POWERING THE AI REVOLUTION: USING OMDDMS® TO NAVIGATE THE COMPLEX JOURNEY OF SMR DEPLOYMENT FOR DATA CENTRES

As Rolls-Royce prepares to power AI data centres with SMRs, the challenge isn't technology; it is operating model design and delivery. OMDDMS® provides the framework to achieve this transformation successfully.

SMR* DEPLOYMENT FOR DATA CENTRES

The convergence of two transformative technologies is creating one of the most exciting infrastructure challenges of our time: powering artificial intelligence data centres with Small Modular Reactors.

With Rolls-Royce positioning itself to become the first UK firm to use nuclear power for AI operations through Small Modular Reactors,[1] and the UK government backing the aerospace giant to build the country's first small modular nuclear reactors following a two-year selection process,[2] the question is no longer *if* this will happen, but *how* organisations can successfully design, build, and deliver such complex transformations.

*Small Modular Reactors

THE SCALE OF THE CHALLENGE

The numbers are staggering.

According to industry analysis, AI data centres will consume 945 terawatt-hours annually by 2030 which is equivalent to the entire electricity consumption of Japan.[3] Traditional power sources cannot meet this demand while maintaining the 24/7 carbon-free reliability required by modern data centres.

Each Rolls-Royce SMR will generate enough energy to power one million homes for a minimum of 60 years whilst producing no carbon emissions during operation.[4] The company reports its SMRs will produce 470 megawatts of low-carbon energy, equivalent to the output of 150 onshore wind turbines.[4]

The UK government's commitment is significant: £2.5 billion for SMRs over three years[5] to build three SMR units with a combined output of about 1.5 gigawatts.[5]

The UK government has indicated these plans could support up to 3,000 jobs and power the equivalent of 3 million homes once the SMRs are connected to the grid in the mid-2030s.[2]

Yet the promise comes with profound complexity.

THE UNPRECEDENTED CHALLENGES

Building an SMR-powered data centre represents what many would call a "first of a kind" (FOAK) transformation and the challenges are formidable:

Regulatory and Timeline Complexity: Data centre companies face five-to-seven-year permitting and construction timelines for nuclear facilities, [6] whereas SMRs are generally considered FOAK projects, as the novelty of their designs often means they are untested, leading to design uncertainty and ultimately, construction, commissioning, and operational risks.[7] The regulatory landscape is evolving rapidly, but organisations cannot afford to wait; they must navigate current frameworks while preparing for future changes.

Technical Integration Hurdles: Integrating SMRs into the existing ecosystem will be complex,[8] requiring specialised expertise to navigate everything from high-density GPU deployments consuming hundreds of kilowatts per rack to sophisticated liquid cooling systems managing extreme heat loads. This isn't simply about connecting a power source to a building; it's about creating an integrated operational ecosystem.

Supply Chain and Workforce Gaps: Supply chain development requires rebuilding nuclear manufacturing capabilities that have been dormant for decades, and workforce training must accelerate to provide the specialised skills needed for SMR construction and operation.[9] The sector suffers from an eroded nuclear supply chain, following a hiatus in nuclear construction during the 1980s and 1990s. [10]

Stakeholder Complexity: Establishing an SMR-based scheme requires multiple stakeholders, including local communities and regulatory bodies, to collaborate closely.[11] The number of interdependencies is unprecedented nuclear regulators, energy authorities, data centre operators, construction partners, local communities, and technology providers must all align.

WHERE TRADITIONAL APPROACHES FALL SHORT

Most organisations approach these challenges through conventional project management frameworks. They create Gantt charts, define work packages, and hope for the best.

But here's the problem: **they're trying to manage a fundamental operating model transformation using tools designed for discrete projects**.

When you're building an SMR-powered data centre, you're not just constructing infrastructure, you are transforming:

Capabilities: From traditional grid-connected operations to integrated nuclear-powered systems

Processes: Entirely new operational, safety, and maintenance procedures

People: New roles, skills, and organisational structures

Information: Novel data flows between nuclear operations and data centre management

Technologies: Unprecedented integration of nuclear and digital infrastructure

Governance: Multi-jurisdictional regulatory compliance frameworks

Organisational structures: New entities bridging nuclear and technology sectors

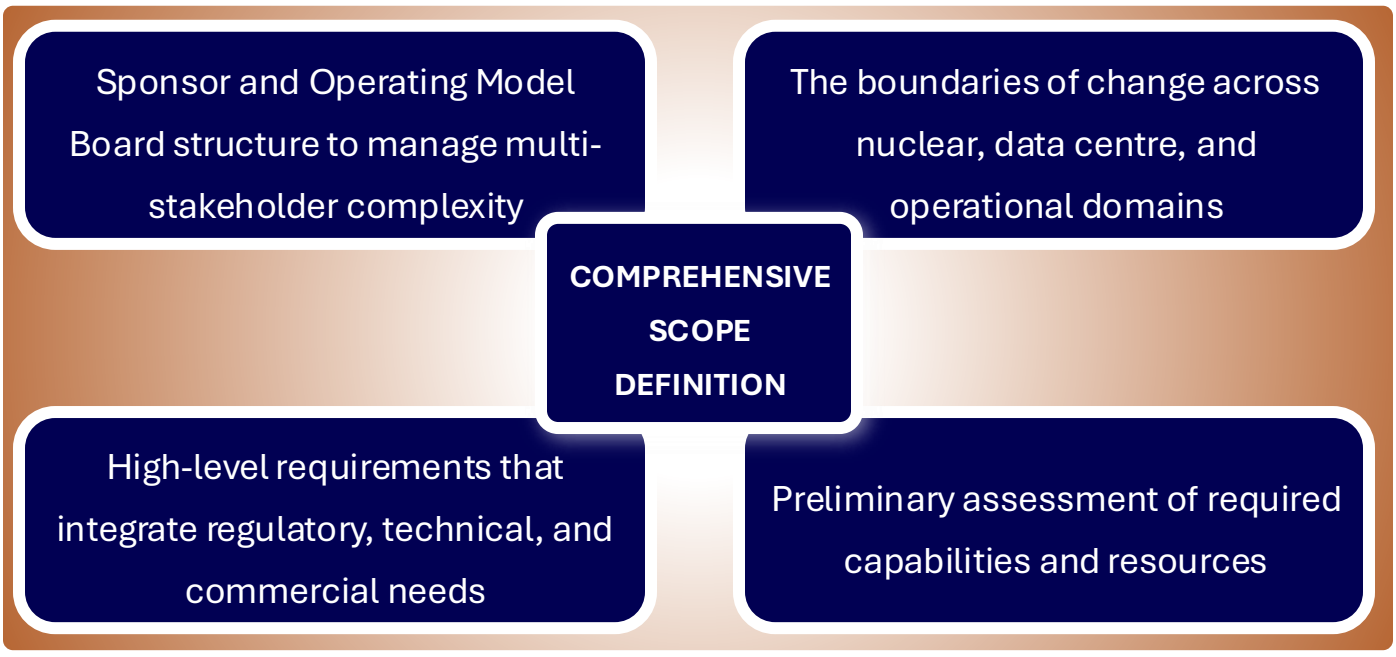
Sound familiar? This is precisely what an operating model transformation looks like and it's exactly where OMDDMS® (Operating Model Design Delivery Management Standard) becomes invaluable.

HOW OMDDMS ADDRESS SMR-DATA CENTRE CHALLENGES

The OMDDMS® framework provides a structured methodology specifically designed for operating model transformation of this scale and complexity. Here's how it directly addresses the SMR-data centre challenge:

Comprehensive Scope Definition

OMDDMS® begins with the Scope phase, which is critical when you're dealing with unprecedented complexity. Rather than diving into design, you first establish:

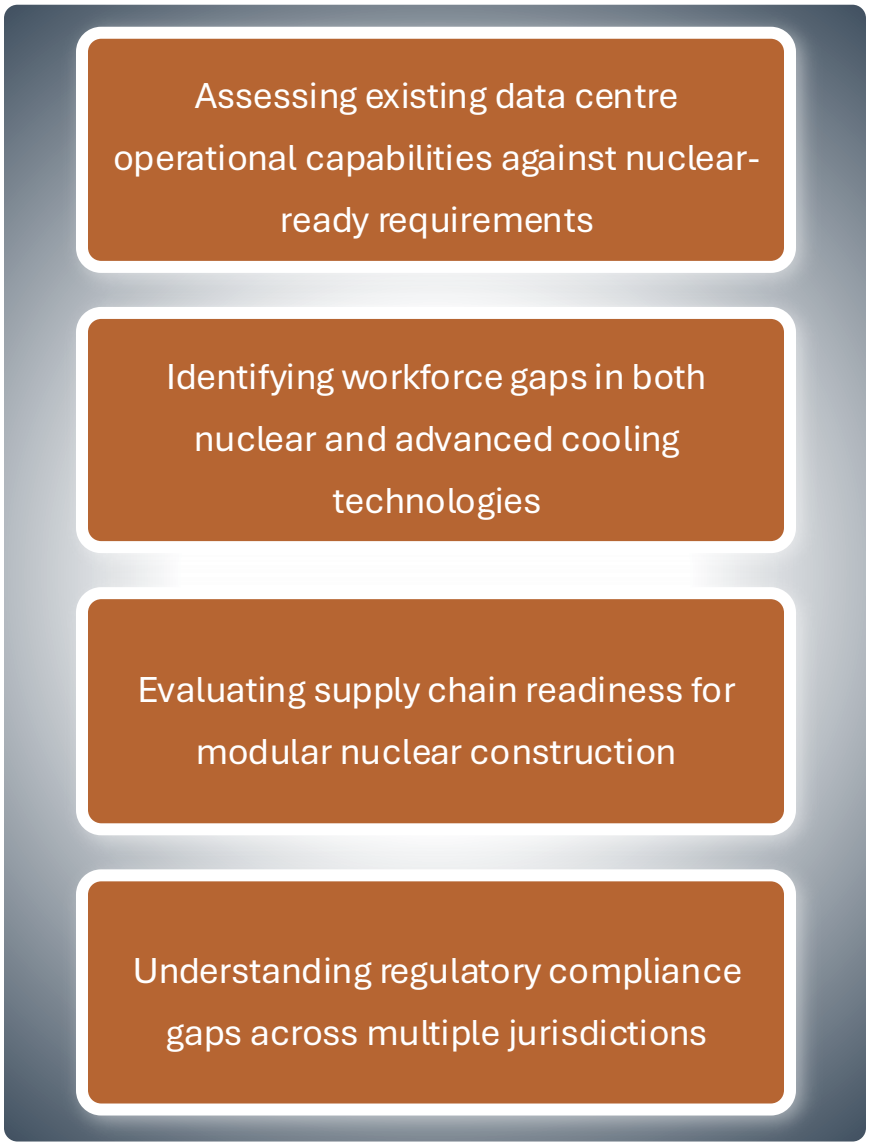


For an SMR-data centre project, this means clearly defining where nuclear operations end and data centre operations begin, what shared capabilities are needed, and how governance will function across traditionally separate domains.

BASELINE AND GAP ANALYSIS

SMRs are promoted as offering significantly reduced construction times and costs compared to their traditional counterparts, mainly due to factory/yard manufacturing, which lowers exposure to certain construction interruptions[12] but only if your operating model can leverage this advantage. OMDDMS® helps you understand whether you're ready.

The Analyse phase of OMDDMS® enables organisations to conduct a thorough assessment of their current capabilities versus what's required.



STRUCTURED DESIGN APPROACH

The Design phase is where OMDDMS® truly differentiates itself.

Rather than creating isolated technical designs, it provides a framework for designing the entire operating model and how your organisation will operate once the SMR data centre is live.

OMDDMS® explicitly recognises that multiple design methodologies can be employed:

Human-centred design: Essential for creating operational roles that safely bridge nuclear and data centre operations

Service design: Critical for defining how energy supply interacts with data centre loads

Customer-centric design: Vital when your "customers" include both end-users and regulatory bodies

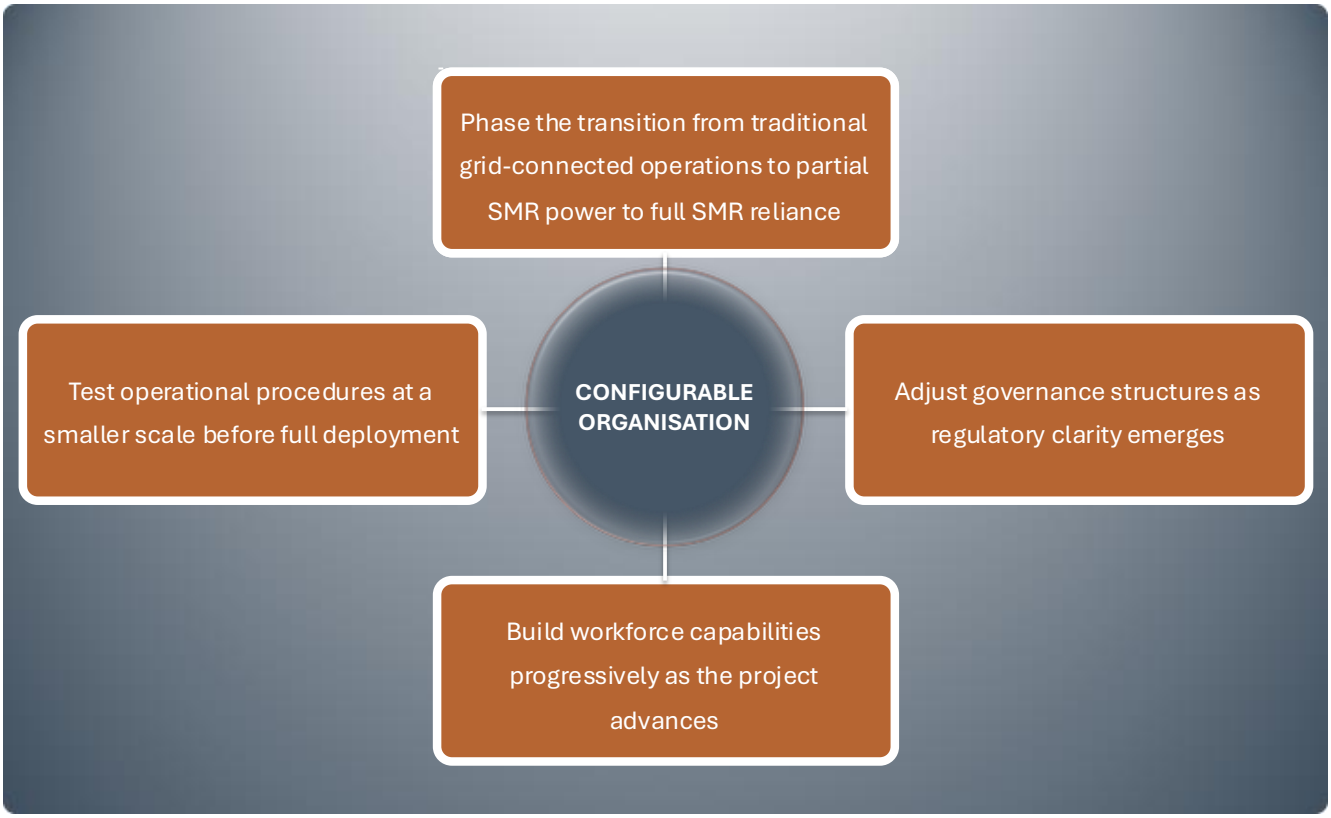
For SMR data centres, this means designing:

- How shift operations will function with nuclear safety protocols
- How maintenance windows will be coordinated between reactor refuelling cycles and server maintenance
- How emergency response procedures will integrate nuclear safety with data continuity
- How performance monitoring will span from reactor metrics to computational loads

THE CONFIGURABLE ORGANISATION CONCEPT

This is perhaps OMDDMS's most powerful contribution to the SMR data centre challenge, rather than attempting a "Big Bang" transformation, which would be catastrophic for this type of project, OMDDMS advocates for the Configurable Organisation.

Because SMRs have simpler designs and can be manufactured in factories, they can be shipped in a few significant parts, resulting in significantly reduced on-site construction times. Once SMRs start to come online, many are confident that subsequent reactors will be built more quickly and at a lower cost.[13]



This is critical because data centre companies must begin securing permits, ground space, and operational expertise to prepare for SMRs to become scalable and repeatable by the 2030s.[14] You cannot wait until the construction is complete to start building these capabilities.

RISK-MANAGED TRANSITION PLANNING

The OMDDMS® framework explicitly addresses transition planning, not just what the target state looks like, but how you get there safely.

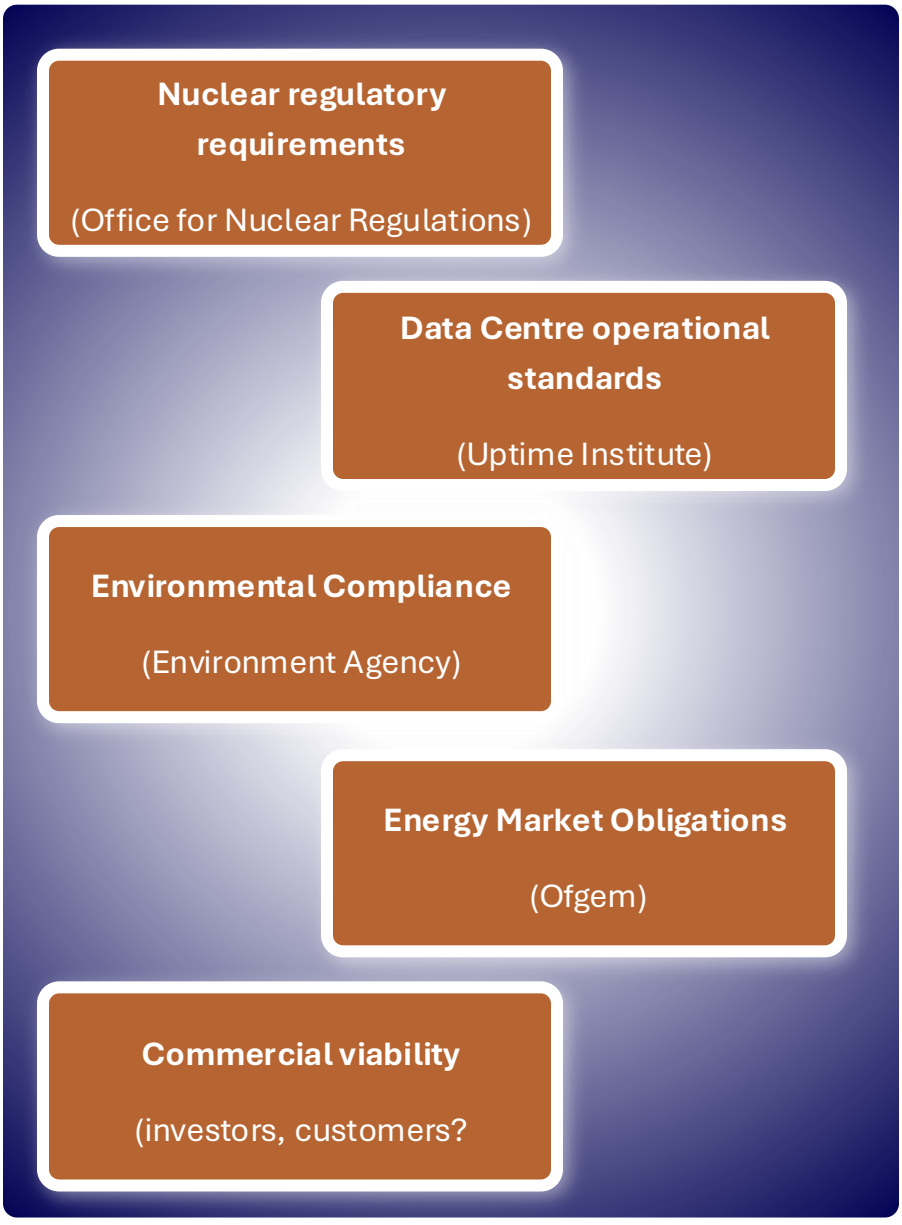
For SMR data centres, this means:

- Phased capability building that aligns with construction milestones
- Risk management that spans nuclear safety, operational continuity, and commercial viability
- Stakeholder management that maintains confidence through a multi-year transformation
- Governance that adapts as the project moves from design through construction to operation

INTEGRATED GOVERNANCE FRAMEWORK

The projects will be "first of a kind" (FOAK) and increased construction costs and delays ought to be expected, meaning that achieving a balanced legal framework from the outset will be important.[15]

OMDDMS® provides structured governance through the Operating Model Board concept; a cross-functional body that can make decisions spanning nuclear, technology, commercial, and regulatory domains, essential when you need to balance:



SUSTAINED MONITORING AND ADOPTION

The Monitor phase of OMDDMS® ensures the operating model changes are effective and sustained.

For SMR data centres, this means:

- Continuous assessment of operational performance against design intent
- Early detection of operating model drift or emerging issues
- Structured feedback loops to drive improvement
- Evidence that the operating model is delivering the intended strategy

REAL WORLD APPLICATION: A ROLLS-ROYCE SMR DATA CENTRE SCENARIO

Let's make this concrete.

Imagine you're leading the deployment of a 470MW Rolls-Royce SMR to power a hyperscale data centre.

Without OMDDMS®: You'd likely treat this as two parallel projects, (1) build the SMR, (2) create the data centre, then connect them at the end.

You'd likely encounter integration issues late, unexpected operational conflicts, and struggle with unclear governance, potentially facing delays as different stakeholder groups work at cross-purposes.

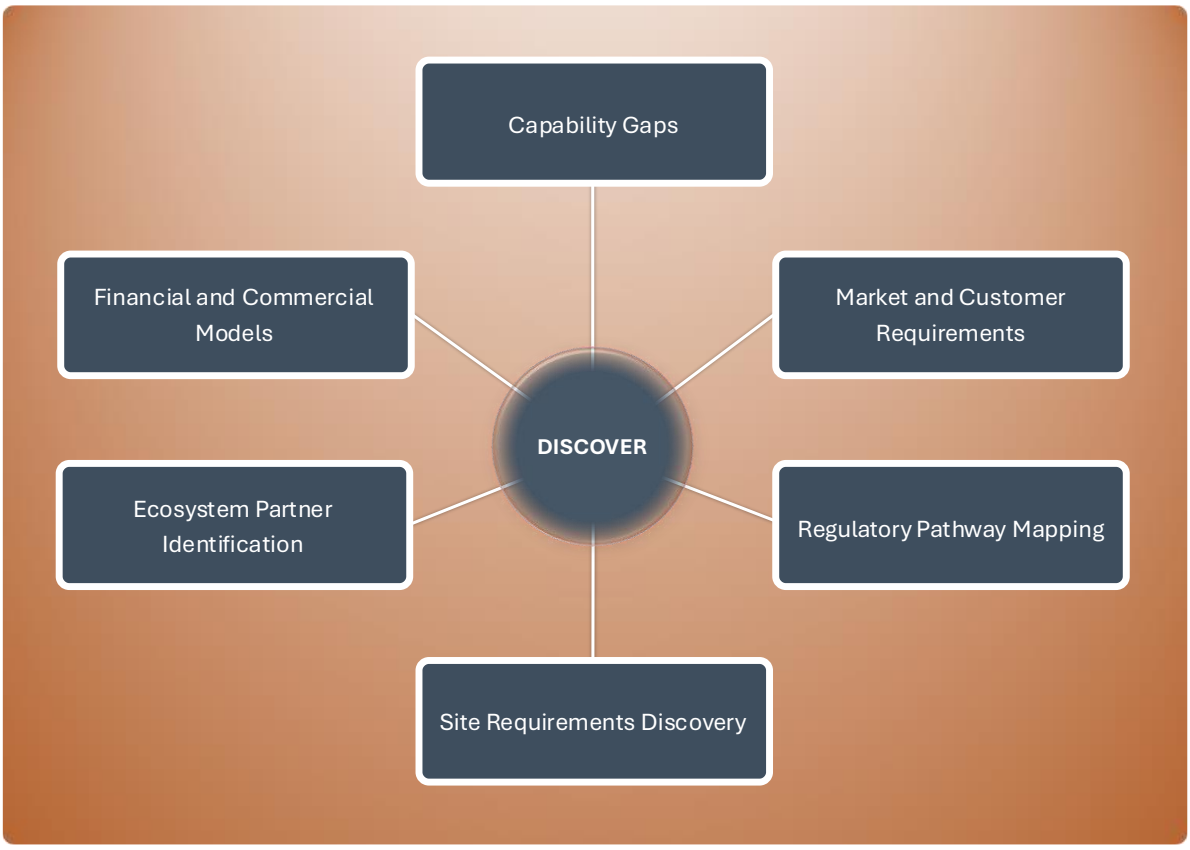
With OMDDMS®:

Scope Phase: You establish that this is fundamentally an operating model transformation requiring new capabilities spanning nuclear operations, advanced cooling, regulatory compliance, and integrated energy management.

You identify the Operating Model Board (OMB) membership (nuclear operations, data centre operations, regulatory affairs, commercial, safety) and establish their decision-making authority.

MAPPING THE CURRENT REALITY BEFORE NUCLEAR INTEGRATION

SMR data centre projects require building entirely new infrastructure from the ground up. The Discover Phase identifies the organisational capabilities, market requirements, regulatory landscapes, and ecosystem partnerships needed to operate a facility that doesn't yet exist. This is about understanding what your organisation must become.



When building something unprecedented from scratch, discovery is reconnaissance into unknown territory. SMRs are manufactured in factories, but integration with AI data centres has never been done at scale.

MAPPING THE CURRENT REALITY BEFORE NUCLEAR INTEGRATION

Capability Gaps: Identify what capabilities the organisation currently lacks, e.g. nuclear operations expertise, advanced cooling system management, integrated facility oversight, and what must be built or acquired.

Market and Customer Requirements: Identify actual AI workload profiles, uptime expectations, and power density requirements that will inform facility specifications, rather than assuming traditional data centre models apply.

Regulatory Pathway Mapping: Discover the full regulatory journey across nuclear licensing, environmental permitting, and data facility certifications and identify where processes overlap or conflict.

Site Requirements Discovery: Understand geological, hydrological, and proximity factors needed for both nuclear licensing and data connectivity. Not all locations suitable for data centres work for SMRs.

Ecosystem Partner Identification: Map the entire value chain from nuclear reactor manufacturers to construction partners, specialised workforce providers, and long-term maintenance suppliers.

Financial and Commercial Models: Discover viable business models, funding structures, and customer contracts that span 60-year nuclear lifecycles alongside rapid technology refresh cycles.

Outcome

Without rigorous discovery, organisations build capabilities in the wrong sequence or design facilities that can't adapt as technologies evolve. The Discover Phase identifies the gaps you weren’t aware of.

IDENTIFYING GAPS, CREATING SOLUTIONS

The Analyse Phase: You conduct the Operating Model Maturity Assessment. This identifies that while your organisation has strong data centre operations capability, you have critical gaps in:

Market Safety Culture

- Limited understanding of nuclear regulatory processes
- No existing framework for integrated energy-complex operation

Supply Chain Assessment

- Need to assess your supply chain
- Identify critical partners who bridge both domains

Internal Leadership

- New CEO
- Data Centre Operations Manager

Transition Planning

- New processes (Integrated Load Generation Planning)
- New governance structures (Nuclear Safety Committee with Data Centre representation)

Technology Focus

- New technologies (real-time load balancing between reactor output and computational demand)

Outcome

A comprehensive understanding of the transformation requirements across operations, governance, and technology integration.

CREATING BLUEPRINTS, DESIGNING STRUCTURE, DEFINING OPERATIONS

The Design Phase: You develop the Target Operating Model based on your analysis findings. This creates the blueprint for how your organisation will function, addressing the critical gaps identified and building the structures needed for success.

Market Safety Culture

- Design an integrated safety framework spanning nuclear and data centre operations
- Create regulatory compliance processes bridging both domains

Supply Chain Integration

- Design a vendor management framework for dual operations
- Map critical supplier relationships across energy and digital infrastructure

Internal Leadership

- Define the Nuclear-Data Centre Operations Manager role and responsibilities
- Design reporting lines and decision-making authority

Transition Planning

- Design the Integrated Load Generation Planning process and workflows
- Create a Nuclear Safety Committee with a Data Centre representation structure

Technology Architecture

- Establish automated failover mechanisms and protocols

Outcome

A complete Operating Model Blueprint document defining organisational structure, processes, governance frameworks, roles, and requirements, ready for implementation.

EXECUTING COMPLEX INFRASTRUCTURE TRANSITIONS

The Transition Phase transitions the SMR data centre transformation from design to reality. You're orchestrating nuclear operations with AI computational infrastructure while maintaining 24/7 uptime. With timelines of five to seven years and zero tolerance for downtime, execution demands unprecedented precision.

Companies must act now to prepare for scalable SMRs by the mid-2030s. The Transition Phase manages this decade-long journey building capabilities, adapting governance, and adjusting to supply chain realities. OMDDMS® treats this as an operating model transformation, not construction.

Modular Deployment Strategy:

Leverage SMRs' factory manufacturing advantage by developing operational capabilities at a smaller scale prior to full deployment, conducting testing procedures, training teams, and refining processes

Parallel Operations Period:

Run traditional grid-connected operations alongside emerging SMR capacity, gradually shifting loads as nuclear systems prove reliable and teams gain confidence

Progressive Regulatory Clearance:

Secure nuclear operating licences, environmental permits, and data centre certifications in phased stages rather than seeking simultaneous approval.

Workforce Transition:

Develop specialised skills gradually - nuclear safety officers, integrated facility managers, advanced cooling technicians; to enable teams to mature as infrastructure becomes operational

Stakeholder Engagement Phases:

Manage community concerns, regulatory relations, and customer communication through structured stages aligned with visible construction milestones

CONTINUOUS MONITORING FOR NUCLEAR-DIGITAL OPERATIONS

The Monitor Phase: You establish performance metrics spanning nuclear safety, energy reliability, computational availability, and commercial performance, ensuring the operating model delivers the intended strategic benefits.

Continuous monitoring identifies deviations early, whether in reactor performance, cooling system inefficiencies, computational load imbalances, or revenue impacts, enabling corrective action before minor issues escalate into operational failures.

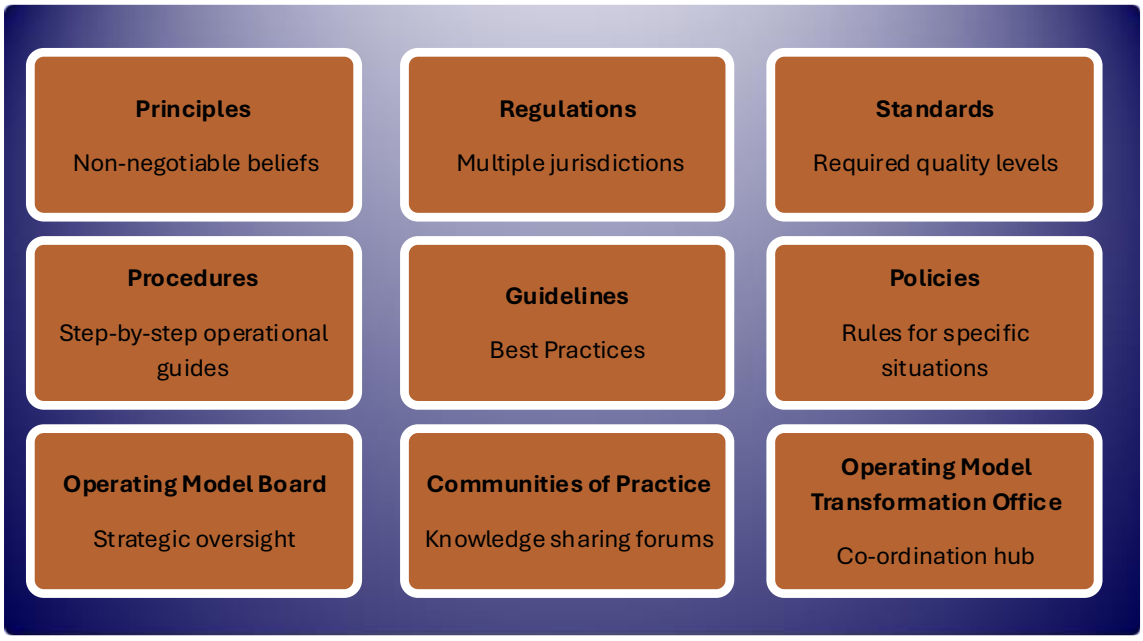
The Monitor Phase also tracks the maturity of your integrated nuclear-digital operations, assessing whether teams are developing the cross-domain expertise needed, whether governance mechanisms are functioning effectively, and whether the operating model is adapting as both nuclear and AI technologies evolve.

This ongoing surveillance ensures that your SMR data centre maintains the delicate balance between nuclear safety protocols and data centre uptime requirements throughout its 60-year operational lifecycle.

INTEGRATED GOVERNANCE FRAMEWORK

The projects will be "first of a kind" (FOAK), and increased construction costs and delays are to be expected, meaning that achieving a balanced legal framework from the outset will be crucial. [15]

The Govern Phase is the continuous framework that ensures your SMR data centre transformation stays coordinated, compliant, and effective throughout the multi-year journey. When bridging two historically separate domains (nuclear power and AI data centres), governance manages complexity, resolves conflicts, and maintains accountability across unprecedented regulatory landscapes.



Multiple stakeholders, communities, and regulatory bodies must collaborate to establish an SMR-based scheme. Without robust governance, relationships fracture, decisions create downstream conflicts, and accountability becomes impossible to trace. Strong OMDDMS governance ensures transparency across the nuclear-digital boundary, alignment with safety and business strategy, proactive risk management of the multi-billion-pound investment, and momentum through inevitable challenges.

THE STRATEGIC ADVANTAGE

The Institute for Global Change, supports the SMR approach for long-term energy planning, saying SMRs can be a cornerstone of the long-term, secure and low-cost decarbonised energy system that can power the future economy.[16]

But realising this vision requires more than good technology; it requires excellent operating model design and delivery.

Organisations that apply OMDDMS® to SMR-data centre deployment will gain:

Faster Time to Value: By planning the operating model transformation in parallel with infrastructure build, you avoid the costly "now what?" moment when construction completes but the organisation isn't ready to operate.

Reduced Risk: Structured risk management across technical, operational, regulatory, and commercial domains results in fewer surprises and enhanced stakeholder confidence.

Competitive Advantage: The SMR fleet could contribute up to £54 billion to the UK economy between 2025 and 2050, with production of the three SMR plants forecast to create 40,000 regional UK jobs by 2050.[17] First movers who can successfully deploy will capture disproportionate value.

Configurable Future: The Configurable Organisation concept means you're not locked into rigid structures. As SMR technology matures, regulatory frameworks evolve, and data centre demands shift, your operating model can adapt.

Regulatory Confidence: Demonstrating a structured and governed transformation builds confidence with nuclear regulators, energy authorities, and other stakeholders, potentially accelerating approvals.

THE FORWARD PATH

The UK government intends to sign a contract with Rolls-Royce SMR and allocate a site later this year, subject to regulatory approval, with the first units expected to connect to the grid in the mid-2030s.[18]

The window for organisations to prepare is now. Those who treat SMR-data centre deployment as simply an infrastructure project will struggle. Those who recognise it as an operating model transformation and apply frameworks like OMDDMS® will thrive.

The question isn't whether SMRs will power tomorrow's data centres, the convergence of forces driving SMR adoption appears unstoppable, with tech companies' insatiable power demands, net-zero commitments by 2030-2040, and grid infrastructure limitations creating a perfect storm favouring nuclear solutions.[19]

The question is whether your organisation has the operating model capability to make it happen successfully.

ABOUT THE AUTHOR AND OMDDMS®

Austin Merrett is Co-Creator of OMDDMS® (Operating Model Design Delivery and Management Standard) and Founder of Oliver Swift, the UK's leading OMDDMS® training provider.

With 20 years of experience leading operating model transformations across financial services, energy, and government sectors, Austin specialises in helping FTSE 250 companies navigate complex, high-stakes change.

Oliver Swift is one of only two OMDDMS® Accredited Training Organisations globally, serving the UK, Europe, Africa, and the United States.

OMDDMS® is an emerging global standard that provides a comprehensive framework for designing, building, and delivering operating model transformations.

The methodology encompasses structured phases: Scope, Discover, Analyse, Design, Transition, Monitor, and Govern, enabling organisations to manage complex change with appropriate governance and risk management.

The Applied Operating Models Design and Delivery courses teach you how to design and deliver a Target Operating Model using the OMDDMS® standard, along with a transition plan that you can use to lead and drive business change in an organisation.

As Chris Cholerton, CEO of Rolls-Royce SMR, stated: "As well as delivering affordable, clean energy to support our nation's energy independence, deploying three of our units will drive domestic growth by creating thousands of highly skilled, well-paid jobs and supply chain opportunities."[20]

FOOTNOTES

[1] AI Magazine - Rolls-Royce using nuclear for AI

[2] CNBC - UK government backing

[3] Introl - 945 TWh consumption

[4] Rolls-Royce SMR - Technical specs

[5] Carbon Credits - £2.5B investment

[6] Data Center Knowledge - 5-7 year timelines

[7] Herbert Smith Freehills - FOAK risks

[8] Intelligent Data Centres - Integration complexity

[9] Introl - Supply chain challenges

[10] Data Center Dynamics - Supply chain erosion

[11] Nuclear Engineering International - Stakeholder collaboration

[12] Herbert Smith Freehills - Factory manufacturing

[13] Data Center Dynamics - Construction times

[14] Data Center Knowledge - Preparation needs

[15] Herbert Smith Freehills - Legal frameworks

[16] Rolls-Royce SMR - Tony Blair quote

[17] Rolls-Royce SMR - £54bn economic impact

[18] CNBC - Contract signing timeline

[19] Introl - Unstoppable convergence

[20] Carbon Credits - Chris Cholerton quote

IS YOUR ORGANISATION READY FOR COMPLEX TRANSFORMATION?

Whether you're deploying SMRs, navigating digital transformation, or restructuring operations, OMDDMS® provides the framework to succeed.

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