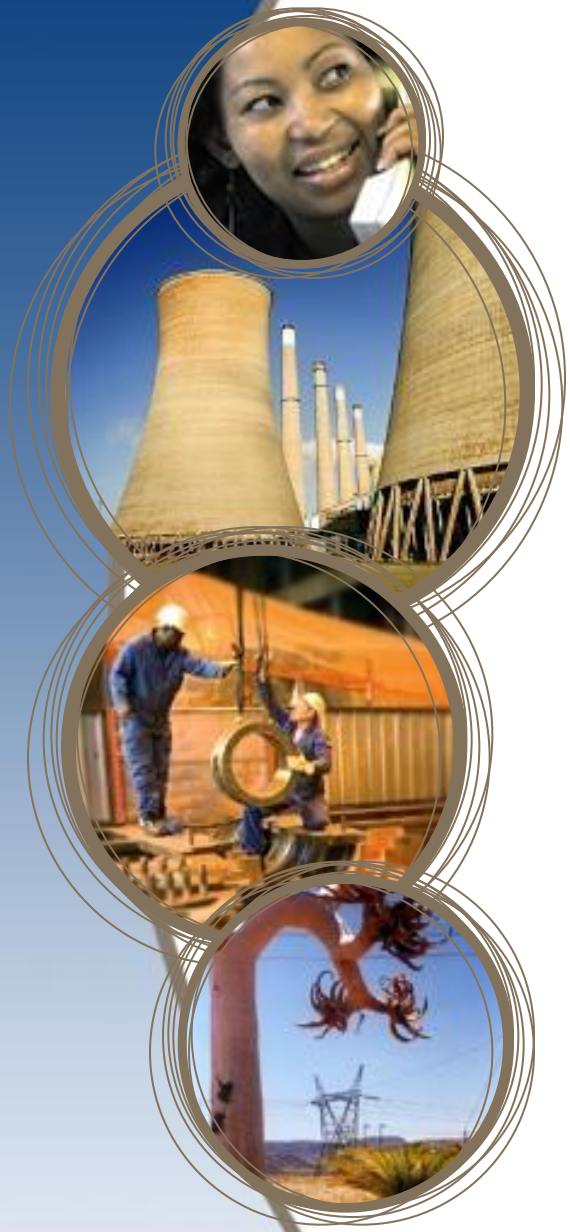


Smart Strategy

- Smart Strategy development team
- March 2014

Ken Hales

Powering your world

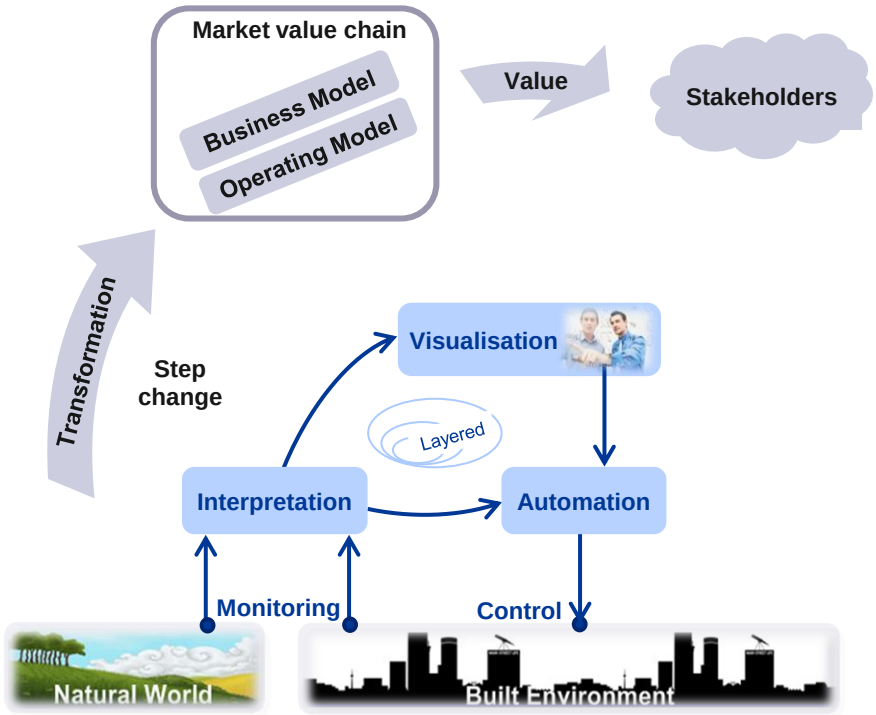
1923-2013

Smart world megatrend…

Smart Phone
Smart Car
Smart Aircraft
Smart City

Smart Building
Smart Home
Smart Grid
…

Eskom



Value

- Real time management of assets, logistics, resource utilisation, revenue and loss
- Planning, optimising and decision making
- Capital and operational efficiencies
- More flexible, adaptive and economic markets (supply-demand)
- New business models & processes
- Integrated value chains across companies, cities, countries

Outcomes

- Assess and predict the natural world and the built environment
- Situational awareness
- Optimal control – operate closer to limits
- Additional automation of more open systems
- Pro-active responsiveness
- Reliability, quality, safety and compliance
- Resilience and adaptability

Challenges

- Exponential data volumes and dependence on data quality
- Information security, business continuity, data privacy
- Device management and configuration
- Cross discipline skills and processes (IT and OT)
- Systems engineering / enterprise architecture to leverage value
- Managing change
- Co-ordination

Nexus

Tipping Point

Drivers

- Lower cost and increased capacity of telecommunications, digital storage, embedded processing
- Capability of sensors, actuators and ICT - analogue to digital, convergence, functionality
- Commercial availability, pervasive deployment
- Pressing / unlocked needs - climate change, connected world, regulatory requirements
- Changes in design practices (multipurpose / open standards), business model transformation

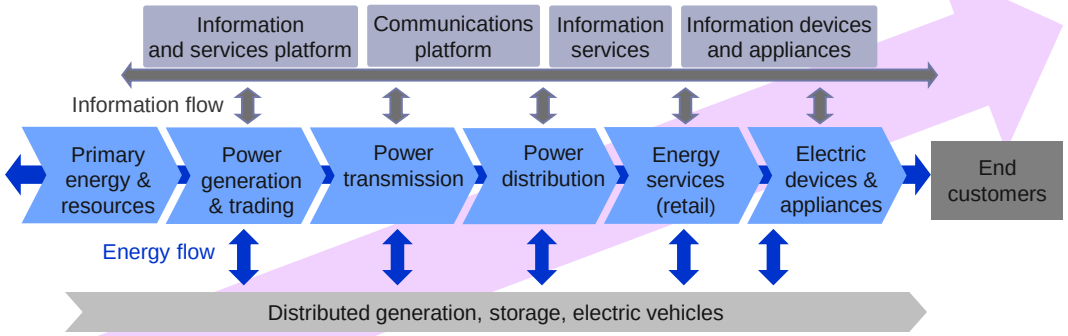
Smart grid / Smart utility…

Market Value Chain

Information and Services

Energy

Distributed Resources



Information and Services:
- Are Linked bi-directionally
- Hold energy system together

Bi-directional energy flow

Integrated throughout

Eskom business model

Operating model

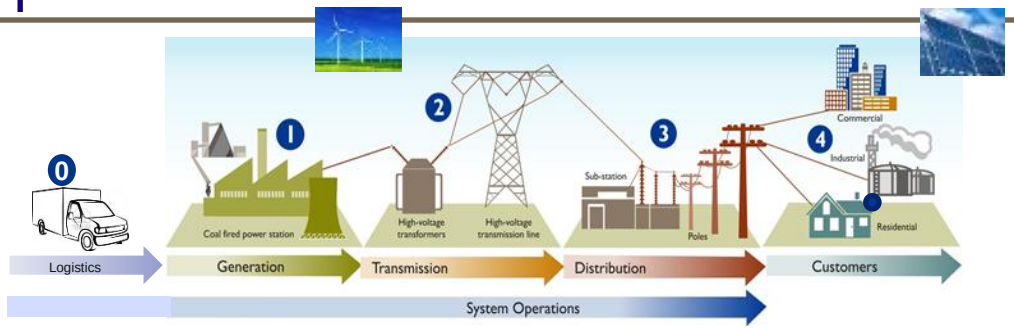
Smart Capabilities

- Cross functional analytics
- Asset analytics
- Asset performance management
- Asset utilization management
- Asset condition monitoring
- Wide Area Visualization / Control
- Advanced fault management
- Adaptive protection / control
- Substation automation
- Power Flow Control
- Supply demand balance
- Advanced DMS
- Power quality management
- Automated feeder switching
- Automated islanding
- Customer analytics
- Energy resource integration
- Usage optimization / appliance control
- Load management
- Automated metering

- Instrumented
- Intelligent
- Automated
- Connected

Monitoring ↑ Control ↓

Grid



Traditional, embedded, separately designed:

- OT (protection, control)
- Telecommunications
- Information Technology

Current state assessment…

Disruptors / change drivers

Energy value chain

- Increasing distributed and renewable generation and load (less predictable / dispatch-able)
- Revenue stream changes – sales to service
- Reduced revenue due to self generation and efficiencies
- Decreasing cost of energy storage and distributed renewables
- Climate change

Other threats

- Policy and regulation limiting generation type and business model options
- Technology push and decision creep – lack of co-ordinated approach is a risk

Strengths and opportunities

- Skills and passion in enabling functions
- Various capabilities in research / pilot
- Various base IT, OT, Telecommunications apps in plans
- Collaboration and governance that can be leveraged

Weaknesses and challenges

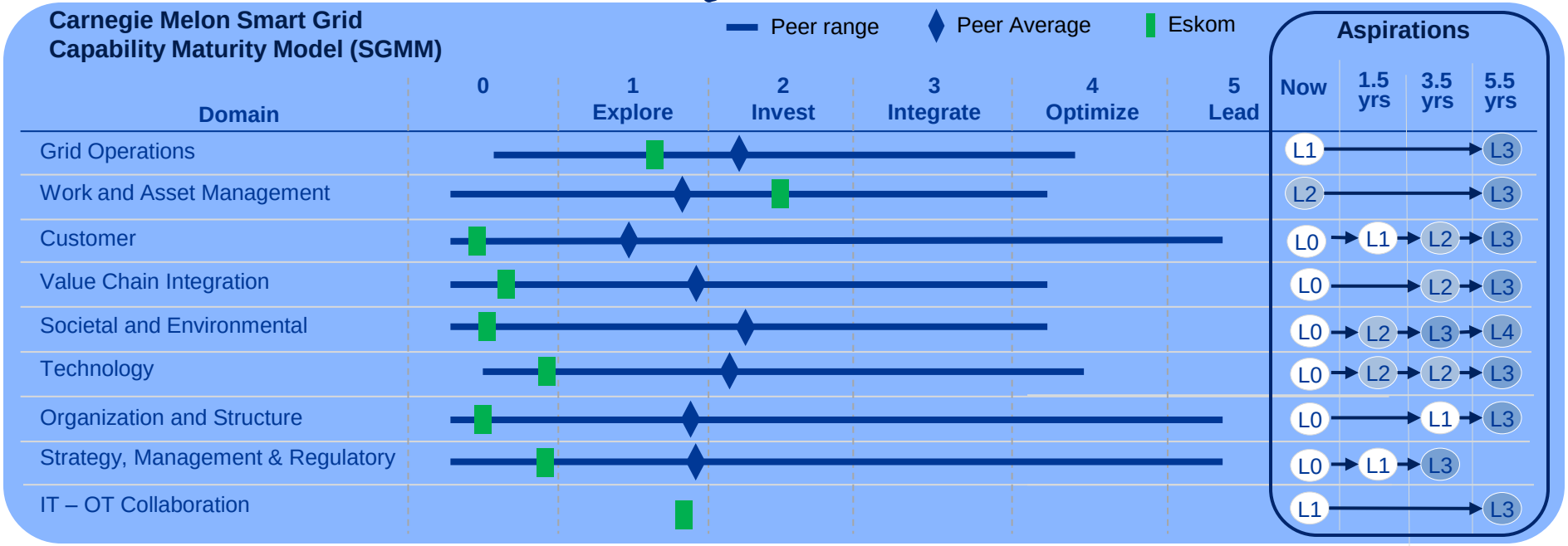
- Fragmented plans and solutions
- Inadequate alignment, focus and co-ordination
- Low maturity of over-arching design
- Limitations in governance
- Collaboration too loose and not manageable
- Resource constraints and inefficiencies
- Limited skills, discipline and data quality in key operations areas

Eskom lags industry peers

National policy, regulation, standards, stakeholder engagement

- Evolving too slowly
- Not always according to strategy aligned principles
- Too fragmented and ad-hoc

Carnegie Melon Smart Grid Capability Maturity Model (SGMM)



Purpose, expected benefits and objectives…

SMART UTILITY VISION (2030)

"We play a key smart-enabled role in an *economic* energy market, where provision and usage of energy is optimised (in stakeholder and national interest) potentially including an integrator role between the willing participation of prosumers"

SMART STRATEGY PURPOSE AND EXPECTED BENEFITS

BUSINESS OPTIMISATION

- Revenue and loss management
- Supply demand balance
- Capital efficiencies (better asset utilization)
- Operational efficiencies
- Improved planning and optimization

RESILIENCE / SUSTAINABILITY AGAINST DISRUPTORS

- Grid stability with renewable and distributed micro generation
- Improved resilience to detrimental weather
- Improved compliance, safety and resilience to human /system errors

NEW BUSINESS MODEL

- Enables new business model options

CUSTOMER

- Reliability and quality
- Lower cost and ability to balance cost against utility
- Better information and service experience

COUNTRY AND SOCIETY

- Reduced environmental impact
- More effective, responsive and inclusive energy market
- Supplier localization, job creation etc.

OVERALL OBJECTIVES

- Keep pace despite constraints while building capability, addressing enablers and risks.
- Optimum transformation – future-proof / agile, avoid technology push, decision creep, ineffective investments.

SMART STRATEGY OBJECTIVES AND OUTCOMES

GRID OPERATIONS

- Improved reliability, availability, voltage and stability
- Improved grid control
- Optimisations through analytics

WORK / ASSET MANAGEMENT

- Improved asset health and utilisation
- Workforce optimisation
- Better planning and forecasting

CUSTOMER

- Improved customer usage information / automation / service
- Participation in distributed generation
- Managed supply / demand balance
- Customer analytics

STABILITY / RESILIENCE

- Early detection and correction of safety hazard conditions
- Increasing automation and verification of operations and maintenance activities
- Stability with renewables

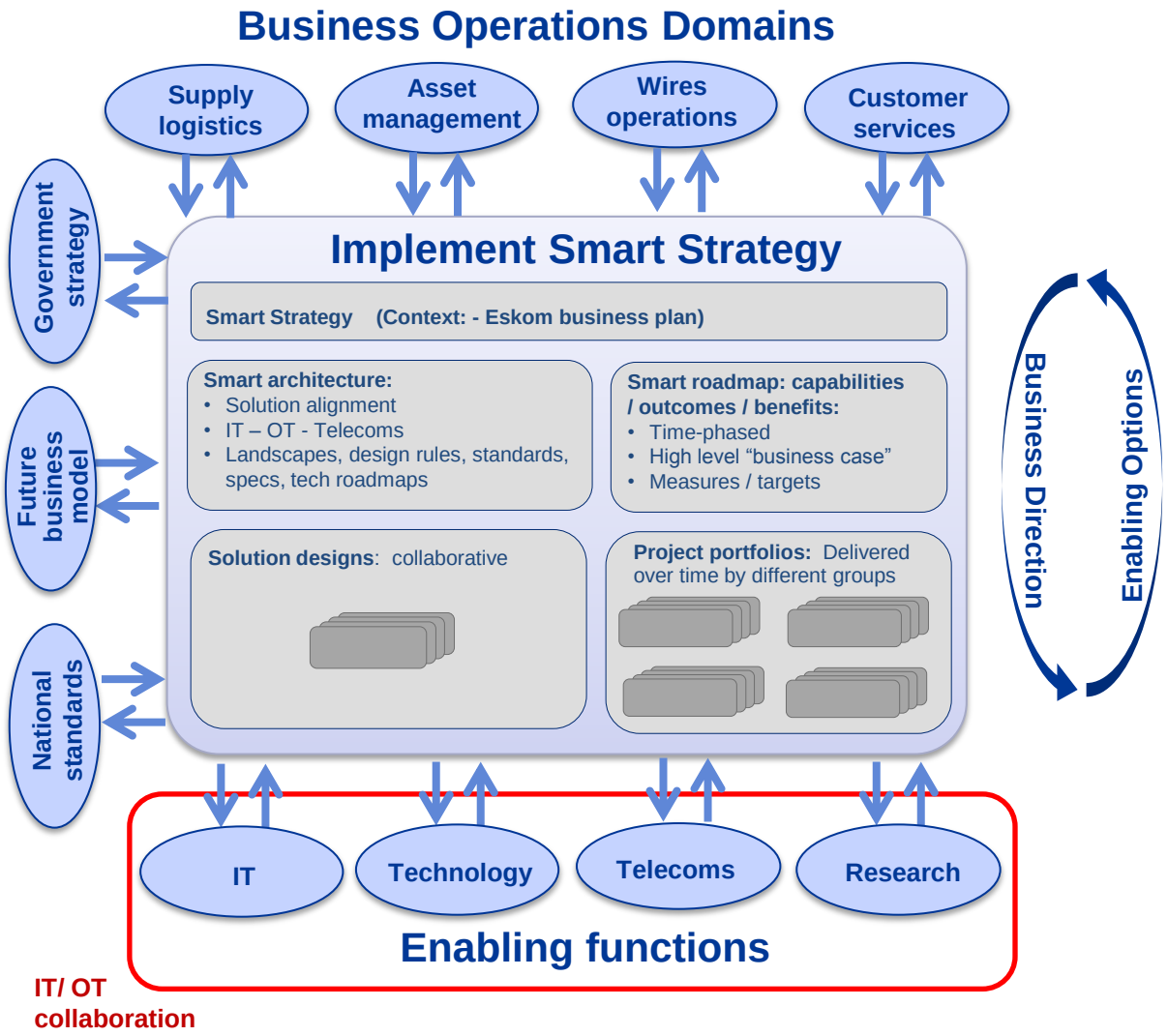
BUSINESS MODEL FLEXIBILITY

- Enable business model options

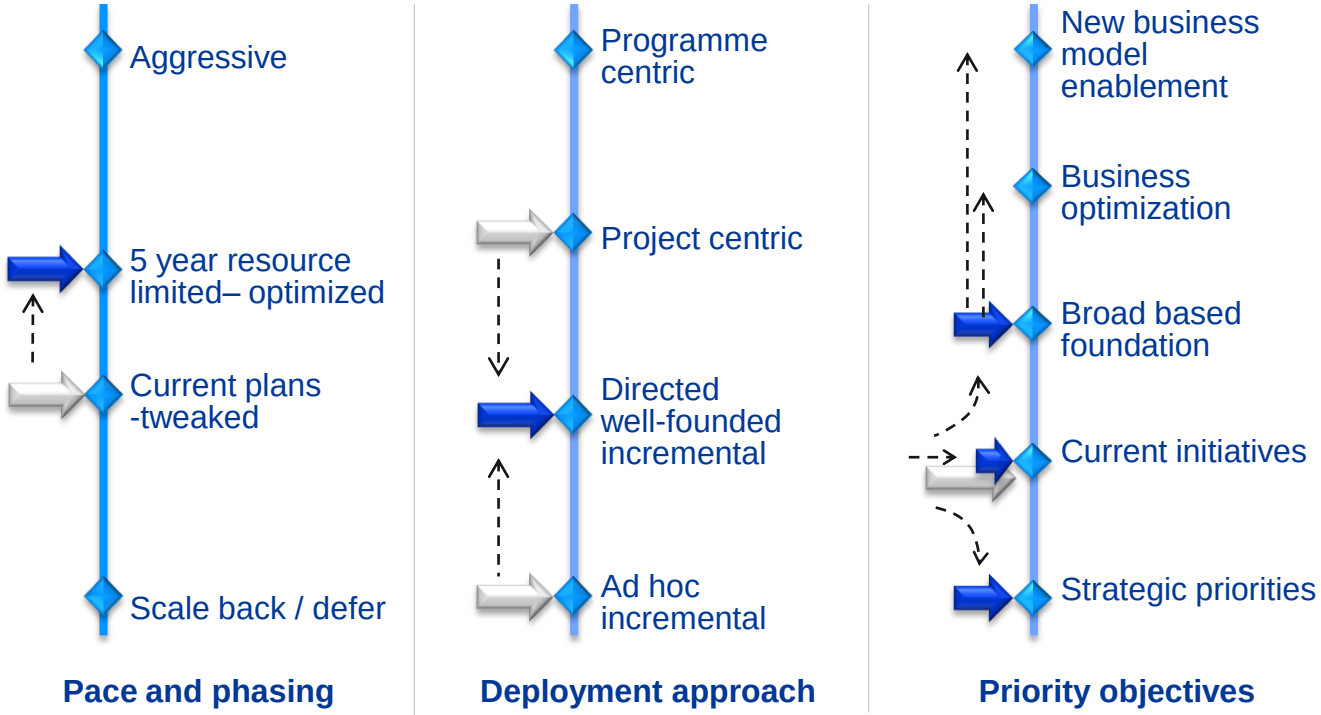
COUNTRY AND SOCIETY

- Responsible contribution to national interest, including national development plan, new markets and market entrants
- Job creation
- Local suppliers

Scope of cross functional co-ordination…



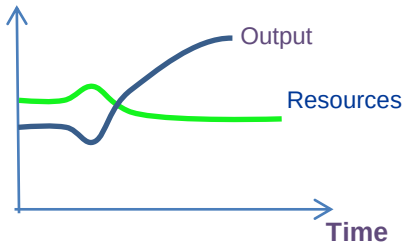
Strategic options for evolving to a Smart Utility…



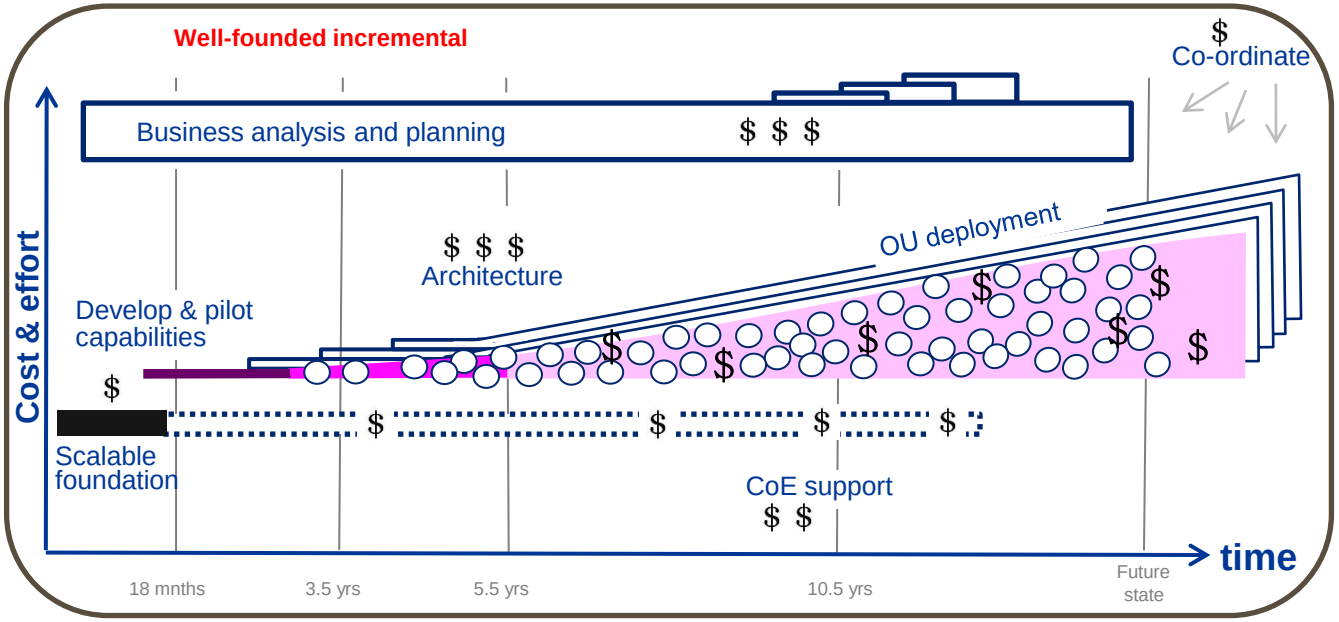
We will shift Eskom's position despite limited resources by:

- Limited investments / deployment pace for 5 years – optimize for efficiency, leverage, flexibility, traction
- Potentially scale up thereafter pending medium term planning
- Shift approach to directed well-founded well-phased incremental (centre-led, OU deployment)
- Shift organization dynamics for more effective overall alignment
- Balanced programme of capabilities to optimize the business, build resilience and enable evolving business model
- Leverage current initiatives, address strategic priorities and lay a broad based foundation

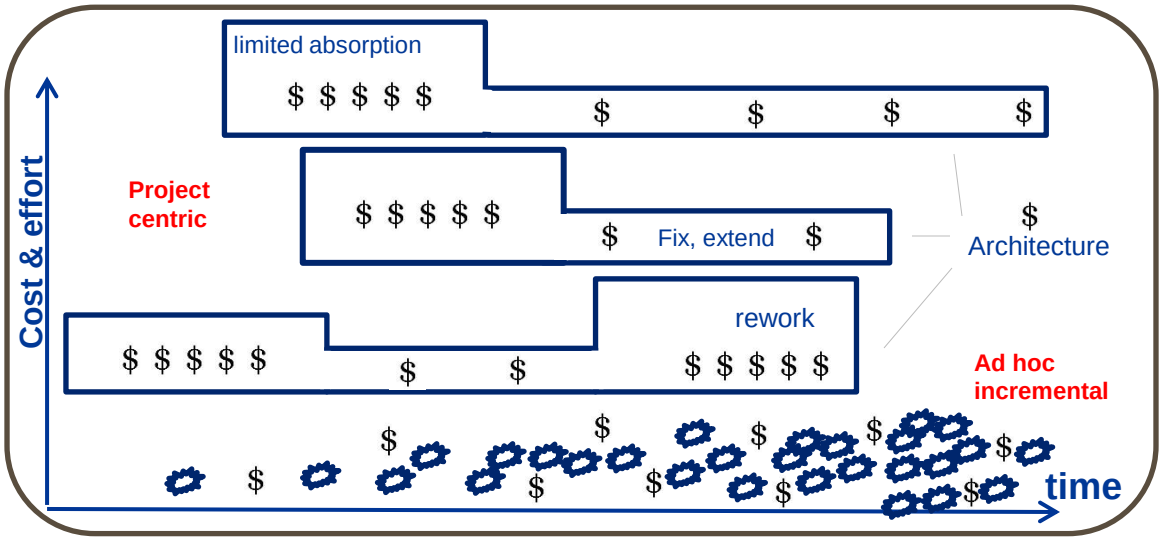
Shift to a directed, well-founded, well-phased incremental approach…

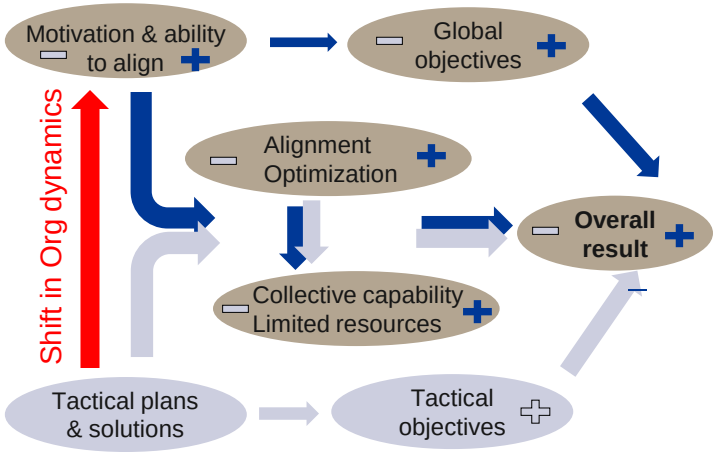


Optimised for efficiency & traction

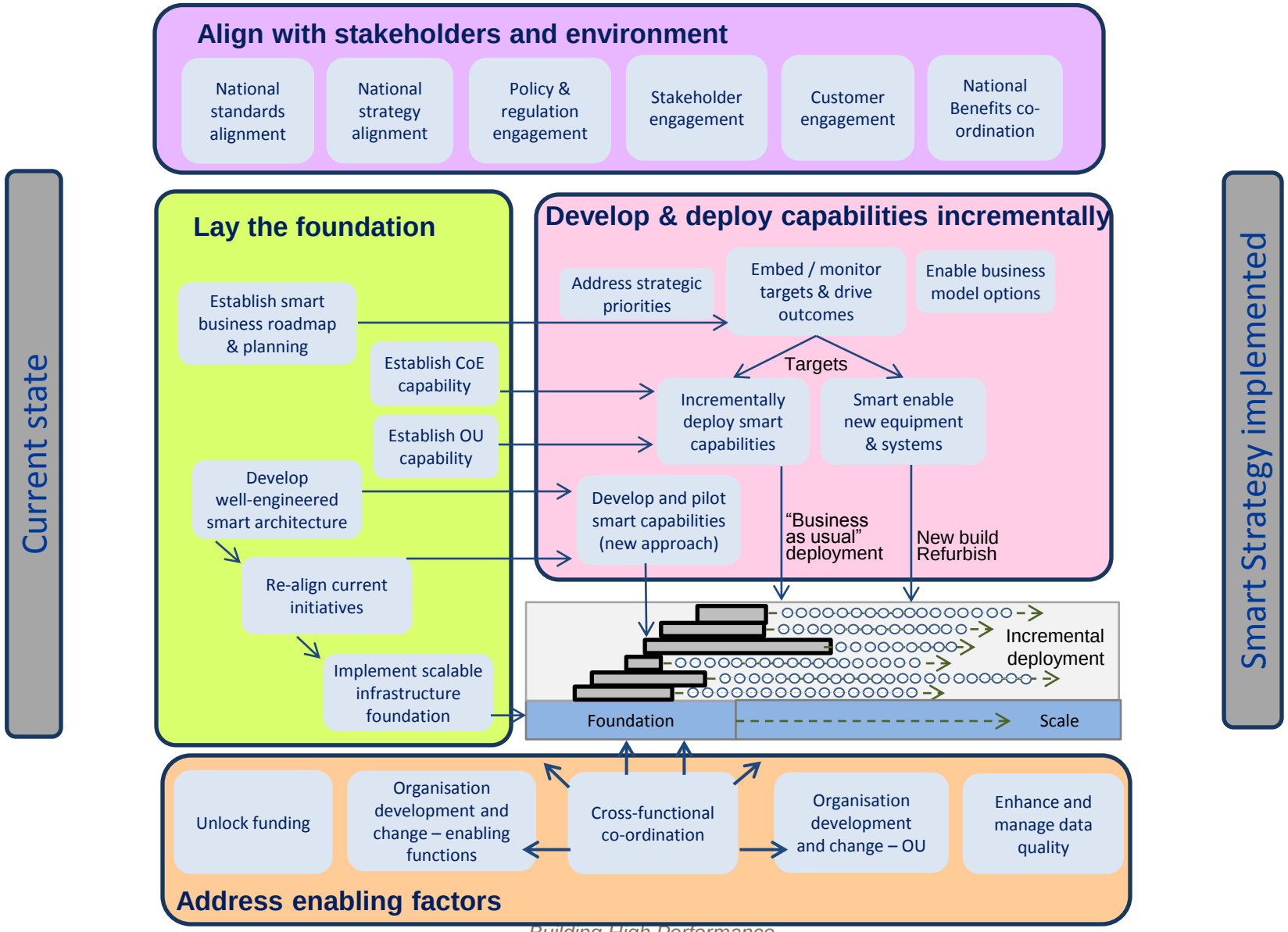


Shift in approach





Strategic initiatives…



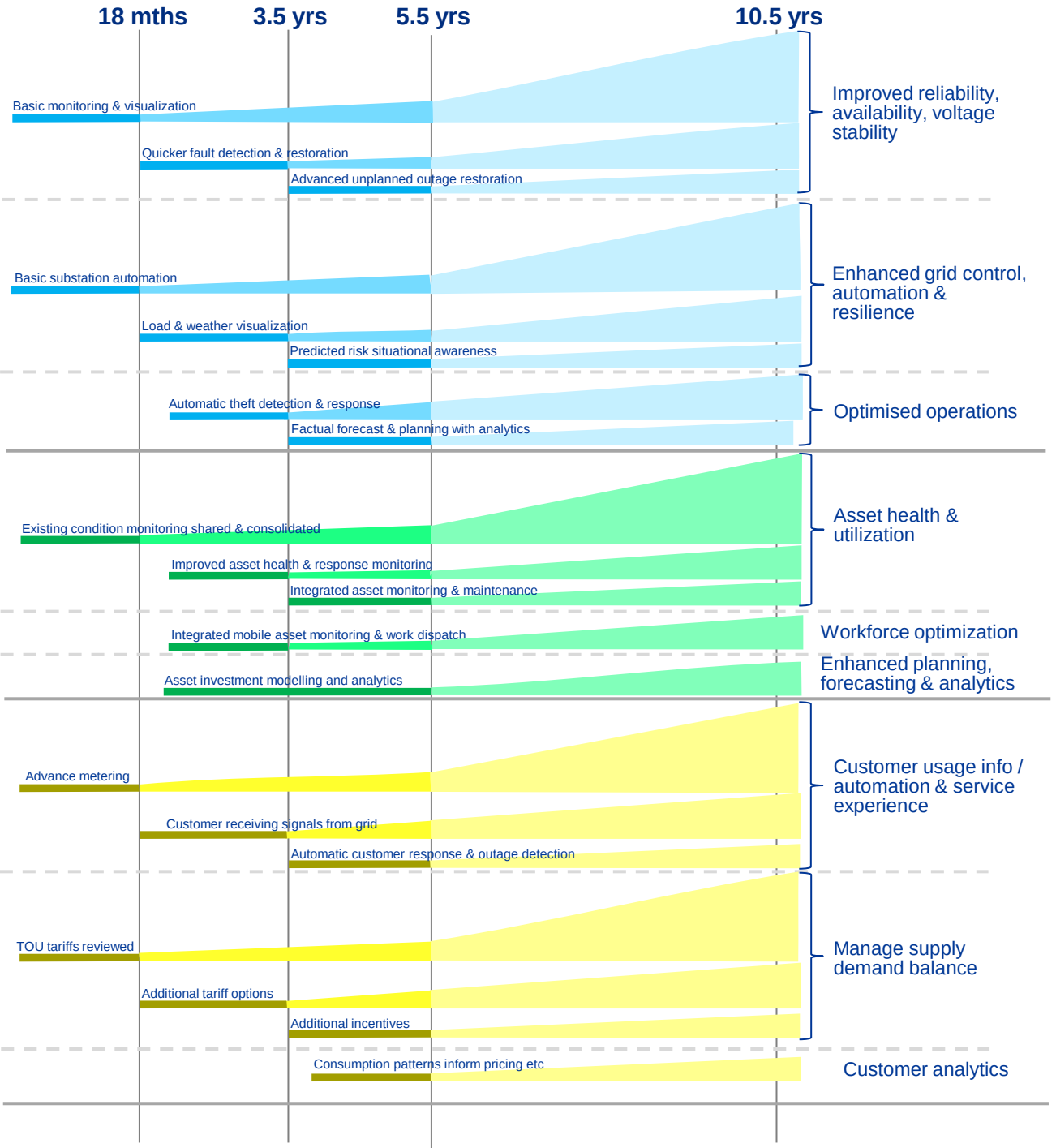
Business optimization

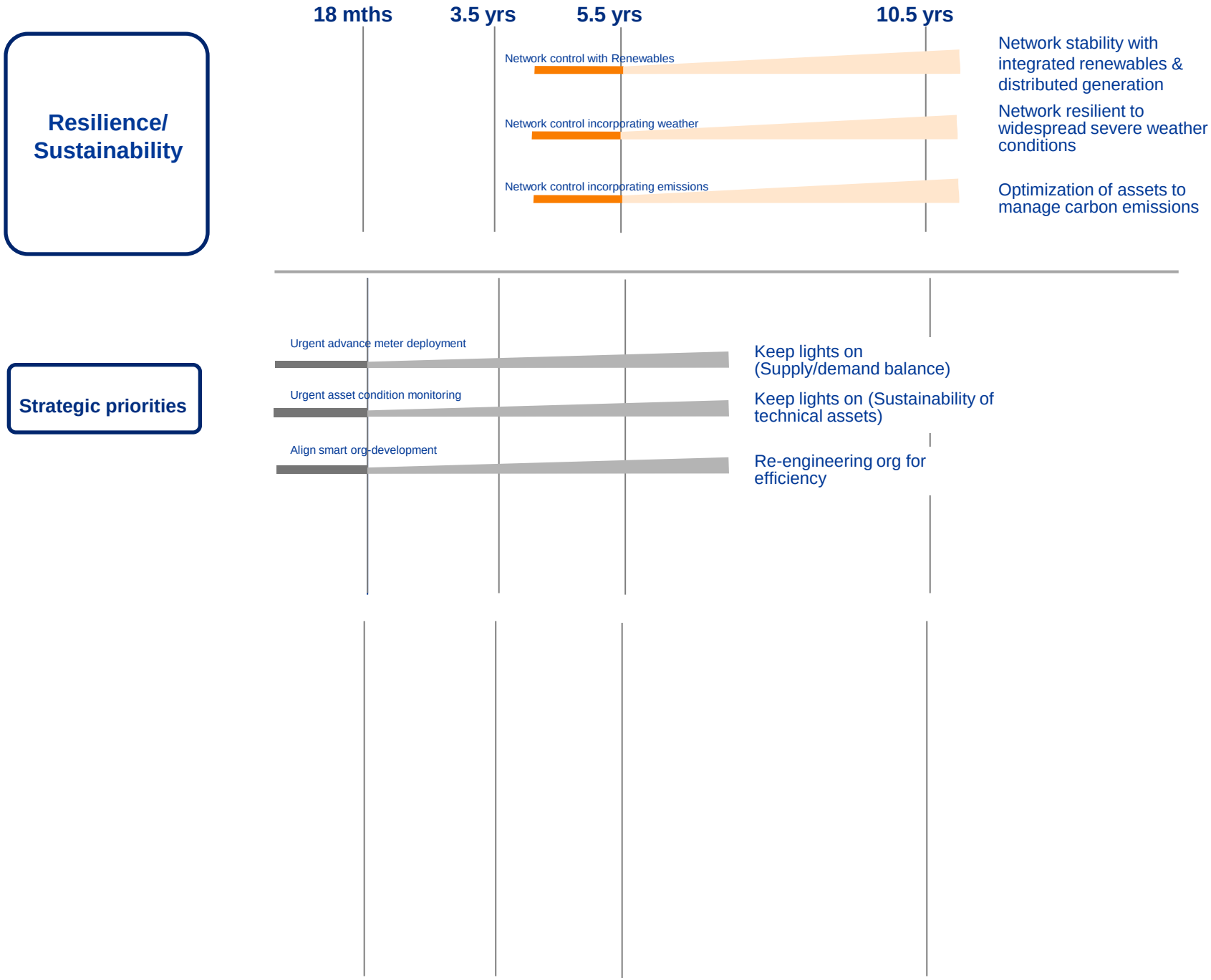
Grid operations

Work & asset mgmt.

Customer

- Research, develop, pilot
- Deploy (limited pace)
- Deploy (increased pace)

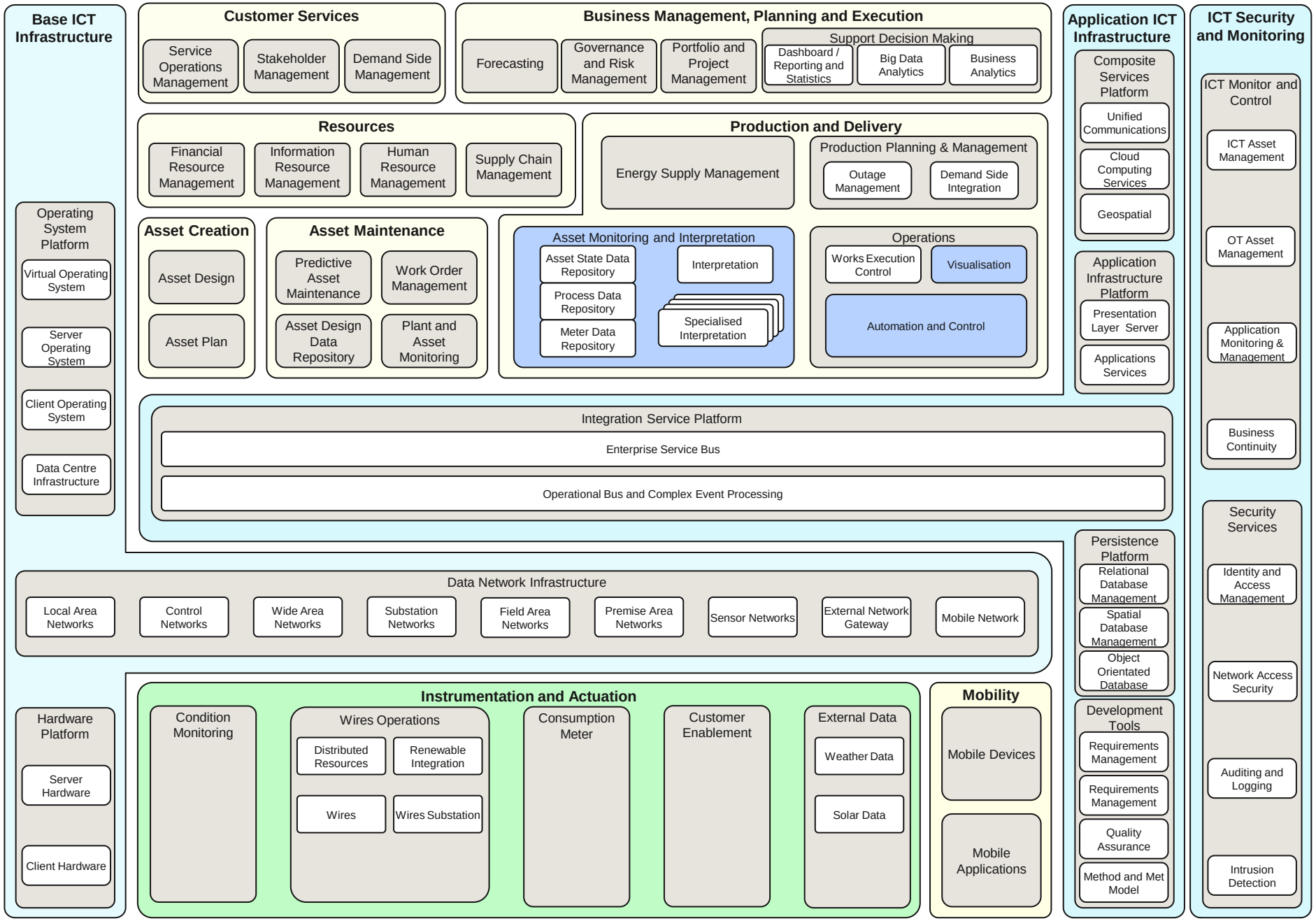



18 mths
3.5 yrs
5.5 yrs
10.5 yrs
Resilience/ Sustainability
Network control with Renewables
Network control incorporating weather
Network control incorporating emissions
Network stability with integrated renewables & distributed generation
Network resilient to widespread severe weather conditions
Optimization of assets to manage carbon emissions
Strategic priorities
Urgent advance meter deployment
Urgent asset condition monitoring
Align smart org-development
Keep lights on (Supply/demand balance)
Keep lights on (Sustainability of technical assets)
Re-engineering org for efficiency

Strategy implementation risks…

	Risks	Treatment
1	Strategy / roadmap flaws (market evolution / timing / unintended consequences)	• Managed roadmap and decision tree. • Focussed research, modelling and assessments, on-going monitoring, extensive field testing.
2	Achieving the required change (new way of working)	• Organisation development, process maturity and change management. • Cross functional co-ordination across groups and projects.
3	Policy and regulation (ability to influence)	• Co-ordinated engagement. • Strategy aligned principles first.
4	Customer acceptance	• Customer engagement and management. • Extensive field testing and piloting.
5	Planning	• Roadmap planning and monitoring. • Accountabilities.
6	Operational execution (project management, data quality, skills development)	• Refine, re-prioritize & re-align current initiatives. Progressive co-ordinated data clean-up. Facilitated project management improvement.
7	Architecture and business alignment	• Focussed architecture and cross project business case analysis, monitoring and continuous improvement. • Facilitated process maturity improvement.
8	Cyber security, business continuity and data privacy	• Comprehensive attention at every stage, contracted accountabilities, functionaries involved, monitoring and response.

Smart architecture landscape (functional, in context)



Smart megatrend in context – Enterprise architecture functional decomposition landscape