

Project Controls Expo UK - 13th November 2019

Emirates Arsenal Stadium, London

Improving the reliability of Design Information for Procurement and Construction

David Prangle

Managing Consultant, Adept Management



About Me

David Prangley – Managing Consultant, Adept Management

- ~20yrs in design and project management
- Experience across different sectors, industries and scales
- Particular focus on the management of complex inter-dependent processes such as design/engineering
- Passionate about improving the understanding of these processes
- Involved in developing the next generation of design, construction and project management professionals, incl. teaching on a number of MSc programmes.
- Father of a 2yr old 😊

Where are we going

- A bit about us
- Why focus on Design / Engineering
- The Design / Engineering Process
- A Methodology for Reliability – Case Study 1
- Further Case Studies
- What Next

Adept Management

A bit about us

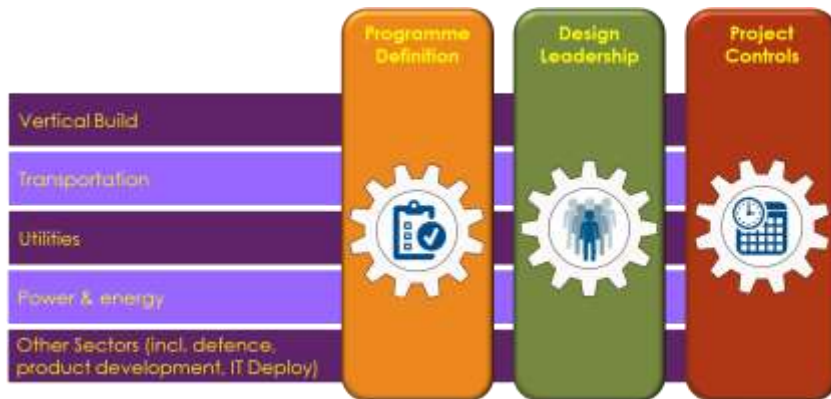


Our Story



- Industry / Academic Research (1990's)
- 1999 Quality in Construction Supreme Award for Innovation
- AML Established (2001)
- 1st Gen Tool Launched (2002) – Plan Weaver
- 2nd Gen Tool Launched (2008) – Adept Design Suite
- AML US Incorporated (2009)
- 3rd Gen Tool Launched (2018) – Flow
- Continue to innovate and develop tools and services
- Continue to support academic teaching and research

Our Services



Our Experience



Why Design / Engineering?

Industry Data



Over the last ten years in the UK across all capital projects, big and small, **design & engineering work** is as likely to be late as on time.*

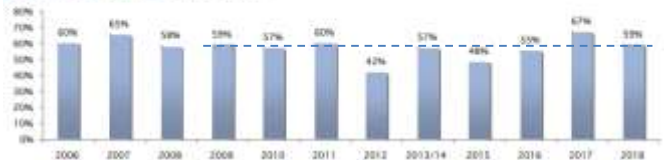
The performance trendline over those 10yrs aligns with the performance of construction

This is not unique to the UK

Predictability Time - Design



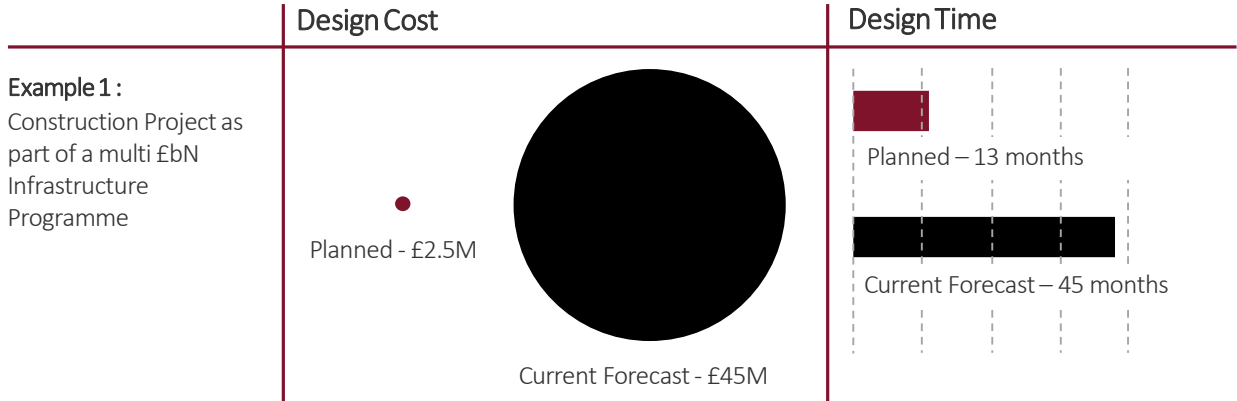
Predictability Time - Construction



* Data from UK Industry Performance Report 2019 (UK Construction KPI's)

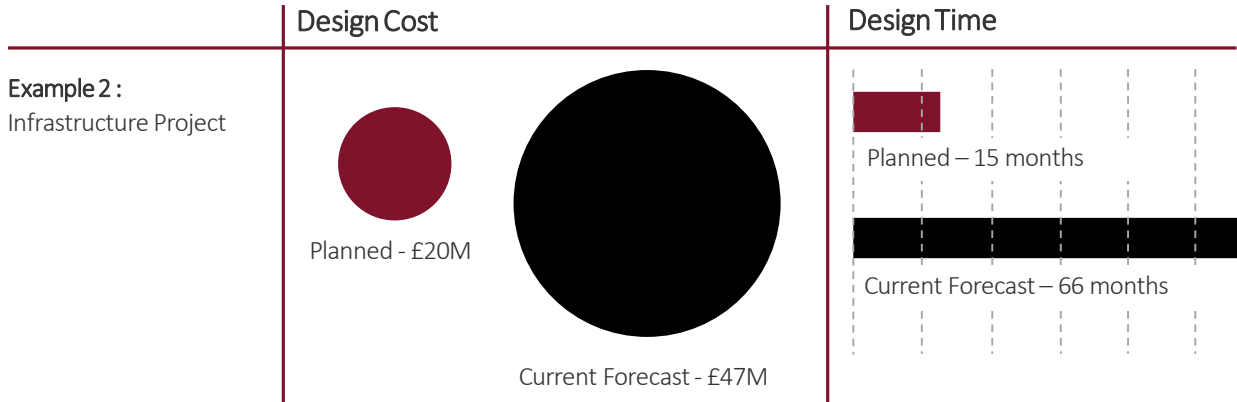
Project Data

Some specific examples;



Project Data

Some specific examples;

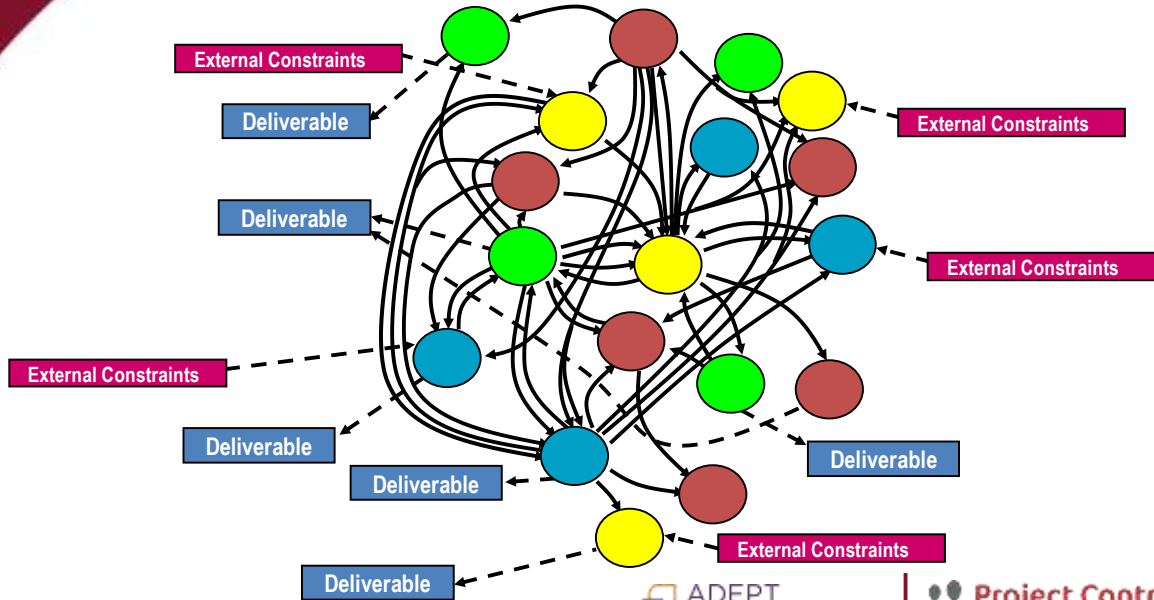


The Design / Engineering Process

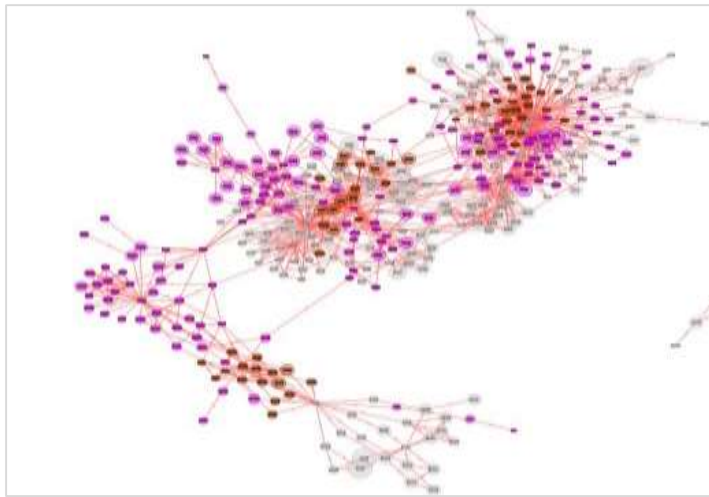
Characteristics of Design / Engineering

- Design is an iterative process
- Driven by intangible information
- Can be highly complex
- Silo-based teams
- Usually broken into sub-problems
- Can involve many people
- Normally undertaken in stages
- Value of the information increases

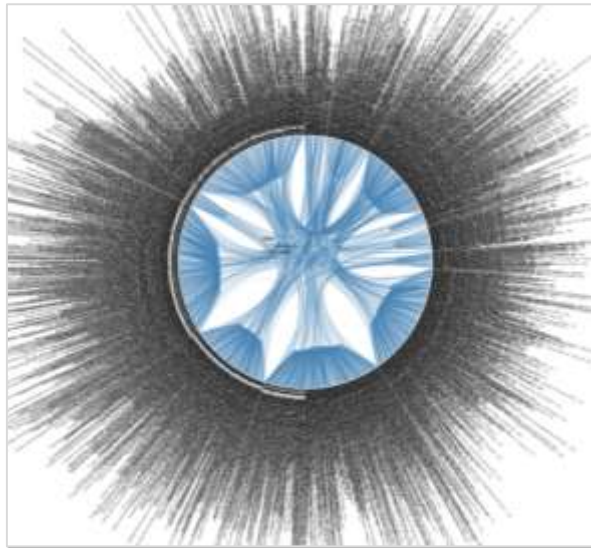
Typical Design / Engineering Process



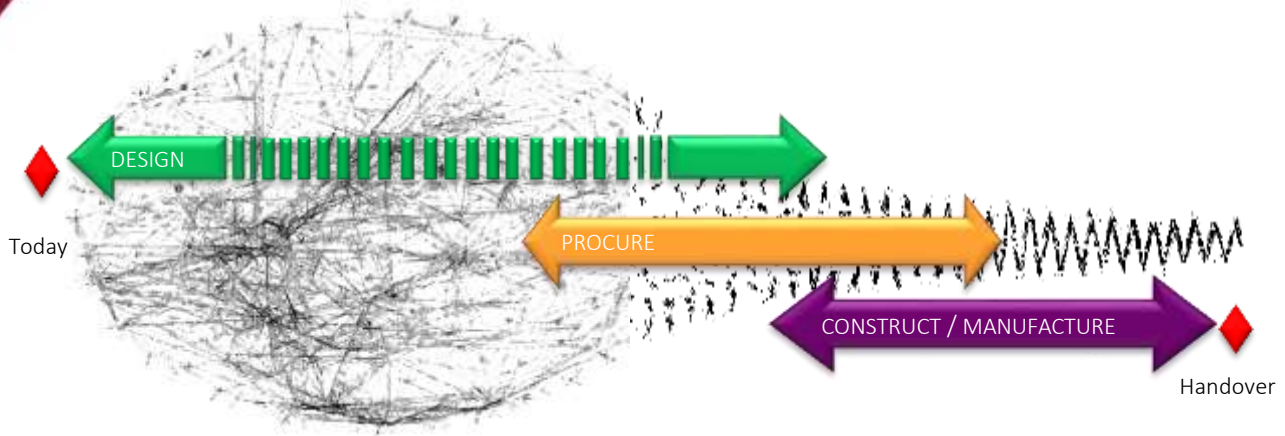
A real example



A real example



Planning Principles in Reverse



A Methodology for Reliability

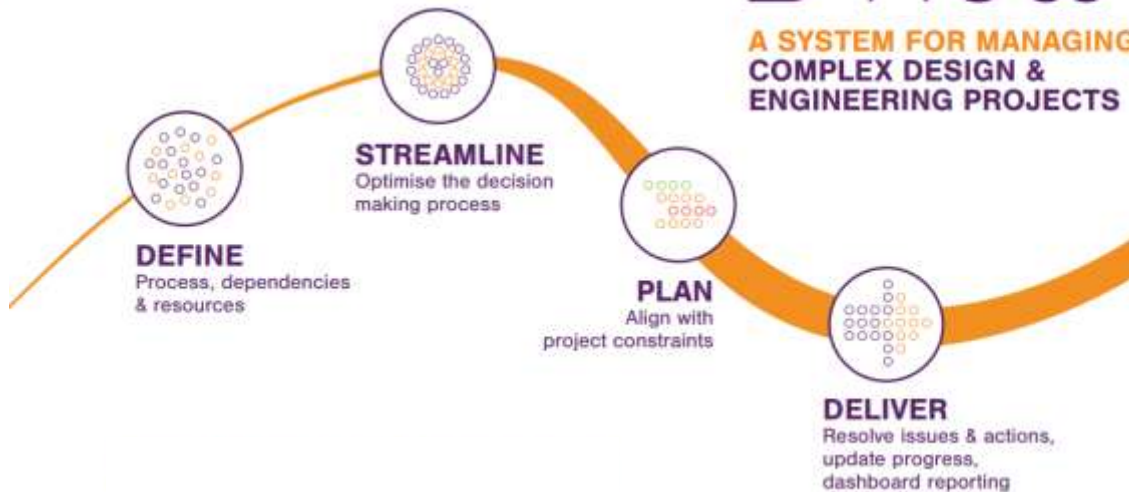
Case Study 1 - Mixed Use Development, London

Project Characteristics

- Mixed Use Commercial Development
- Combination of Refurbishment and New Build
- 4 Main Plots
- 4 Different Architects
- Complex interfaces with shared plant spaces in existing basements
- Complex interfaces with existing Heritage assets
- Complication of existing tenants in place

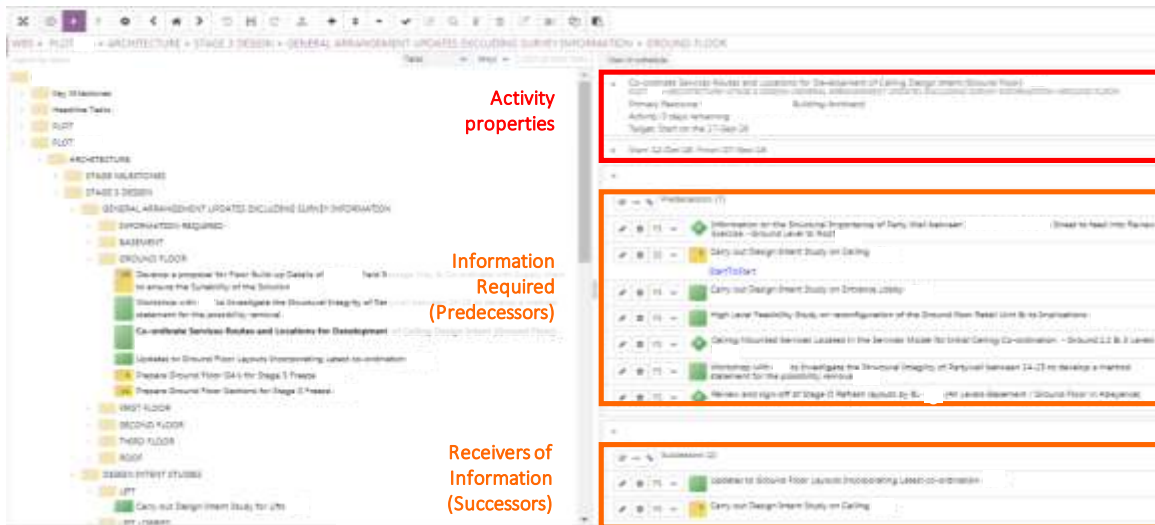


**A SYSTEM FOR MANAGING
COMPLEX DESIGN &
ENGINEERING PROJECTS**

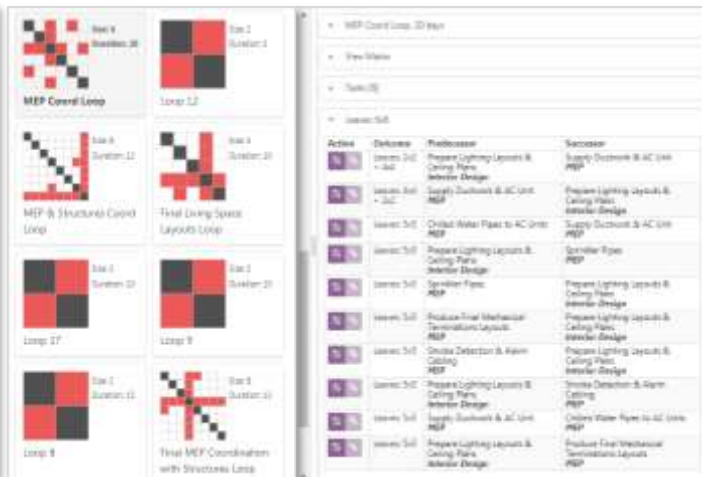
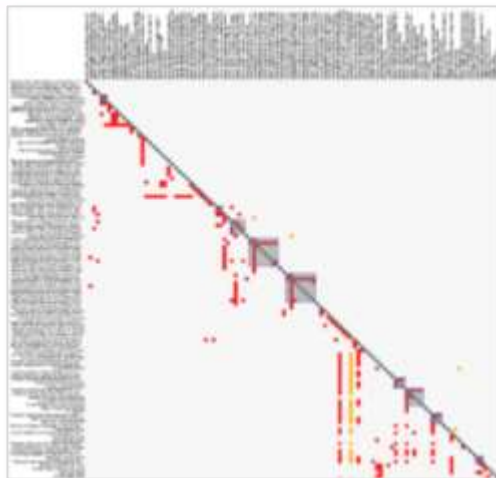




Stage 1 - Define



Stage 2 - Streamline



Stage 3 - Plan

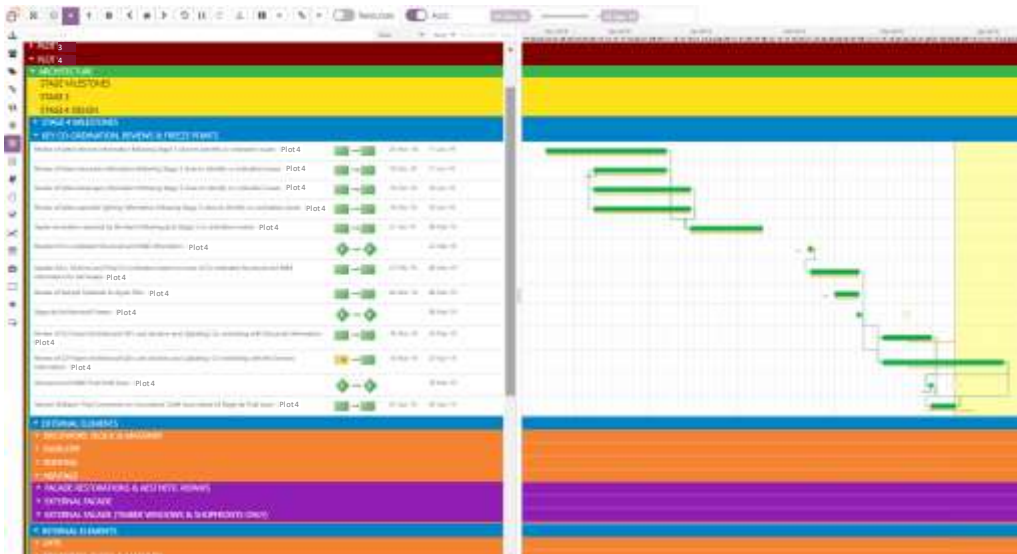
Consider Pinch-Points and Resolve before setting a baseline

Completion of Stage 3 (excl. incorporating survey information) - Plot 1	Missing (by 6 days)
Completion of Stage 3 (excl. incorporating survey information) - Plot 2	Missing (by 11 days)

Action	Task
Overlap 0 0	Completion of Stage 3 (excl. incorporating survey information) - Plot 1 (None)
Overlap 0 0	Develop Level 2 Sections for Stage 3 Design Freeze - Plot 1 (Masterplan, Plot Architect)
Overlap 0 0	Co-ordination of Lvl 2 Exposed Services to soffits with Looking at Typical Floor (i.e. Level 4) - Plot 1 (Masterplan, Plot Architect)
Overlap 0 0	Develop Level 3 Sections for Stage 3 Design Freeze - Plot 1 (Masterplan, Plot Architect)
Overlap 0 0	Develop Level 3 GA's for Stage 3 Design Freeze - Plot 1 (Masterplan, Plot Architect)
Overlap 0 0	Co-ordination of Lvl 3 Exposed Services to soffits with Arup & AKT Looking at Typical Floor (i.e. Level 4) - PI 1 (Masterplan, Plot Architect)
Overlap 0 0	W's Design Study on Finishes & Co-ordination Checks with Arup - PI 1 (Masterplan, Plot Architect)

Action	Task
Overlap 0 0	Completion of Stage 3 (excl. incorporating survey information) - Plot 2 (None)
Overlap 0 0	Issue External Window Types Matrix - Plot 2 (Building Architect)
Overlap 0 0	Develop External Window Types Matrix - Plot 2 (Building Architect)
Overlap 0 0	Develop External Window Types Sourcing Drawings & Review with the Team - Plot 2 (Building Architect)
Overlap 0 0	Developing Wall Elevation and Assembly Details - Plot 2 (Building Architect)
Overlap 0 0	Feeded Input to all Sourcing Docs and Assembly Details for the Facade - Facade Package - Plot 2 (Facade Engineer)

Stage 3 - Plan



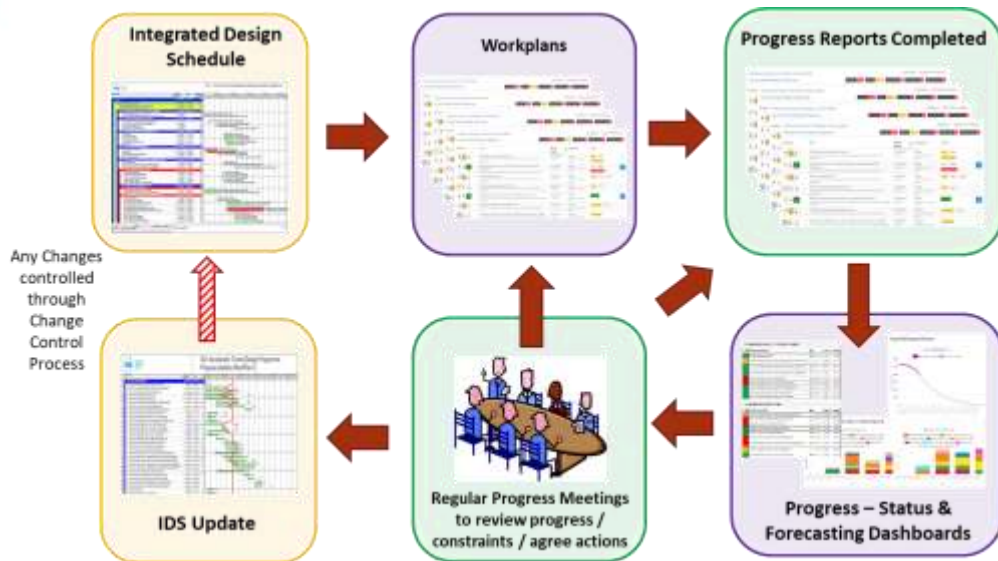
Stage 4 - Deliver



Stage 4 - Deliver



Stage 4 - Deliver



Stage 4 - Deliver

The screenshot displays a project management software interface. On the left, a sidebar lists project phases: **ACQUISITION**, **DESIGN & MANUFACTURE**, **EXTERNAL ARCHITECTURAL DEVELOPMENT**, and **INTERNAL ELEMENTS**. The main area shows a Gantt chart with tasks and their durations. A modal window titled "In Progress" is open, showing details for the task "Develop floor solution details to suit fire requirements - Plot 2".

Task Details (In Progress):

- Task: Develop floor solution details to suit fire requirements - Plot 2
- Remaining Duration: 14
- Started: 14-Jan-18
- Reason for Delay: Decision required on direction following issue of indemnification/insurance for along with costs. Type: Pending Client Decision. Issue Raised by: Building Architect. Reported on: 21-Feb-18.
- Buttons: Save, Cancel

Gantt Chart Data:

Task	Start Date	End Date	Duration	Status
Produce Co-ordinated Information and Device Specification for Access Equipment Package for Stage 4 Early Release: Plot 2	11-Apr-18	13-Apr-18	3 days	Completed
Update with and Manufacture for	16-Apr-18	25-Apr-18	9 days	On Track
Specialist Input and Strategic Decision Re	16-Apr-18	16-Apr-18	1 day	On Hold
Co-ordination and Development of 15	26-Apr-18	27-Apr-18	2 days	On Track
Produce Co-ordinated Information and D	26-Apr-18	27-Apr-18	2 days	On Track
Update with and Manufacture for	21-Apr-18	22-Apr-18	2 days	On Track
Specialist Input and Strategic Decision Re	21-Apr-18	21-Apr-18	1 day	On Hold
Co-ordination and Development of Exter	22-Apr-18	23-Apr-18	2 days	On Track
Produce Co-ordinated Information and D	26-Apr-18	27-Apr-18	2 days	On Track
Update with and Manufacture for	26-Apr-18	27-Apr-18	2 days	On Track

Stage 4 - Deliver

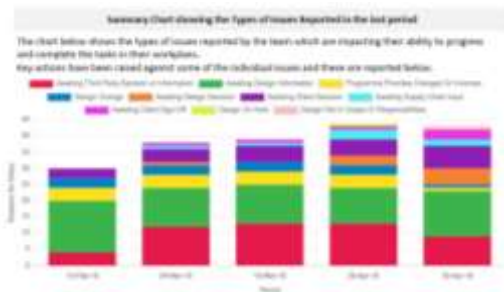
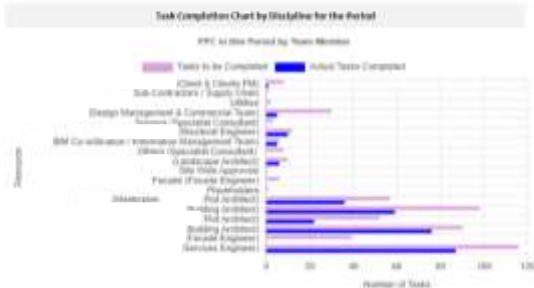
No	Action	Status	Action Owned By	Related To	Issue Raised By
101	Procurement to give feedback to JCR landscape layout - WE	24-Apr-18 2 days ago	JS procurement team	Awaiting Design Decision Feedback - is required from JCR development	NR Unknown
102	Please provide loading and IS information for plant etc within Energy Centre to allow design to progress	27-Apr-18 4 days ago	JS (Building services engineer)	Awaiting Design Information: GP - Produce linked plant layout drawing - EC	SK (Civil & Structural Engineer)
104	Please provide detailed below ground services layout information in completion software	27-Apr-18 4 days ago	M MTEP Design Management	Awaiting Design Information: Request information	SK (Civil & Structural Engineer)
107	Please provide loading and IS information for plant etc within Energy Centre to allow design to progress	27-Apr-18 4 days ago	JS (Building services engineer)	Awaiting Design Information: GP - Working indicating cable structure (3d, column and detail drawings - EC	SK (Civil & Structural Engineer)
111	submitted a foundations concrete specification for review	27-Apr-18 4 days ago	MG (Civil & Structural Engineer)	Awaiting Design Information: submitted a foundations concrete specification for review	SK (Civil & Structural Engineer)
118	MDF team to provide four final final plan for high level locations. We have not currently received anything on	19-May-18 12 days ago	MG (Civil & Structural Engineer)	Awaiting Design Information: Liaison with steel fabric company and steel authorities to agree distance limit	SK (Civil & Structural Engineer)
140	Additional building services GP requested - is referenced to the remaining Civil work. Please provide building services layout for the remaining Civil work	18-May-18 13 days ago	Design Management	Awaiting Design Information: GP - Review received IS information and agree if there are any changes to this information based on existing	SK (Civil & Structural Engineer)
171	MTEP team to provide four final final plan for high level locations. We have not currently received anything on	19-May-18 12 days ago	JS (Building services engineer)	Awaiting Design Information: GP - Review information on proposed components, i.e. RFI, IMIs, service plot for investigating in our structure design	SK (Civil & Structural Engineer)
206	MTEP team to provide four final final plan for high level locations. We have not currently received anything on	21-May-18 10 days ago	JS (Building services engineer)	Awaiting Design Information: Review volume and location of services transferring lights from	SK (Civil & Structural Engineer)
248	Design team to provide four final final plan for high level locations. We have not currently received anything on	23-May-18 8 days ago	RS (Structural/Civil Design Management)	Awaiting Design Information: CDR information is required to provide more specific road layout for the site	DK (Civil & Structural Engineer)

Stage 4 - Deliver

Key Design Delivery Milestone Health Check (One Month Lookahead)

Ref#	Key Design Delivery Milestone	Status (working days)	Target Date	Reported	Owner	Comment
8	Approval of Form 3 Received - Ground Assessment & Monitoring Action Plan	Hitting by 10 days	30-Nov-18	16-Nov-18		Approval now covers Ground Assessment and MAP,
9	Completion of Stage 3 (excl. incorporating survey information) - Plot 1	Missing (by 7 days)	16-Nov-18	27-Nov-18		are on target to achieve their revised target
10	Completion of Stage 3 (excl. incorporating survey information) - Plot 3	Missing (by 5 days)	23-Nov-18	30-Nov-18		Critical string is driven by update of structural model ordination. Architectural details are reported as on
11	Completion of Stage 3 (excl. incorporating survey information) - Plot 4	Missing (by 9 days)	30-Nov-18	13-Dec-18		Critical string is driven by completion of co-ordination originally planned. Resolutions in the subsequent to and structural models to be agreed
12	Completion of Stage 3 (excl. incorporating survey information) - Plot 2	Missing (by 5 days)	30-Nov-18	07-Dec-18		Critical string of activities involves resolution of the

Stage 4 - Deliver



A Methodology for Reliability

Case Study 2 – IT Deployment Project, Europe

Project Characteristics

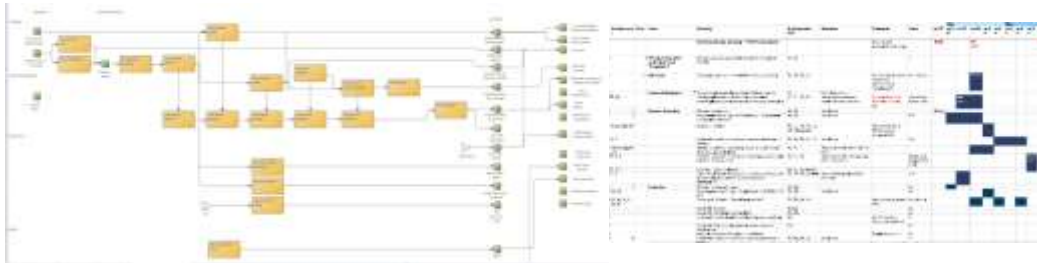
- Deployment of Oracle Fusion across of multi-national organisation
- Stakeholder managers, software integration developers and deployment professionals based in multiple continents
- Previous releases delivered under scope, late and over budget
- Complex integrations across departmental functions and embedded reporting tools
- Challenge of both Agile and Waterfall approaches to planning and management
- Time pressure imposed by switch off of existing payroll system!

Stage 1,2,3 – Define, Streamline, Plan

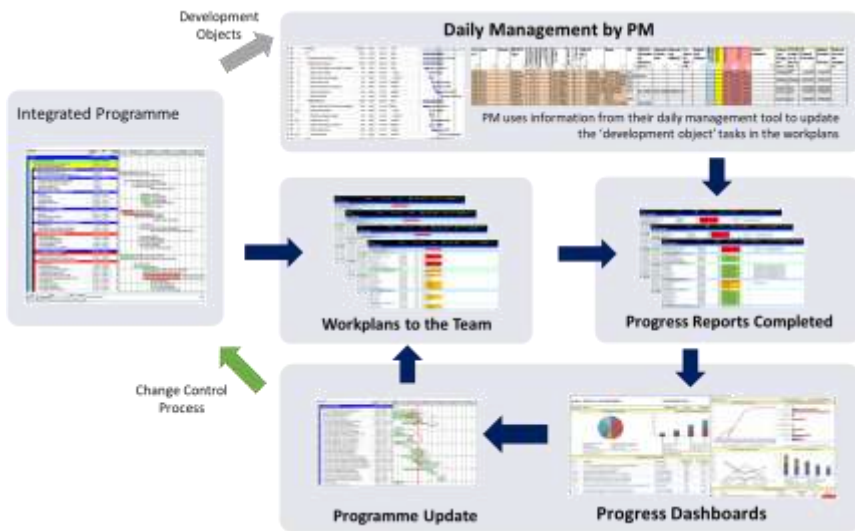
Overall Development / Deployment Process



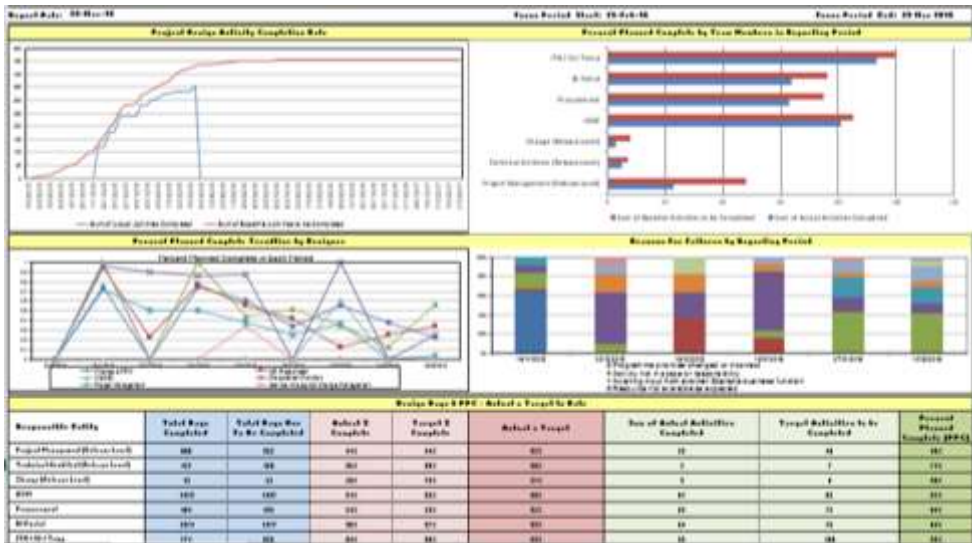
Complex integrations within and across the different stages



Stage 4 – Deliver



Stage 4 – Deliver



A Methodology for Reliability

Case Study 3 – Infrastructure Programme, Los Angeles

Project Characteristics

- Complex programme for delivering an automated people mover system at a major US airport
- 11 different projects with complex integrations within and across projects
- Over 100 different resource roles being managed across the programme
- Pace of project in certain phases required daily checks on progress and impact of progress

Stage 1,2 – Define, Streamline

The screenshot displays a software interface for project management, specifically for Stage 1,2 – Define, Streamline. The interface is divided into two main sections: a task grid on the left and a task list on the right.

Task Grid (Left): The grid contains 16 task cards, each with a unique icon and a label. The tasks are organized into four groups of four:

- Group 1: Task 1 (Loop 1), Task 2 (Loop 2), Task 3 (Loop 3), Task 4 (Loop 4)
- Group 2: Task 5 (Loop 5), Task 6 (Loop 6), Task 7 (Loop 7), Task 8 (Loop 8)
- Group 3: Task 9 (Loop 9), Task 10 (Loop 10), Task 11 (Loop 11), Task 12 (Loop 12)
- Group 4: Task 13 (Loop 13), Task 14 (Loop 14), Task 15 (Loop 15), Task 16 (Loop 16)

Task List (Right): The task list shows a summary of the tasks, including their status, priority, and due date. The tasks are listed in a table format:

Task	Status	Priority	Due Date
Task 1	Not Started	High	2023-10-10
Task 2	Not Started	High	2023-10-10
Task 3	Not Started	High	2023-10-10
Task 4	Not Started	High	2023-10-10
Task 5	Not Started	High	2023-10-10
Task 6	Not Started	High	2023-10-10
Task 7	Not Started	High	2023-10-10
Task 8	Not Started	High	2023-10-10
Task 9	Not Started	High	2023-10-10
Task 10	Not Started	High	2023-10-10
Task 11	Not Started	High	2023-10-10
Task 12	Not Started	High	2023-10-10
Task 13	Not Started	High	2023-10-10
Task 14	Not Started	High	2023-10-10
Task 15	Not Started	High	2023-10-10
Task 16	Not Started	High	2023-10-10

Stage 3,4 – Plan, Deliver



What Next

Lessons Learned over the last 20 yrs

- A detailed design / engineering programme is not optional
- The design / engineering process is repeatable : define it and then re-use the process
- Building a culture of honesty, transparency and integrity in reporting is critical
- The solution develops with increasing certainty and diminishing flexibility
- Manage intangible information, not just tangible deliverables
- Recognise when assumptions are being made, and the risk they represent
- BIM still requires a process to be defined and managed
- 80% complete isn't good enough; that represents risk
- Procurement of specialist sub-contractors is a critical part of the design process
- The skills/tools we've developed are transferable across industries / sectors

What Next



A new community for all those involved in the leadership of the design process

Launching Q1 2020

Please contact me if you'd like to join us

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Any Questions