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# *'Just give me the design!':*

## Design delivery performance and the implications on assumptions, technical debt, and the project lifecycle

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**Outcome focused**

**Reduce risk / increase certainty**

**Programme Governance & Assurance**

Workflow 'flow' control

Design / Project Management

Project Controls

**Our Tools & Technology** (current & future)

**Our Experience & Industry Knowledge**

**Our People** (40+ internal: extended capability brings +60)

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*Just give me the design!*

*Just keep it high level*

*I just want a deliverables list!*

*I don't want to scare the designers*

*I don't pay you to get the assumptions wrong!*

# On ‘mixed use development’ projects, what type of issue is the most commonly reported reason for delaying designers from completing their tasks?

- ❑ Contractor Related Issue
- ❑ Awaiting Design Information
- ❑ Client Related Issue
- ❑ Design Change

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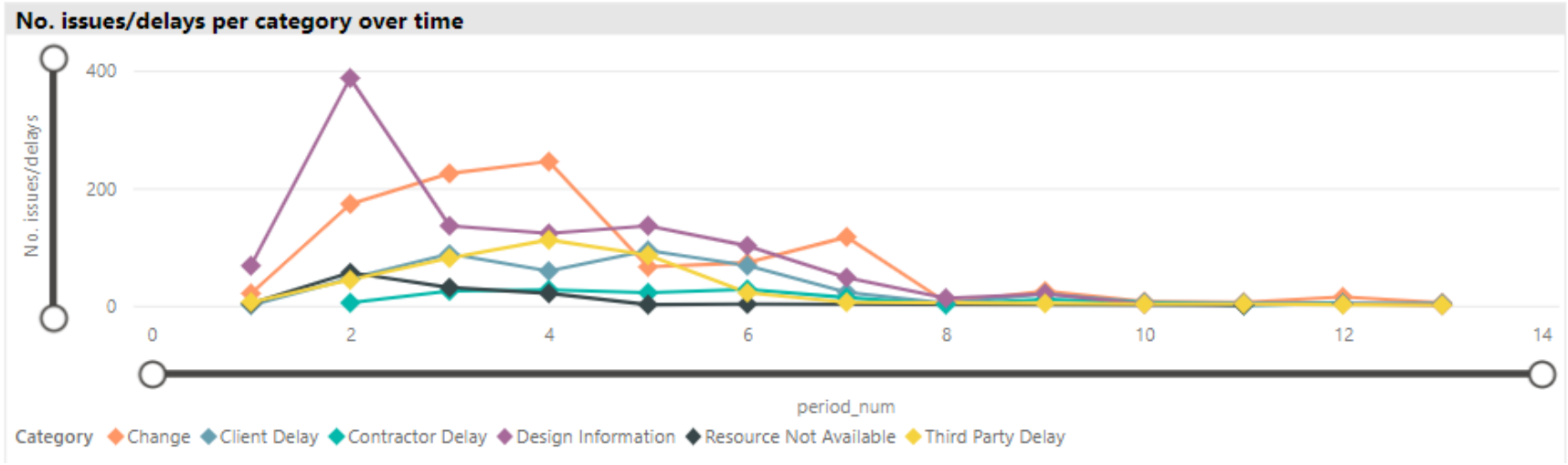


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# On rail projects, what type of issue is the most commonly reported reason for delaying designers from completing their tasks?

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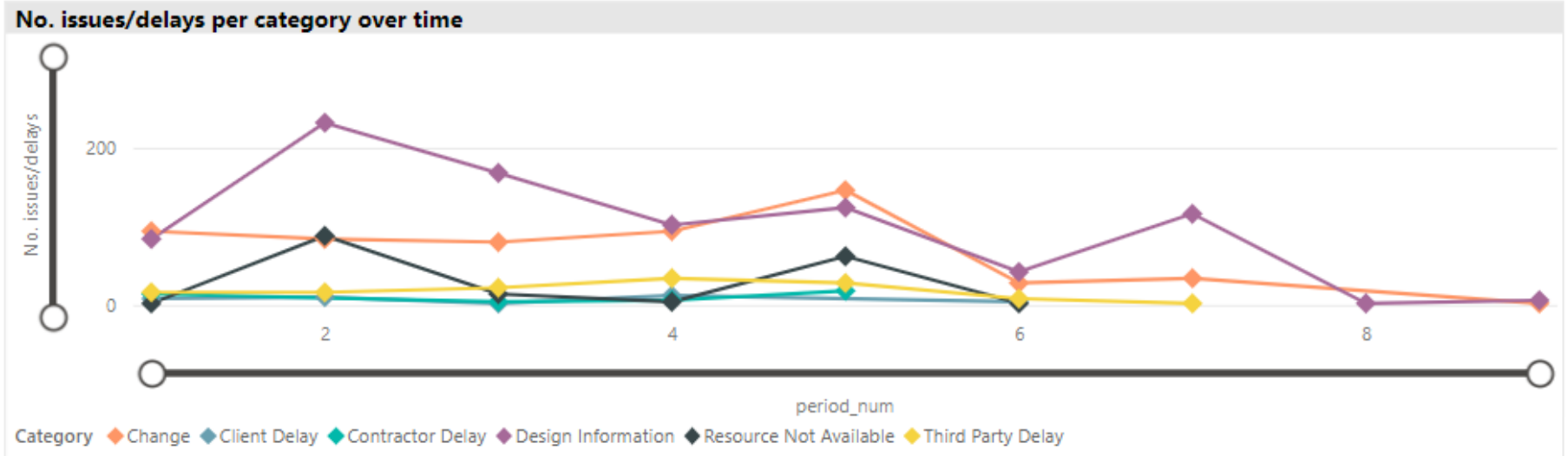


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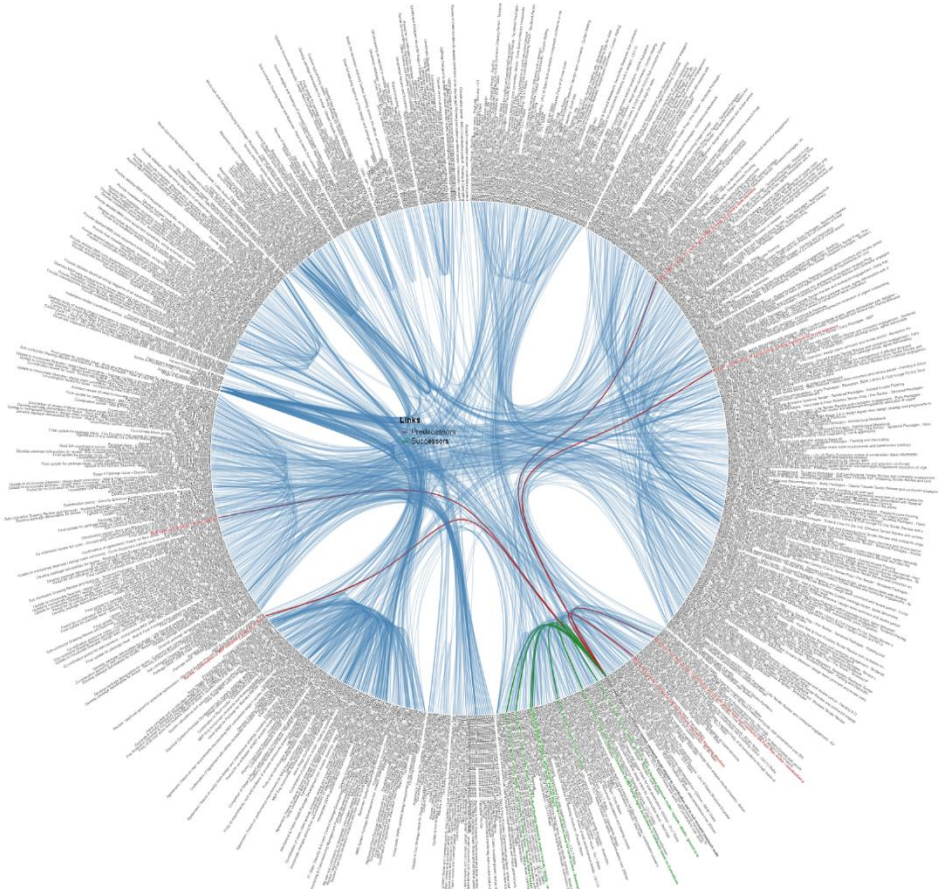
# In percentage terms, what proportion of tasks do the designers commence without the necessary information?

- ❑ 8 %
- ❑ 22 %
- ❑ 28%
- ❑ 42%
- ❑ No Idea

# What makes the design process different?

- Typically, highly complex exchanges of information across a network
- Information is the common currency
- Silo-oriented – by specialism
- Requires progressive fixity (chill to freeze)…
- Moves through several sub-phases / stages

  …which requires timely decision-making
- It is an iterative process
- Change is constant (or is it just design development?)
- **Iteration used to enhance certainty**
  - Drive for ‘zero latency’ (information now!)
  - Ambiguity accrual / technical debt accrual



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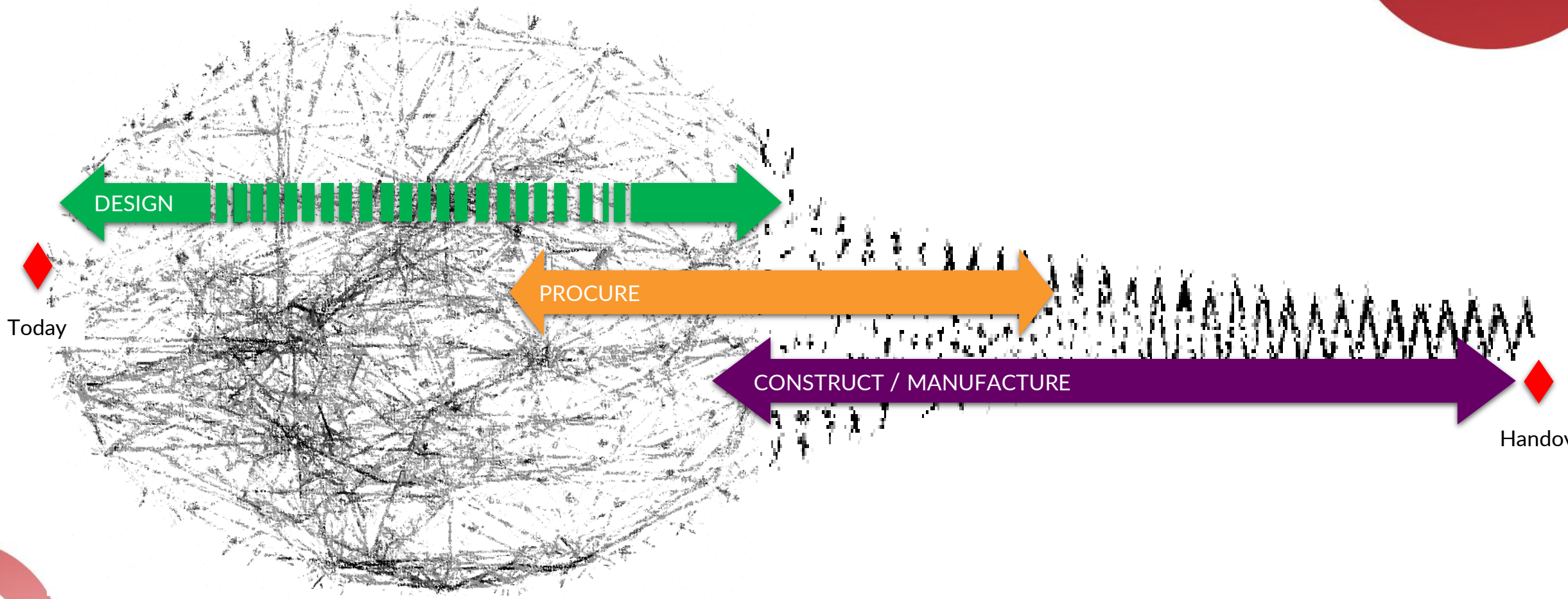
# Planning Principles in Reverse

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# Technical debt: a definition (or sorts)

Originating in the Software Development industry:

- *"Technical debt – or code debt – is the consequence of software development decisions that result in prioritizing speed or release over the [most] well-designed code. It is often the result of using quick fixes and patches rather than full-scale solutions."*

Translating that into construction design:

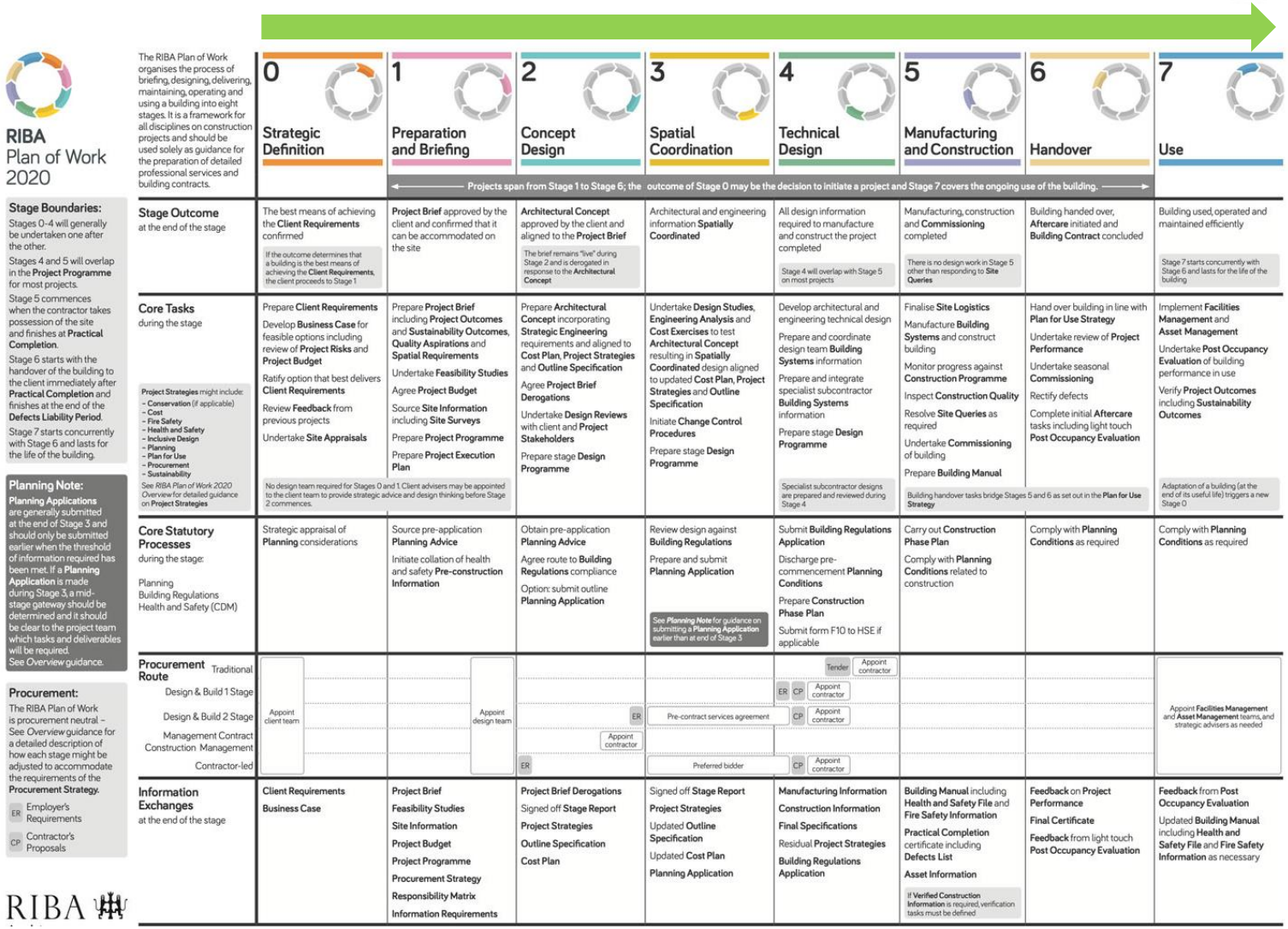
- *"Technical debt is the consequence of design decisions that result in prioritizing speed or information release / design submission over the [most] well-designed solution. It is often the result of applying assumptions to enable progression rather than allowing time for the iteration and collaborative working that is needed to develop the optimum solutions."*

# Traditional understanding of design process

Input


Output

# Enhanced models of the design process



RIBA Plan of Work 2020

The RIBA Plan of Work organises the process of briefing, designing, delivering, maintaining, operating and using a building into eight stages. It is a framework for all disciplines on construction projects and should be used solely as guidance for the preparation of detailed professional services and building contracts.

| | 0 Strategic Definition | 1 Preparation and Briefing | 2 Concept Design | 3 Spatial Coordination | 4 Technical Design | 5 Manufacturing and Construction | 6 Handover | 7 Use |
|---|---|---|---|---|---|---|---|---|
| | Projects span from Stage 1 to Stage 6; the outcome of Stage 0 may be the decision to initiate a project and Stage 7 covers the ongoing use of the building. | | | | | | | |
| **Stage Outcome** at the end of the stage | The best means of achieving the **Client Requirements** confirmed. If the outcome determines that a building is the best means of achieving the **Client Requirements**, the client proceeds to Stage 1 | **Project Brief** approved by the client and confirmed that it can be accommodated on the site | **Architectural Concept** approved by the client and aligned to the **Project Brief**. The brief remains "live" during Stage 2 and is derogated in response to the **Architectural Concept** | Architectural and engineering information **Spatially Coordinated** | All design information required to manufacture and construct the project completed. Stage 4 will overlap with Stage 5 on most projects | Manufacturing, construction and **Commissioning** completed. There is no design work in Stage 5 other than responding to **Site Queries** | Building handed over, **Aftercare** initiated and **Building Contract** concluded | Building used, operated and maintained efficiently. Stage 7 starts concurrently with Stage 6 and lasts for the life of the building |
| **Core Tasks** during the stage | Prepare **Client Requirements**<br>Develop **Business Case** for feasible options including review of **Project Risks** and **Project Budget**<br>Ratify option that best delivers **Client Requirements**<br>Review **Feedback** from previous projects<br>Undertake **Site Appraisals** | Prepare **Project Brief** including **Project Outcomes** and **Sustainability Outcomes**, **Quality Aspirations** and **Spatial Requirements**<br>Undertake **Feasibility Studies**<br>Agree **Project Budget**<br>Source **Site Information** including **Site Surveys**<br>Prepare **Project Programme**<br>Prepare **Project Execution Plan** | Prepare **Architectural Concept** incorporating **Strategic Engineering** requirements and aligned to **Cost Plan**, **Project Strategies** and **Outline Specification**<br>Agree **Project Brief Derogations**<br>Undertake **Design Reviews** with client and **Project Stakeholders**<br>Prepare stage **Design Programme** | Undertake **Design Studies**, **Engineering Analysis** and **Cost Exercises** to test **Architectural Concept** resulting in **Spatially Coordinated** design aligned to updated **Cost Plan**, **Project Strategies** and **Outline Specification**<br>Initiate **Change Control Procedures**<br>Prepare stage **Design Programme** | Develop architectural and engineering technical design<br>Prepare and coordinate design team **Building Systems** information<br>Prepare and integrate specialist subcontractor **Building Systems** information<br>Prepare stage **Design Programme** | Finalise **Site Logistics**<br>Manufacture **Building Systems** and construct building<br>Monitor progress against **Construction Programme**<br>Inspect **Construction Quality**<br>Resolve **Site Queries** as required<br>Undertake **Commissioning** of building<br>Prepare **Building Manual** | Hand over building in line with **Plan for Use Strategy**<br>Undertake review of **Project Performance**<br>Undertake seasonal **Commissioning**<br>Rectify defects<br>Complete initial **Aftercare** tasks including light touch **Post Occupancy Evaluation** | Implement **Facilities Management** and **Asset Management**<br>Undertake **Post Occupancy Evaluation** of building performance in use<br>Verify **Project Outcomes** including **Sustainability Outcomes** |
| | **Project Strategies** might include: – **Conservation** (if applicable) – **Cost** – **Fire Safety** – **Health and Safety** – **Inclusive Design** – **Planning** – **Plan for Use** – **Procurement** – **Sustainability**. See *RIBA Plan of Work 2020 Overview* for detailed guidance on **Project Strategies**. No design team required for Stages 0 and 1. Client advisers may be appointed to the client team to provide strategic advice and design thinking before Stage 2 commences. | | | | Specialist subcontractor designs are prepared and reviewed during Stage 4 | Building handover tasks bridge Stages 5 and 6 as set out in the **Plan for Use Strategy** | | Adaptation of a building (at the end of its useful life) triggers a new Stage 0 |
| **Core Statutory Processes** during the stage: Planning, Building Regulations, Health and Safety (CDM) | Strategic appraisal of **Planning** considerations | Source pre-application **Planning Advice**<br>Initiate collation of health and safety **Pre-construction Information** | Obtain pre-application **Planning Advice**<br>Agree route to **Building Regulations** compliance<br>Option: submit outline **Planning Application** | Review design against **Building Regulations**<br>Prepare and submit **Planning Application**<br>See ***Planning Note*** for guidance on submitting a **Planning Application** earlier than at end of Stage 3 | Submit **Building Regulations Application**<br>Discharge pre-commencement **Planning Conditions**<br>Prepare **Construction Phase Plan**<br>Submit form F10 to HSE if applicable | Carry out **Construction Phase Plan**<br>Comply with **Planning Conditions** related to construction | Comply with **Planning Conditions** as required | Comply with **Planning Conditions** as required |
| **Procurement Route** Traditional | Appoint client team | Appoint design team | | | Tender; Appoint contractor | | | Appoint **Facilities Management** and **Asset Management** teams, and strategic advisers as needed |
| Design & Build 1 Stage | | | | | ER; CP; Appoint contractor | | | |
| Design & Build 2 Stage | | | ER; Appoint contractor | Pre-contract services agreement | CP; Appoint contractor | | | |
| Management Contract / Construction Management | | | ER | Preferred bidder | CP; Appoint contractor | | | |
| Contractor-led | | | | | | | | |
| **Information Exchanges** at the end of the stage | **Client Requirements**<br>**Business Case** | **Project Brief**<br>**Feasibility Studies**<br>**Site Information**<br>**Project Budget**<br>**Project Programme**<br>**Procurement Strategy**<br>**Responsibility Matrix**<br>**Information Requirements** | **Project Brief Derogations**<br>Signed off **Stage Report**<br>**Project Strategies**<br>**Outline Specification**<br>**Cost Plan** | Signed off **Stage Report**<br>**Project Strategies**<br>Updated **Outline Specification**<br>Updated **Cost Plan**<br>**Planning Application** | **Manufacturing Information**<br>**Construction Information**<br>**Final Specifications**<br>Residual **Project Strategies**<br>**Building Regulations Application** | **Building Manual** including **Health and Safety File** and **Fire Safety Information**<br>**Practical Completion** certificate including **Defects List**<br>**Asset Information**<br>If **Verified Construction Information** is required, verification tasks must be defined | **Feedback** on **Project Performance**<br>**Final Certificate**<br>**Feedback** from light touch **Post Occupancy Evaluation** | **Feedback** from **Post Occupancy Evaluation**<br>Updated **Building Manual** including **Health and Safety File** and **Fire Safety Information** as necessary |

**Stage Boundaries:**
Stages 0–4 will generally be undertaken one after the other.
Stages 4 and 5 will overlap in the **Project Programme** for most projects.
Stage 5 commences when the contractor takes possession of the site and finishes at **Practical Completion**.
Stage 6 starts with the handover of the building to the client immediately after **Practical Completion** and finishes at the end of the **Defects Liability Period**.
Stage 7 starts concurrently with Stage 6 and lasts for the life of the building.

**Planning Note:**
**Planning Applications** are generally submitted at the end of Stage 3 and should only be submitted earlier when the threshold of information required has been met. If a **Planning Application** is made during Stage 3, a mid-stage gateway should be determined and it should be clear to the project team which tasks and deliverables will be required. See *Overview* guidance.

**Procurement:**
The RIBA Plan of Work is procurement neutral – See *Overview* guidance for a detailed description of how each stage might be adjusted to accommodate the requirements of the **Procurement Strategy**.
ER Employer's Requirements
CP Contractor's Proposals

RIBA

Extract from the RIBA plan of work - )

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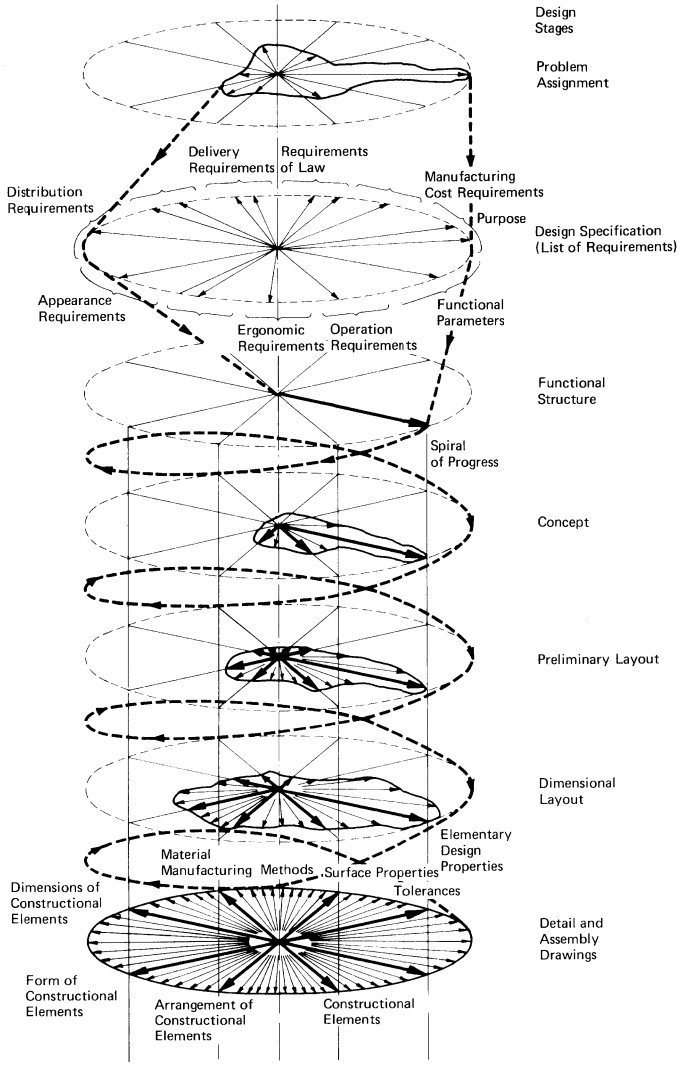
# Enhanced models of the design process




*Hubka's model on the application of the degrees of completeness (Hubka 1980)*

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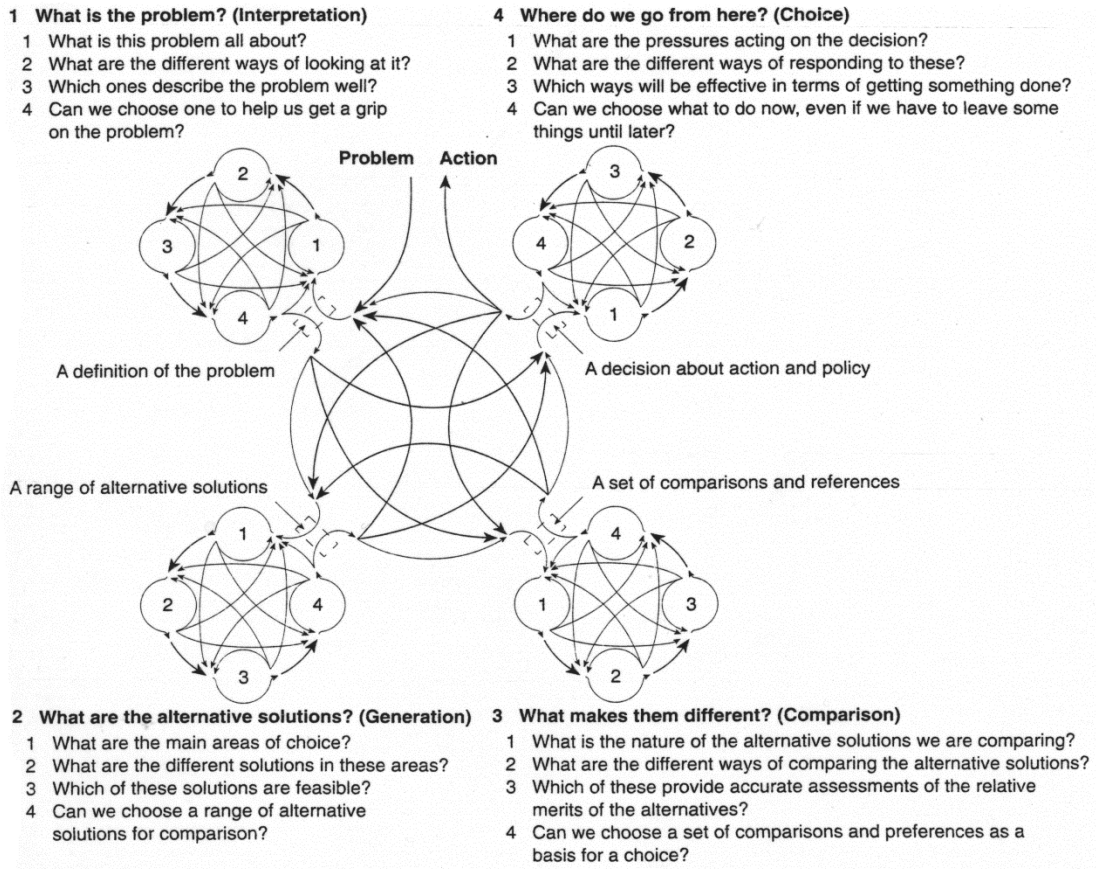


*Hickling's (1982) 'continuous whirling process' model of design (from Gray 1994)*

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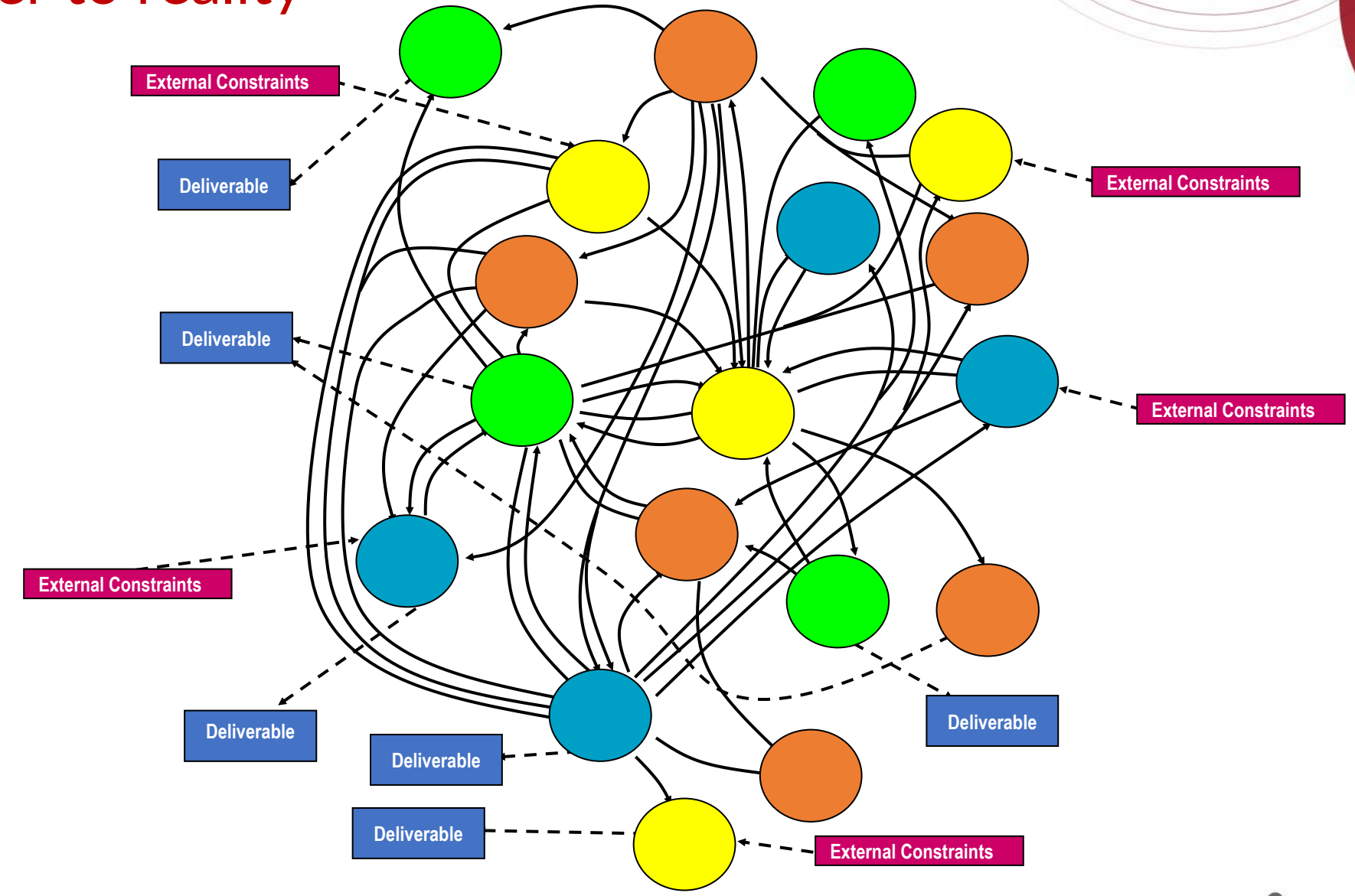
# Closer to reality

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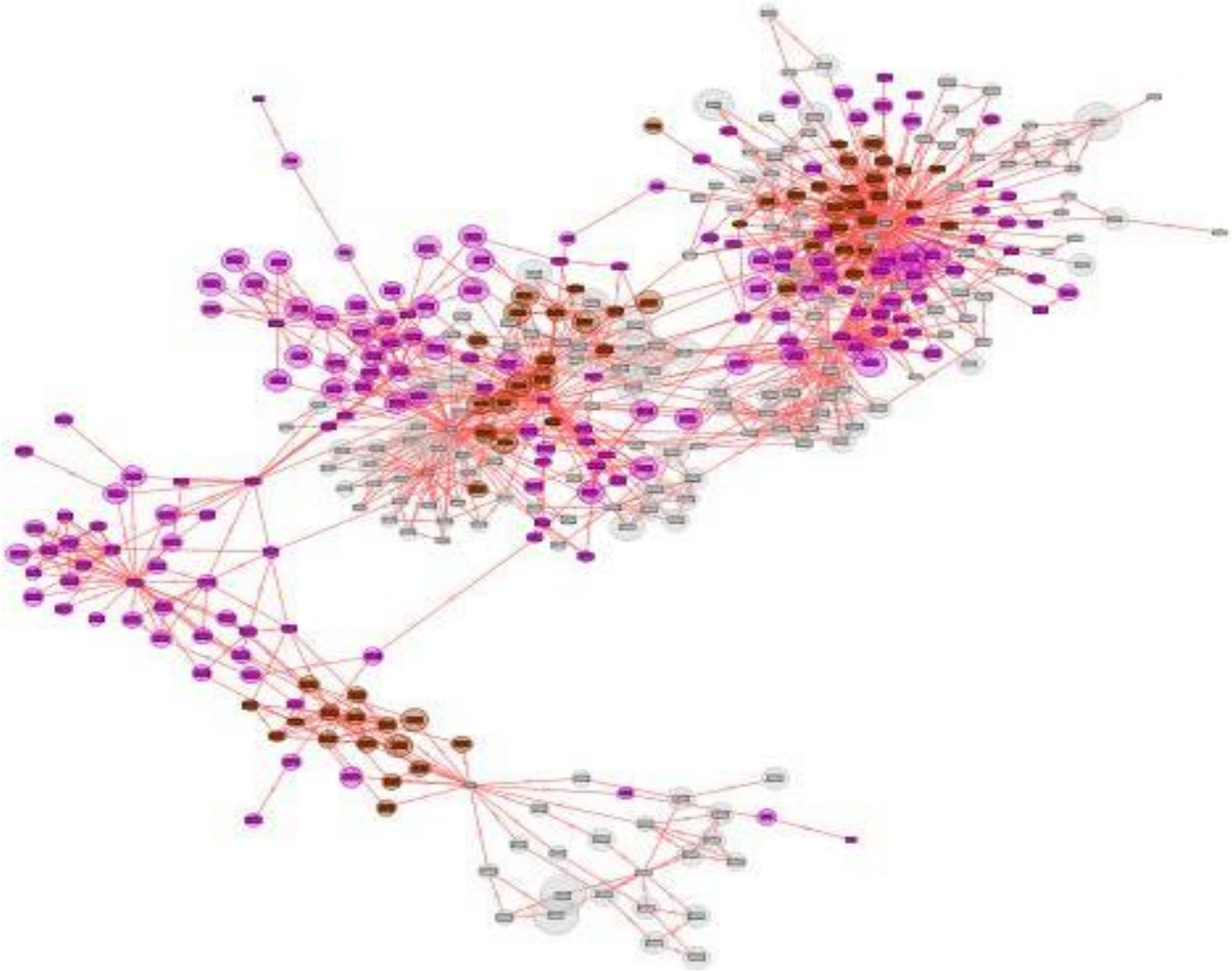
# In reality!



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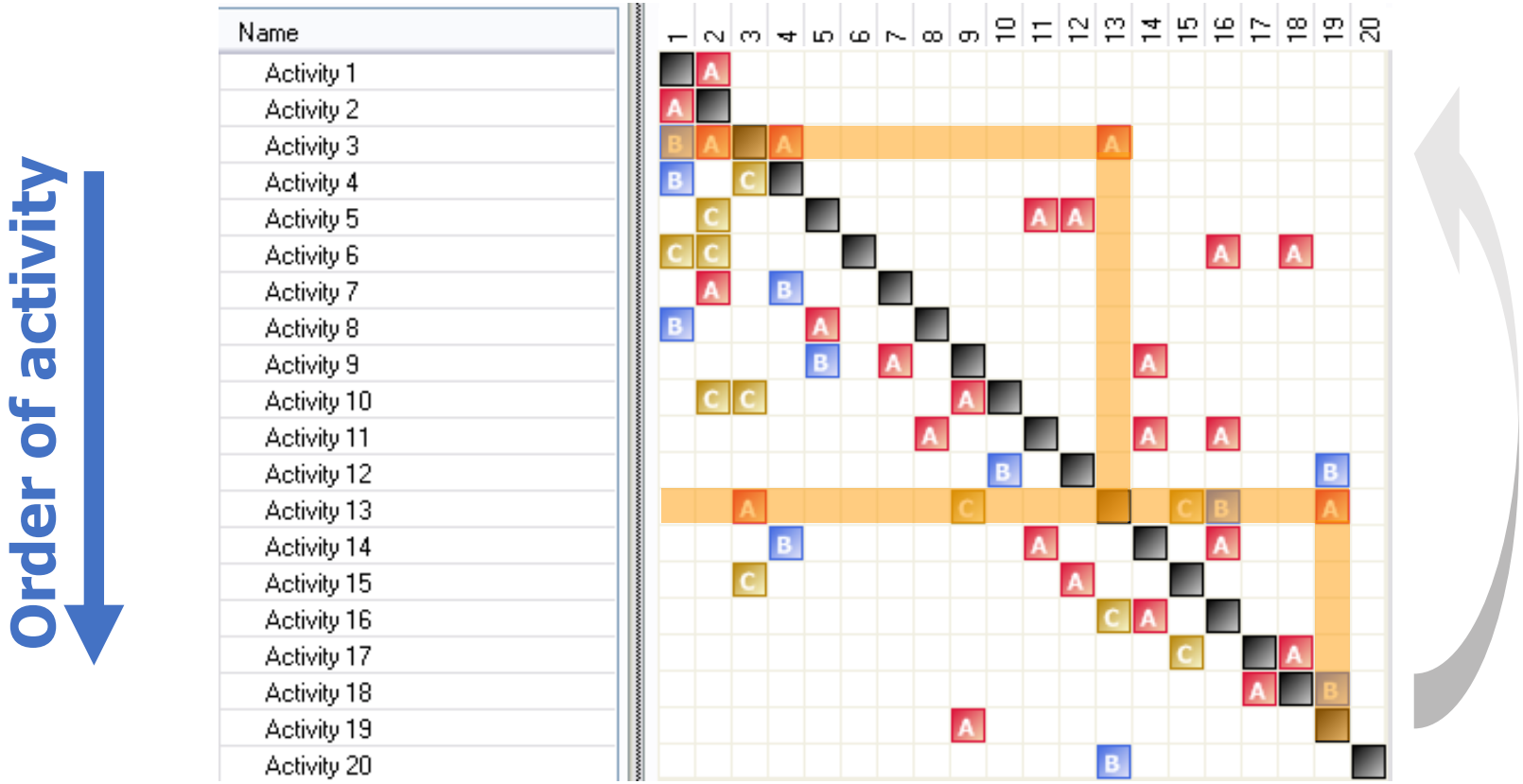
# How and where is technical debt introduced?




**Dependency classification**

**A = vital; B = important; C = 'nice to have'**

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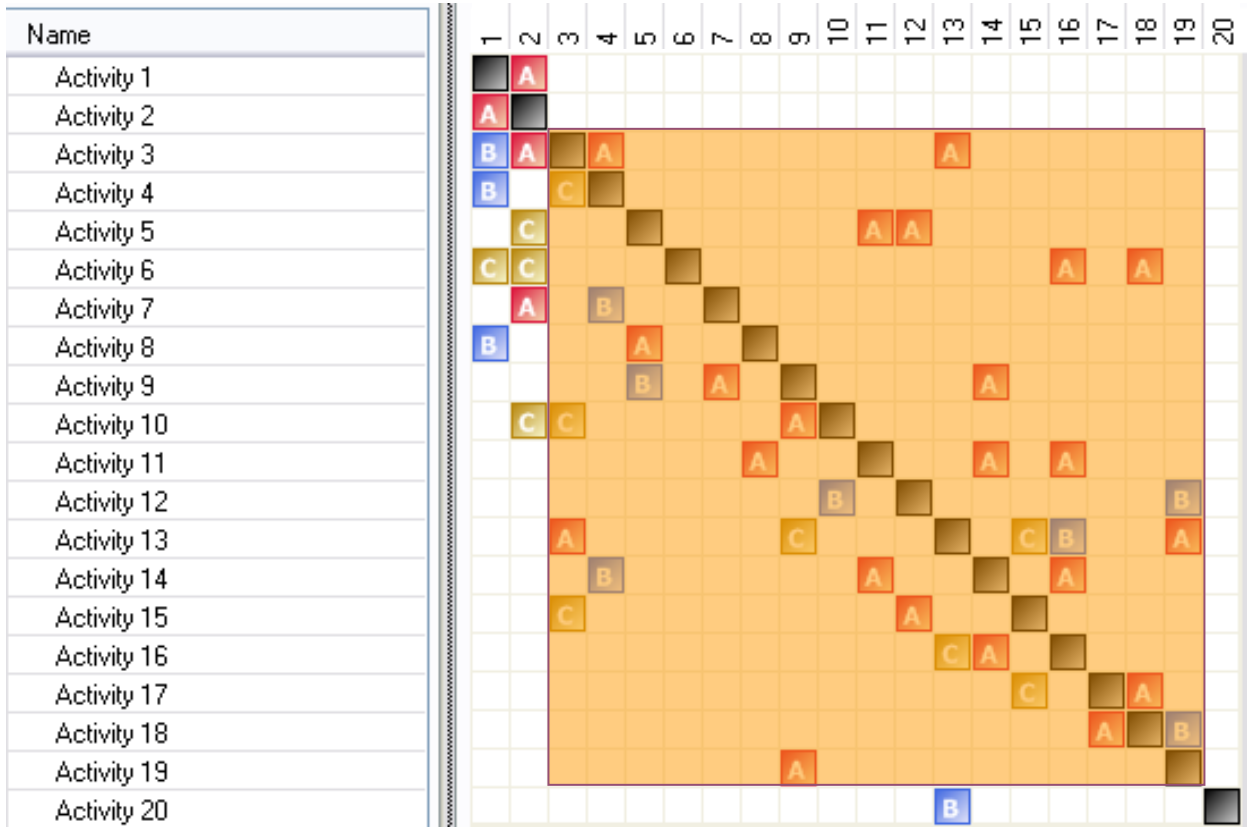


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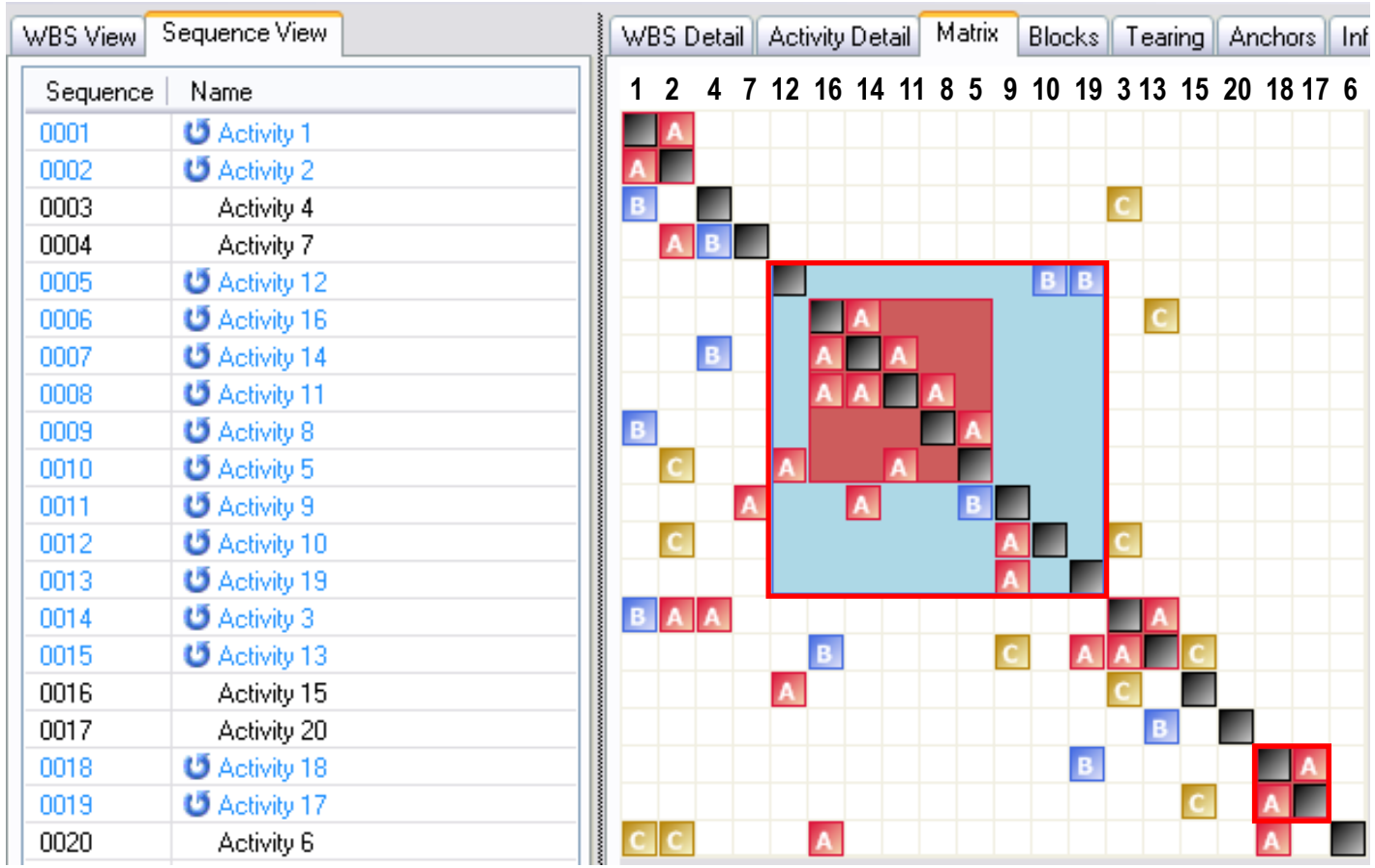
# Sequence the work to minimise ‘latency impact’

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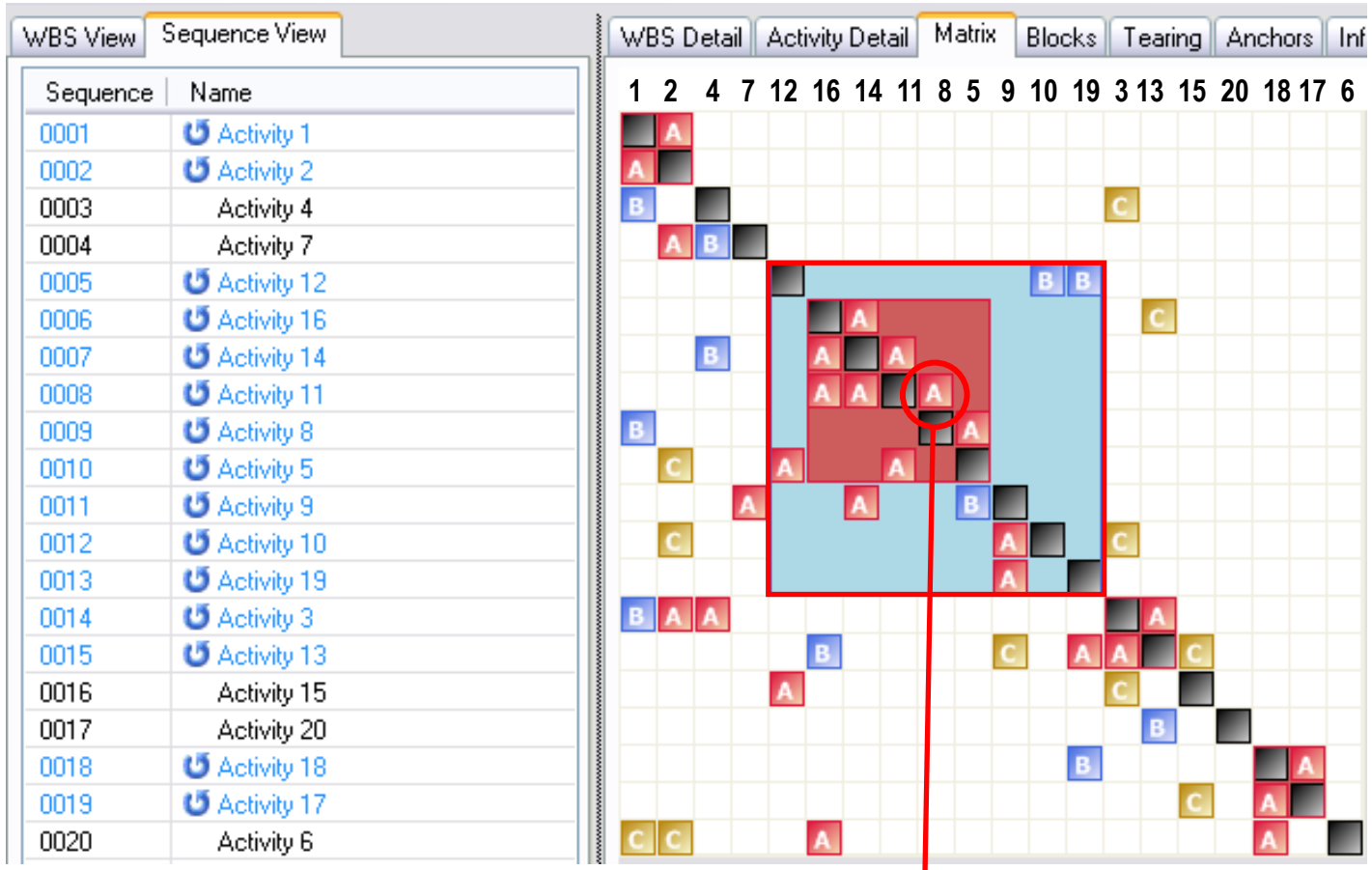
# Targeted decision-making: avoid debt accrual

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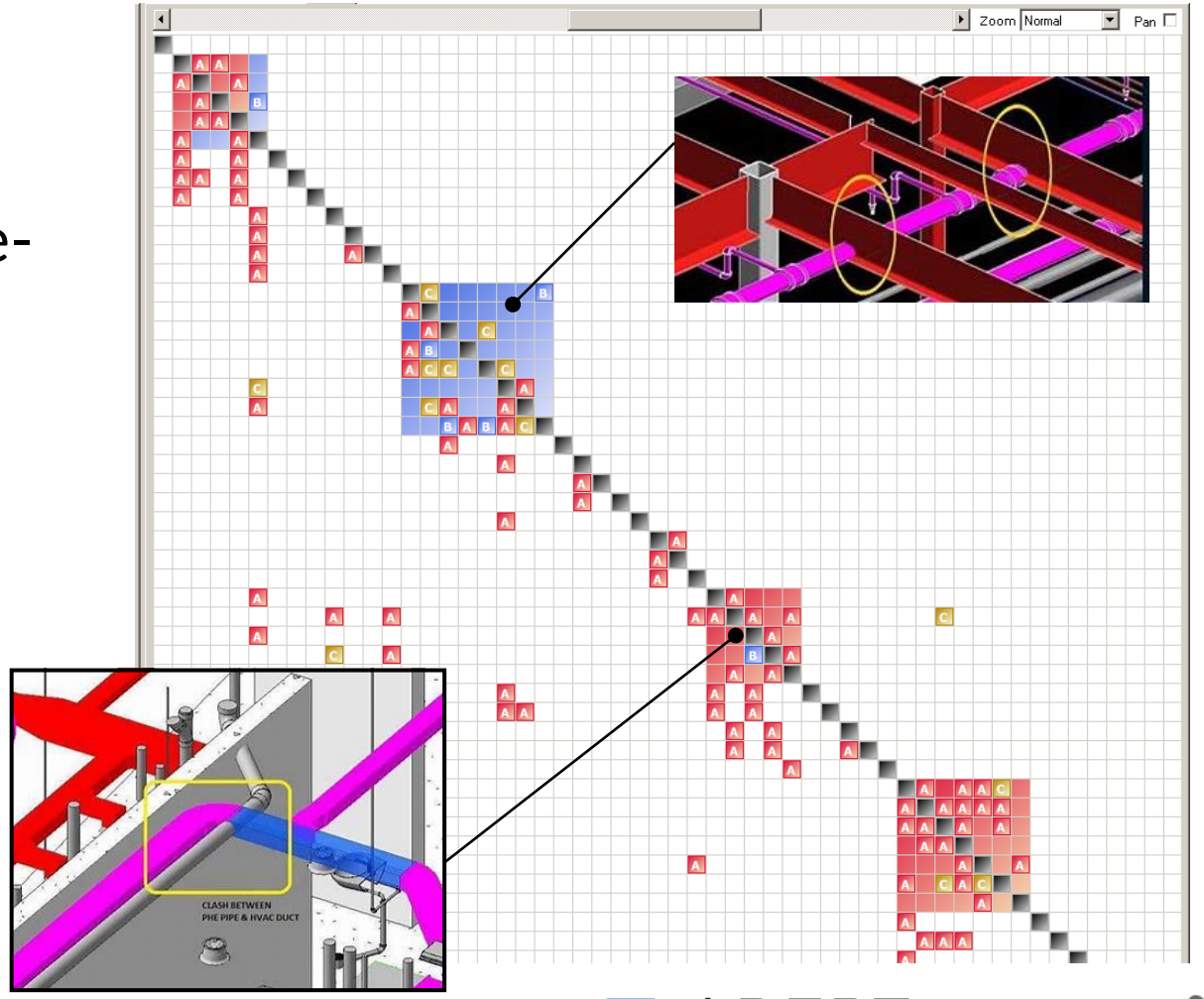
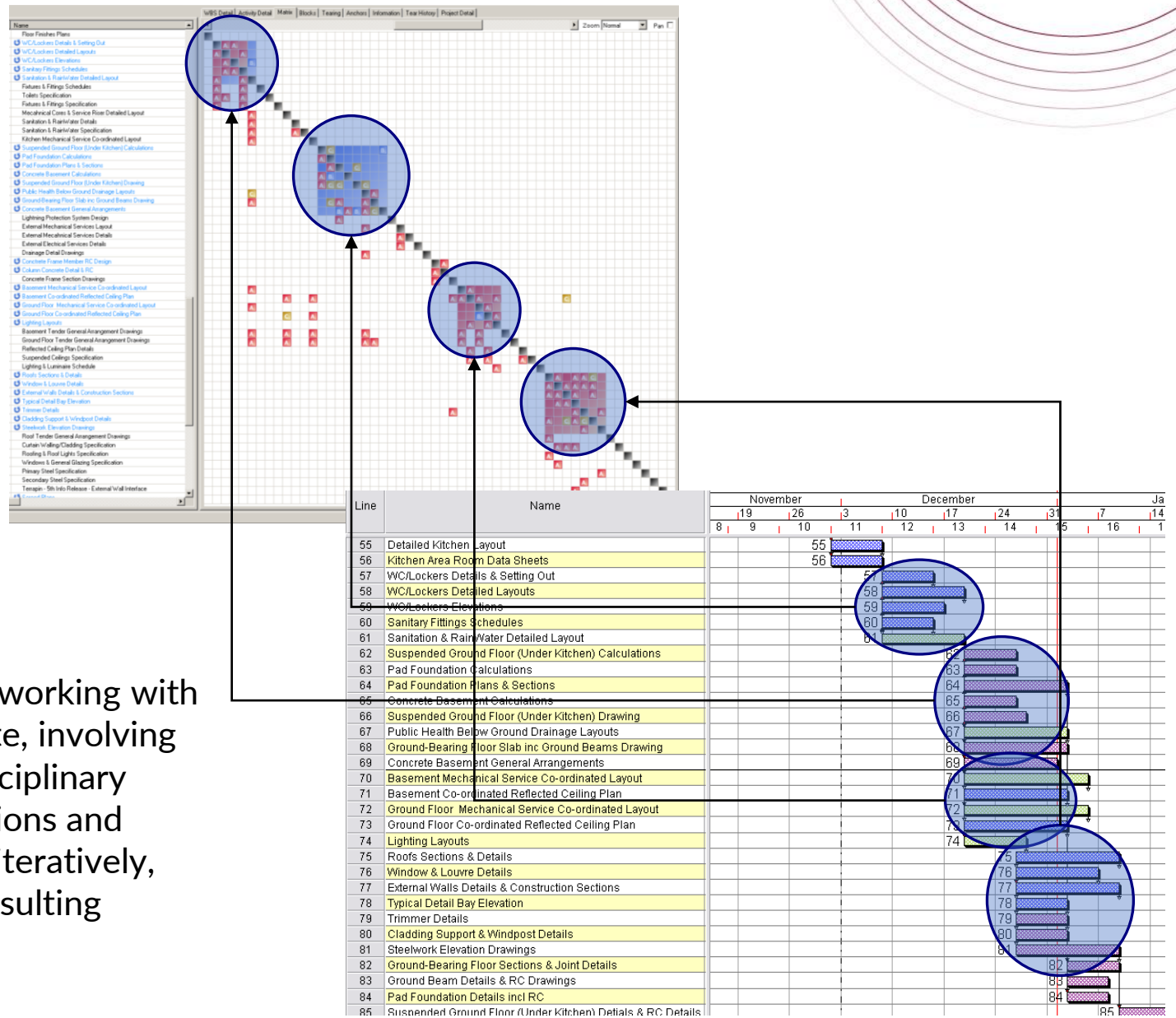
# Design maturity

- Debt is contained and re-paid incrementally
- As maturity increases, technical debt reduces



Progressively fix the design solution, through controlled development of design maturity, whilst introducing technical debt in a controlled manner, with clarity on when the debt will be repaid!




Periods of collaborative working with defined tasks to complete, involving engagement of multi-disciplinary teams, to make assumptions and generate / test solution iteratively, before signing-off the resulting integrated solution.

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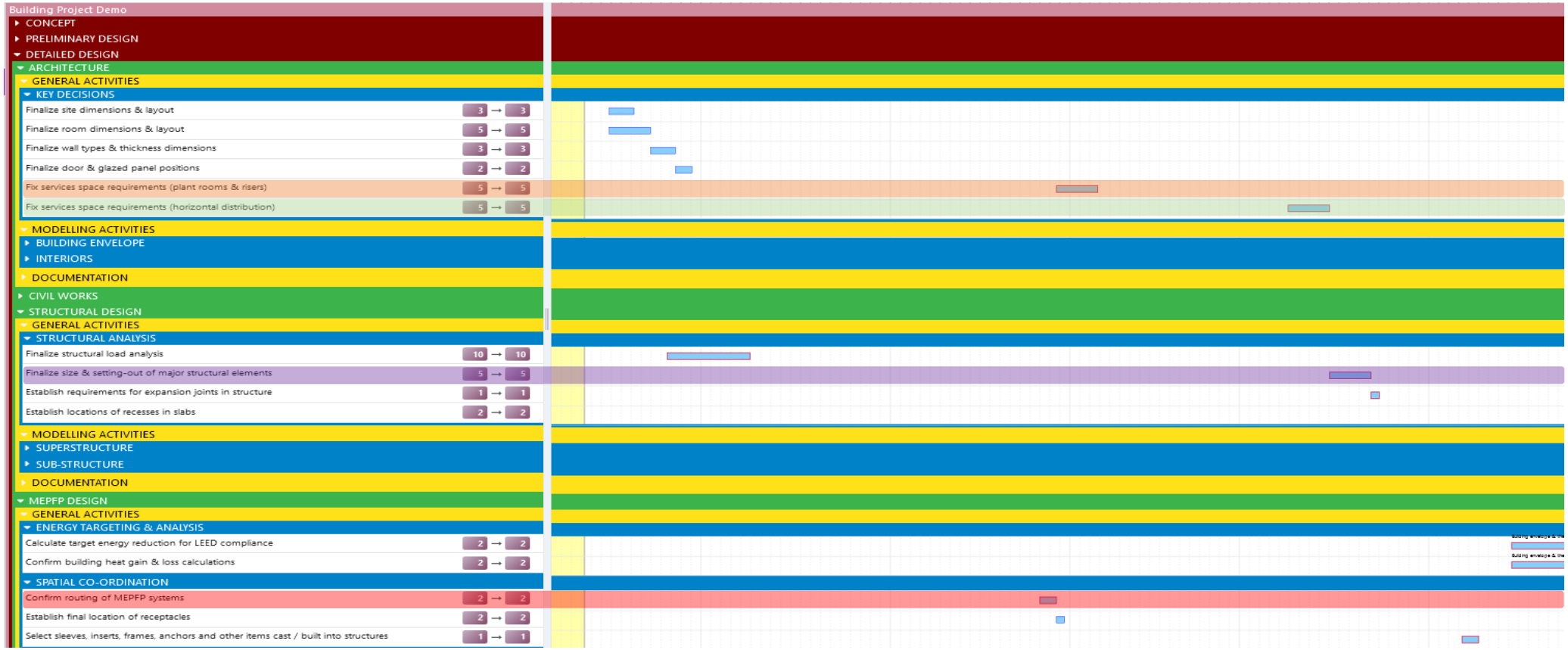
# How bad can it get?

- Assumptions are made continuously by those involved in multi-disciplinary design process.
- These assumptions are introduced for many reasons – but their introduction leads to technical debt being accrued.
- Technical debt is difficult to calculate but in simple terms, it is the time and cost associated with assessing and rectifying the impact of an assumption.
  - If the assumption is tested and proves to be correct – the technical debt level is small.
  - If the assumption is tested and proves to be incorrect – technical debt can be vast (the scale being dependent on the scale of downstream work undertaken prior to completing the test.
- In simple terms, the longer the debt is left unpaid, the large the repayment that must be made.
- Critically, if we don't know that debt has been introduced via assumption making, how do we know when and what to test. It is a debt spiral.

# Schedule Impact

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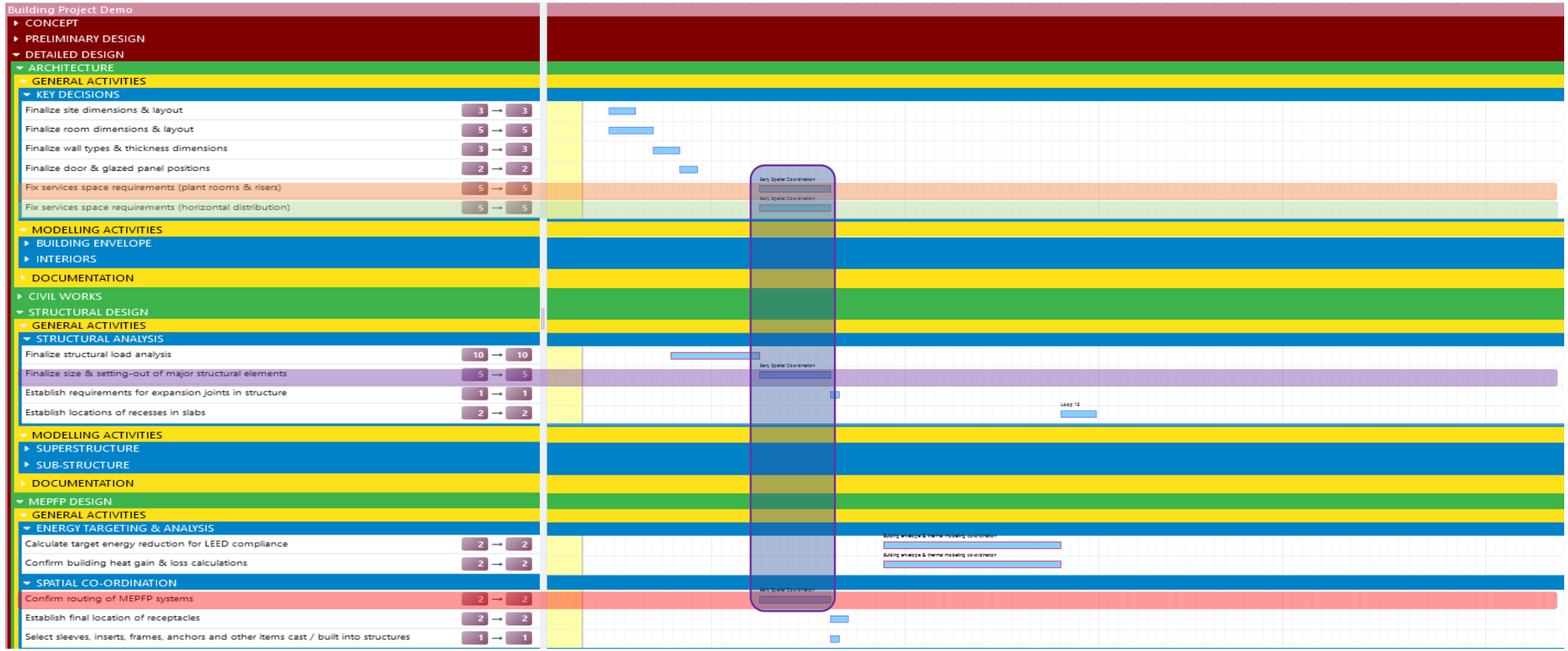


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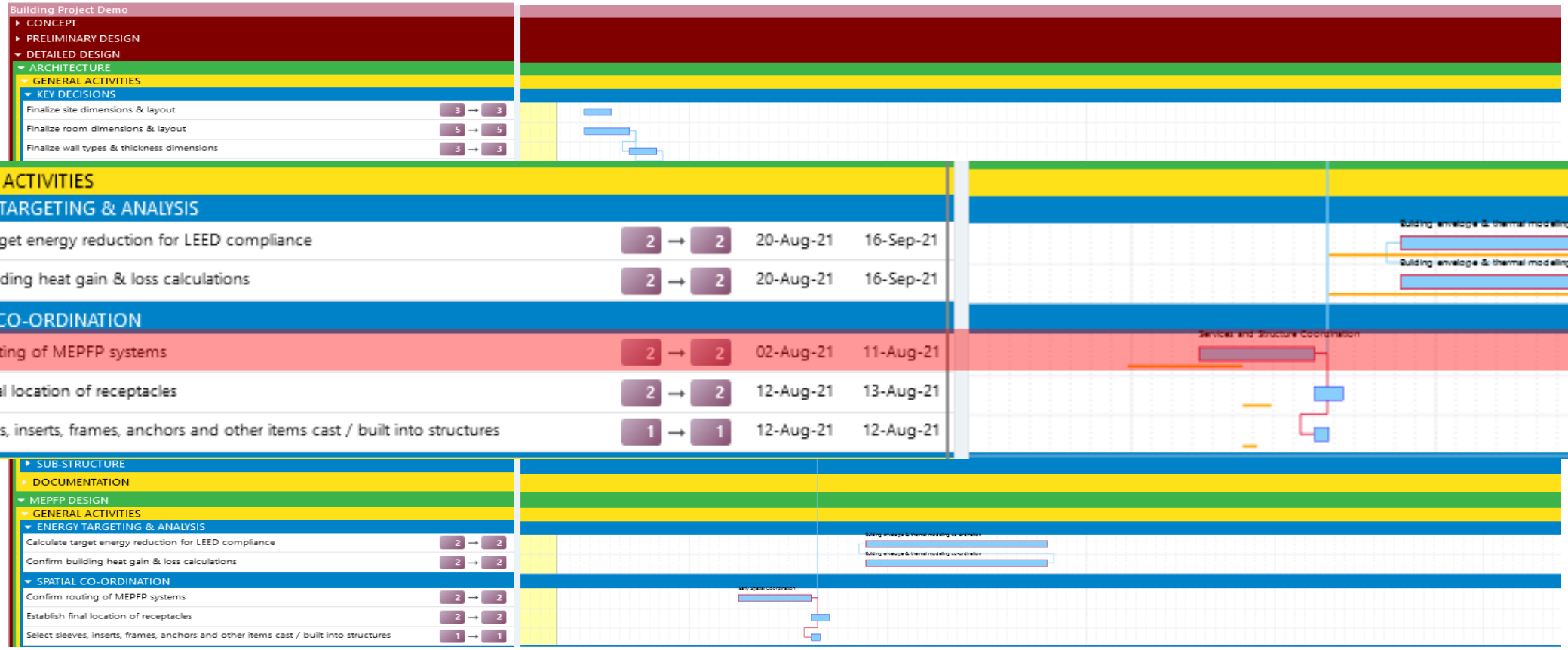


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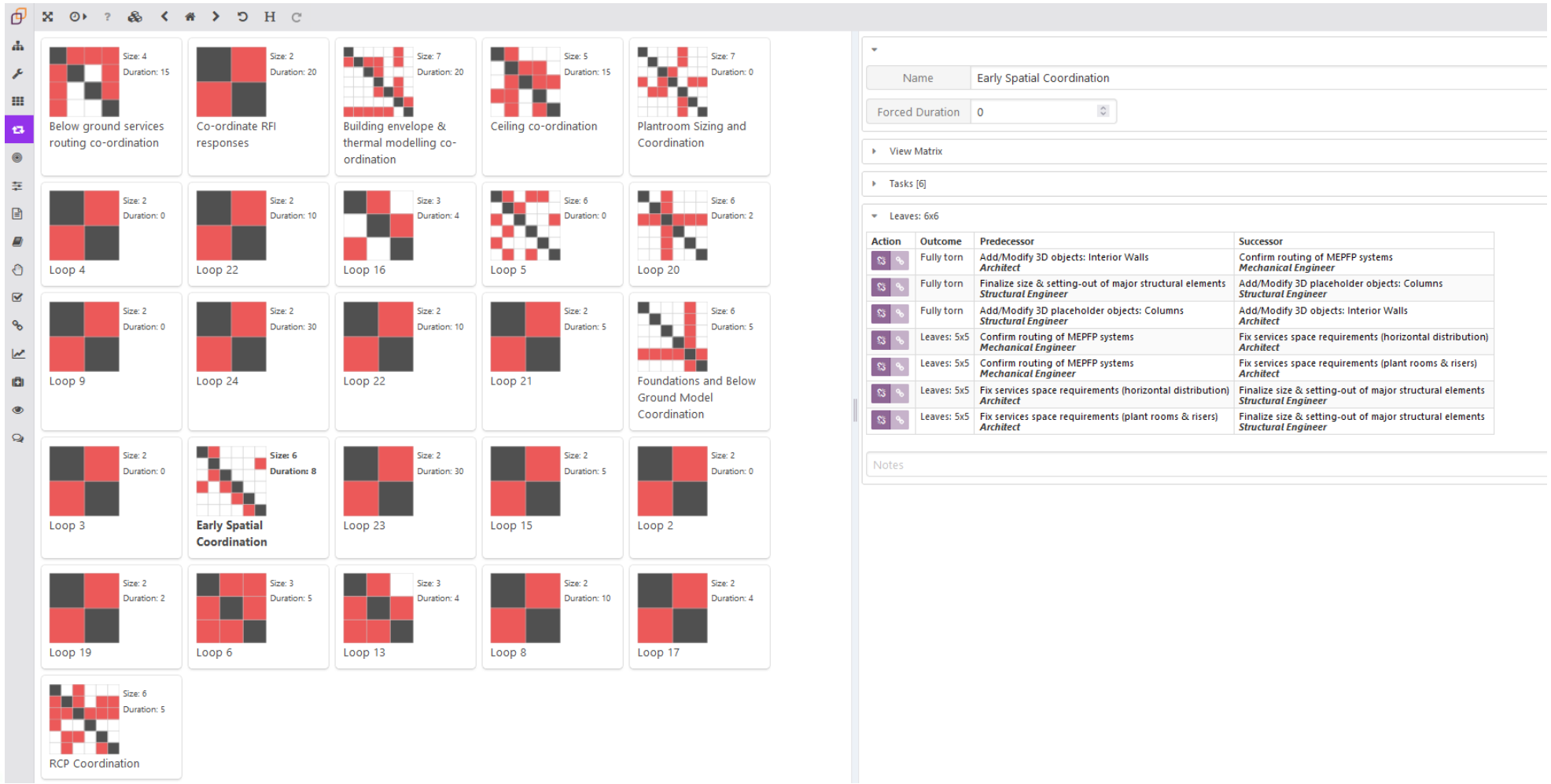


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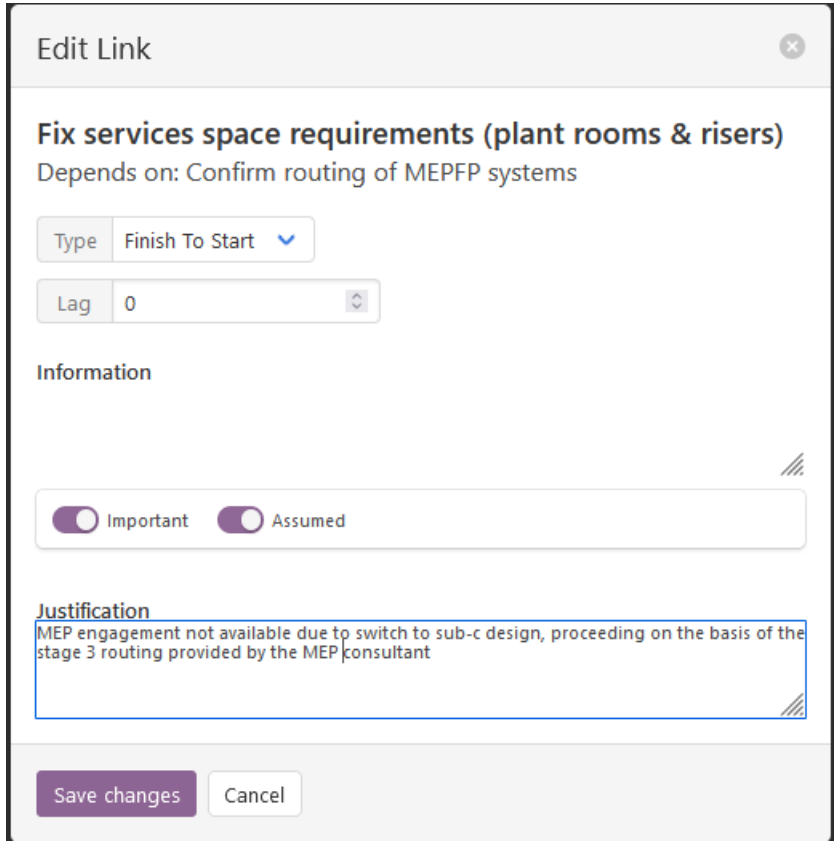

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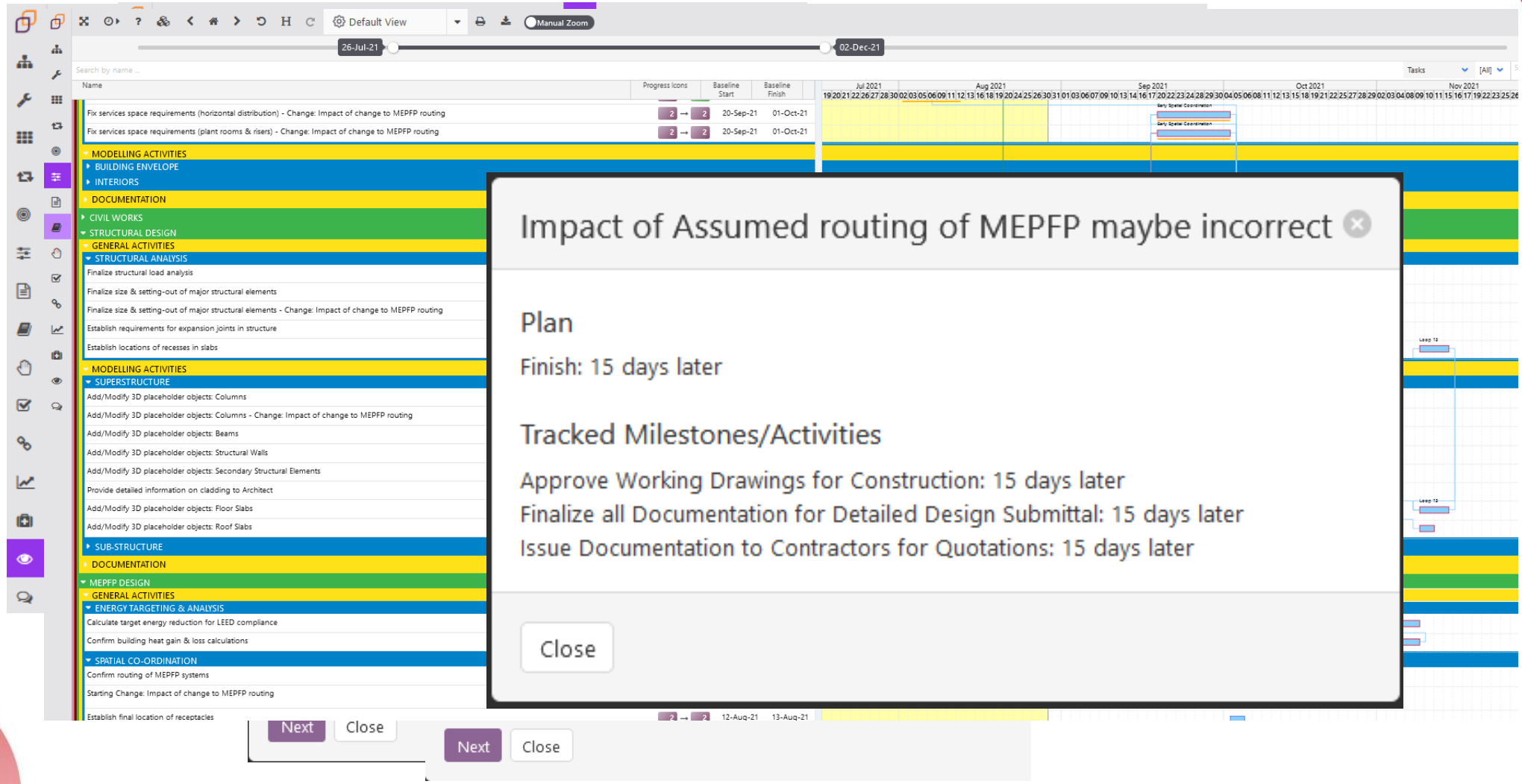


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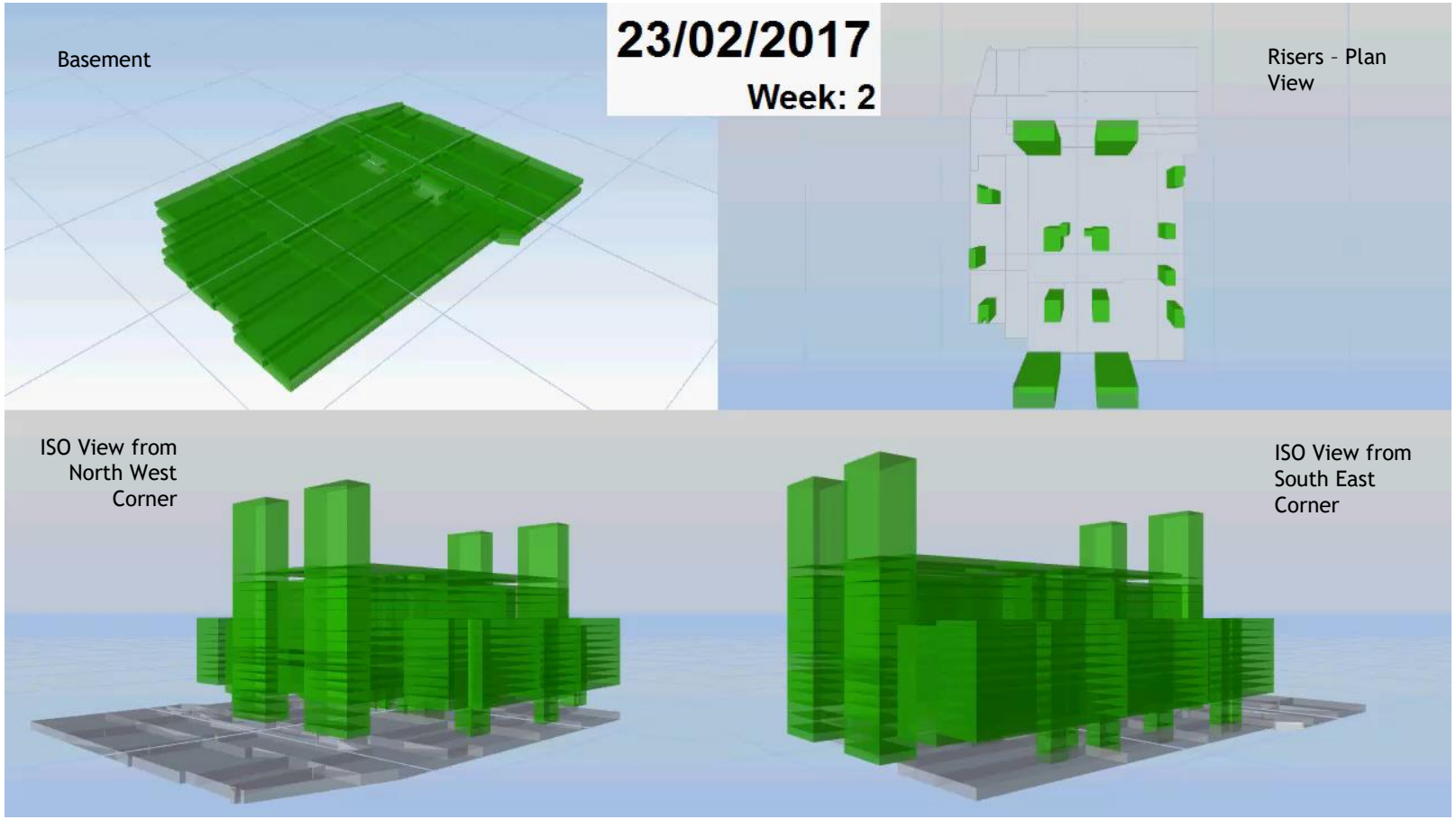
# Design debt / risk accrual: latency impact (an example)



# What have we learned from experience…..

- The solution develops with increasing certainty and diminishing flexibility
- Manage information flow to manage ‘technical debt’
- Recognise when assumptions are being made, and the risk they represent
- A design programme is not optional – build it and keep it up-to-date
- Procurement of specialist sub-contractors is part of the design process
- Introducing technical debt (via constraints / assumptions) is beneficial – if the debt is repaid in a controlled manner (as early as possible)!
- Project delivery is, and must be treated as, a single integrated process

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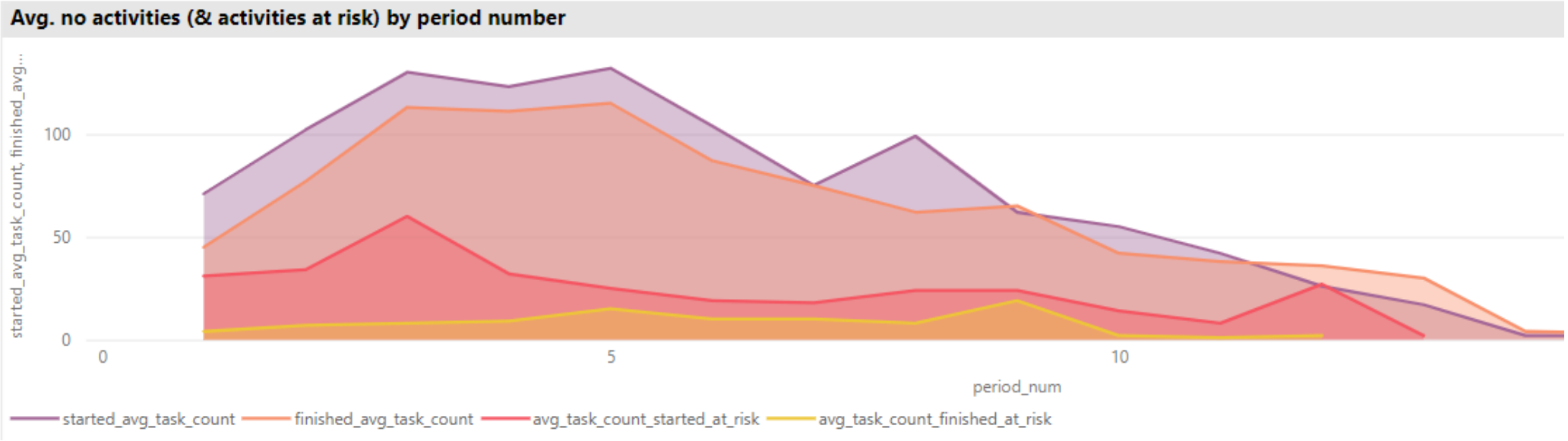


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# THANK YOU


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- David Prangley, Managing Consultant

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