

15 - 16 November, Wembley Stadium, UK

Stratford Waterfront – 10 years on from London 2012

CASE STUDIES ZONE (Day 2) @ The Arc 2

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 **Project Controls**
EXPO
London, UK

Presenters





SAVAN PATEL

Associate Director (Mace)

PROJECT CONTROLS LEAD on
STRATFORD WATERFRONT



MONICA PESCONI

Associate Director (Mace)

PLANNING LEAD on
STRATFORD WATERFRONT

Mace's Legacy at the Olympic Park





2004
Master planning
for LDA



CLM Delivery
Partner for ODA
2006

2011
Won legacy work as
Mace PMP for OPLC



Olympic and
Paralympic Games
2012

2014
Completed Park
Transformation



Retendered next
phase for LLDC
2014

Past, Present & Future



London Stadium Transformation

2016



2016

“Olympicopolis” master planning



UCL Marshgate starts

2018



2018

Stratford Waterfront Construction Starts



N08 East Village – ‘rising factory’ completes

2020



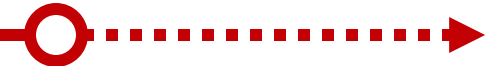
2021

N06 East Village – ‘HRS’ completes



East Bank Opens Mace Handover

2023



Project rendering



Current status



Project Brief

Client:

- London Legacy Development Corporation (LLDC).

Project scope:

- Site clearance, four new buildings, extensive public realm, 100m long new footbridge, road upgrades.

Tenants/Partners:

- Sadler's Wells, University of Arts London College of Fashion (UAL), V&A Museum and BBC Studios

Mace:

- Principal Contractor, Construction Manager, Project Management Partner.

Client Consultants:

- Allies & Morrison are Lead Design Consultant with Buro Happold and G&T sub-consultants along with O'Donnell + Tuomey and Charcoal Blue.
- Arcadis and RSM provide assurance services.

Timeline:

- Nov 2018 to end 2023/early 2024.

Stakeholders:

- GLA, Network Rail, DLR, National Grid, UKPN, Lendlease, London Aquatics, Canal River Trust.

Mace services:

- Mace remit project and construction management (*including Principal Contractor under CDM 2015*);
 - Health, safety and wellbeing;
 - Construction management and logistics;
- Planning & Schedule management;
- Project Controls including change control, risk management and document control;
 - Tender analysis;
 - BIM and digital strategy;
 - QA/QC and commissioning management carried out by others - Mace provide the digital tools to allow the QA/QC system to be implemented;
- Environmental and Sustainability management including Skills & Employment and Community Engagement.



- GIA: 6,815 sqm;
- Steel frame, precast and in-situ concrete upper floor slabs, RC cores;
- Steel roof;
- Precast and glazed facades.



- GIA: 38,080 sqm;
- In-situ, precast concrete frame with steel frame and steel clad roof;
- Facade of precast concrete, steel windows and aluminium curtain walling;
- Saw-tooth roof profiles;
- Giant concrete colonnades define key public routes.



- GIA: 8,475 sqm;
- Concrete and steel frame;
- Ribbed painted steel main studio;
- Pre-cast concrete support spaces;
- Large openings to create visibility;
- Precast and glazed façade.



- GIA: 4,896 sqm;
- Concrete and steel frame;
- Brick and fully-glazed facades divided by deep metal mullions;
- Clay tiled roof;
- The bricks of the walls and tiles of the roofs made from same clay;
- Concrete canopy.

Use of Digital Technology: Client Reporting



Issue:

- Multiple stakeholders;
- Client - Ingrained to use MS office;
- Regular ad-hoc requests for information;
- 5 year programme – not sustainable;
- Inconsistency of messaging / information – reduced data integrity.

Requirements:

- Develop a platform that will provide the necessary information for the projects 5 year duration;
- Behavioural step change through engagement with client and stakeholders;
- Integration with existing and new systems to ensure single source;
- Ensure platform allowed necessary information to various stakeholders.

“Mace have developed a fantastic online reporting system for LLDC that provides us with a tailored, accessible and intuitive monthly report with a dashboard summary. The system is especially useful for us as we can easily lock down varying levels of information to suit the needs of our different stakeholders.

We now have a system that we know we can all go to for the single source of the truth and that I can trust and use as a sound basis for onward reporting to my board”.

*Colin Naish, Executive Director,
LLDC*

Solution:

- Developed an online reporting system, named “Promas”, based within a Google platform;
- Utilised in-house technical expertise of Mace PMO developers;
- Intuitive and user-friendly design - quick adoption by client and stakeholders with minimal training;
- Presents the client with a consistent message and data across multiple functions and buildings;
- Access to all historical reports from a user-friendly interface;
- Reduces the client’s request for ad-hoc reports and additional analysis;
- Ability to share and restrict specific reports to wider stakeholder community;
- Single source of truth and basis for project reviews;
- Senior management confidence on information reported;
- Sound platform for successful delivery.

“The new Reporting system is a huge improvement on the previous reports submitted. The newly designed platform allows access to a huge body of information, all of which is presented in a simple and easy to understand format. Additional functionality enables us to easily track movement and changes between reporting periods.

The new system has much improved access to information and made internal reporting at UAL much easier. Simple, concise and user friendly!”

*Mark Farthing, Programme
Director, University of the Arts
London*



Executive Summary

CURRENT STATUS

| | | | |
|-----------------------------------|--------------------------------|--|---------------------------------|
| 22-Dec-23 BL Const. Complete | £575.13m Current Budget | £18.91m CBB Contingency | 1 RIDDORs (12 month rolling) |
| 24-Nov-23 FCST Const. Complete | £615.19m AFC | £58.97m QRA+Trends | 0.05 Target AFR |
| 28 Variance in Days | £40.06m AFC vs CBB Variance | £40.06m QRA+Trends vs CBB Contingency | 0.05 AFR (12 month rolling) |

EXECUTIVE SUMMARY

H&S:

- During the Oct-22 reporting period, 207,690 workforce hours were undertaken in the month, with the total workforce hours to date on the project now standing at 4,404,384
- There was x1 lost time and 1 near miss reported in the period. These, along with progress for the period can be found in the HS&W section of this report.

SCHEDULE:

- Summary
- Health & Safety
- Schedule
- Risk
- Cost
- Sustainability
- Quality
- Procurement
- Site Photos
- Admin

Digital Technology: Systems

Google

- Programme Management Delivery System
- All systems feed into Dashboard

- BIM management
- 3D Modelling
- Site Diaries

B AUTODESK®
BIM 360™

conject

- Cost Management System
- Document Control Platform

- Construction Schedule Management Software

Powerproject

Optimise mace

- Sustainability reporting platform

- Risk Analysis Software
(quantitative risk and schedule analysis)

ORACLE®
PRIMAVERA

datascope

- Construction logistics system

- Planned vs Actual reporting
- 360° weekly photo records to assist with CE's

DISPERSE

YellowJacket™

- Health & Safety system

Google

- Various Trackers & Dashboards using Google Sheets *(flexibility / collaborative across projects)*

Use of Digital Technology: Working with the Supply Chain



Issue:

- Multiple Trade Contractors to integrate;
- Paper-based plans and schedules;
- Regular ad-hoc requests for information for reporting;
- Need to recall previous versions for claims purposes;
- Inconsistency of messaging / information – reduced data integrity.

Requirements:

- Develop a process that will provide the necessary information for the interfaces to be managed;
- Behavioural step change through engagement with Trade Contractors;
- Integration with existing and new systems to ensure single source.

The development, evolution and ownership of the project plan resides with the whole of the project team.

The project leader is responsible for ensuring that the plan is delivered consistently.

Planning is a fundamental managerial function, all managers of all disciplines must plan so they can anticipate and influence future events.

Managers who do not plan, cannot control.

Solution:

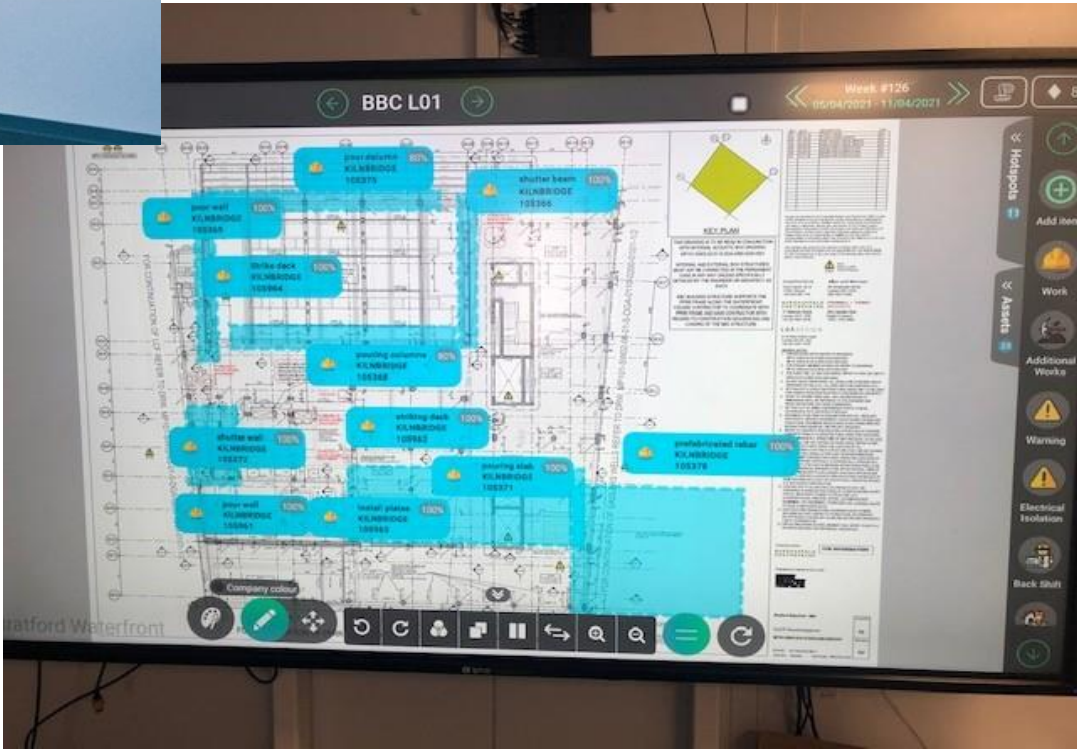
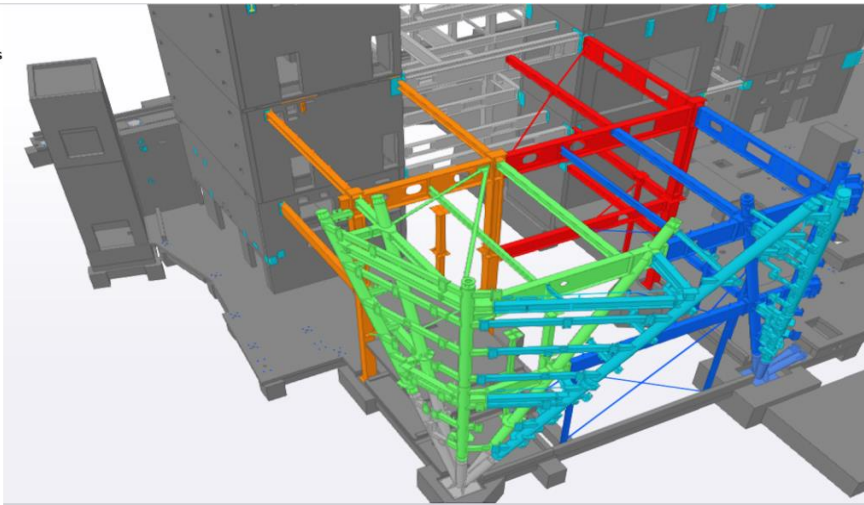
- Breaking down the project into packages;
- Production Control Room within the main project site office;
- Progress to be reflected for each package and progressed at least weekly to maintain the momentum of measuring planned versus actual;
- Consistent project reporting to support potential contractual dispute to improve Trade Contractors productivity;
- Trend to be generated from actual positions;
- Realistic plans, only plans agreed by all parties can be achieved;
- Effective communication and real programme ownership;
- Visual representation of the plan improves programme ownership.

A collaborative planning approach with each of our supply chain partners is required to create a relationship which aims to succeed based on an agreed, integrated plan and key milestone dates.

The Production Control Room visually illustrates a very clear factual status of the project so that anyone can swiftly get a clear understanding of the key issues and performance of the project and identify the key actions, their owners and next steps.

Digital Technology: Control Room

Ph 113 – 117
No shelf angles
107 no pieces



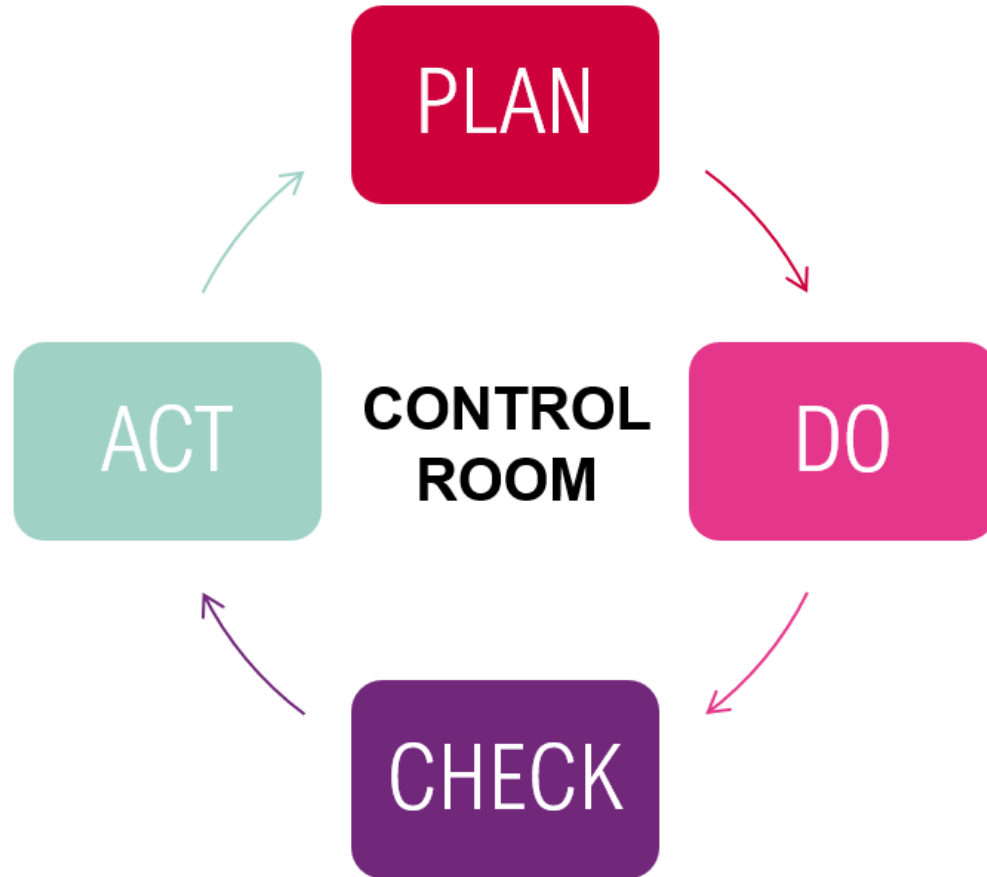
Digital Technology: Control Room

PLAN: Set goals, plan, decide how to gather data

- Master Schedule
- Milestone approach
- 4D Digital scenario planning
- 8 week look ahead
- Weekly plan Last Planner
- Metrics

ACT: implement changes, mitigations or improvements

- 4D what if scenarios
- Resequencing for next cycle
- Reporting with priorities and actions



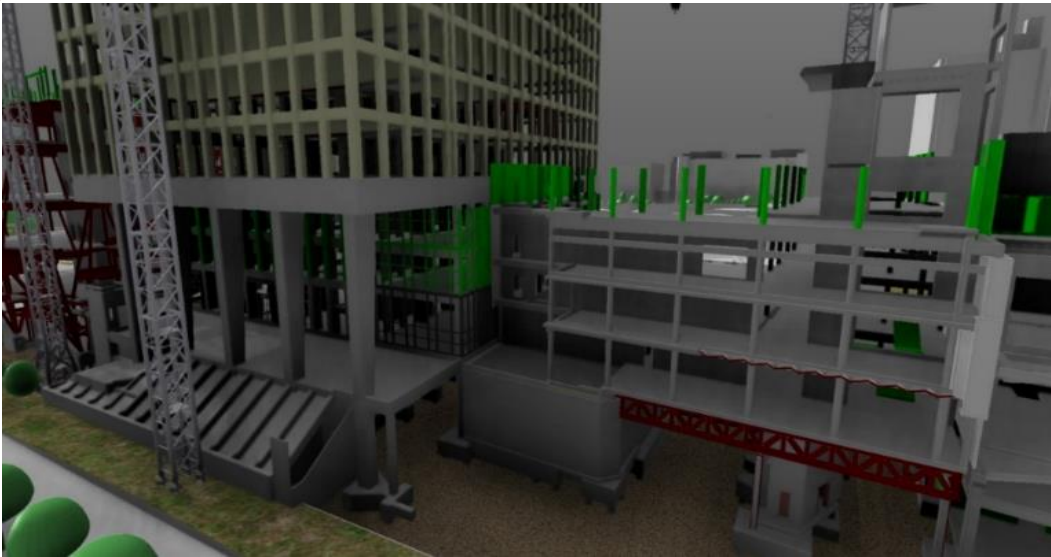
DO: Follow the plan and record data

- Last Planner update
- Recording progress and quantities

CHECK: Analyse and compare data and check outputs

- Last Planner scoring
- Milestone variances
- S-curves
- 4D Plan vs Actual

Digital Technology: 4D



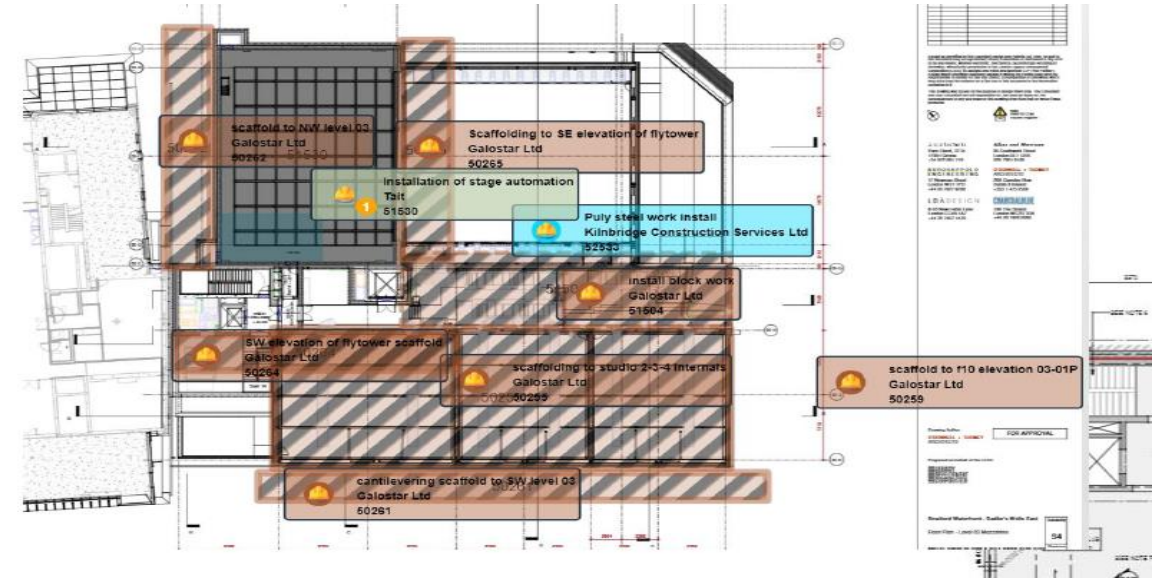
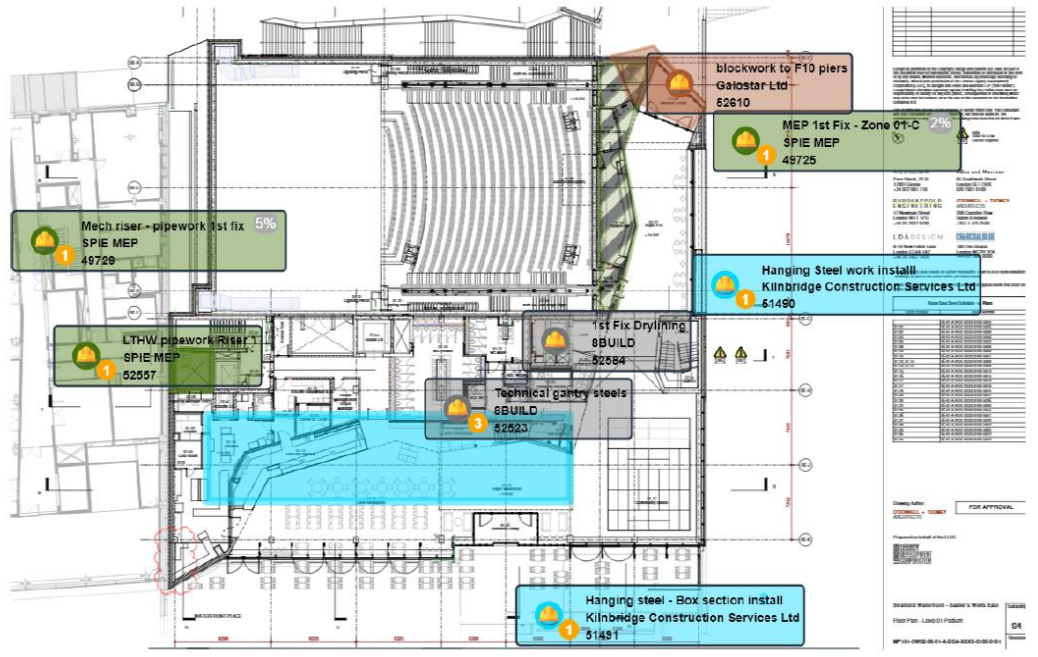
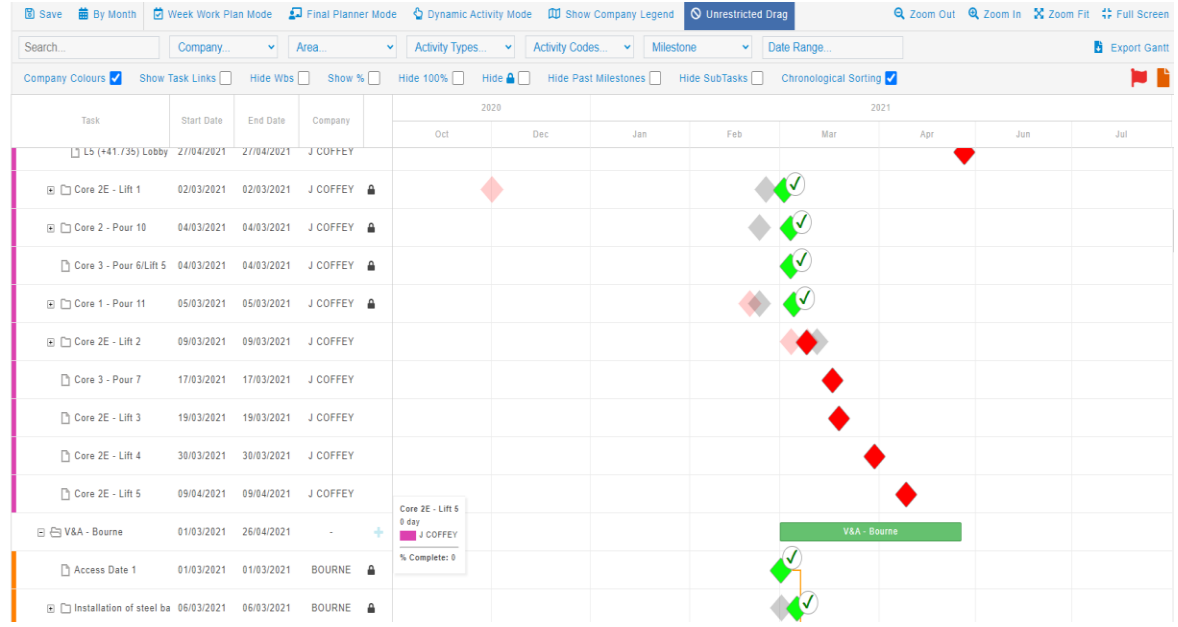
- Using Digital Technology to challenge programme interfaces and plan logistics;
- Quantity take offs from 3D model to challenge programme durations and track progress on site;
- 4D Planning to manage the interfaces.

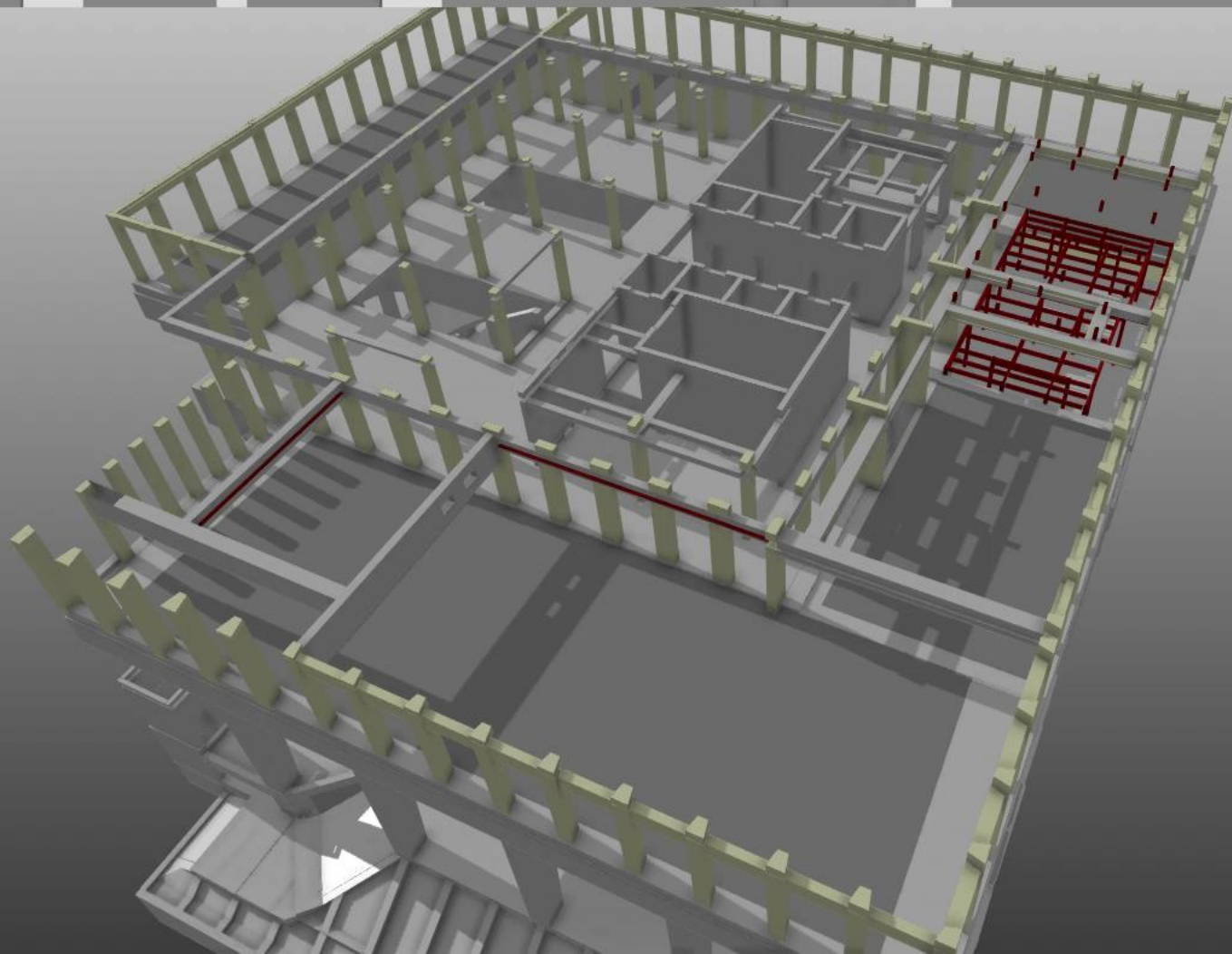
| NAME | QUANTITY | NET VOLUME, m³ | LENGTH, m | OUTER PERIMETER, m | OUTER SURFACE AREA WITHOUT TOP, m² | MAX DOUBLE FACE AREA, m² | MID DOUBLE FACE AREA, m² | MIN DOUBLE FACE AREA, m² | GROSS VOLUME, m³ |
|--|----------|----------------|-----------|--------------------|------------------------------------|--------------------------|--------------------------|--------------------------|------------------|
| IFCBEAM | | | | | | | | | |
| YCH_WALLS_Precastwall | | | | | | | | | |
| Default | | | | | | | | | |
| 10mm x 1850mm, 20mm length | 2 | 0 | 0.04 | 0.12 | 0.15 | 0.15 | 0.08 | 0 | 0 |
| 10mm x 20mm, 225mm length | 6 | 0 | 1.36 | 2.95 | 0.05 | 0.05 | 0.05 | 0 | 0 |
| 10mm x 550mm, 20mm length | 1 | 0 | 0.03 | 0.06 | 0.02 | 0.02 | 0.01 | 0 | 0 |
| 10mm x 595mm, 20mm length | 28 | 0 | 0.56 | 1.68 | 0.67 | 0.67 | 0.54 | 0.01 | 0 |
| 10mm x 910mm, 20mm length | 22 | 0 | 0.44 | 1.32 | 0.81 | 0.8 | 0.4 | 0.01 | 0 |
| 10mm x 930mm, 20mm length | 19 | 0 | 0.38 | 1.14 | 0.71 | 0.71 | 0.51 | 0.01 | 0 |
| 110mm x 8430mm, 1000mm length | 312 | 174.55 | 312.31 | 682.61 | 5925.73 | 5264.71 | 582.5 | 69.98 | 281.54 |
| 110mm x 8430mm, 1150mm length | 7 | 4.61 | 8.06 | 17.88 | 152.97 | 135.83 | 13.06 | 1.78 | 7.52 |
| 110mm x 8430mm, 1151mm length | 3 | 2.23 | 4.07 | 8.58 | 76.76 | 68.64 | 5.59 | 0.9 | 3.8 |
| 110mm x 8430mm, 1375mm length | 4 | 3.16 | 5.5 | 11.8 | 104.51 | 92.79 | 7.48 | 1.22 | 5.14 |
| 110mm x 8430mm, 2625mm length | 1 | 1.52 | 2.63 | 5.45 | 49.88 | 44.27 | 1.87 | 0.58 | 2.45 |
| 255mm x 415mm, 485mm length | 1 | 0.05 | 0.49 | 1.48 | 0.53 | 0.4 | 0.25 | 0.21 | 0.05 |
| 485mm x 415mm, 5265mm length | 1 | 1.06 | 5.26 | 11.5 | 6.92 | 5.11 | 4.37 | 0.4 | 1.06 |
| 485mm x 415mm, 6005mm length | 1 | 1.21 | 6 | 13.95 | 7.91 | 5.05 | 4.99 | 0.4 | 1.21 |
| rectangular section, 10mm x 960mm, 20mm length | 2 | 0 | 0.04 | 0.12 | 0.08 | 0.08 | 0.04 | 0 | 0 |

Digital Technology: Control Room

Solution:

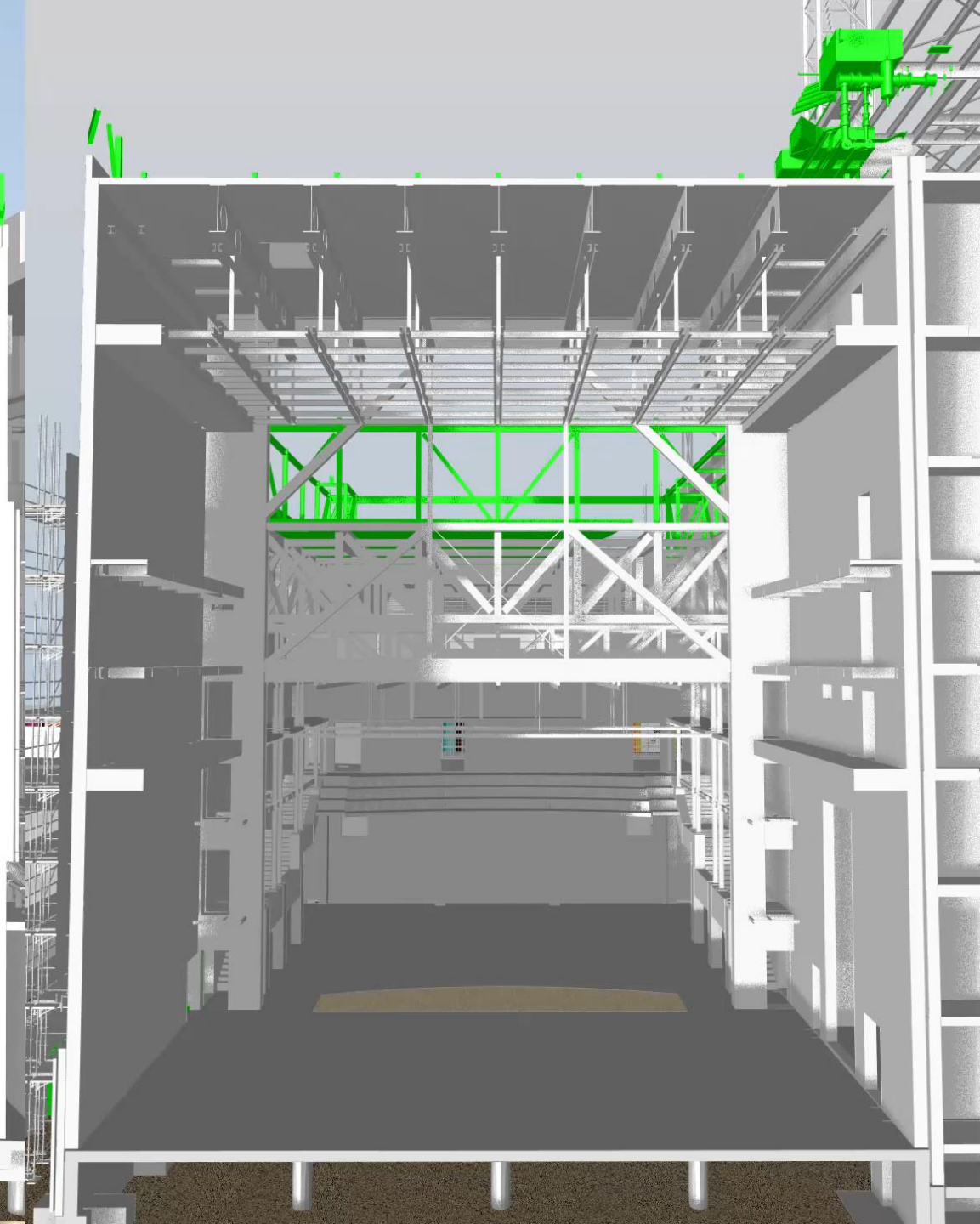
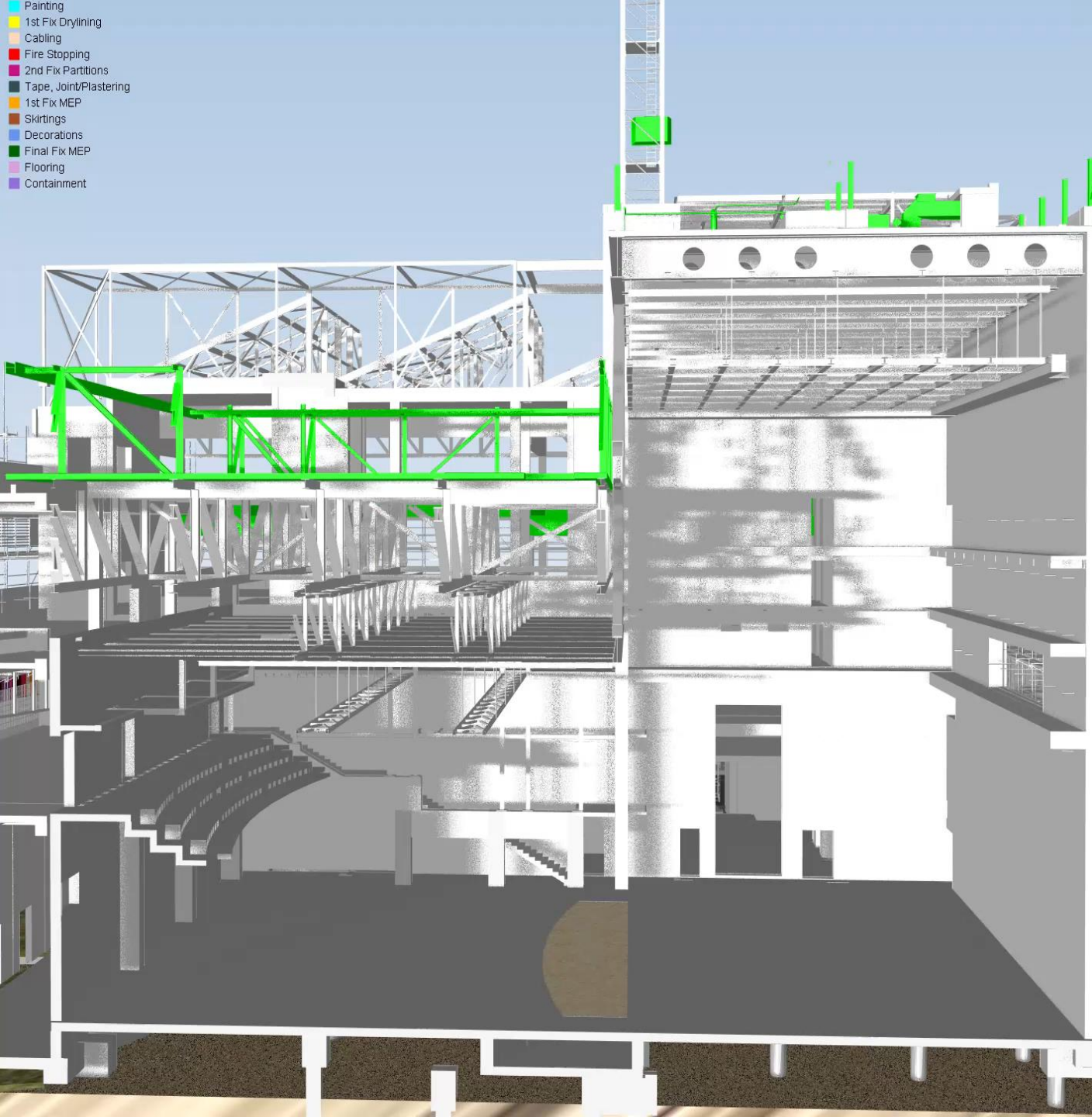
- Simple approach;
- Milestones approach with binary input to avoid subjectivity and arguments;
- Training and support provided to take them on the journey.





- Legend**
- Metalwork & Boarding
 - Conduit Drops
 - Board 2nd side
 - Fire Stopping High Level
 - Painting
 - Tape & Joint
 - Fire Stopping Low Level
 - Mist Coating
 - MEP 1st fix
 - MEP 2nd fix
 - Lagging/Insulation
 - Containment

- Painting
- 1st Fix Drying
- Cabling
- Fire Stopping
- 2nd Fix Partitions
- Tape, Joint/Plastering
- 1st Fix MEP
- Skirtings
- Decorations
- Final Fix MEP
- Flooring
- Containment



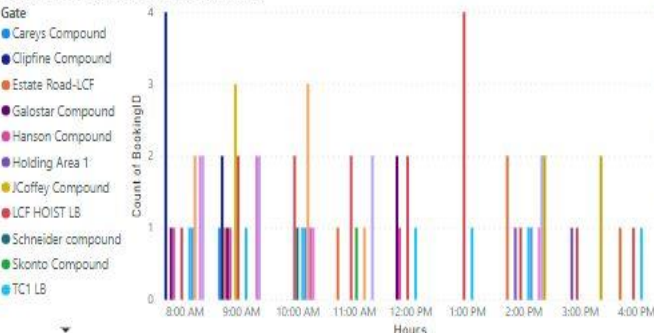
Digital Technology: Logistics

Live dashboards:

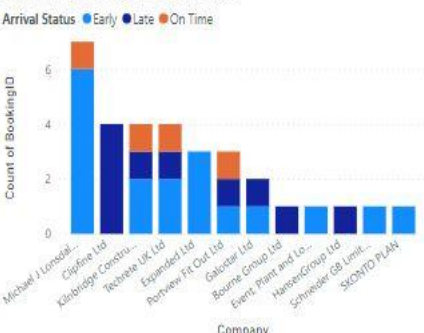
- Live dashboards to track resources and deliveries on site and compare planned vs actual.



Hourly Gate Deliveries (Planned Arrivals)

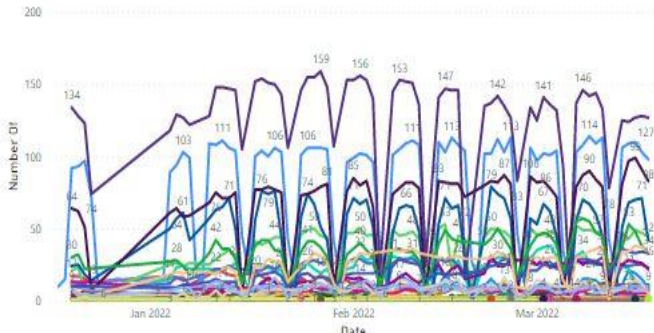
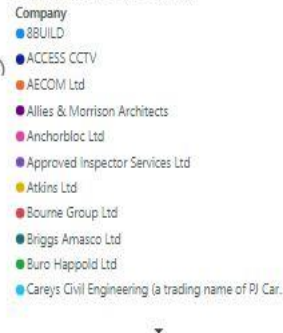


Company and Delivery Arrival Status



11/16/2019
3/13/2022

Daily Numbers By Company

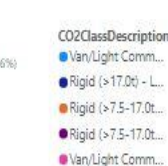
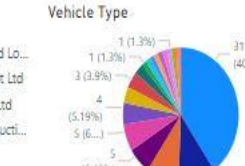
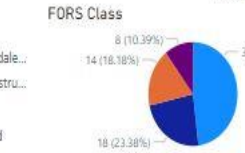
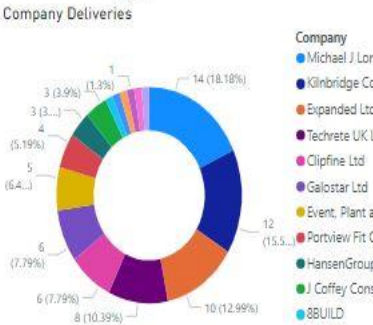
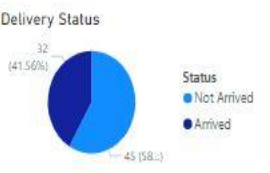


11/16/2019
3/13/2022

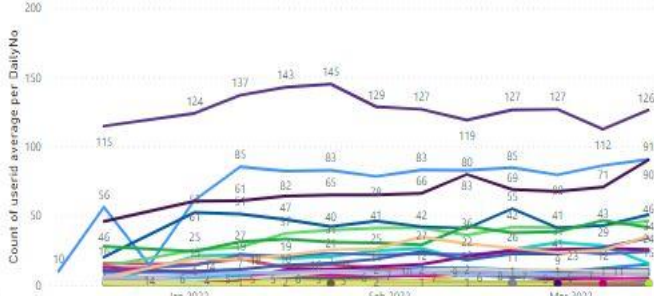
Daily Numbers By Co



77
Total Bookings Today



Weekly (Average) Numbers By Company



11/16/2019
3/13/2022

Weekly Numbers By



Use of Digital Technology: Lessons Learned



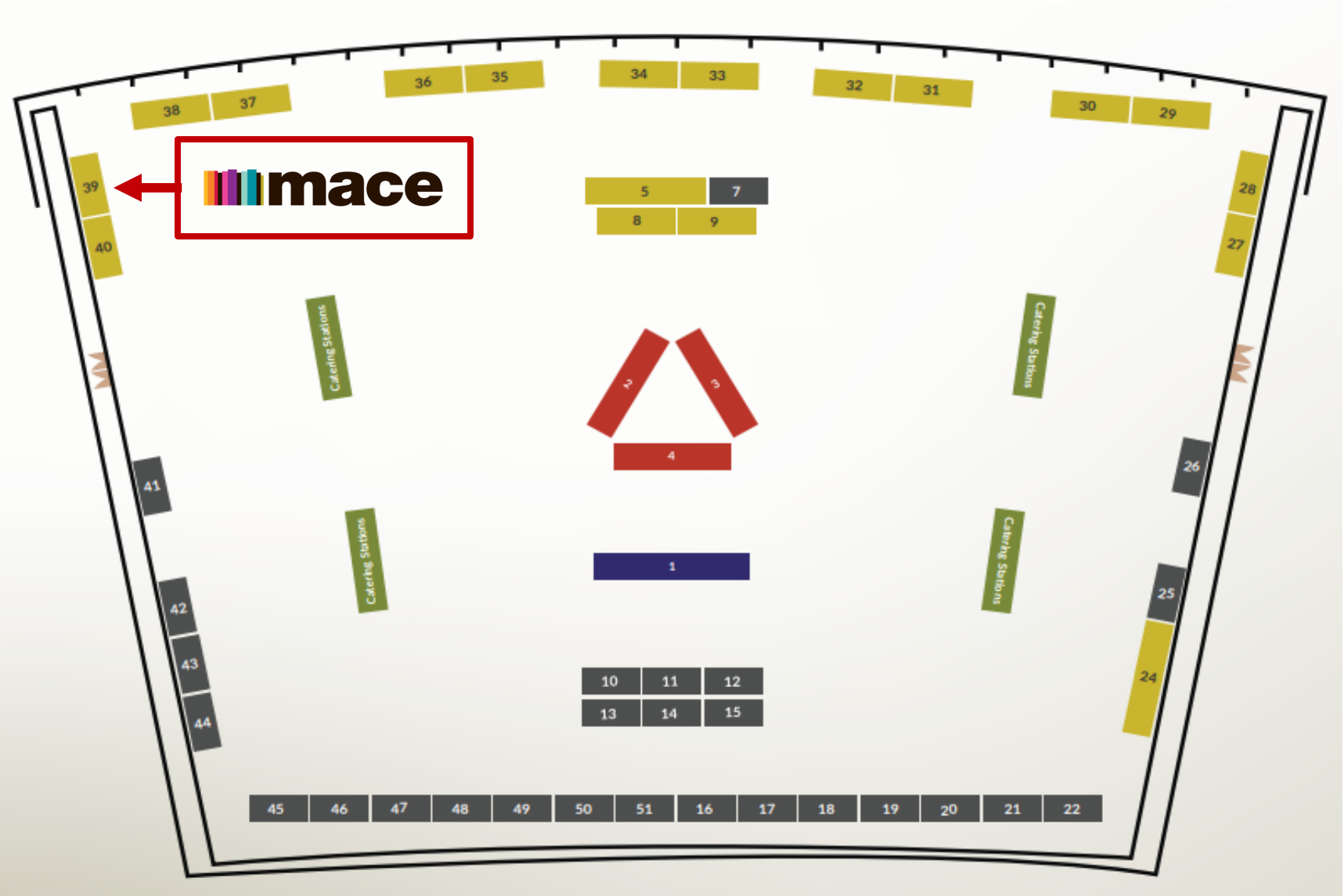
Client Reporting:

- Systems need to be built to be adaptable to align with the composition of the team and delivery life-cycle;
- Training is required and full support provided for the teams to adjust to new ways of working.
- Early integration and buy-in of client key to successful implementation.
- Deployment of updates to platform strategically staggered to ensure stability.

Supply Chain Reporting:

- Data overload can negatively impact those not generally used to it – e.g. construction managers;
- Touch screens invite interaction and collaboration;
- A visual representation is needed to bridge the skills gap;
- Thorough preparation by all parties;
- Information can be accessed remotely from the Control Room to be used as real-time centralised control of communication;

Come and visit Mace on Stand 39





MAYOR OF LONDON