DIOHAS

Designers' Initiative Of Health And Safety

Meeting Record

Date	5th July 2021 (Mon), 16:30-18:00
Venue	Video conference using Microsoft Teams
Chair	Paul Bussey
Author	-

Attendees	Name	Initial	Organisation
1	Paul Bussey (chair)	PB	AHMM
2	William Collinge (guest speaker)	WC	University of Manchester
3	Carlos Osorio-Sandoval (guest speaker)	COS	University of Manchester
4	Patrick Manu (guest speaker)	PM	University of Manchester
5	Gavin Bull	GB	HSE
6	Steve Copping	SC	Arcadis
7	Pav Singh	PS	Arcadis
8	Craig Mcakenzie	CM	Argyll and Bute Council
9	Graham Kelly	GK	BIM Academy
10	Mark Reynolds	MR	Boundary Concepts Limited
11	Peter Hegarty	PH	Chapman Taylor
12	Aamir Shahzad	AS	Currie Brown
13	Mustafa Hussain	MH	Currie Brown
14	Aissam Nehari	AN	Faithful + Gould
15	Nigel Ostime	NO	Hawkins Brown
16	Ketan Valambhia	KV	Laing O Rourke
17	Peter Taylor	PT	Leslie Clark
18	Neil Molloy	NM	Levitt Bernstein
19	Susan Haroutunian	SH	MSMR Architects
20	David Mulligan	DM	Metwork
21	Chris Ottaway	CO	Ottaway and Associates
22	Gary Burden	GB	PRP Architects
23	Ken Pike	KP	Pike Associates
24	Lee Harvey	LH	Redline Fire Safety Consultancy
25	Martin Touška	MT	Rolfe Judd
26	David Stabler	DS	Ryder Architecture
27	Richard Price	RP	Sweco
28	George Poppe	GP	Sheppard Robson
29	Sarah Susman	SS	Scott Brownrigg
30	Stuart Cudmore	SC	Scott Brownrigg
31	Jim Fifield	JF	Veretec
32	David Lewis	DL	AHMM
33	Sneha Holis	SH	AHMM
34	Goh Ong	GO	AHMM

NOTE ON COVID-19: Since 23rd March 2020, all DIOHAS meetings will take place over video conference.

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Speaker	**Presentation Title:** The BIM Risk Library Treatment Suggestion Tool

Background:

The BIM Risk Library Treatment Suggestion Tool aims to assist designers in their identification of health and safety risks and possible treatments when working with digital models in BIM environments.

In development since January 2019, the Tool is now being piloted by several industry partners (AstraZeneca; Atkins; Heathrow; Multiplex) on live construction projects. The presentation will review the purpose, design and use of the Tool with industry so far.

The BIM Risk Library project is a research collaboration funded by Lloyd`s Register Foundation (https://www.lrfoundation.org.uk/en/) between University of Manchester Thomas Ashton Institute (https://www.ashtoninstitute.ac.uk/) and the Health and Safety Executive (https://www.hse.gov.uk/).

Speakers:

Dr William Collinge is a Lecturer in Project Management in the Department of MACE (Mechanical Aerospace Civil Engineering) at The University of Manchester. He is Lead Investigator on the Lloyd`s Register Foundation Discovering Safety funded BIM Risk Library research project, a collaboration with Health and Safety Executive (HSE) and construction industry partners.

Dr Carlos Osorio-Sandoval is a Postdoctoral Research Associate in the Department of MACE (Mechanical Aerospace Civil Engineering) at the University of Manchester. He is a researcher on the BIM Risk Library project.

Dr Patrick Manu is an academic in the Department of MACE (Mechanical Aerospace Civil Engineering) The University of Manchester. He is a co-investigator on the BIM Risk Library research project.

Mr Gordon Crick works in the Construction Division of the Health and Safety Executive (HSE). He has recently taken a lead for HSE in embedding CDM 2015 in BIM, and adoption of digital technology in design. Gordon chairs the BIM 4 Health & Safety Working Group.

Details	Link to the recording of the meeting: https://youtu.be/pp1wHvF-KAo

THE BIM RISK LIBRARY TREATMENT SUGGESTION TOOL
Carlos Osorio-Sandoval, William Collinge, Patrick Manu, Gordon Crick

DISCOVERING SAFETY

DISCOVERING SAFETY

Delivering health and safety benefits through a data driven global community

- £10 million, 5-year (2017-2022) research programme funded by the Lloyd's Register Foundation

- Jointly delivered by the HSE and The University of Manchester through the recently established Thomas Ashton Institute

Lloyd's Register Foundation

HSE

MANCHESTER 1824
The University of Manchester

Safet i Base

TAI Thomas Ashton Institute

OUTLINE

- Motivation
- Phase 1 summary
- Phase 2 overview
  - Aims and objectives
  - Pilot projects
  - Evaluation
- Outputs, Impact
- Future work

DISCOVERING SAFETY

Motivation

100k occupational fatal injuries annually worldwide in construction
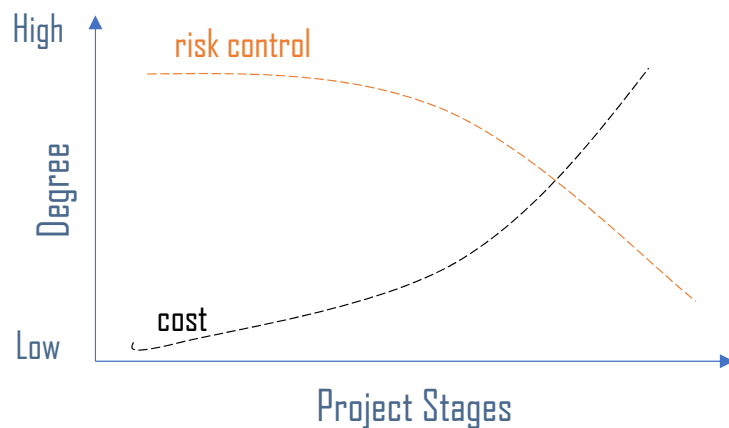
Prevention through Design

PROJECT BACKGROUND

Issue: Disaggregated information

Expert knowledge

Risk Library

Past events
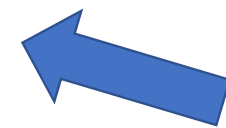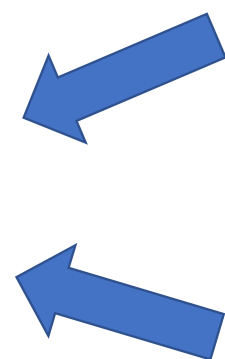
Implementation: 3D REPO   Safet i Base

PROJECT DETAIL

PHASE 1 | PHASE 2

Ontology development

Sourcing risk scenarios

Mapping scenarios to treatment prompts

Risk Library

Implementation
- 3D BIM
- 4D BIM

Evaluation
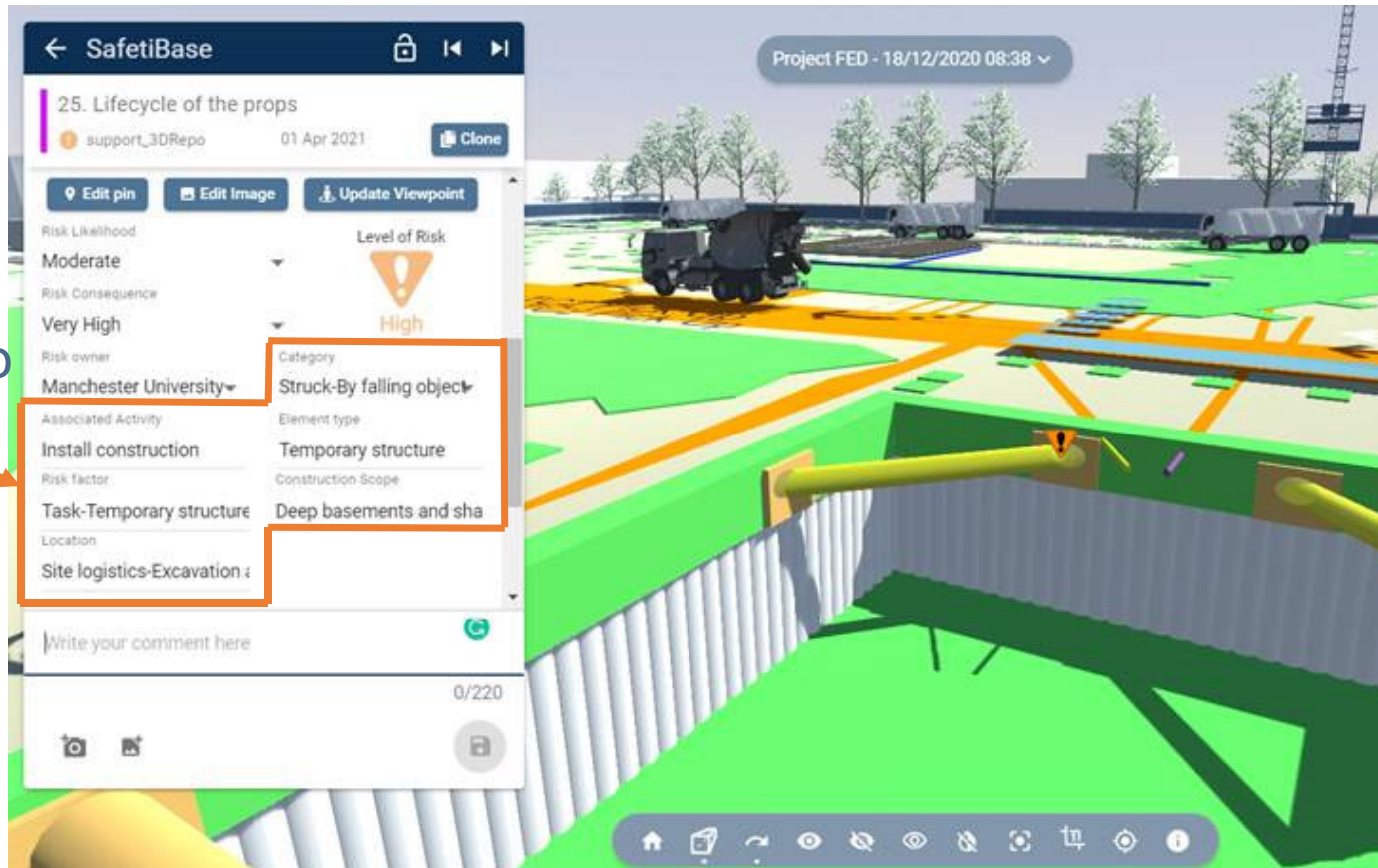- Pilot projects
- Workshops
- Surveys

Continuous improvement

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Phase 1 summary

RISK SCENARIO ONTOLOGY

Risk scenario

Building Element — *Contains* ← Construction Scope

LocatesIn   *Produces*   *ConsistsOf*

Element Location ← *OccursAt* — Associated Activity

Construction Scope — *Triggers* → Risk Factor

Risk Factor — *Eventuates* → Risk

Risk — *Requires* → Treatment Prompts

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Risk scenario

Link to

Risk Library

Phase 2 overview

AIMS AND OBJECTIVES

Expand

Risk Library
(Phase 1)

Risk Library
(Phase 2)

Tool Evaluation

Pilot projects

3D REPO

Safet i Base

Qualitative research

qualtrics XM

Tool Development

4D

+

Risk Library
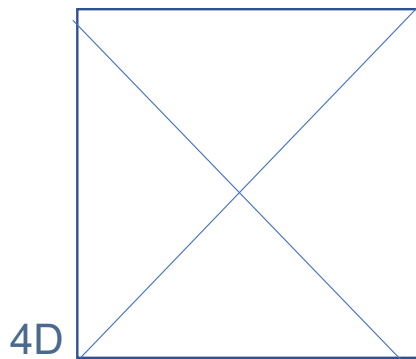
HSE Archive Mobilisation

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WORK ORGANISATION

WP 1 Community of Practice	Identify industry partners to pilot the tool	Review scenarios and treatments
WP 2 Tool Development	Explore implementation in 4D BIM environment	Risk Library
WP 3 Tool Piloting	SafetiBase user guide / Pilot guidance / Instructions preparation	Pilot the new version of 3D Repo's SafetiBase
WP 4 HSE Archive extraction	Annotate press releases / RIDDORs / Natural Language Inference model	Stand-alone NLI report (Appendix C)
WP 5 Tool Evaluation	Questionnaire survey / 4D workshops analysis	Individual interviews to pilot project participants

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AstraZeneca

QA Archive Facility Expansion
Pharmaceutical cold storage facility

ATKINS

SeedPod
Specialist facilities
for business

TP Paddington
2-storey shop and
16-storey residential

Un-named project
Groceries retail
store

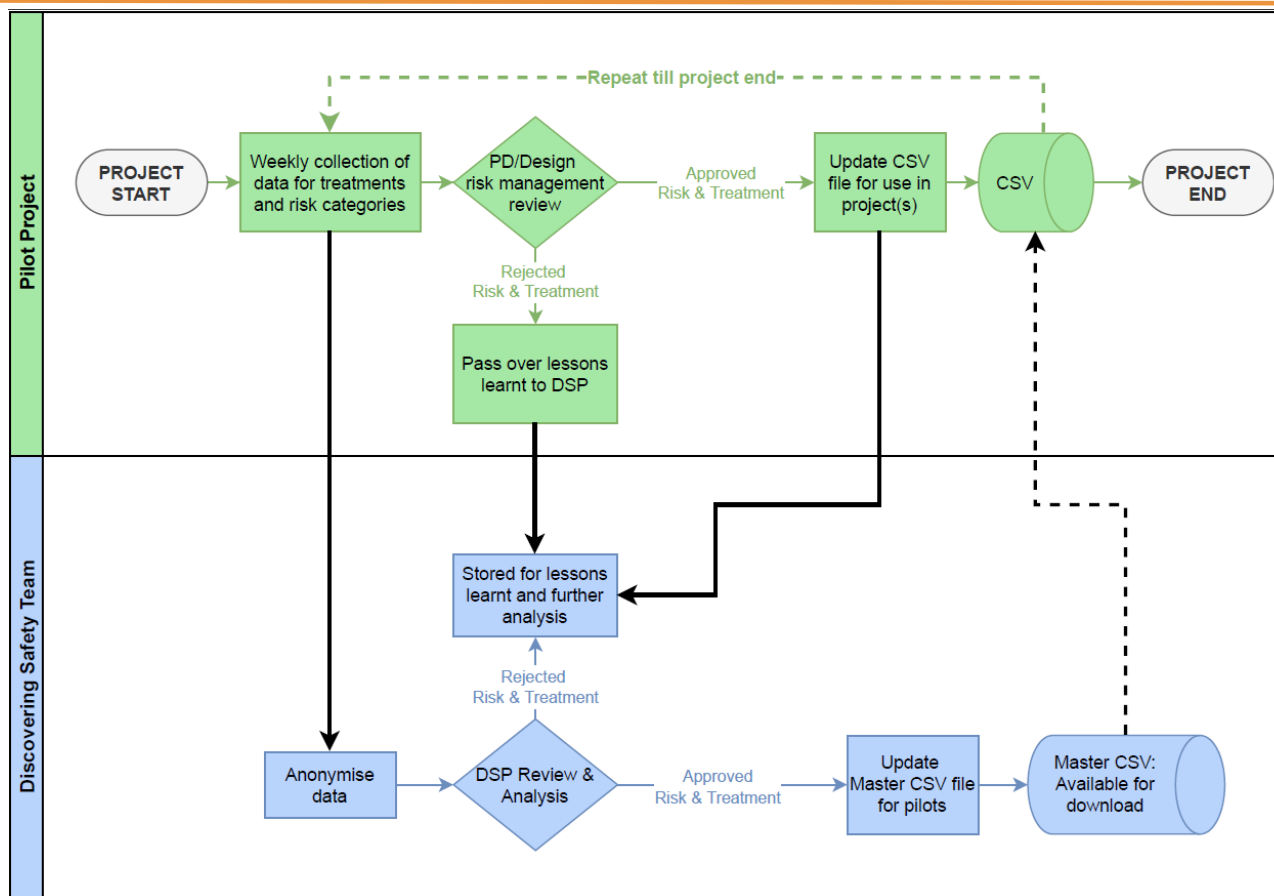MULTIPLEX

Western Yards (B3)
18-storey office block

Heathrow

Cargo Tunnel
Road tunnel underneath airway

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PILOT PROJECTS

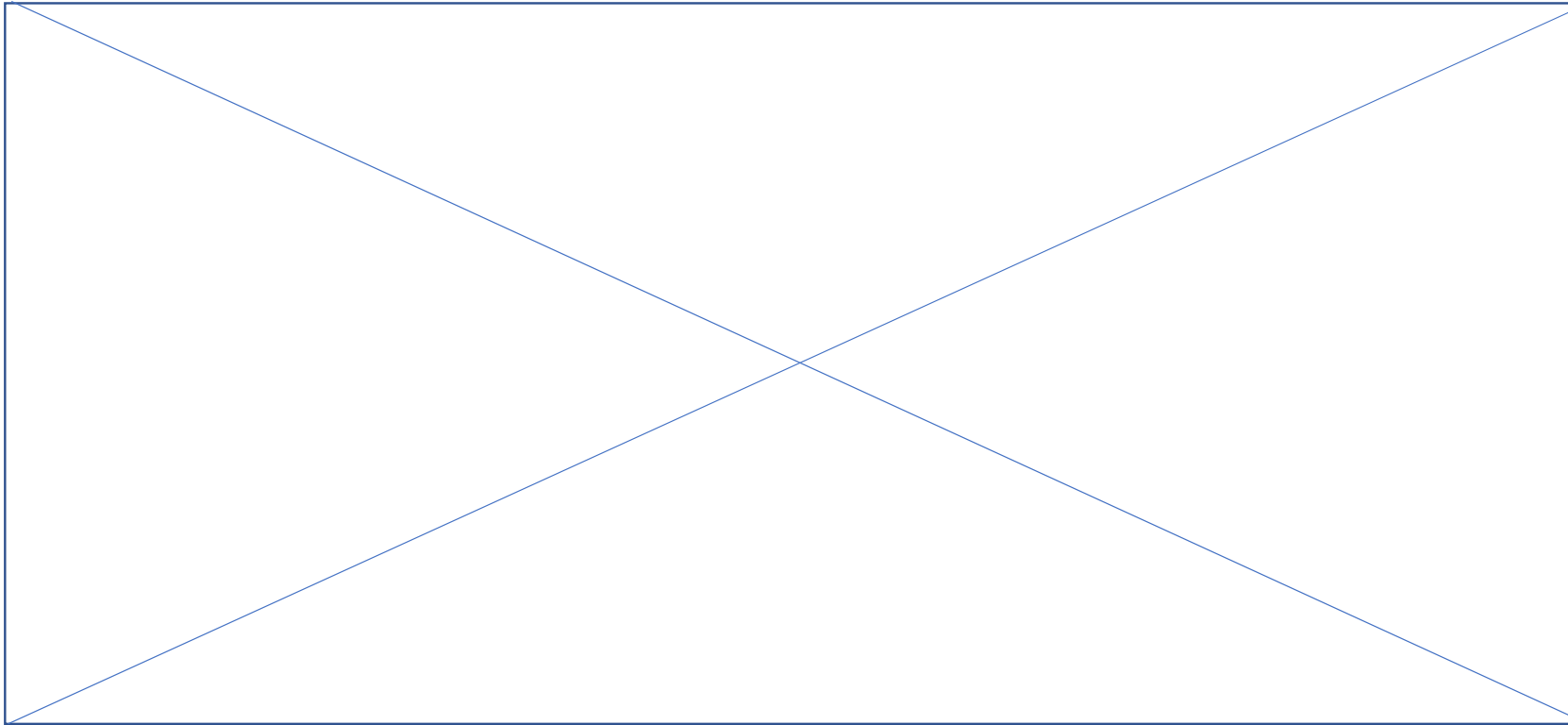# QA Archive Facility Expansion Pilot Project

QA ARCHIVE FACILITY EXPANSION - PILOT PROJECT

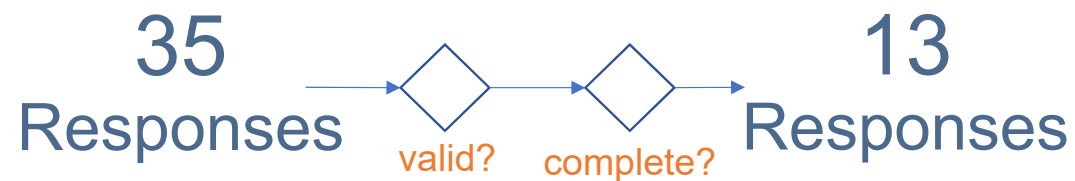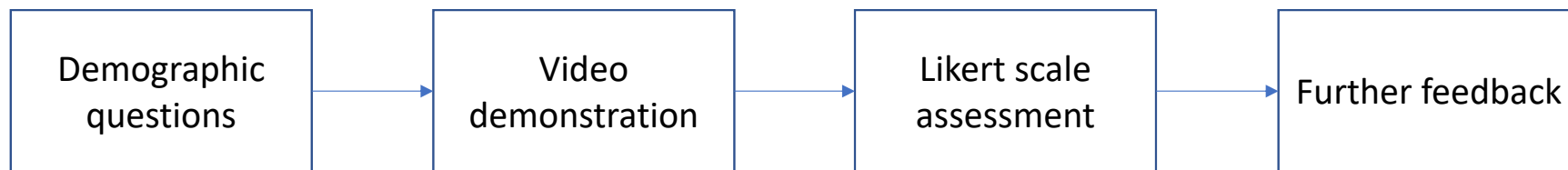# QA ARCHIVE FACILITY EXPANSION - PILOT PROJECT

Before

After

"We were able to design that [risk] out [...] it was a much safer solution that we came up with, and a lot cheaper as well [...] *Definitely a big success*."

DISCOVERING SAFETY
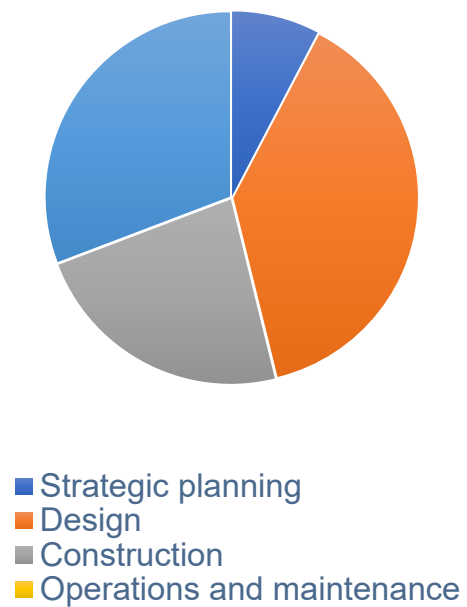
Online survey created and deployed in **qualtrics**.XM

| Demographic questions | → | Video demonstration | → | Likert scale assessment | → | Further feedback |

35
Responses → ◇ valid? ◇ complete? → **13**
Responses

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Demographics

Area of work

- ■ Strategic planning
- ■ Design
- ■ Construction
- ■ Operations and maintenance
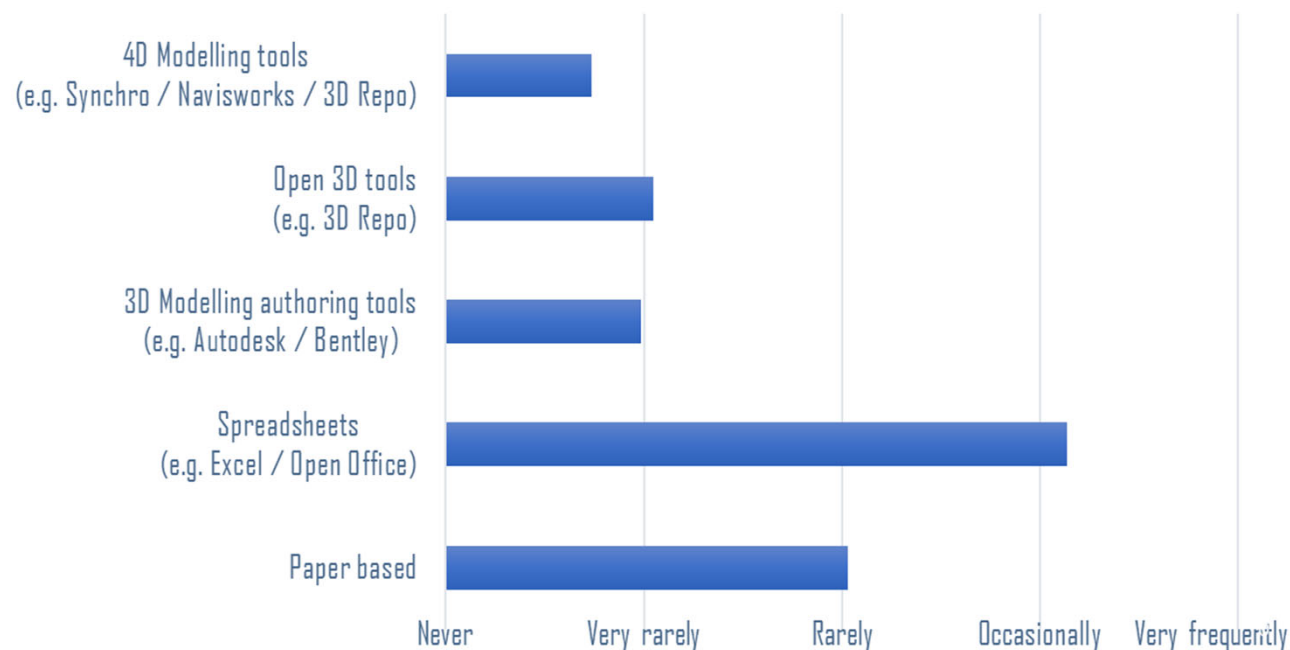
Years of experience

$\mu = 33.92$

DISCOVERING SAFETY
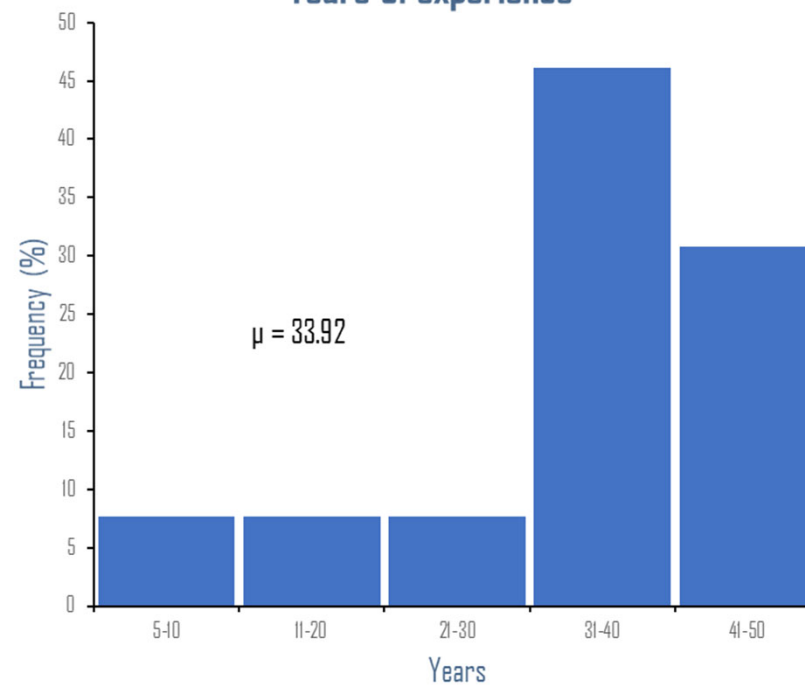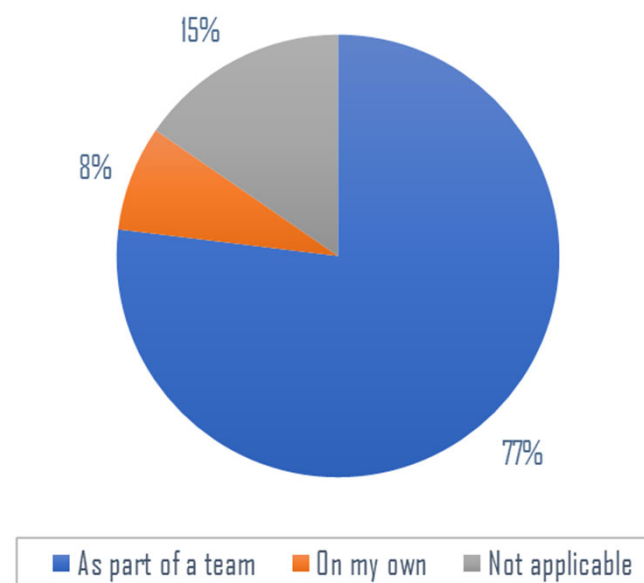
How the respondents work?

Tools used to manage health and safety information

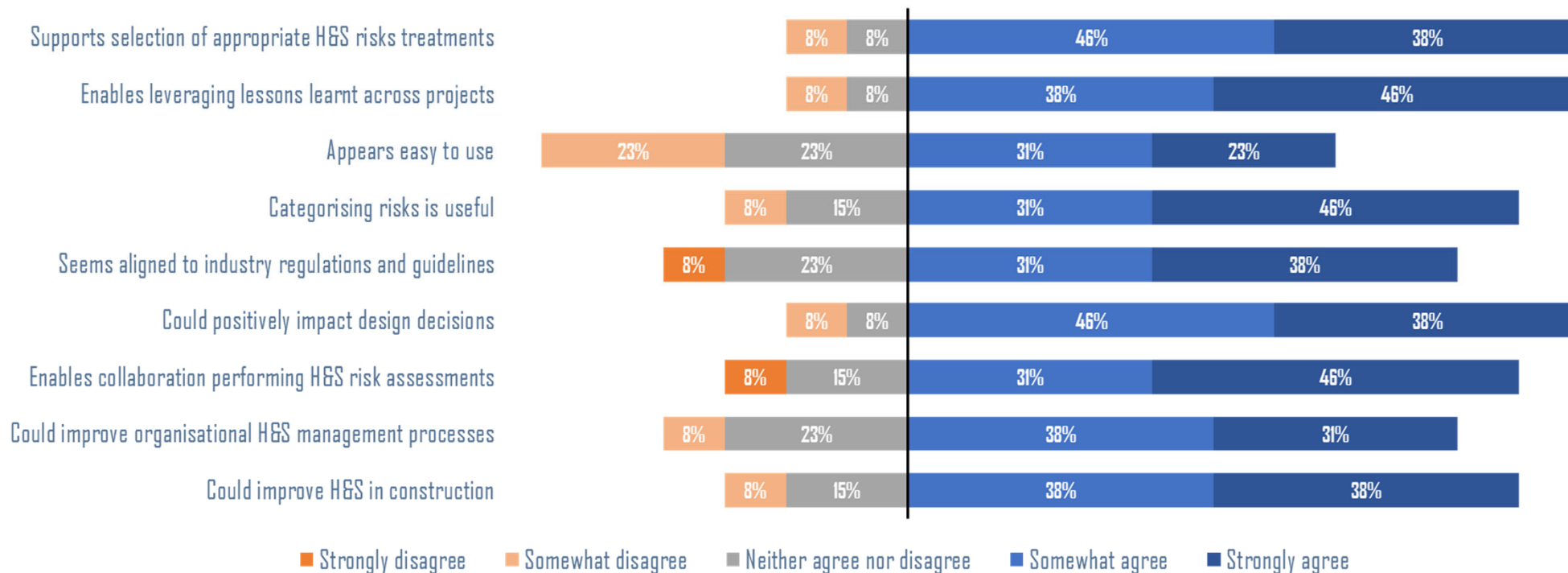## How do you typically perform risk assessment?

DISCOVERING SAFETY

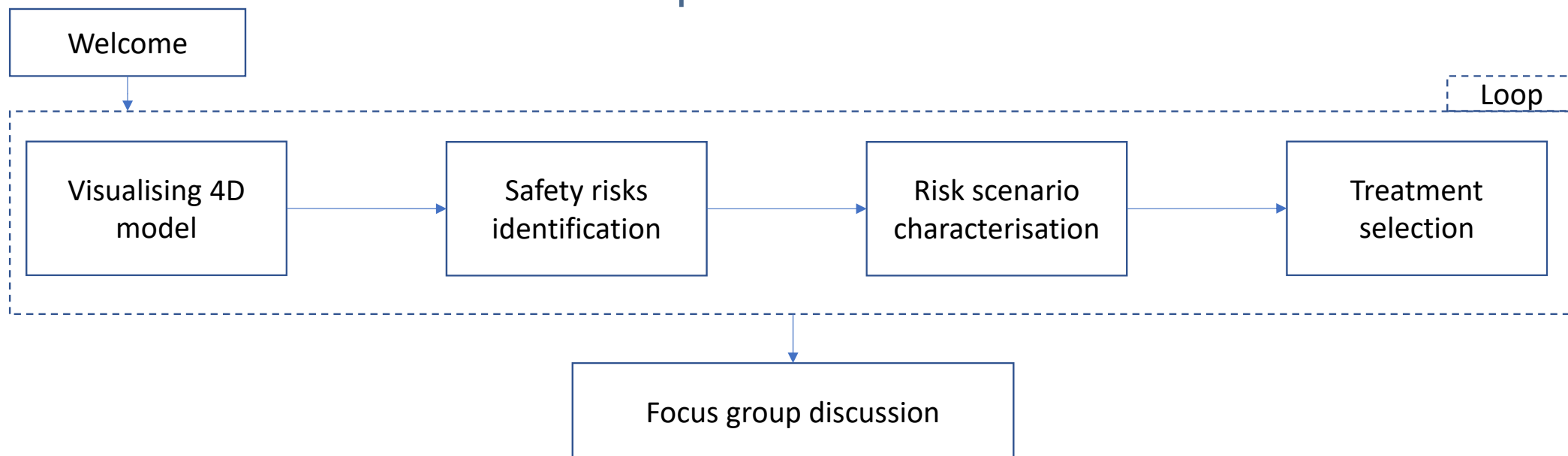Assessment of Risk Treatment Suggestion feature of **3D REPO**'s **Safeti Base**

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Supports selection of appropriate H&S risks treatments		8%	8%	46%	38%
Enables leveraging lessons learnt across projects		8%	8%	38%	46%
Appears easy to use		23%	23%	31%	23%
Categorising risks is useful		8%	15%	31%	46%
Seems aligned to industry regulations and guidelines	8%		23%	31%	38%
Could positively impact design decisions		8%	8%	46%	38%
Enables collaboration performing H&S risk assessments	8%		15%	31%	46%
Could improve organisational H&S management processes		8%	23%	38%	31%
Could improve H&S in construction		8%	15%	38%	38%

■ Strongly disagree   ■ Somewhat disagree   ■ Neither agree nor disagree   ■ Somewhat agree   ■ Strongly agree

DISCOVERING SAFETY

4D Workshops

How can 4D support the traditional safety management process?

OVERVIEW
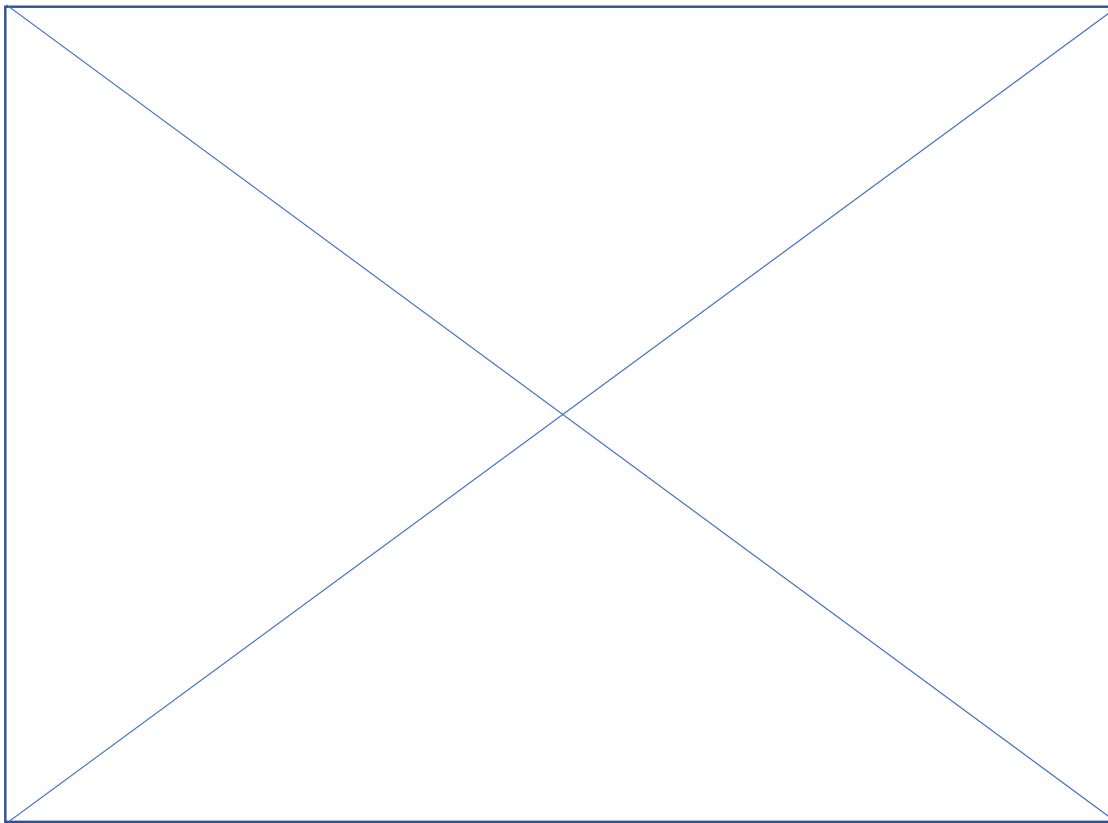
Concept	Category
Risk	Struck – By falling object
Risk factor	Task – Temporary structure
Activity	Install construction
Construction scope	Excavation – Deep basements and shafts
Location	Site logistics – Excavation area
Element	Temporary structure

DISCOVERING SAFETY

4D MODELLING WORKSHOPS
RESULTS

"Without the BIM model, some of the identified safety risks would have been overlooked"

"Visualising the 4D model was invaluable to identify risks associated with temporary works"

"4D enables thinking of a particular point in time in the project, which could result in identifying risks that are not evident from static BIM models"
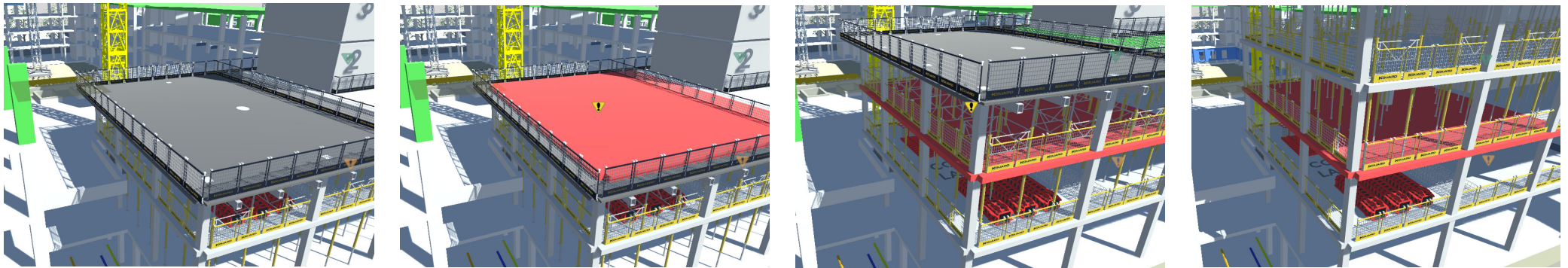
"As the 4D model and programme evolve, identified risks need to be updated manually, which is time consuming and error-prone"

DISCOVERING SAFETY

4D to visualise risks

"Can help to understand when back-props need to be installed or removed"

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Outputs, Impact

OUTPUTS

- The current version of the Risk Library (CSV) contains 401 treatment prompts for 31 risk scenarios related to 11 different risk categories. The majority of the risk scenarios were sourced from pilot projects.

- The user guide for the new version of 3D Repo's SafetiBase has been widely distributed among industry partners from the Community of Practice.

- The Community of Practice has been established and members are using the Tool. They are positively ready to continue working with Discovering Safety.

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OUTPUTS

- **buildingSMART** award under the Professional Research category.

- Conference paper on 4D modelling work accepted for CIB W78 2021.

- Several journal papers under review.

DISCOVERING SAFETY

IMPACT

- The proposed approach to characterise safety risks based on the Risk Library ontology has the potential to provide information consistency and long term benefits for asset management.

- The pilot projects have proved that our concept of a digital tool to assist safety is sound.

- Risk and treatment identification: moving from a chore to a valuable and useful process.

- Visualising safety information within a BIM environment provides context to the identified risks, enhancing communication with stakeholders.

DISCOVERING SAFETY

Future work

FUTURE WORK

- Possible future work directions:
  - Use BIM contextual information to streamline risk scenario identification.
  - Add context to treatments in the Risk Library with links (e.g. DBP website).
  - Apply methods followed in this Use Case to other safety risks.
  - Develop training tool to familiarise new users with risk characterisation.

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GETTING INVOLVED

- You can join the BIM Risk Library Community of Practice

- Contact Dr William Collinge (william.collinge@manchester.ac.uk) or Gordon Crick (gordon.crick@hse.gov.uk)

THE BIM RISK LIBRARY TREATMENT SUGGESTION TOOL

DISCOVERING SAFETY