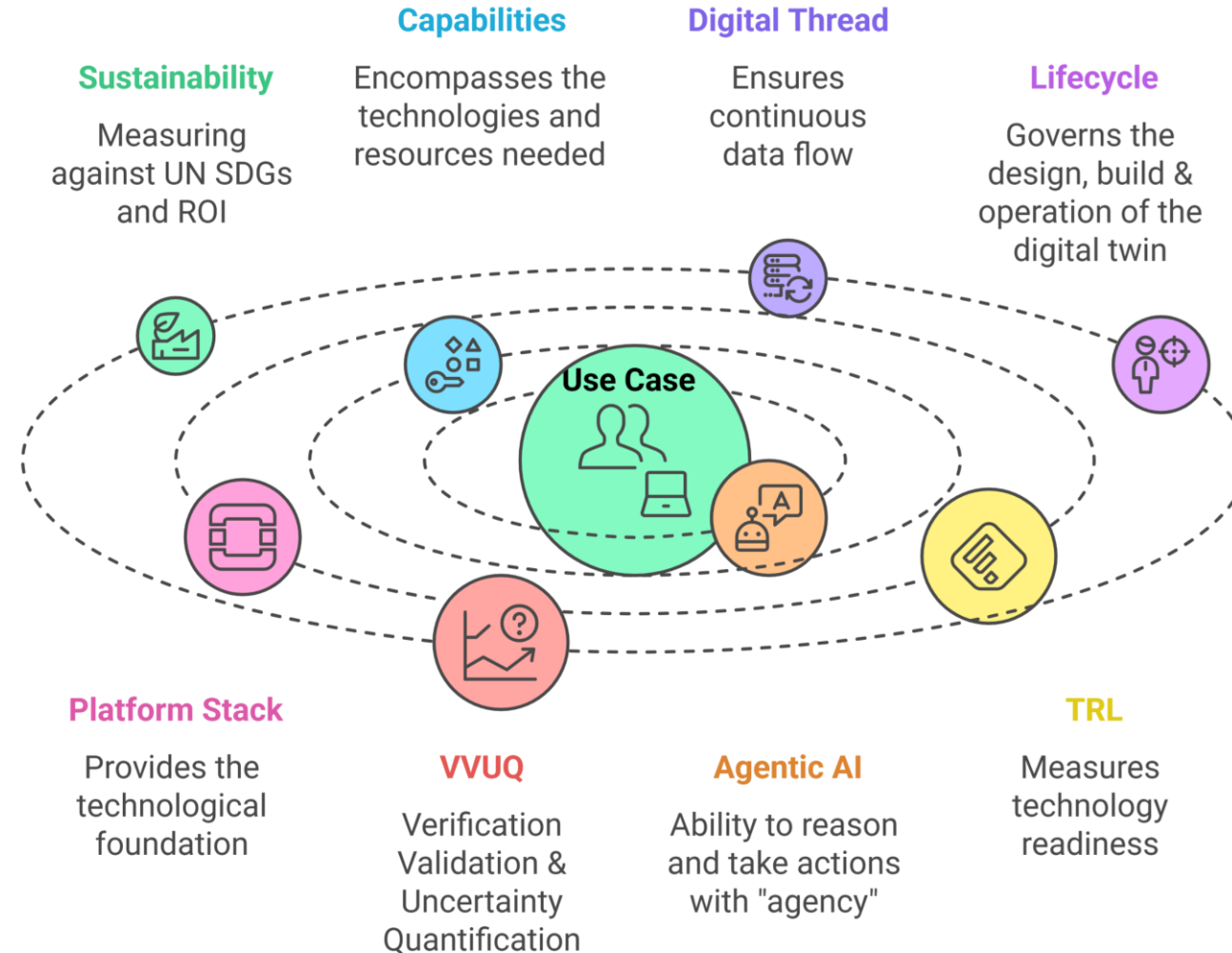
- It facilitates secure and resilient data and model management and governance, ensuring trustworthiness in data exchange and interoperability.
- By integrating different types of data and providing ontologies, the digital thread fosters a seamless flow of information throughout the lifecycles of a digital twin.
- Through its reciprocal interaction, the digital thread enhances visibility and transparency, enabling organizations to make informed decisions and optimize operations.
- Digital twin systems may comprise of multiple digital threads working together to ensure comprehensive linkage across isolated data, repositories, and systems, enabling safe and secure closed-loop communication across products, people, processes, and place.

07 Sustainable digital twin

A Sustainable Digital Twin [system] is enduring and trustworthy, ensuring and adapting for *long-term value* through *compliance, assurance, and governance*, with timely return on investment (ROI), and is measured against UN Sustainable Development Goals (SDGs).



08 Expanded to 8 dimensions



09 Expanded to 8 dimensions

Lifecycle	TRL	DT System Maturity	DT Qualifiers	Digital Thread	Capabilities	Decision Intelligence	Platform Stack	Sustainable DT Attributes
Research & Planning	Actual system proven in operational environment	Modelling & Simulation	Structured Data	Bidirectional	Data Ingestion	Dashboards	Applications	Built to last
PoC Development	System complete, integrated and qualified	Digital Twin Prototype	Data-Driven	Dependable & trustworthy	Data Storage	Business Intelligence	Application Services	Demonstrate ROI
System Development	System prototype demonstrated in operational environment	Digital Twin System	Virtual Representation	Interconnected/integration	Data Management (& Structures)	Position Monitoring	Integration Services Interfaces	Integrity
Operations & Maintenance	System prototype demonstrated in relevant environment		Real-World Entities &/or Processes	Secure & resilient data & model management	Data Processing	AI Augmented Information	Integration Representaiton / Functions	Reliability
	Component validated in relevant environment		Initialized	Seamless information flow	System Integration & Interoperability	Prescriptive Recommendations & FRS	Computational Representation	Compliance
	Component validated in lab		Synchronized	Visibility and transparency of data and processes	APIs	Closed-loop feedback & learning	Stored Representation	Inclusive design
	Experimental proof of concept		Integrated	Linkage across data, repositories, and systems	Modelling & Simulation	Business process automation	Modelling Language	IT Infrastructure (Environmental)
	Technology concept		Interventions	Integration of multiple digital threads	Prediction & Forecasting	Distributed intelligence system	Service Interfaces	Assurance
	Basic principles observed		User Applications		Prescriptive	Multi-agent generative systems	Real-World Synchronisation Mechanisms	SDGs
					Analytics & Insights		Data Interoperability	Environmental Impact
					Machine Learning		"External" data sources	Social Impact
					Automation & Control		Real World	Economic Impact
					Governance		Software Platform / Tooling	
					Visualization		Platform APIs	
					3D Visualization		Orchestration / Middleware	
					Workflows		Compute	
					Monitoring		Networking	
					Governance		Data Storage	

10 Digital twin living lab



Engaged DTC members:

- Nexus Leeds
- Ingenuity (White Rose Park Innovation)
- University of Leeds
- Ingenuity
- XMPro
- Crisp
- Counterpoint Technologies



10 Nexus Leeds



- University of Leeds innovation centre
- 80+ companies' resident as tenants
- Extensive conference facilities
- Building opened in 2019
- First of 100+ testbed campus buildings

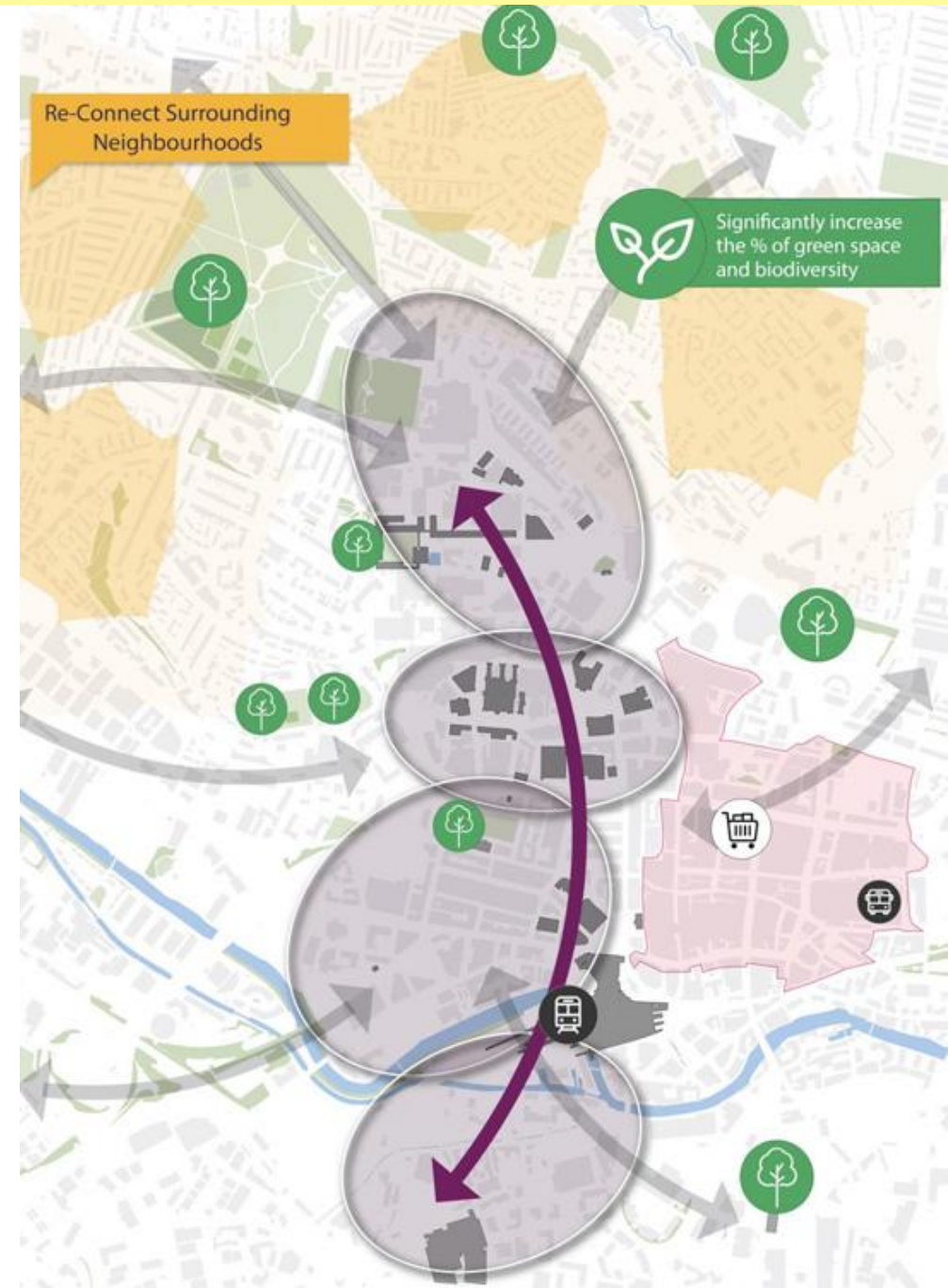
11 White Rose Park

- Business park with over 5,000 people
- High school
- Train station
- Data-center on-site
- Next door to and partnered with White Rose Shopping centre



12 Leeds Innovation Arc

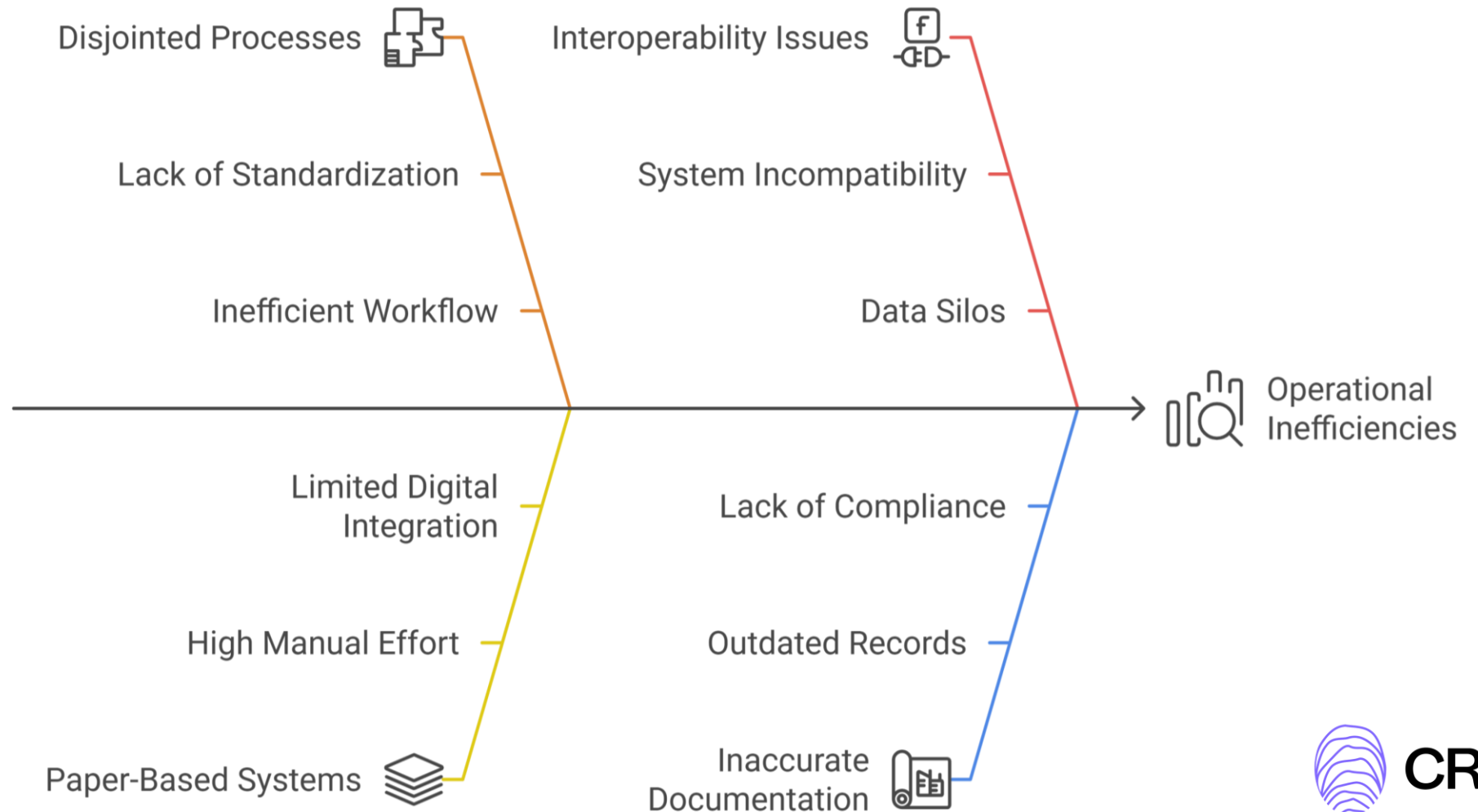
- Spans from University of Leeds & Nexus to White Rose Park
- 150 hectares
- 30,815 businesses
- As well as:
 - Leeds Teaching Hospitals
 - Leeds Beckett University
 - British Library North
 - Leeds Train Station



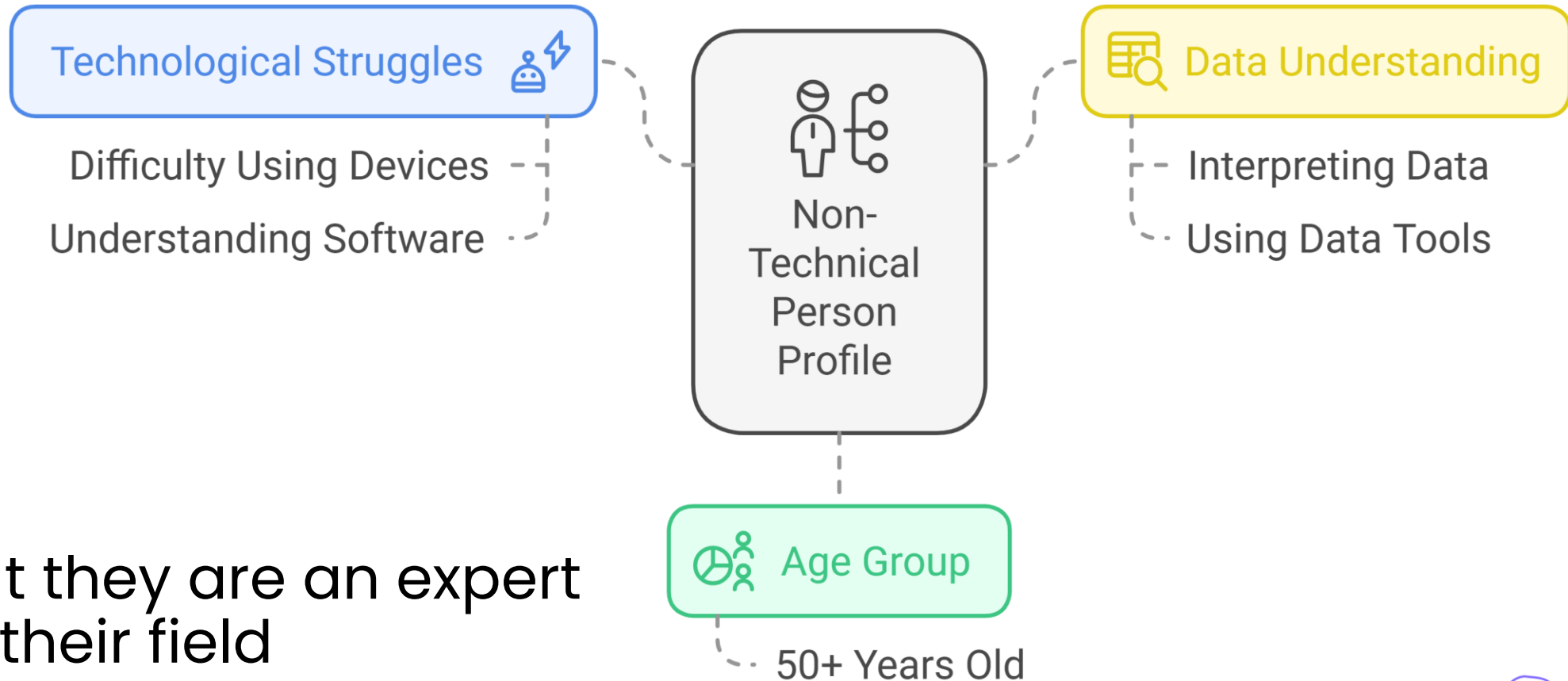
13 Their vision

- Provide a sandbox for technology companies, researchers & 100k high school students to prototype devices and solutions on premise
- Become genuinely environmentally sustainable and smart campuses

14 The reality

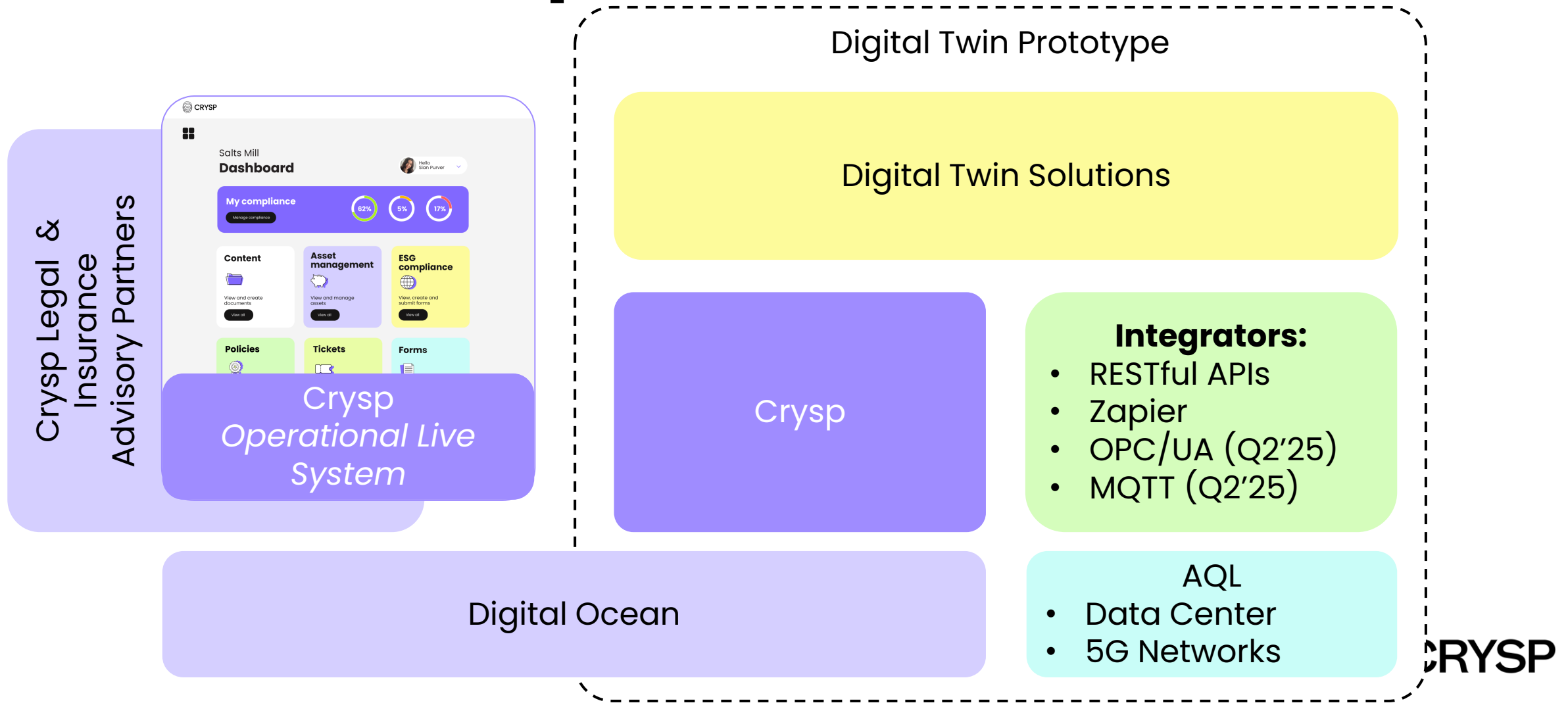


15 The non-technical persona



But they are an expert in their field

16 Testbed setup





Salts Mill Dashboard

Hello Sian Purver

My compliance

Manage compliance

62% 5% 17%

Content

View and create documents

View all

Asset management

View and manage assets

View all

ESG compliance

View, create and submit forms

View all

Policies

View and edit policies

View all

Tickets

Manage projects and contractors

View all

Forms

View, create and submit forms

View all

Admin

Manage team

View

Get support

Contact us

New features

View all

Back to dashboard

Salts Mill Manage compliance

Hello Sian Purver

Overview

You have compliance items that require reviewing

Review compliance

62% 5% 17%

15 Compliant 3 Warnings 7 Outstanding

Compliance over time

View

Compliance by site

View

All compliance

Filter by

View calendar View map Download report

Fire	62%	5%	17%				
Gas	62%	5%	17%				
Environmental	62%	5%	17%				
Water	62%	5%	17%				
HR	62%	5%	17%				
Policies	62%	5%	17%				
Properties	62%	5%	17%				

1 >



Case study



- Support of facilities team who are responsible for 140 buildings and giving them a complete picture of compliance
- Centralising the workflow of independent contractors working on the project
- Significant time saving for the organisation



Case study



- Crisp introduced a centralised dashboard for c-suite and trustees
- The platform created a sense of standardisation of data entry which has allowed the C-suite to consider the idea of Digital Twins now
- We saved the Trust £192,000 or \$250,000 over a three-year period



19

Next steps: up and across

- Up:
 - Underpinning with legal and insurance partners
 - Exploring Agentic AI Use Cases
 - Underpinning Digital Twin applications
- Replicating testbeds across more sectors
- Scaling the testbeds across the Leeds Innovation Arc and further geographies

Showcase in
September 2025 in
Leeds