Programme Area: Nuclear

Project: SMR Deployment Enablers

Title: Project presentation

## Context:

The purpose of the SMR Deplyment Enablers project was to identify the activities needed to take place in the first five years of a development plan for UK SMRs and the necessary capability of the SMR utility/developer organisation during this phase. Selection processes are out of scope so the starting assumption for the project is that both the SMR utility/developer and reactor vendor have already been identified.

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# Energy Technologies Institute

# Small Modular Reactor (SMR) Deployment Enablers Project

# Project Presentation

# Decision Analysis Services Ltd

# 28th September 2016

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# Agenda

- Introductions
- Project Presentation
  - *Context*
  - *Approach*
  - *Evidence*
  - *Analysis*
  - *Conclusions*
- Questions

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# SMR Deployment Enablers Project

# Introduction

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# Context: *SMR Deployment Enablers*

- A key conclusion from ETI's work was that there is a need to take action now if the option to deploy SMRs as part of the UK's low carbon transition is not to be closed off.

- The SMR Deployment Enablers Project was initiated by the ETI to explore the answer to a critical question:

**"What are the enabling activities in the first five years of an SMR programme necessary to support potential operations of a first UK SMR by 2030?"**

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# SMR Deployment Enablers Project

# Approach

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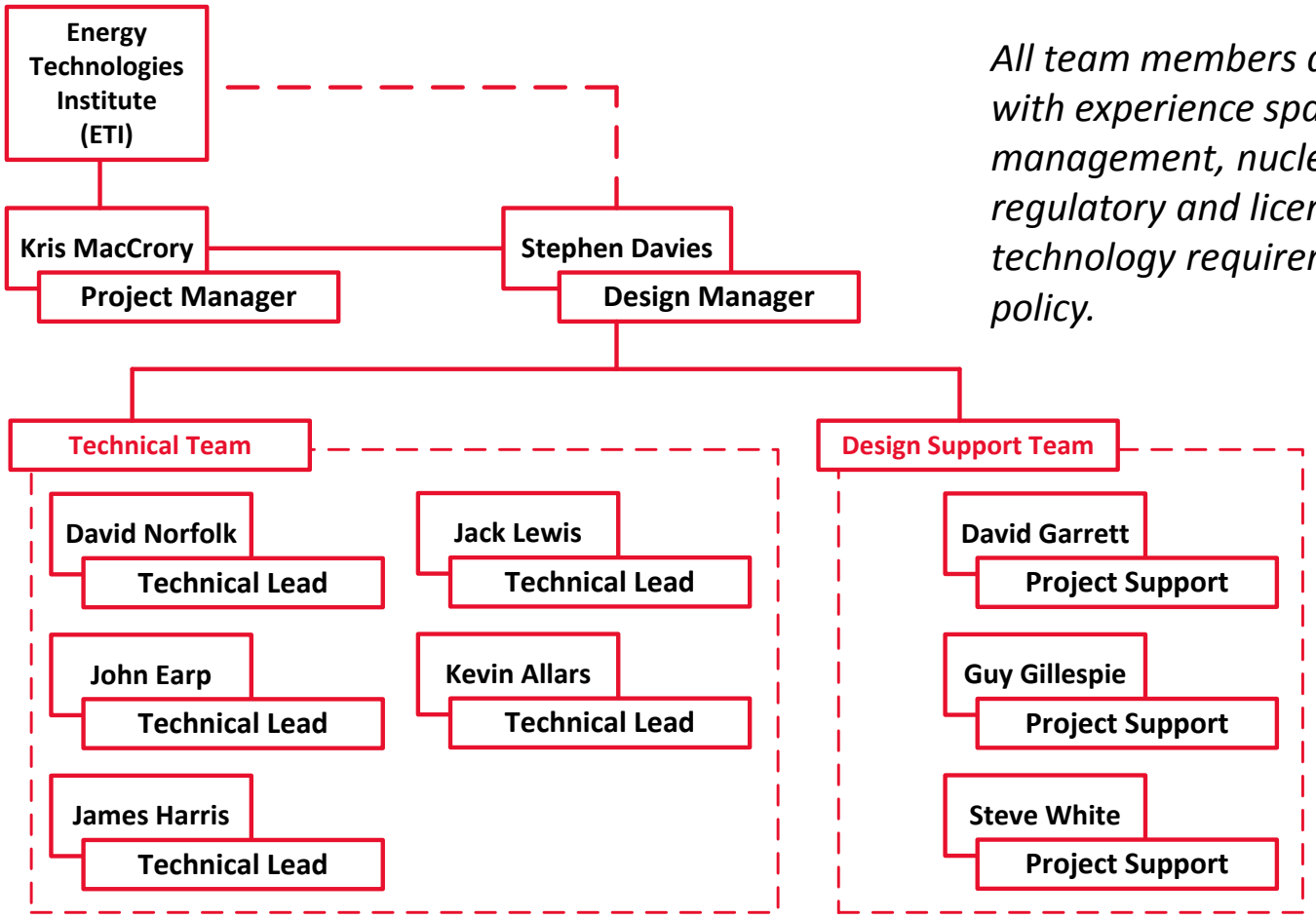
# Approach: *Project Team*

The Project Team brings significant experience of the UK nuclear new build sector and marries this with expertise in major programme delivery support to Government.




*All team members are nuclear industry professionals with experience spanning investment analysis, risk management, nuclear operator organisational design, regulatory and licensing permitting & consents, technology requirements and analysis of Government policy.*

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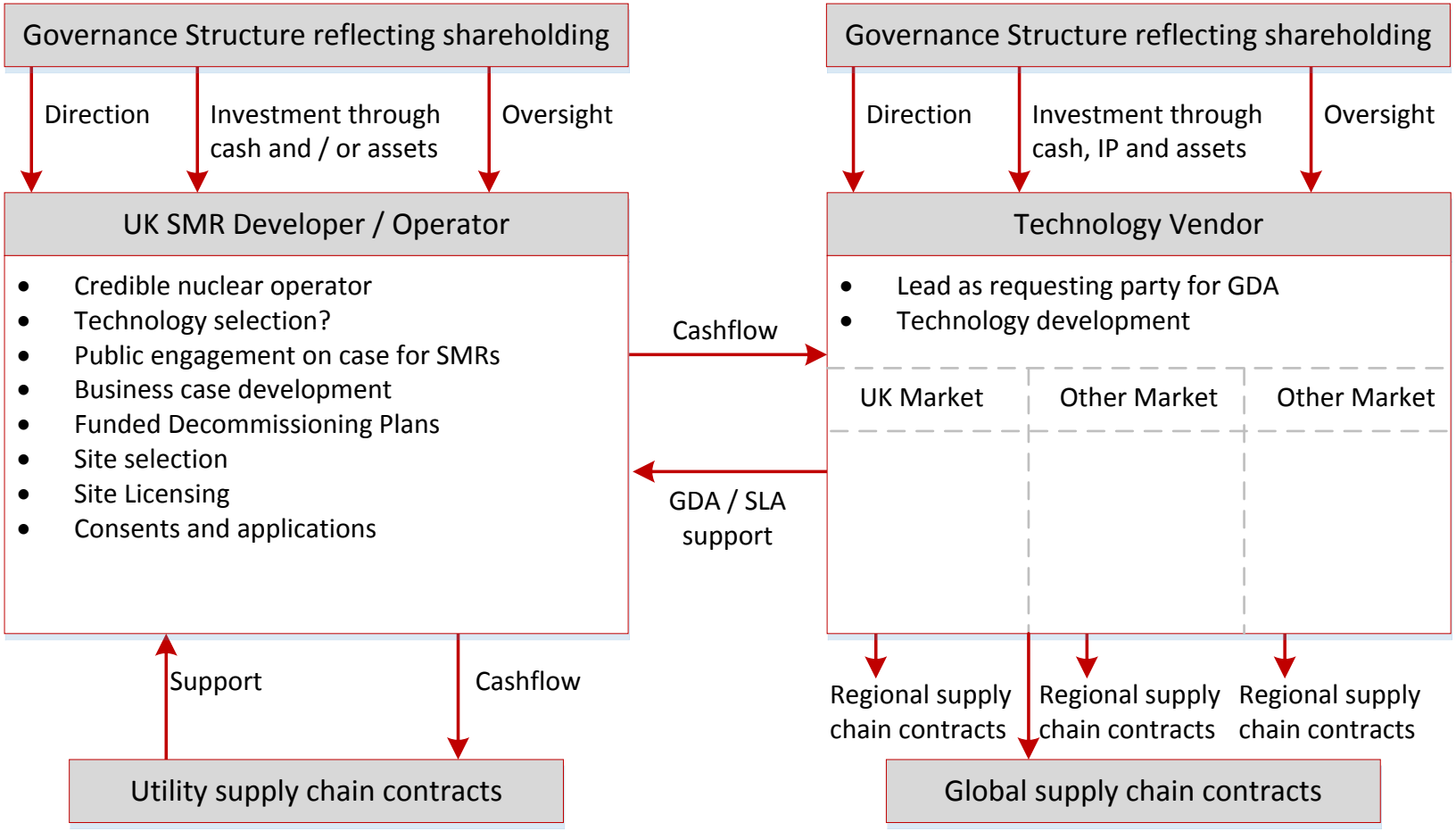
# Approach: *Assumptions*

- A conceptual scenario for this study was defined by bounding assumptions.

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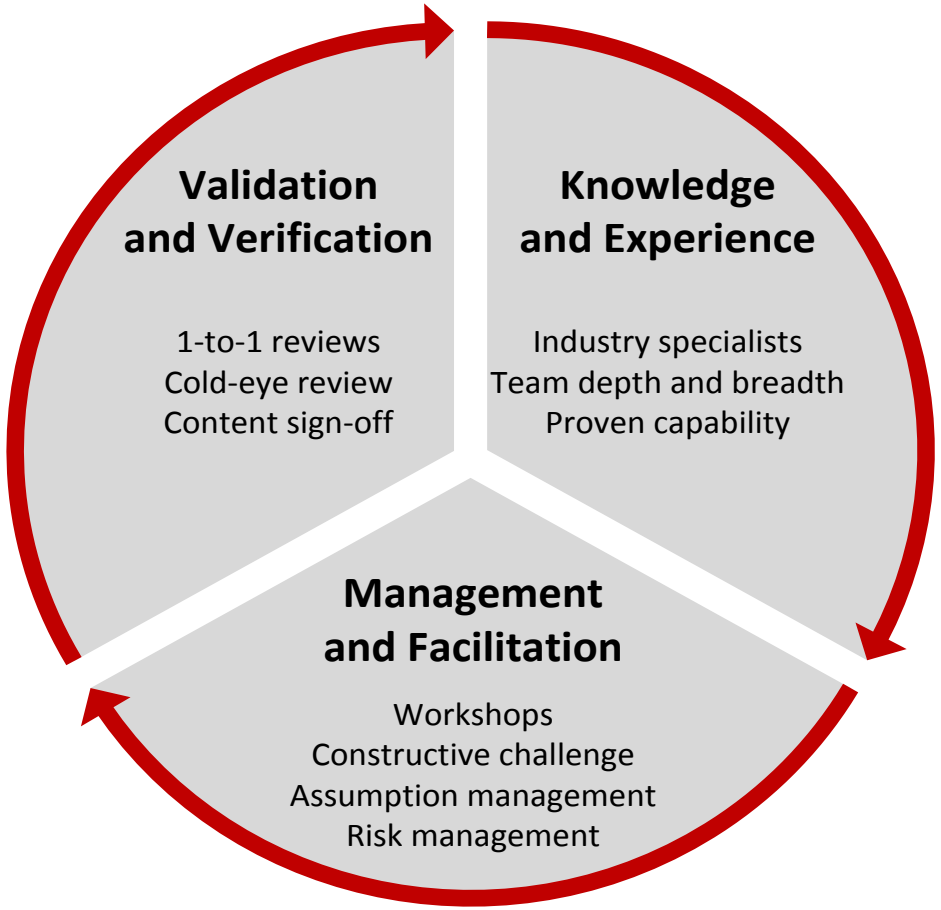
# Approach: *Assurance*

- A staged approach, with interim reviews providing progressive assurance of the fitness for purpose and accuracy of the evidence creation and analysis.

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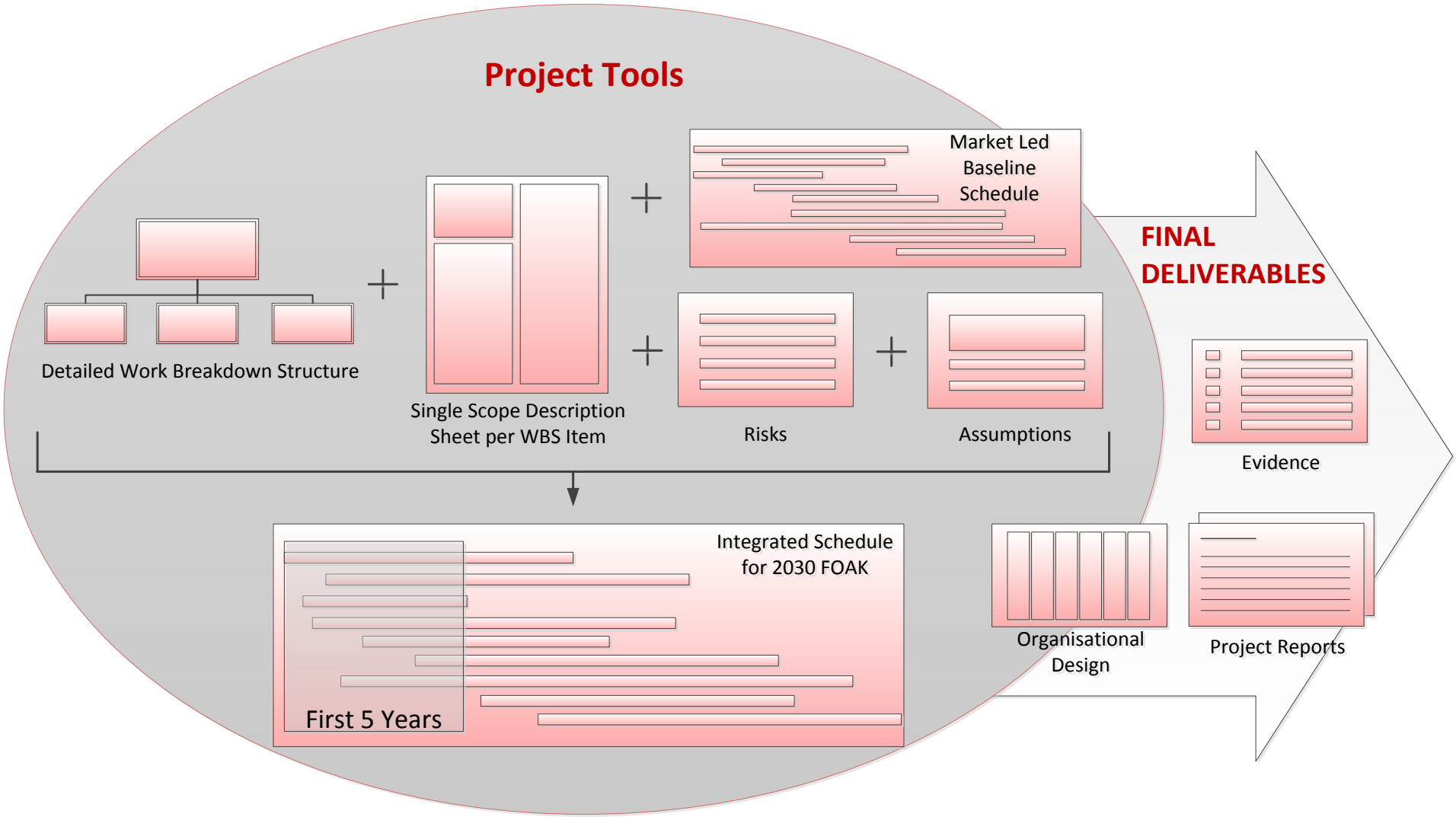
# Approach: *Project Tools*

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# SMR Deployment Enablers Project

# Evidence

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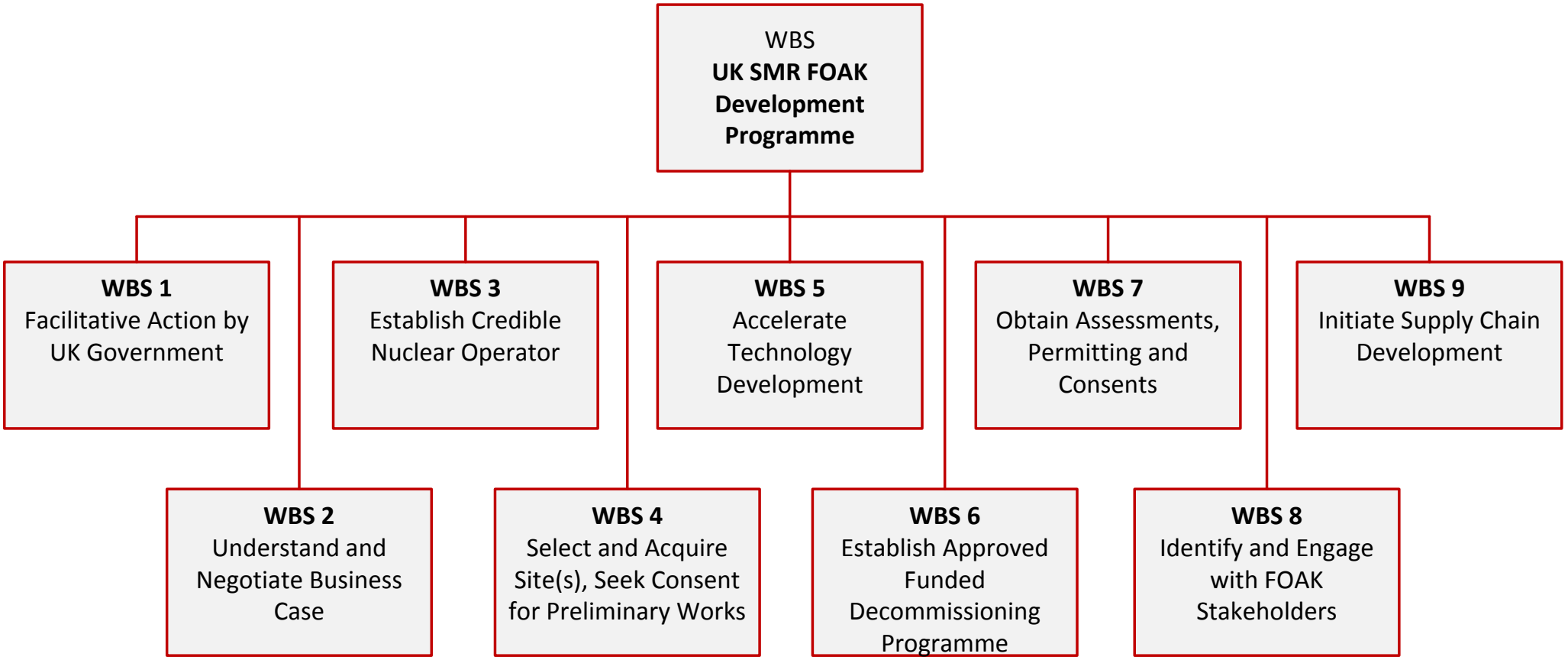
# Evidence: *Work Breakdown Structure*

- The range of activities that must be undertaken over the first 5 years of the SMR development programme.

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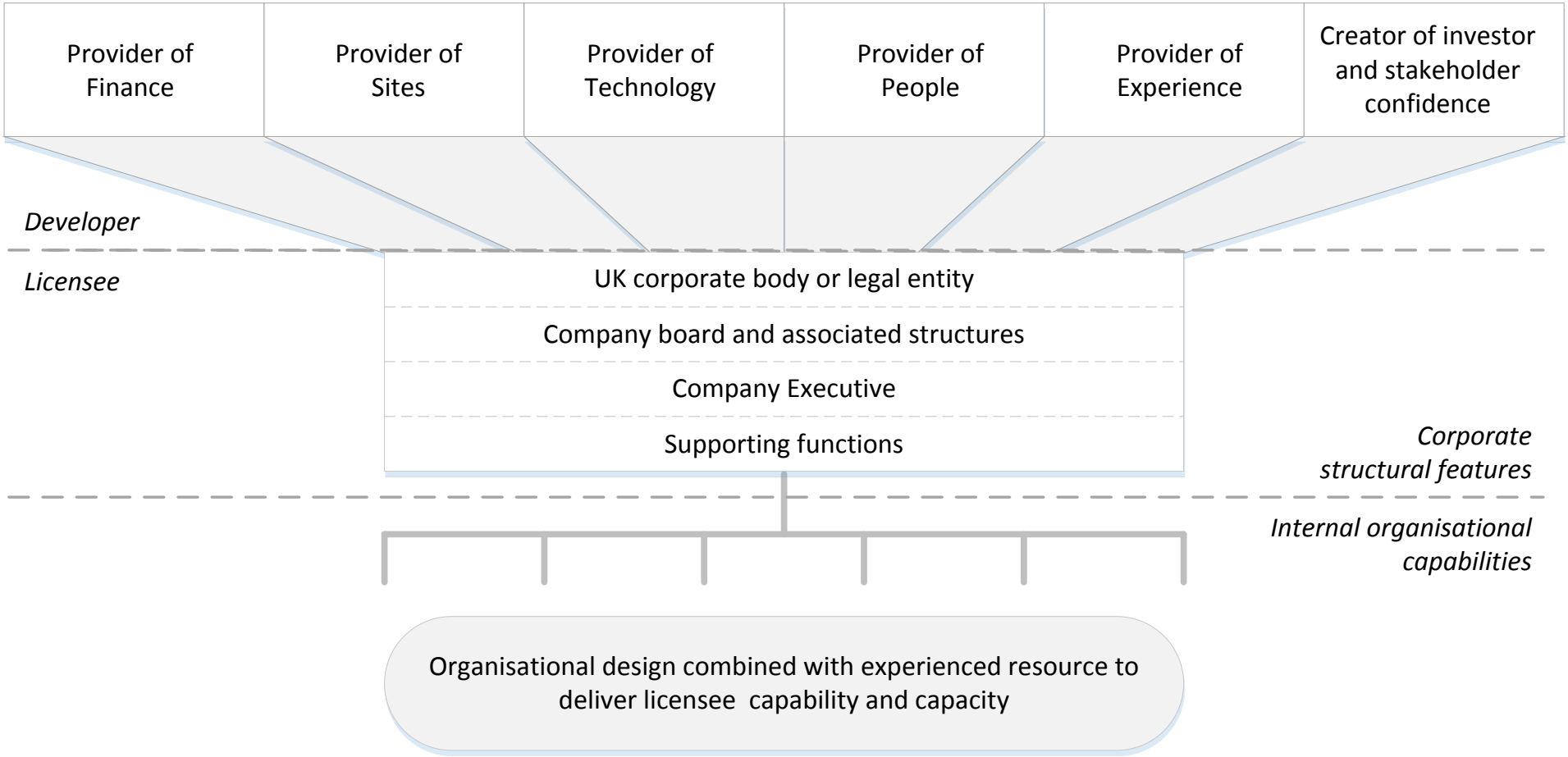
# Evidence: *Organisational Design*

- An SMR developer and organisational design of the associated operator.

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# Evidence: *Risks*

- The high-level risk analysis classified risks by likelihood-impact criteria. The critical risks are:

| Ref: | Risk Description: |
|---|---|
| **R3** | **Legal intervention by nuclear NGOs building on experience from 2008 programme.** |
| **R4** | **There is a risk that if you don't apply for Parliamentary time early enough, Parliamentary time will not be allocated.** |
| **R84** | **If the Safety and Environmental Management Prospectus document does not meet the required standards and/or there is insufficient evidence of its application then Licence Grant has the potential to be delayed by the Regulators.** |
| **R113** | **Over emphasising passive safety.** |
| **R118** | **Pre-Construction Safety Report (PCSR) evidence insufficient.** |
| **R146** | **Lack of supply chain appetite to invest in nuclear.** |
| **R152** | **Skills are not available in sufficient quantities in some vocations and professions due to demand elsewhere (nuclear and non-nuclear).** |

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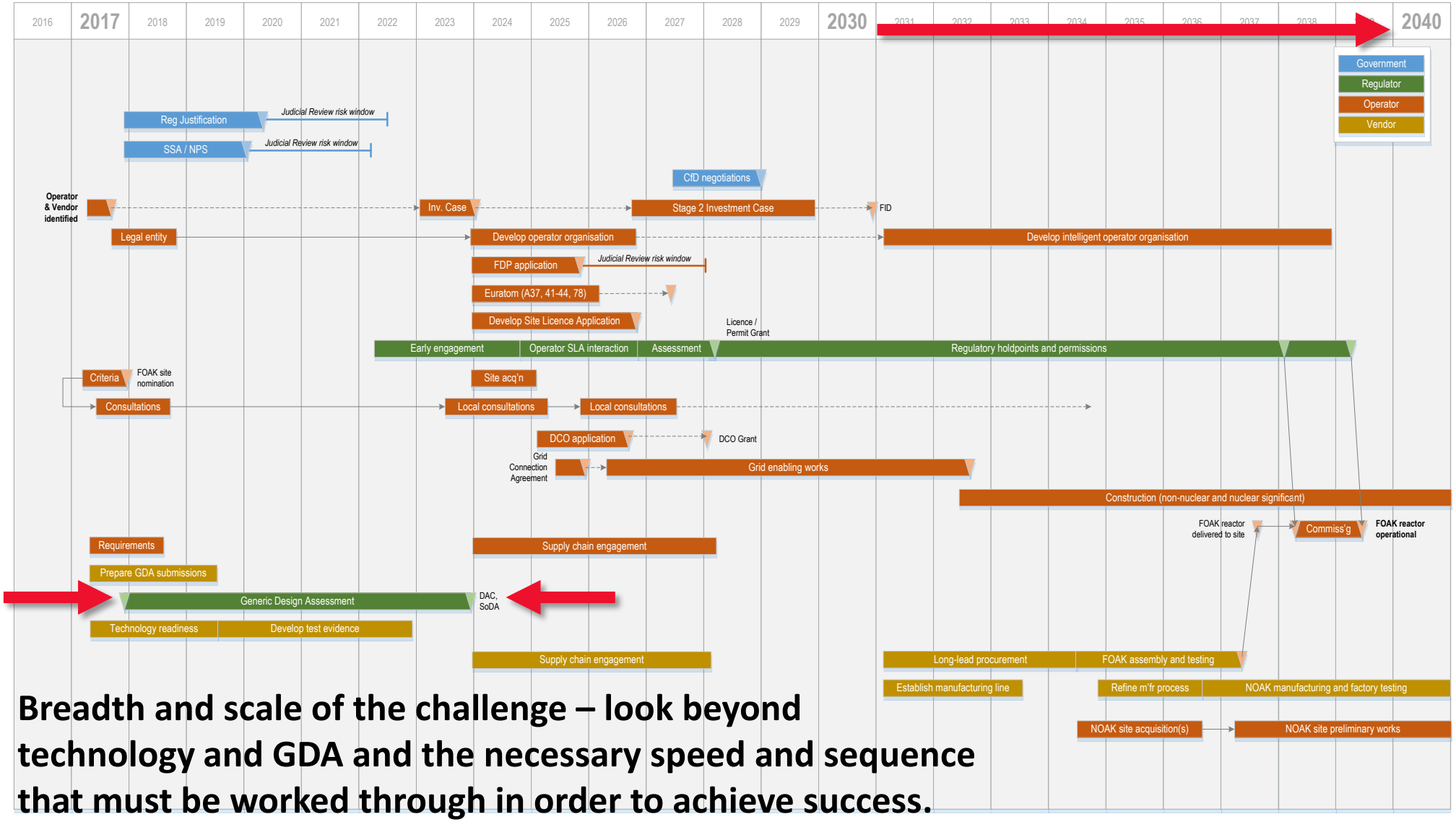
# Evidence: *Market-led Schedule*




**Breadth and scale of the challenge – look beyond technology and GDA and the necessary speed and sequence that must be worked through in order to achieve success.**

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# SMR Deployment Enablers Project

# Analysis

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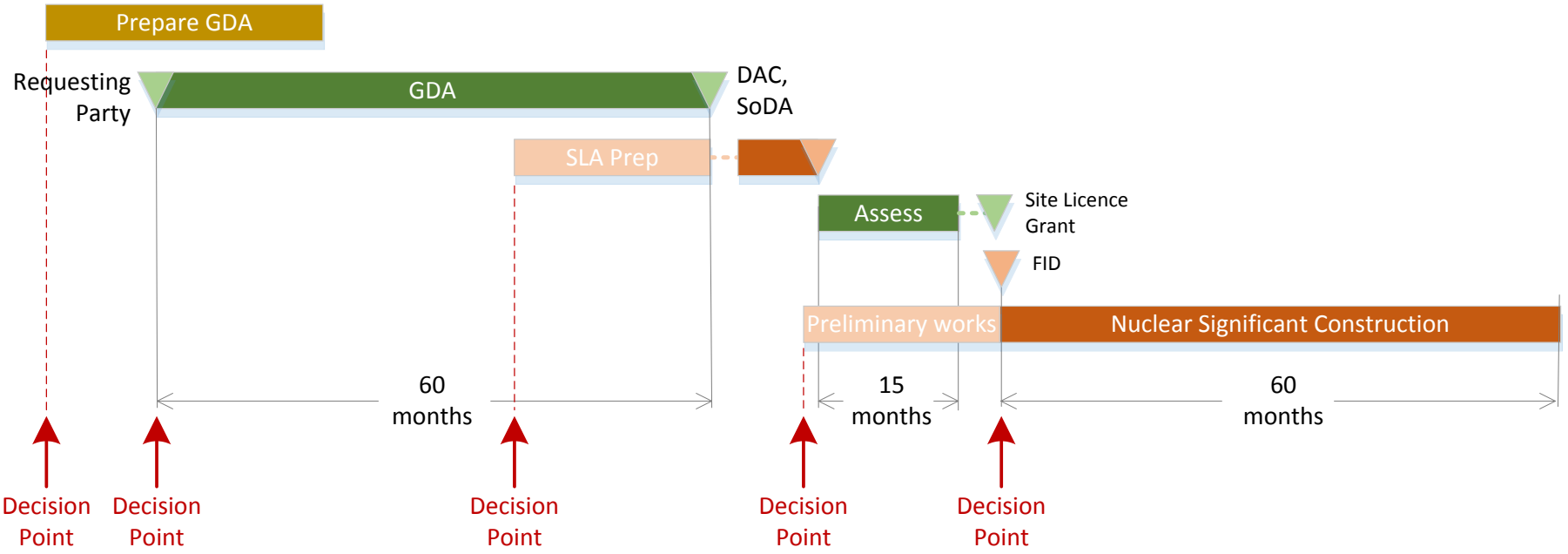
# Analysis: *The Critical Path for 2030 Deployment*

- By working back from a 2030 target for operation, the basic logic of a critical path can be established.

| 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -14 | -13 | -12 | -11 | -10 | -9 | -8 | -7 | -6 | -5 | -4 | -3 | -2 | -1 | 0 |

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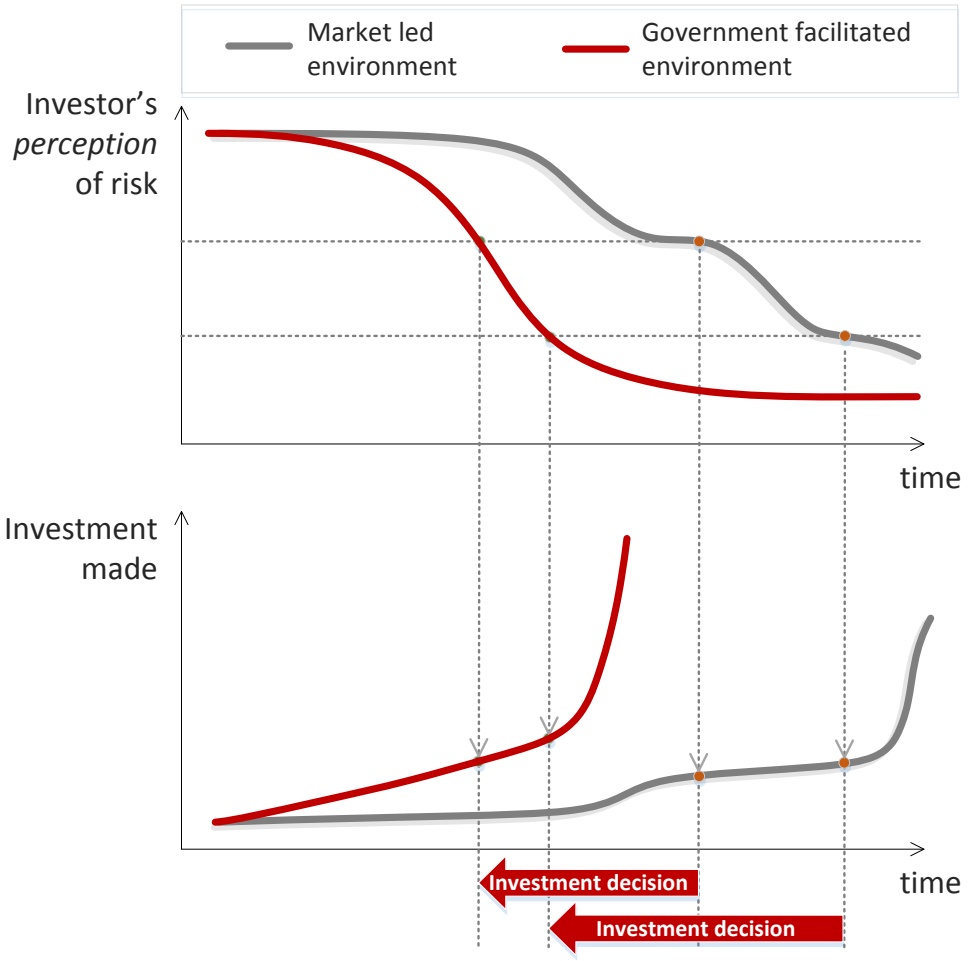
# Analysis: *Investor Confidence*

- The Government's role in fostering investor confidence is viewed to be crucial for enabling a 2030 timeline for FOAK operation.

- It is insufficient for Government to set out an aggressive timeline for private sector investment without also taking steps to create an environment that promotes this investment through a systematic reduction of risk.

- In simple terms, earlier investment in large-scale capital works requires a quicker reduction in an investor's perception of risk.

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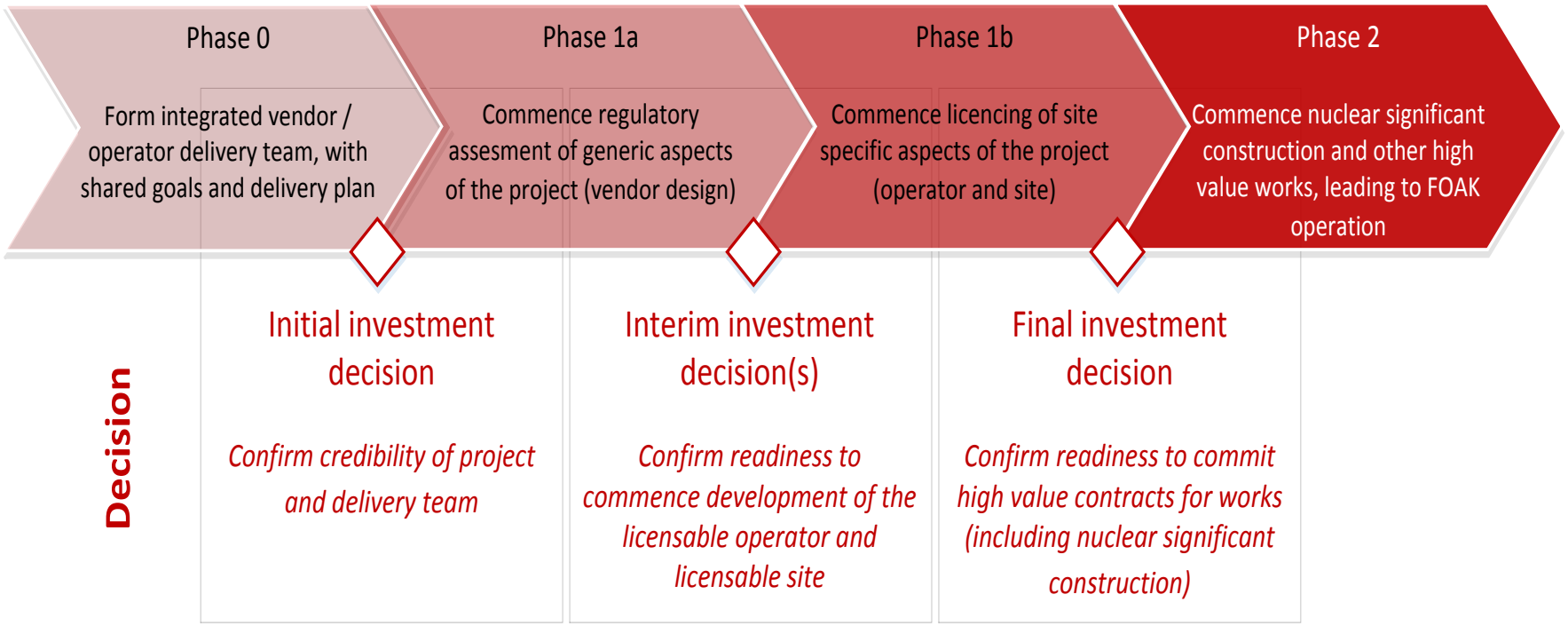
# Analysis: *Key Decision Points*

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# Analysis: *Critical Programme Milestones*

| Milestone: | Indicative Timescale: |
|---|---|
| • Publication of White Paper, setting out Government intent | • **September 2017** |
| • Initiate Operator / Vendor 'Bootcamp' | • **September 2017** |
| • Commence Generic Design Assessment (GDA) and Regulatory Justification | • **December 2017** |
| • Nominate site into new Strategic Siting Assessment | • **March 2018** |
| • Complete site selection / acquisition | • **September 2020** |
| • Issue of interim Design Acceptance Confirmation (iDAC) and interim Statement of Design Acceptability (iSoDA) to Vendor | • **August 2020** |
| • Commencement / acceleration of site specific licencing/permitting/development consenting and organisational development work | • **August 2020** |

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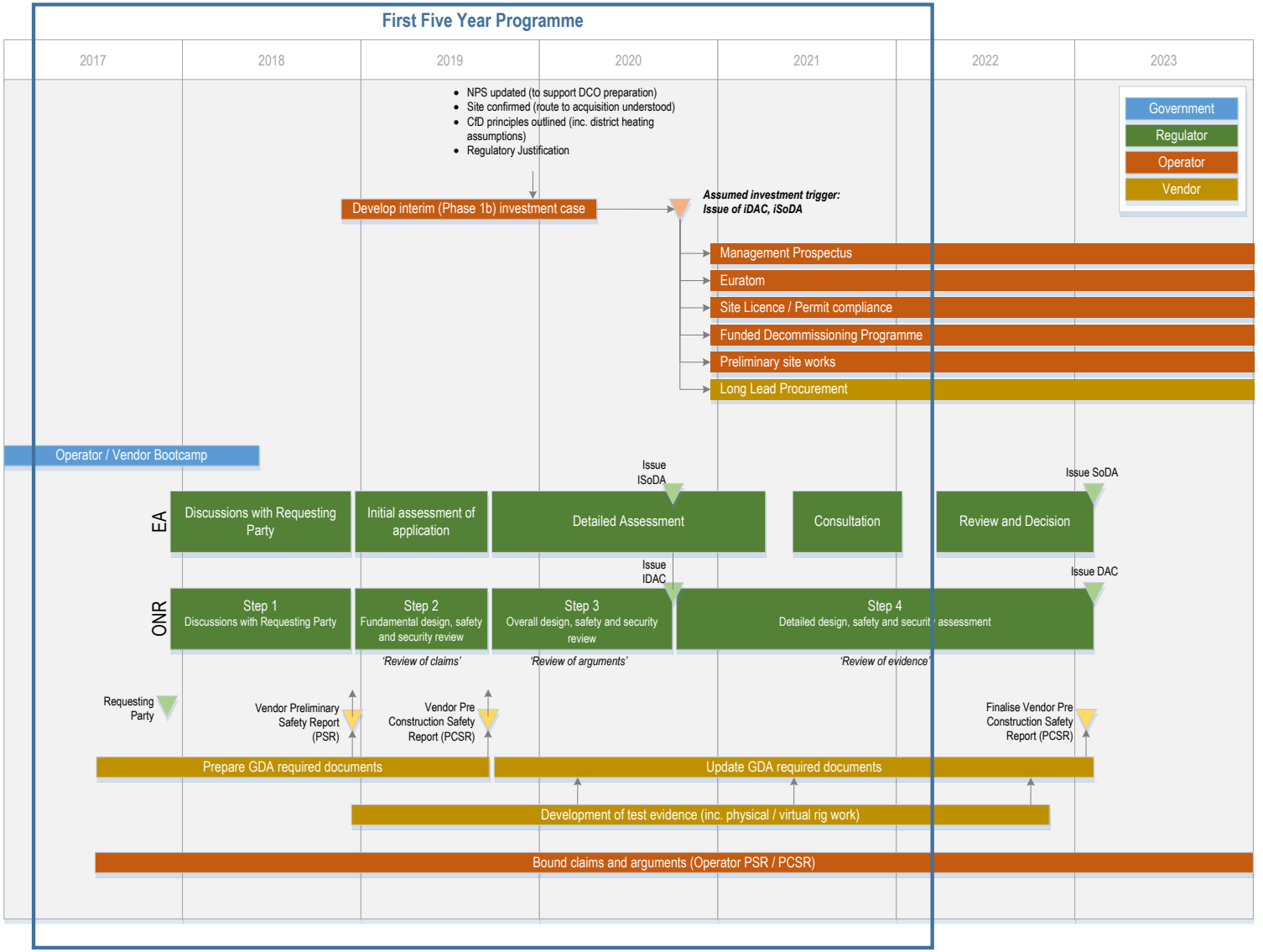
# Analysis: *Pre-FID Schedule*

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# Analysis: *Enabling Actions*

| Aim: | Method: |
|---|---|
| • **Commence GDA and Regulatory Justification early and complete within a 5 year timeframe** | • Enhance the quality of engagement between vendor(s) and Regulators by raising awareness of the GDA process, in particular the UK regulatory standards and expectations, and by promoting progress on GDA and Regulatory Justification processes. |
| • **Criteria necessary for compiling case for FID met by end-2024** | • Enhance the confidence of private sector investors that future revenue SMR generation is likely.<br>• Identify opportunities for the operator to commence wider site licence and consenting work in parallel with vendor GDA (noting that this will represent a commercial risk to the private sector).<br>• Limit uncertainty within the investment case that underpins FID (in order to release interim investment ahead of FID and increase investor confidence concerning FID itself) |
| • **FID achieved by mid-2025** | • Limit uncertainty within the investment case that underpins FID |
| • **5 year timeline post-FID** | • Minimise the scope of post-FID construction to nuclear significant works by undertaking as much preliminary site work as is permissible ahead of Site Licence Grant (i.e. all non-nuclear construction)<br>• Ensure the manufacture and assembly of the FOAK reactor is not on the critical path, by commencing the procurement of long-lead items ahead of FID. |

Government | Regulator | Operator | Vendor

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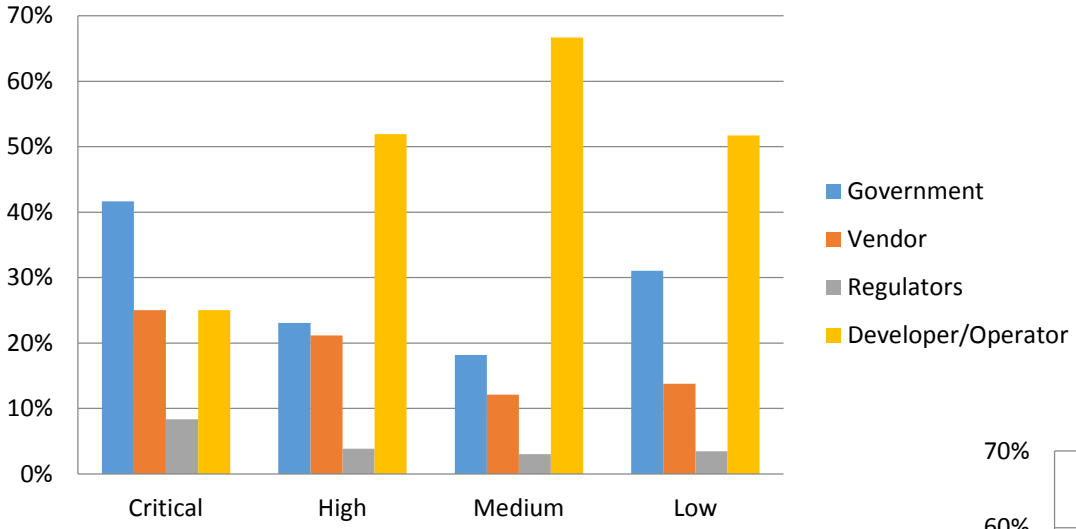
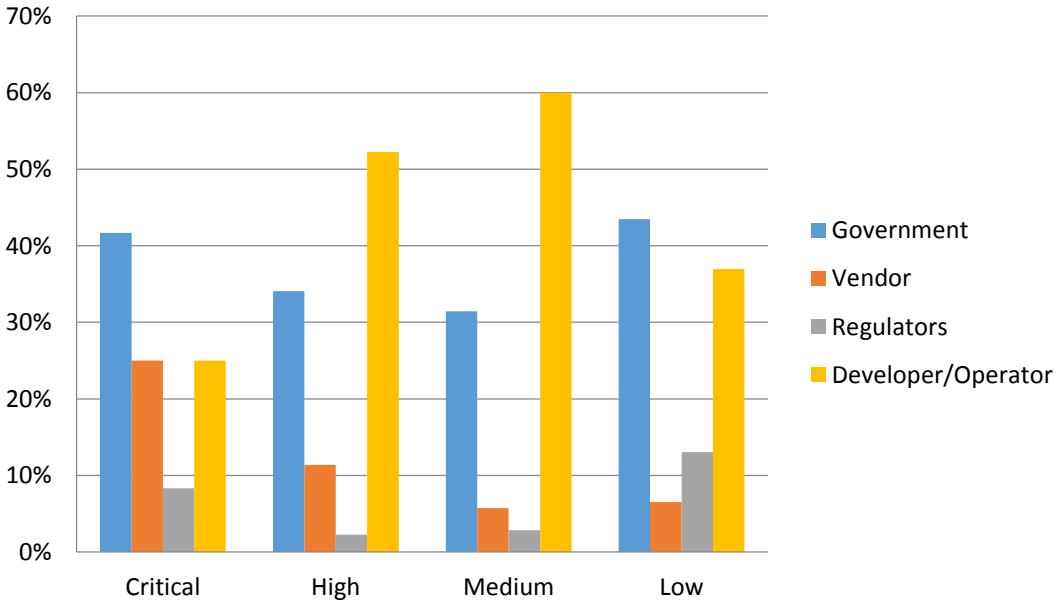
# Analysis: *Delivery Risks*

**Percentage of risks in risk register by likelihood-impact score "owned" by an organisation**




**Percentage of risk mitigation actions by likelihood-impact score "owned" by an organisation**

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# SMR Deployment Enablers Project

# Conclusions

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# Conclusions (1 of 3): *Overview*

**A credible integrated schedule demonstrates the potential for a UK SMR operating by 2030; achieving this schedule depends on the creation of early investor confidence.**

**For an effective programme to achieve FOAK SMR deployment, significant Government commitment and facilitative action is required from the outset.**

**It is insufficient for the first 5 years of the deployment schedule to focus on just GDA and Regulatory Justification.**

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# Conclusions (2 of 3): *Moving Forward*

**A strong and early marriage is required between developer / operator and vendor.**

**The notion of a developer / operator / vendor 'boot camp' is proposed as a near-term risk mitigation activity.**

**A co-ordinated public communications plan is required, led by the prospective Licensee, supported by the vendor and facilitated by Government.**

**The scale of the recruitment challenge to establish a Nuclear Baseline should not be underestimated, with staged planning essential.**

**Regulators will need to be able to resource-up without adverse influence on current UK nuclear safety activity.**

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# Conclusions (3 of 3): *Reflection*

**Bounding assumptions were judged to be sound in the context of a deployment schedule leading to a UK FOAK SMR operating by 2030.**

**The evidence gathered forms the basis of a toolkit which could be used to test or assess the feasibility of specific scenarios for SMR Deployment in the UK.**

**Deployment of a FOAK SMR in the UK is achievable by 2030 under the bounding scenario considered by this study.**

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# SMR Deployment Enablers Project

# Question Session

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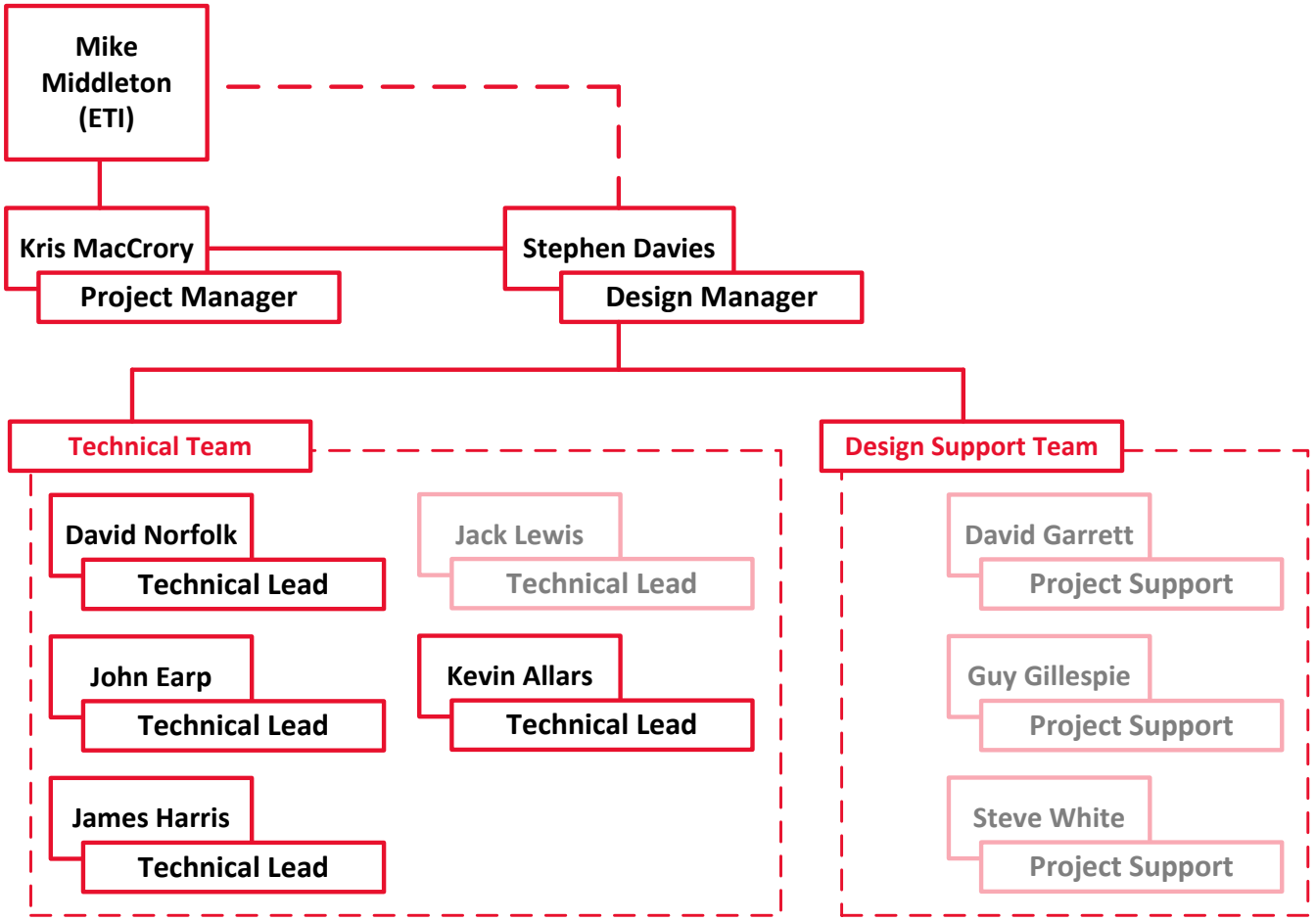
# Question Session: *Today's Team*

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# Thank You

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