

# Mixed-media CDM Tool to help new graduates spot hazards



Prof Billy Hare



**Professor Billy Hare** PhD, BSc (Hon), BA, MCIQB  
Deputy Director BEAM Research Centre | Construction & Surveying / SEBE

T: +44 (0)141 331 3908 | F: +44 (0)141 331 3696 | E: [b.hare@gcu.ac.uk](mailto:b.hare@gcu.ac.uk)  
Glasgow Caledonian University, Cowcaddens Road, Glasgow, G4 0BA,  
Scotland, United Kingdom



# BEAM Research Centre

The Research Centre for Built Environment & Asset Management

Innovation | Technology | Sustainability



<https://www.gcu.ac.uk/assetmanagement/beamresearch/>



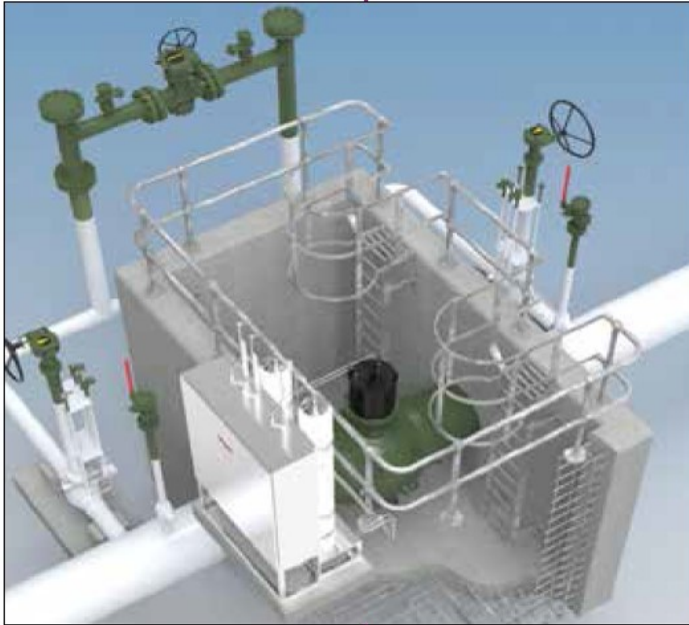
University for the Common Good

# BIM4H&S Publication

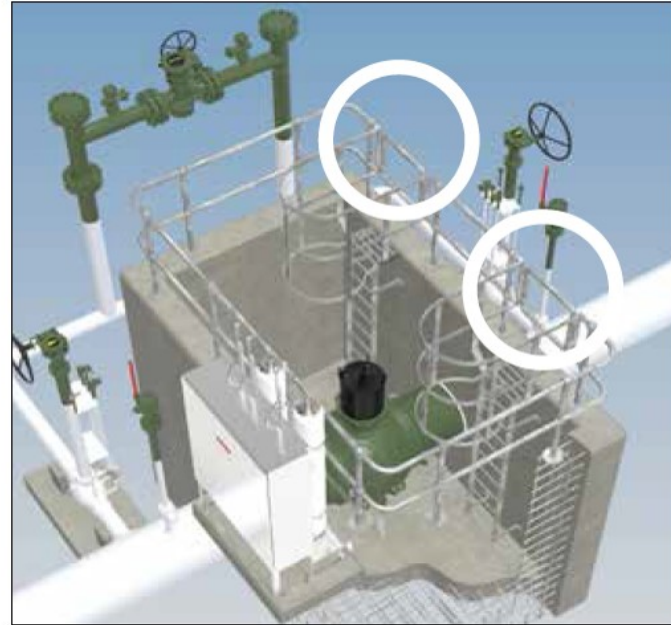
<http://www.hse.gov.uk/construction/lwit/assets/downloads/improving-health-and-safety-outcomes-in-construction.pdf>



# BIM as a platform for design evaluation and review



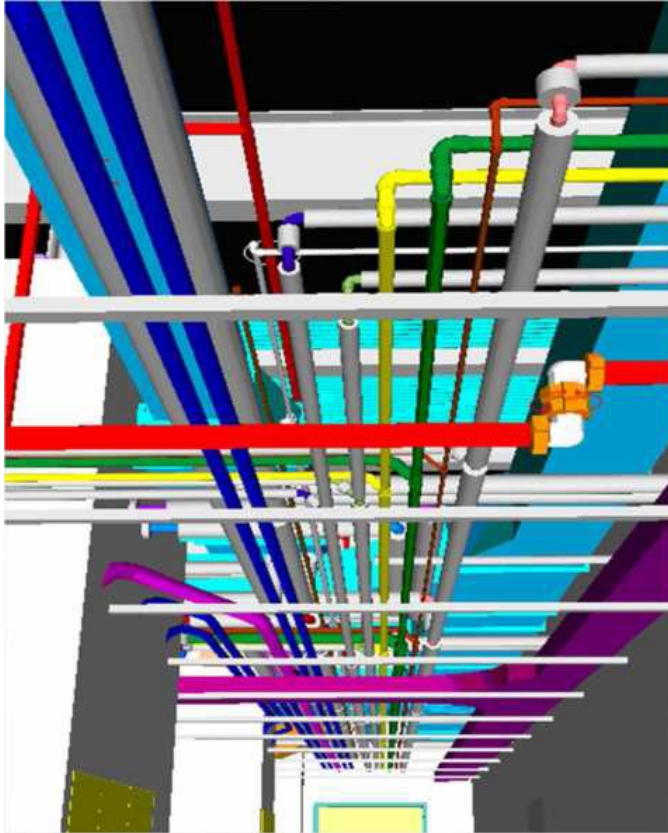
**Figure 4** Railing without gated access



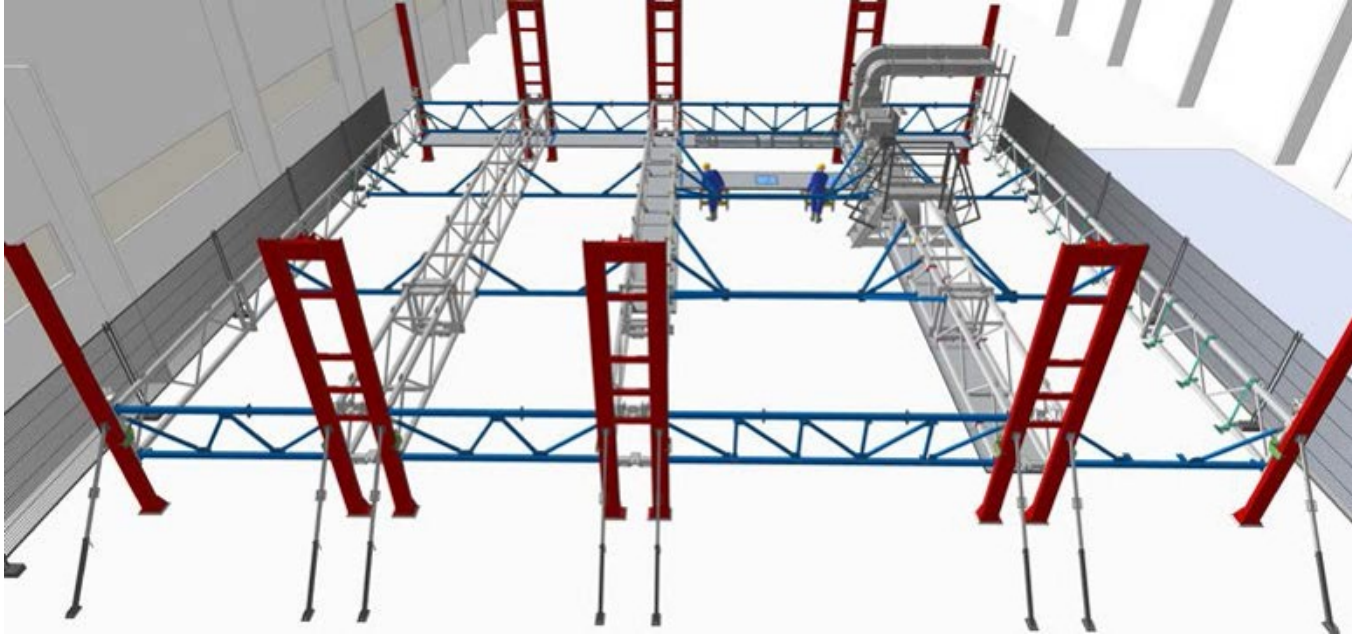
**Figure 5** Railing with gated access following a safety review of the BIM model



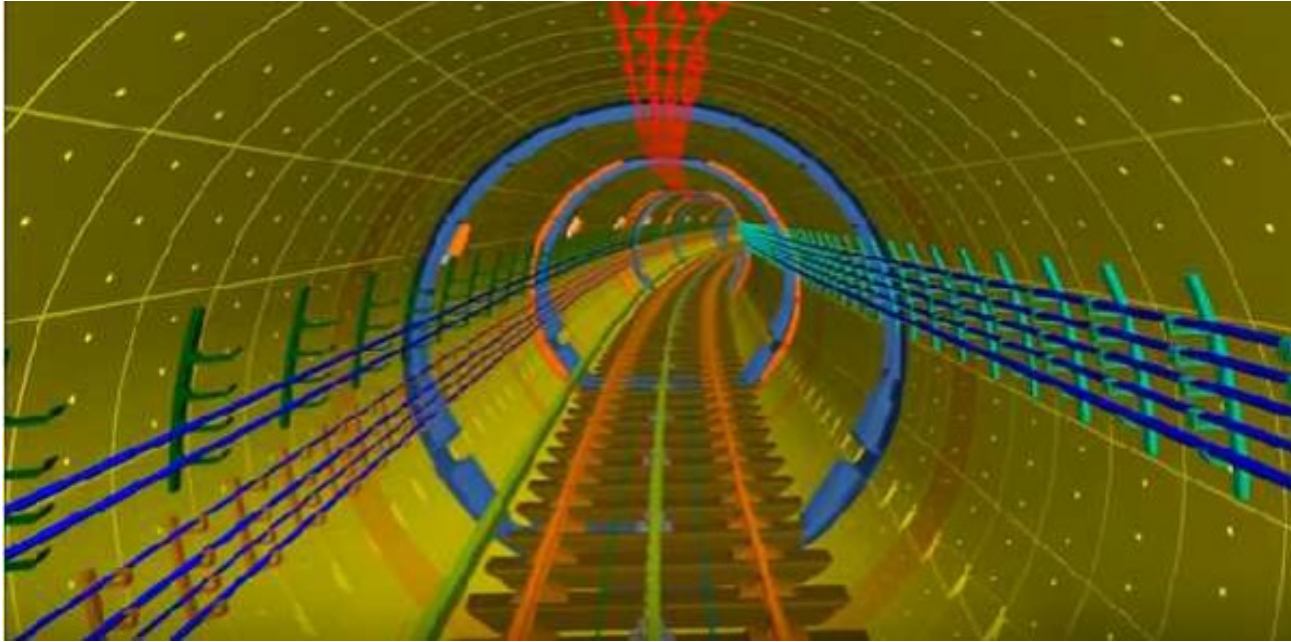
# Clash Detection



# Visual Method Statement



# Scan existing structure to BIM & 4D



<https://www.youtube.com/watch?v=eN2MBIfhxBI>

# PAS 1192-6

## Specification for collaborative sharing and use of structured Health and Safety information using BIM

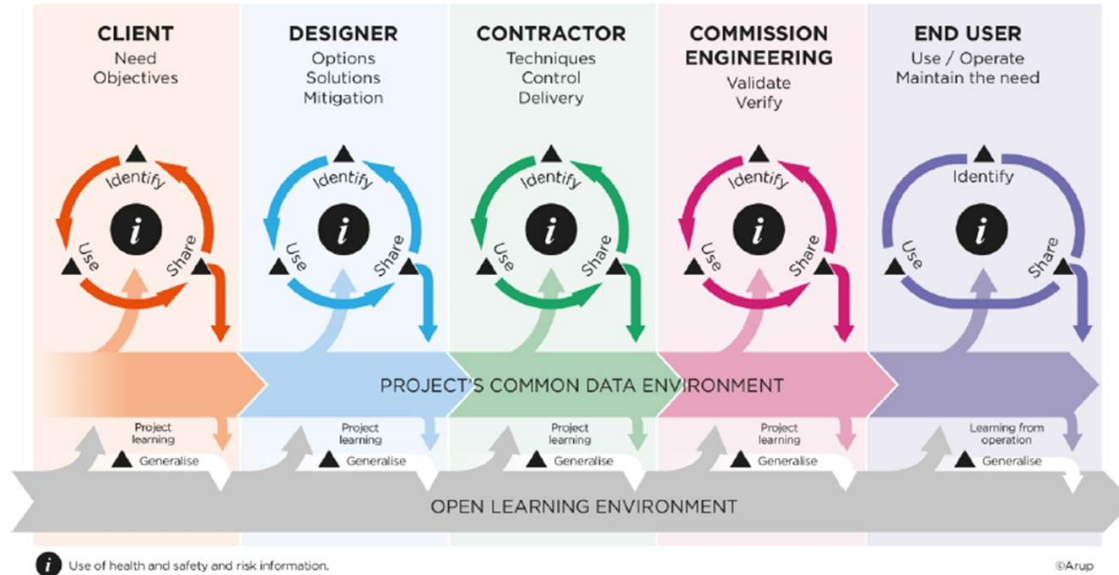
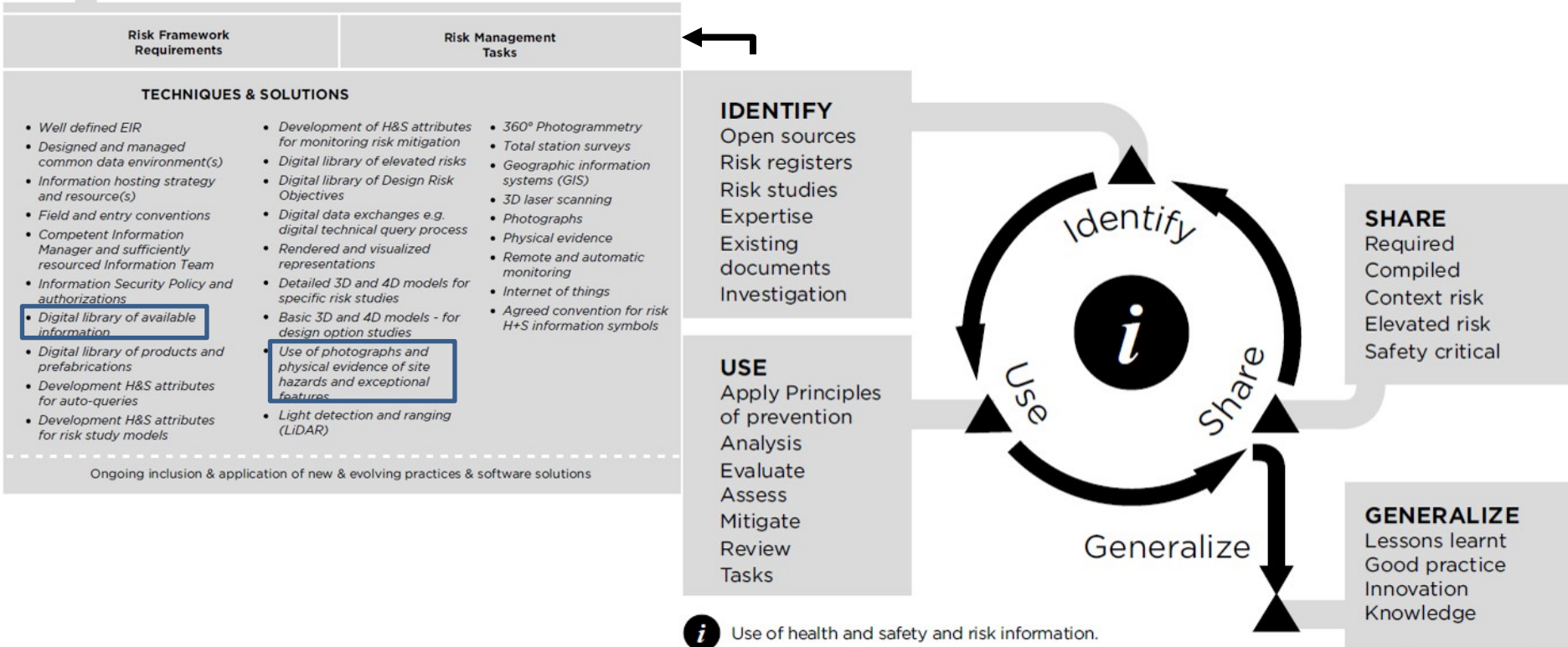


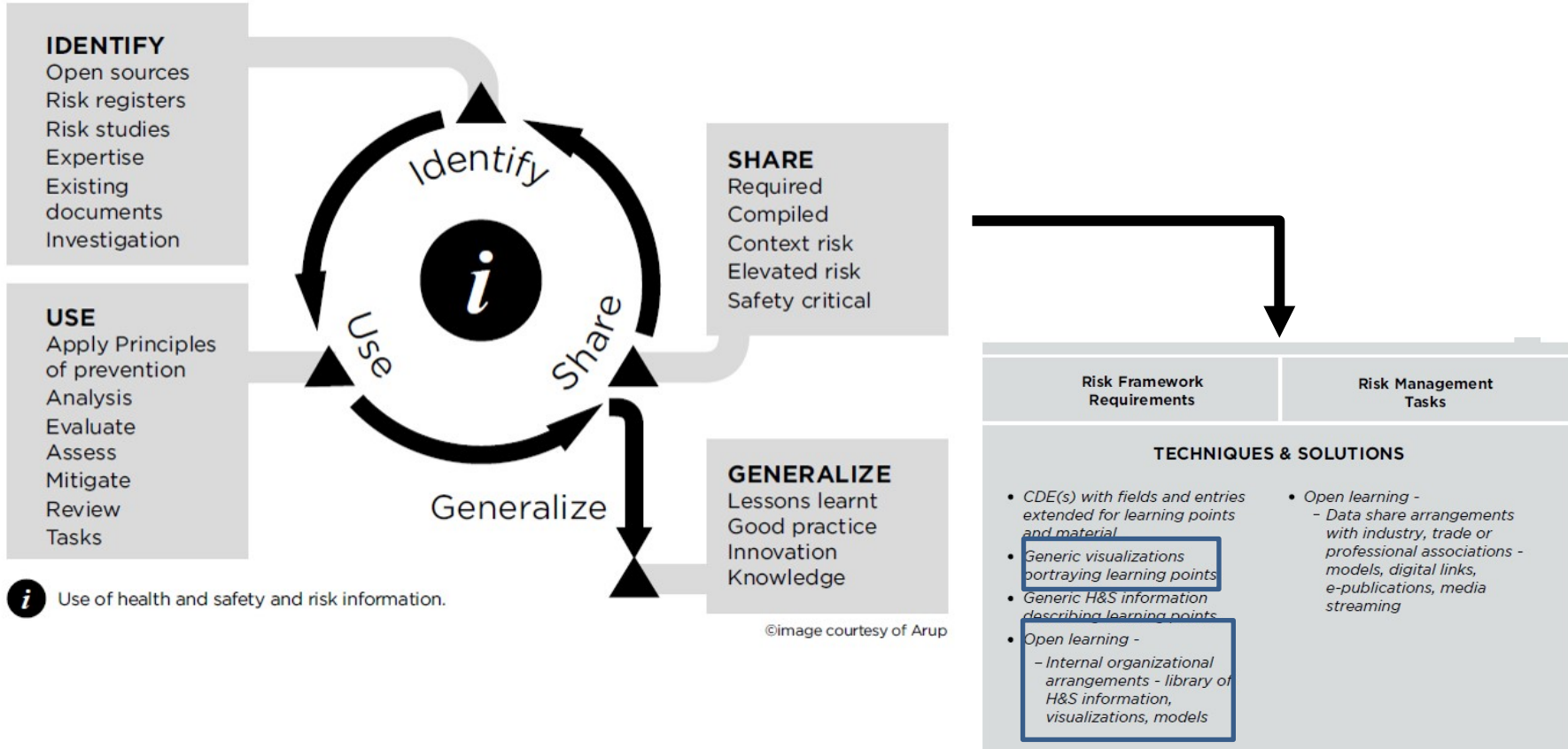
Figure 2 – Progressive development of H&S Information



# PAS 1192-6 PAS 1192-6



# PAS 1192-6 PAS 1192-6



# IOSH Funded Project: Helping designers identify hazards in their designs

Funded by



## **BEAM Research Centre**

*The* Research Centre for Built Environment & Asset Management

Innovation | Technology | Sustainability



# Measurement criteria

Type	Measure
Hazards identified	No.
Controls proposed	No.
'ERIC' Level	Score

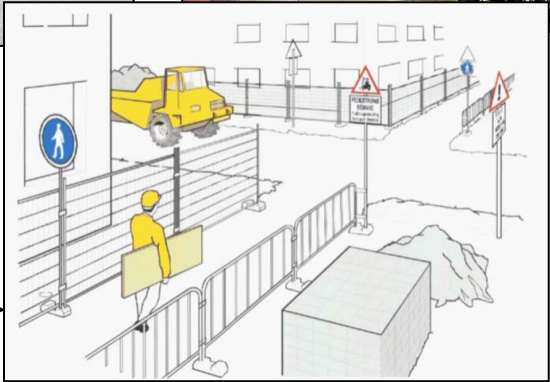
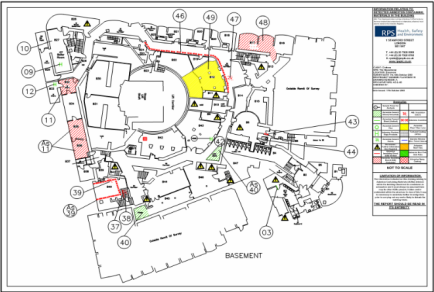
Type of Control	Score
Eliminate (through design)	5
Reduce (through design)	4
Reduce	3
Inform of procedure (SSOW)	2
Control (contractor PPE)	1

Ignored: generic; standard  
Building Control (Code)  
items; out of scope

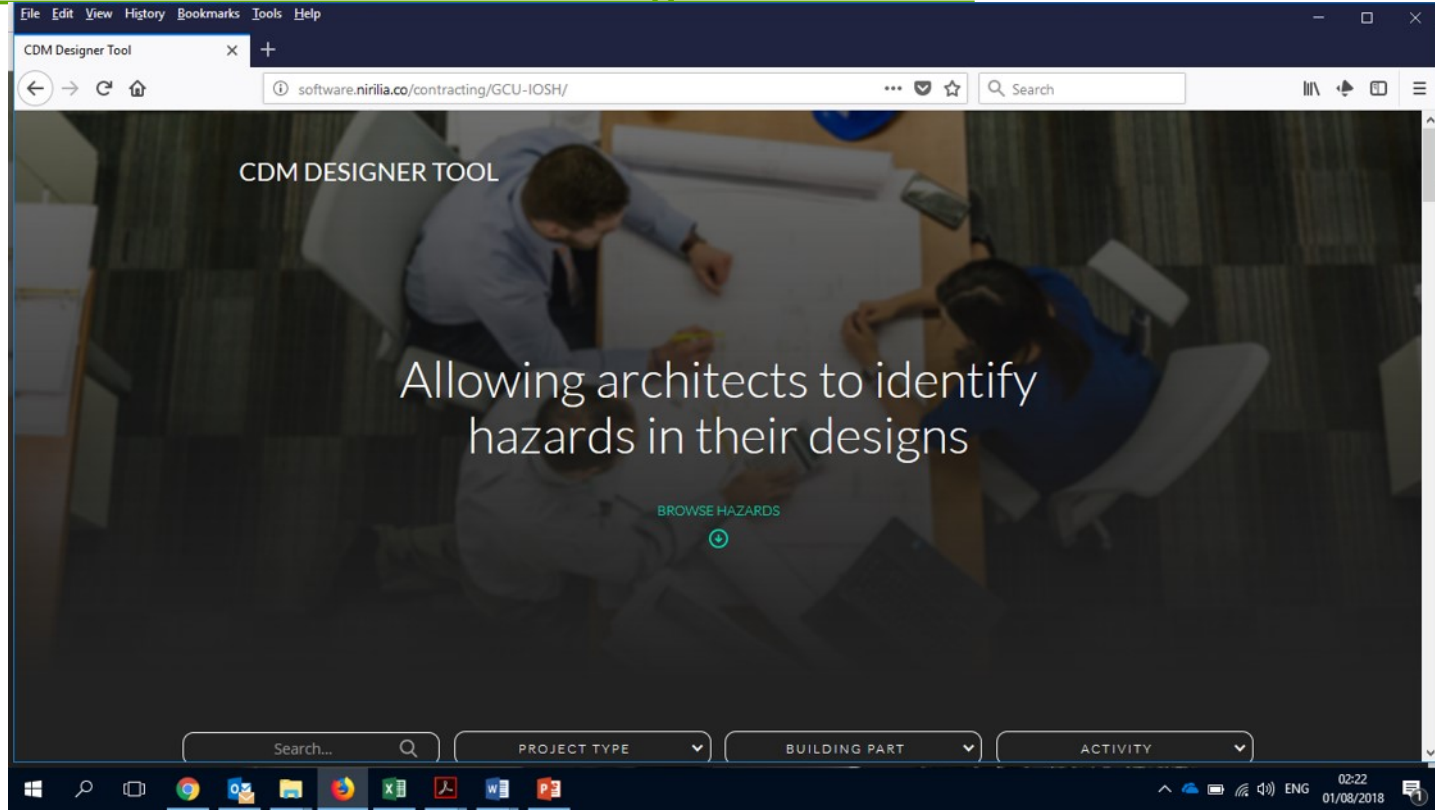
# Database Extract

Location	Activity	Product	Hazard	Hazard ID	Hazard	Hazard
Name	Name	Code (Uniclass)	Category		Name	Description (the action)
<b>Ground</b>	Piling	Ss_20_05_15_71 * Reinforced Concrete Pilecap And Ground Beam Foundation systems	Vibration	1	Using a hand-held breaker on concrete	Using a hand-held breaker for long periods of time to create a rough surface on concrete can cause hand arm vibration syndrome
<b>Basement</b>	Piling	Ss_15_10_28_15 * Contiguous Bored Pile Embedded Retaining Wall Systems	Vibration	1	Using a hand-held breaker on concrete	Using a hand-held breaker for long periods of time to create a rough surface on concrete can cause hand arm vibration syndrome

# CDM Designer: ERIC



<http://software.nirilia.co/contracting/GCU-IOSH/>





INADEQUATE TRAFFIC ROUTE



LACK OF CONSTRUCTION STAGE FIRE CONTAINMENT



LIFTING HEAVY BLOCKS



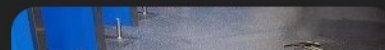
LIFTING HEAVY CLADDING



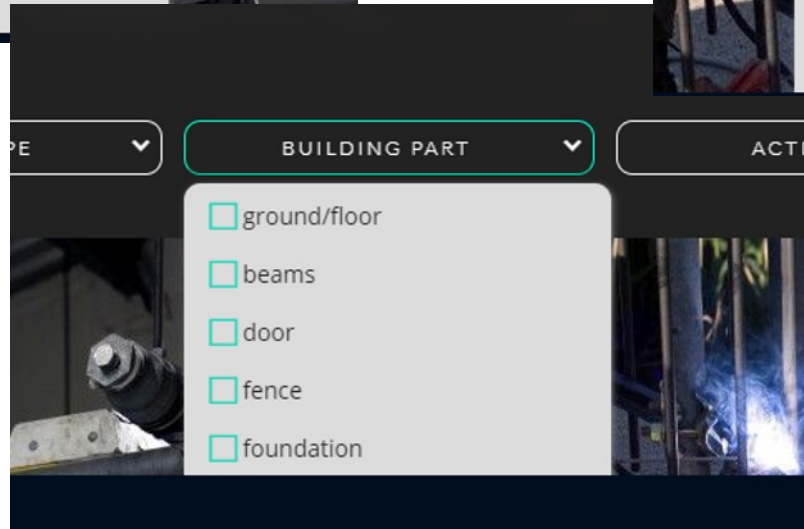
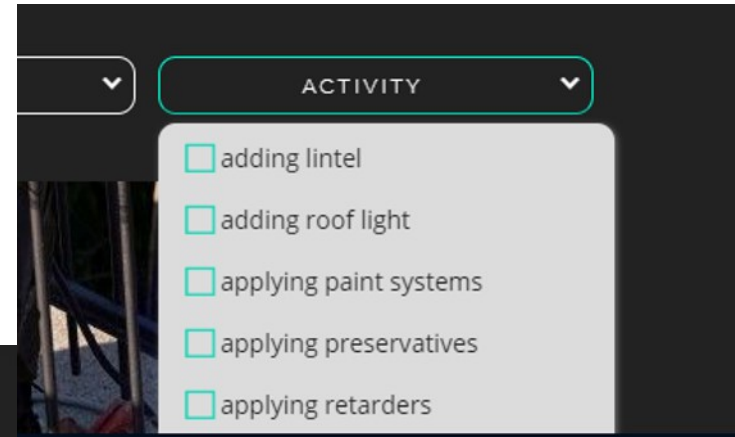
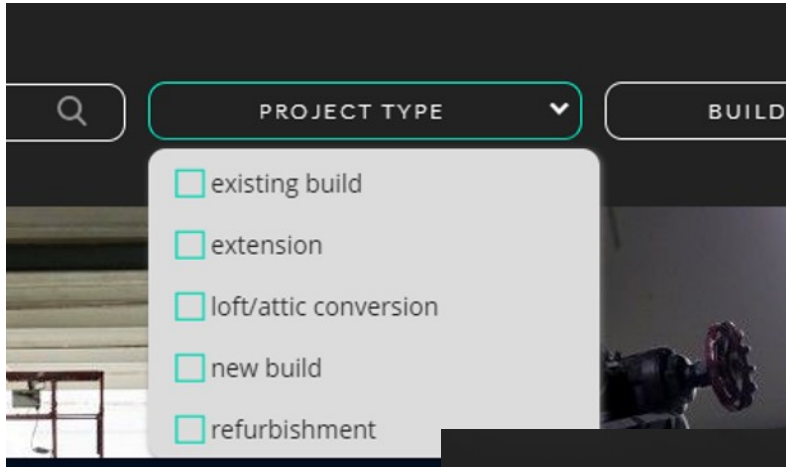
LIFTING HEAVY LINTELS



LIP DETAIL TRIP HAZARD









## USING A POWERED TOOL PLASTERBOARD



## GYPSUM BOARD

An alternative to prevent workers from using a powered tool to cut plasterboard is to use prefabricated walls with gypsum board already attached, which eliminates the need to cut on site

## FURTHER READING

REDUCE

ELIMINATE



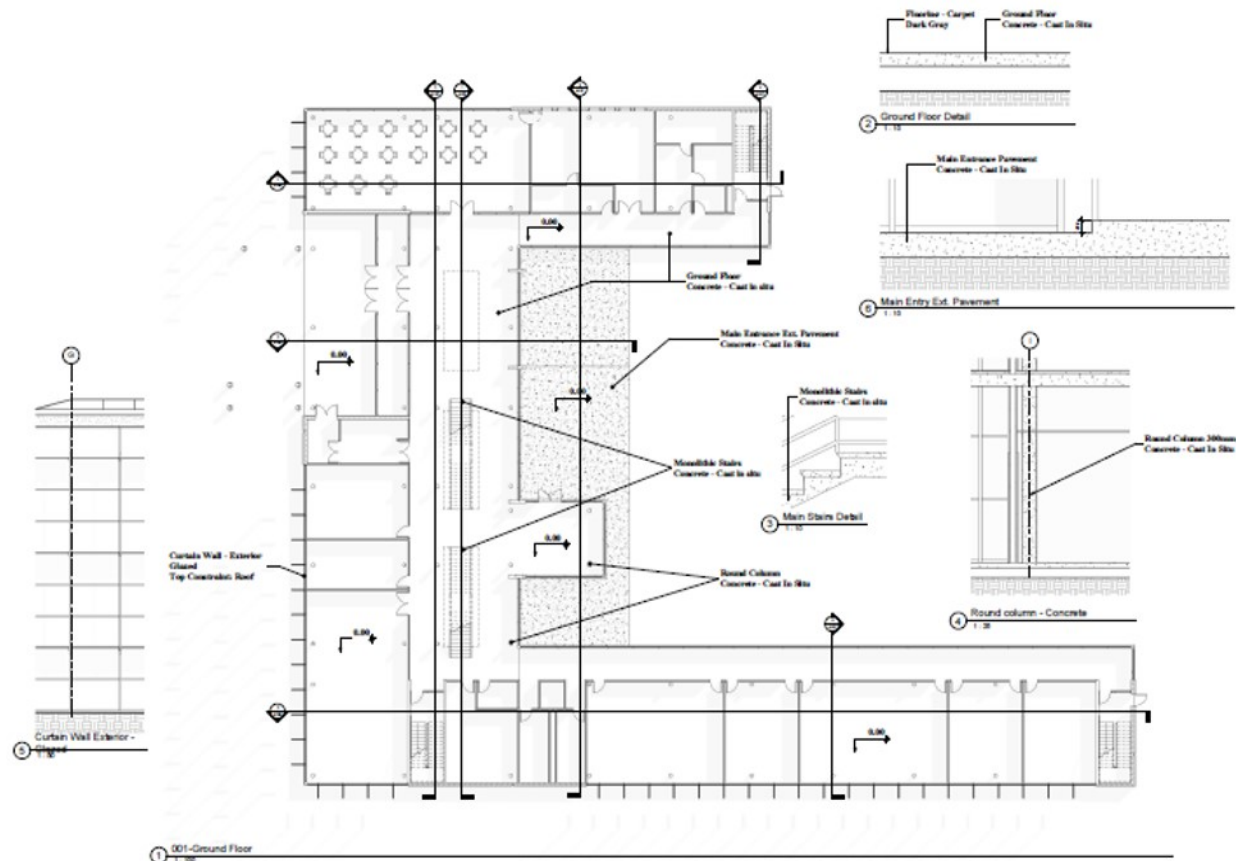
## 900MM WIDE BOARDS

An alternative solution to prevent workers from using a powered tool to cut plasterboard is to use 900mm wide boards, which leads to less cutting and increased productivity

## FURTHER READING

<http://www.hse.gov.uk/research/rrndf/rrR12.pdf> (page 11)

Notes:



Project Name:

**Architectural Design  
Hazard Identification**

Title:

Ground Floor (Level 0)

Project Number:

**IOSH\_180518\_01**

Date: 18/05/2018

Drawing Number:

**A101**

Scale: As indicated

Falls through  
fragile surfaces

Specify Guarding



Specify netting



Specify Non-Fragile

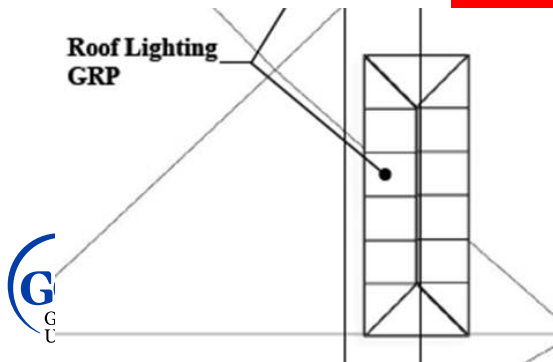
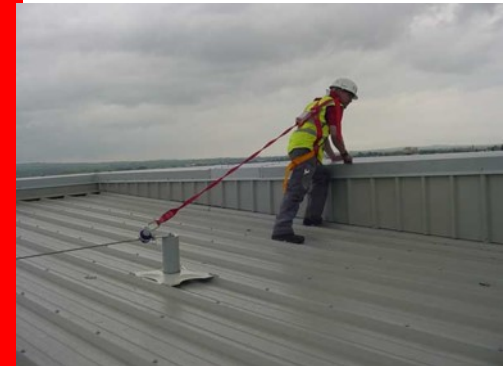
**ADVISORY COMMITTEE FOR ROOFSAFETY**

**Materials Standard**

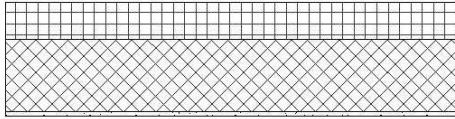
**Non Fragile – Class A**  
**Non Fragile – Class B**  
**Non Fragile – Class C**

**ACR[M]001:2014**  
**Test For Non-Fragility of**  
**Large Element Roofing Assemblies**  
**[fifth edition]**

Specify anchors



## Blocks over 20kg



Exterior Wall - Insulation on Masonry

Construction:

- Insulation/Thermal Barriers (over 20kg)
- Air Infiltration Barrier
- Masonry - Concrete Block (36kg)
- Vapour/Moisture Barriers
- Plasterboard

“Always order blocks that weigh less than 20 kg unless specified by a designer for genuine technical reasons.”

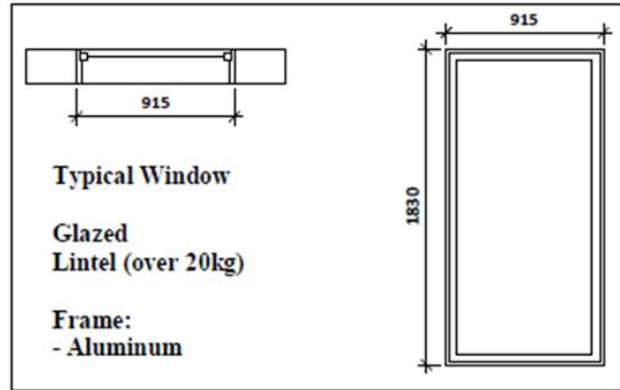


Always select the lightest block you can that has the required strength.

If using large foundation (trench) blocks, consider units with handholds to help grip.



## Heavy lintels over 20kg



Typical Window

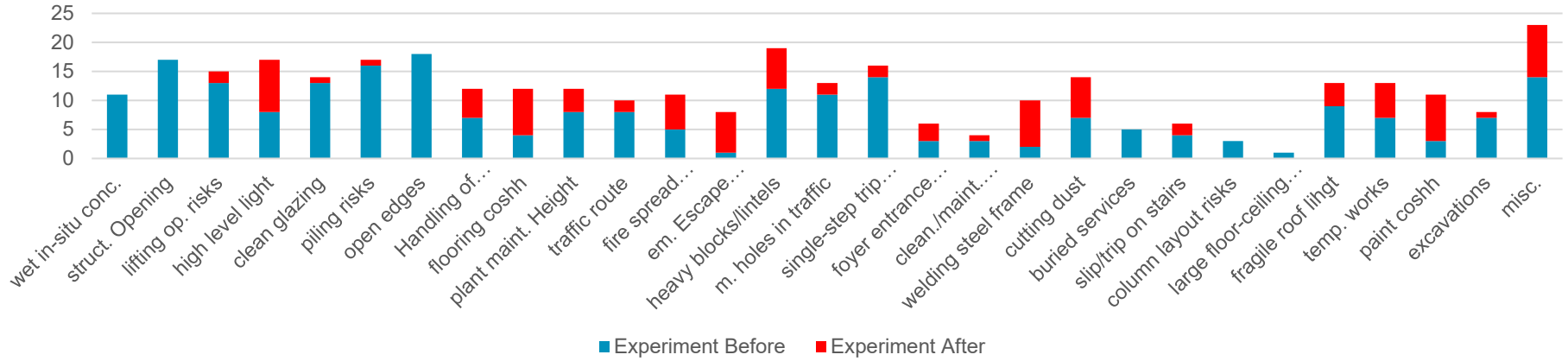
1 : 20

## Specify lightweight lintels

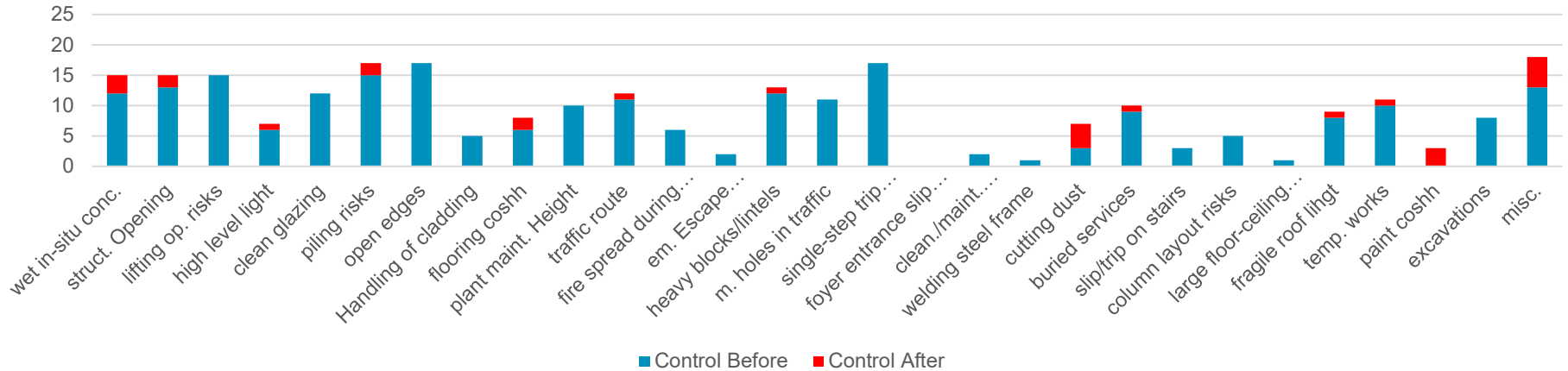


# Results

## Experimental Group Before/After Cumulative

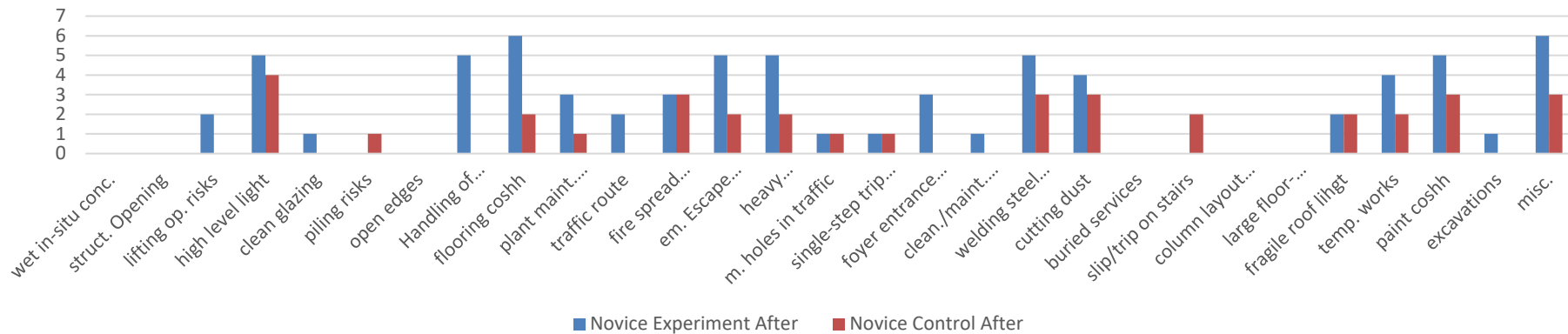


## Control Group Before/After Cumulative

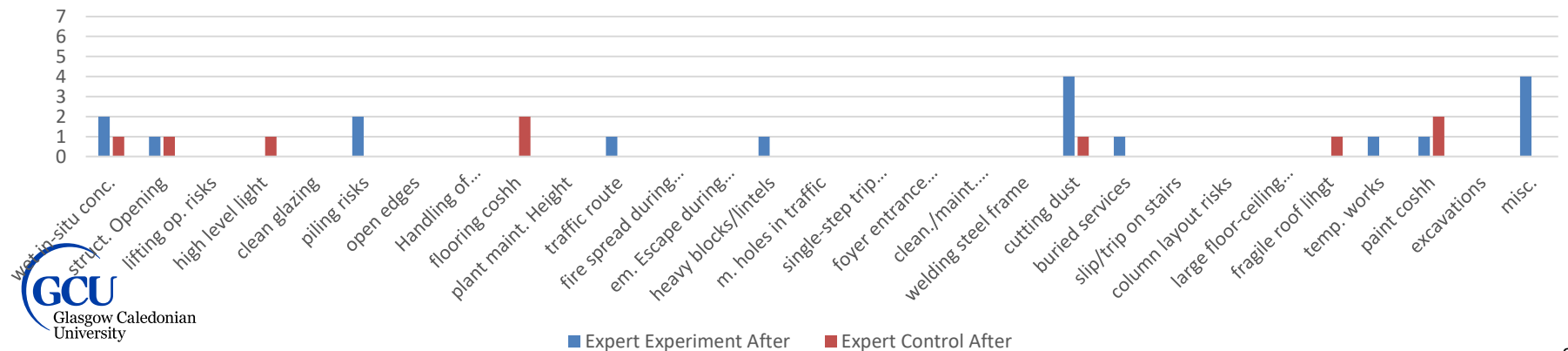




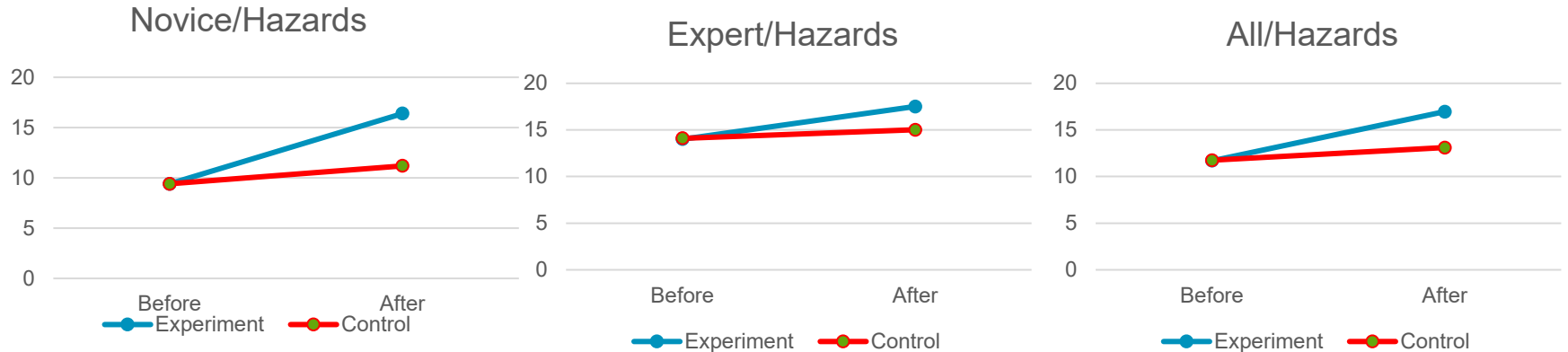
## Novice After Experiment/Control



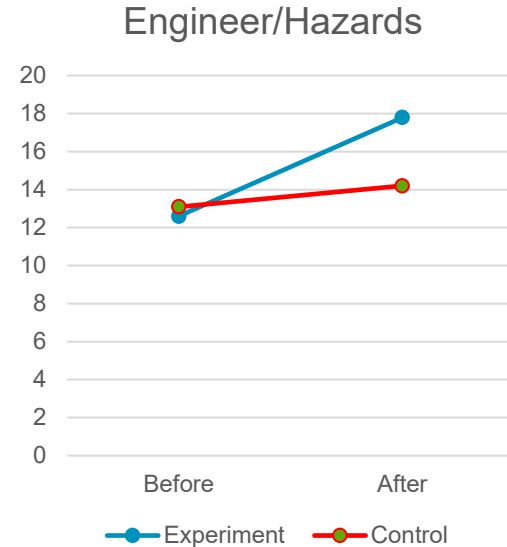
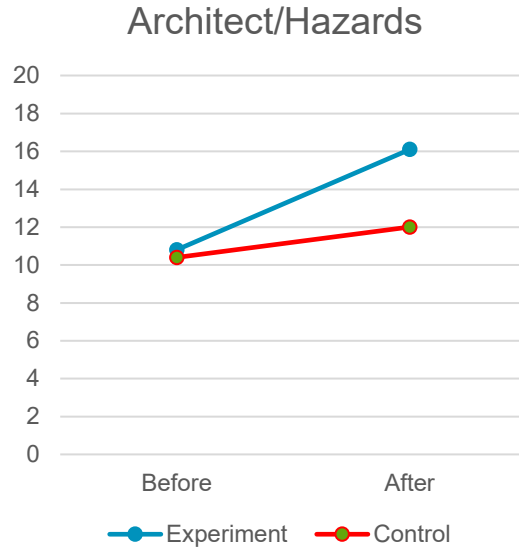
## Expert After Experiment/Control



# Average No. Hazards identified



# Average No. Hazards identified

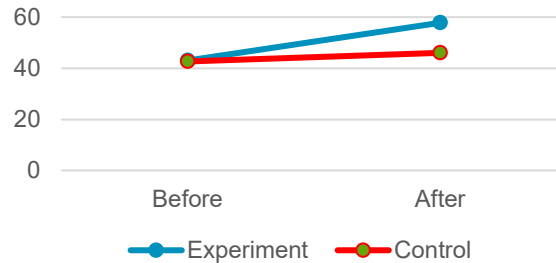


# Average 'ERIC' Score

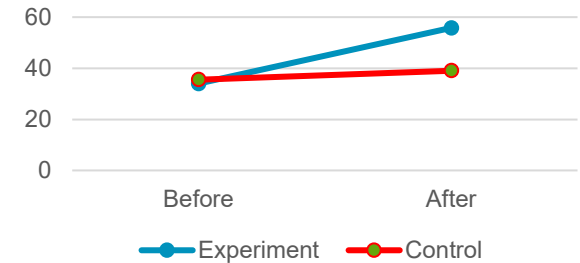
## Novice/Controls-Score



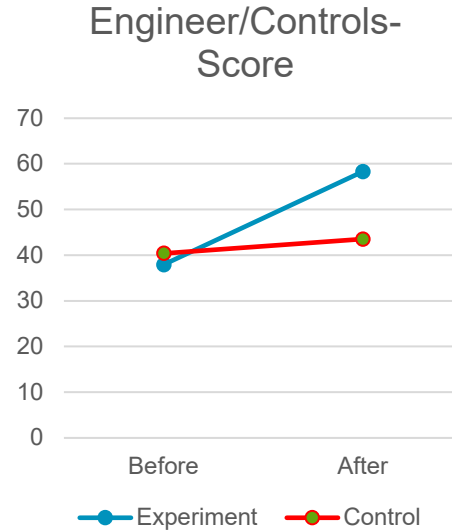
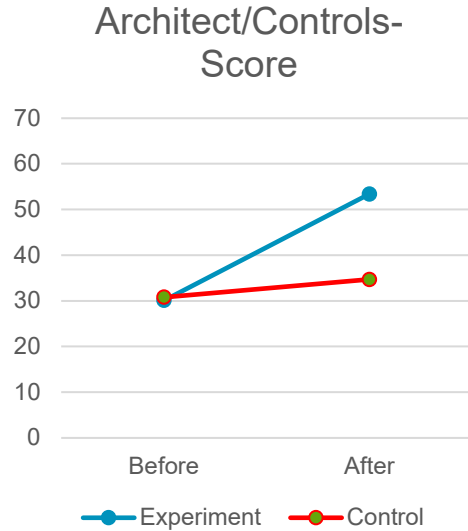
## Expert/Controls-Score



## All/Controls-Score



# Average 'ERIC' Score



# Future

IOSH publication of report: <https://www.iosh.com/designershazards>

Digital Tool: <http://software.nirilia.co/contracting/GCU-IOSH/>

Permission from IOSH to develop tool further with other partners

Can link with BIM software

Test Drawings: Excellent CDM Training Tools

# Thank you

**Professor Billy Hare** PhD, BSc (Hon), BA, MCIOB

Deputy Director BEAM Research Centre | Construction & Surveying / SEBE

T: +44 (0)141 331 3908 | F: +44 (0)141 331 3696 | E: [b.hare@gcu.ac.uk](mailto:b.hare@gcu.ac.uk)

Glasgow Caledonian University, Cowcaddens Road, Glasgow, G4 0BA,  
Scotland, United Kingdom



University for the Common Good