

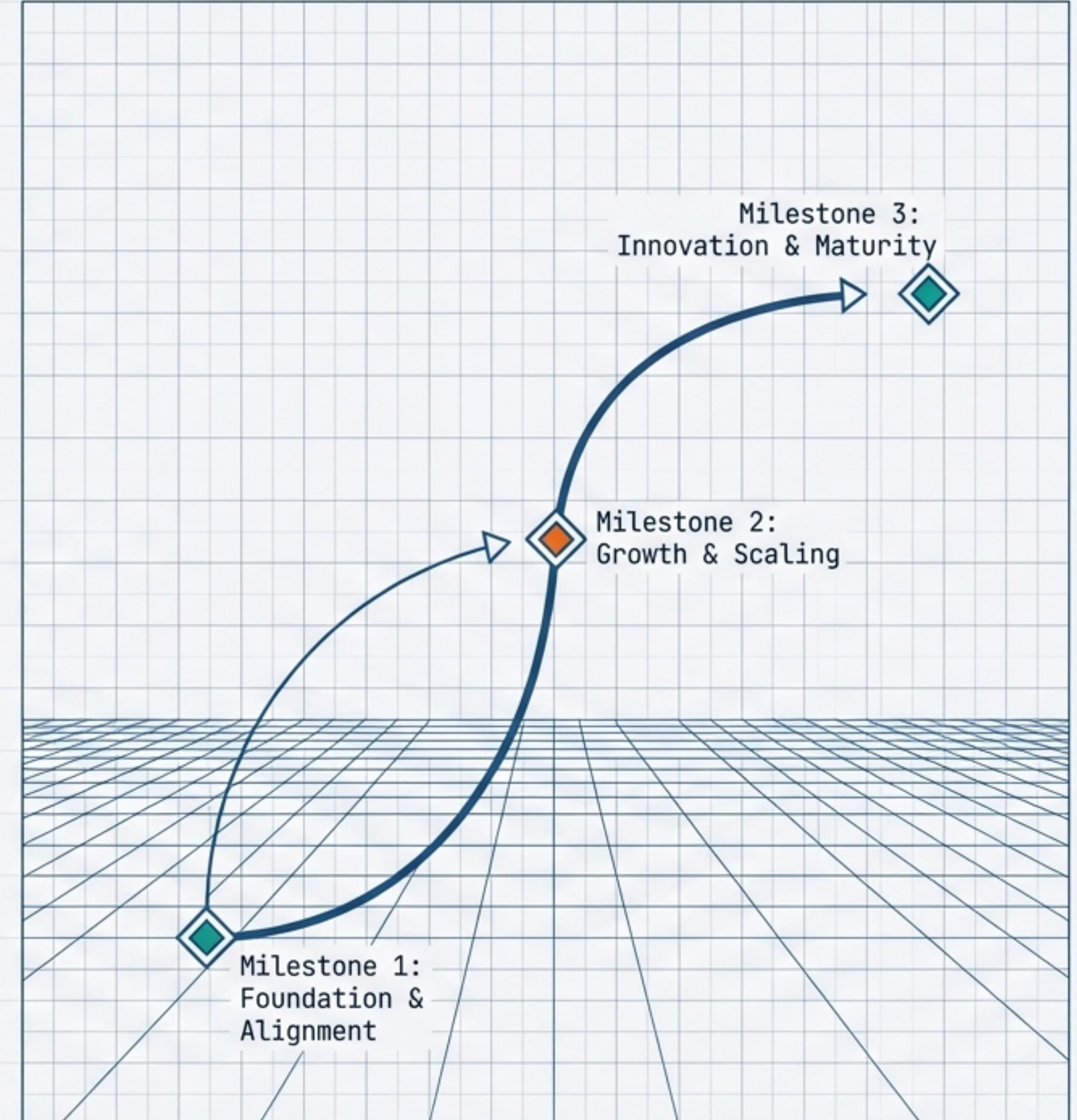
Strategic Technology Roadmapping

From Vision to Execution

Aligning Market Needs with
Technological Capabilities

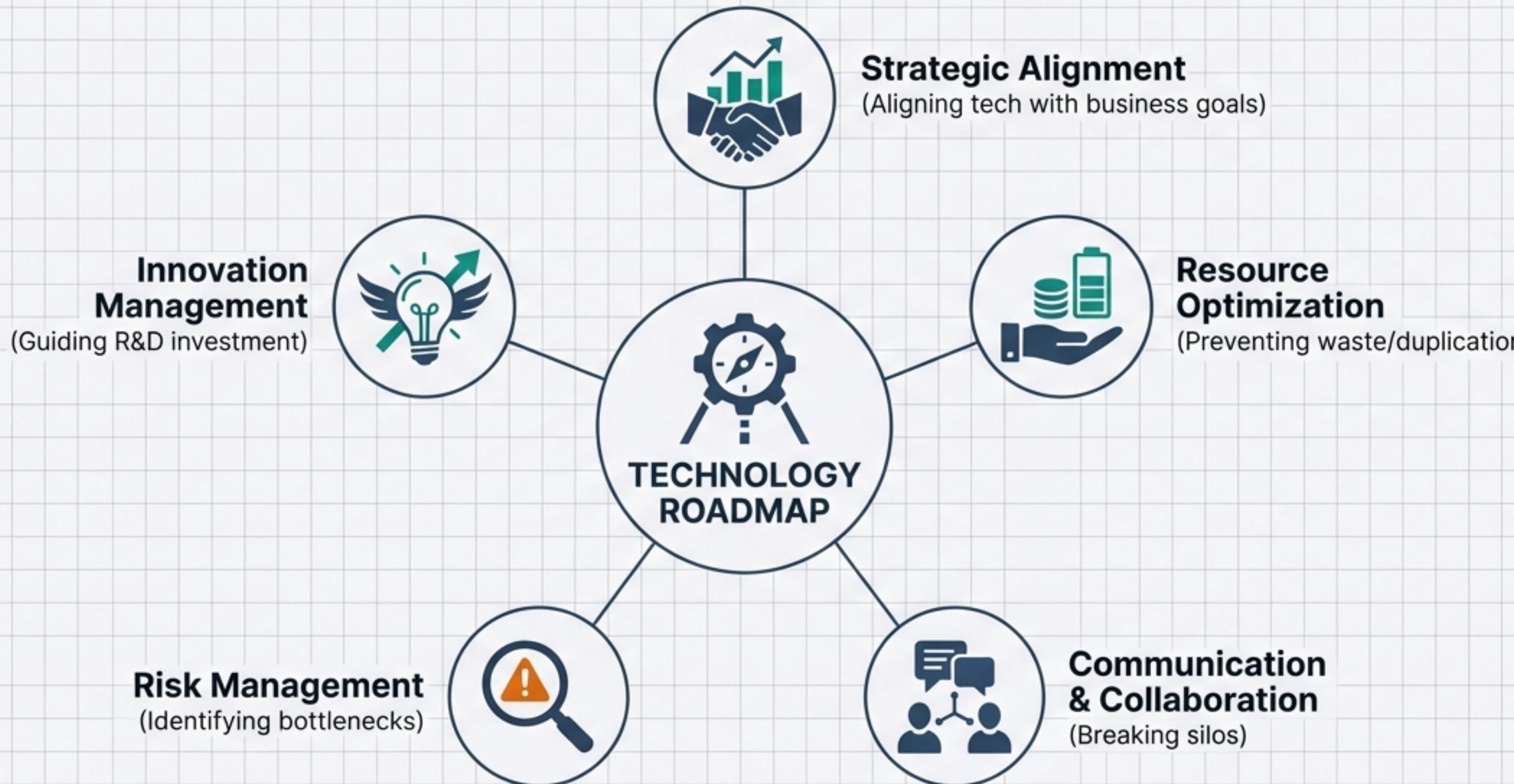
Source: Chapter 5, "The AI Era CTO"

Prepared for: Technical Leadership Team



The Strategic Imperative

Why Roadmapping Matters



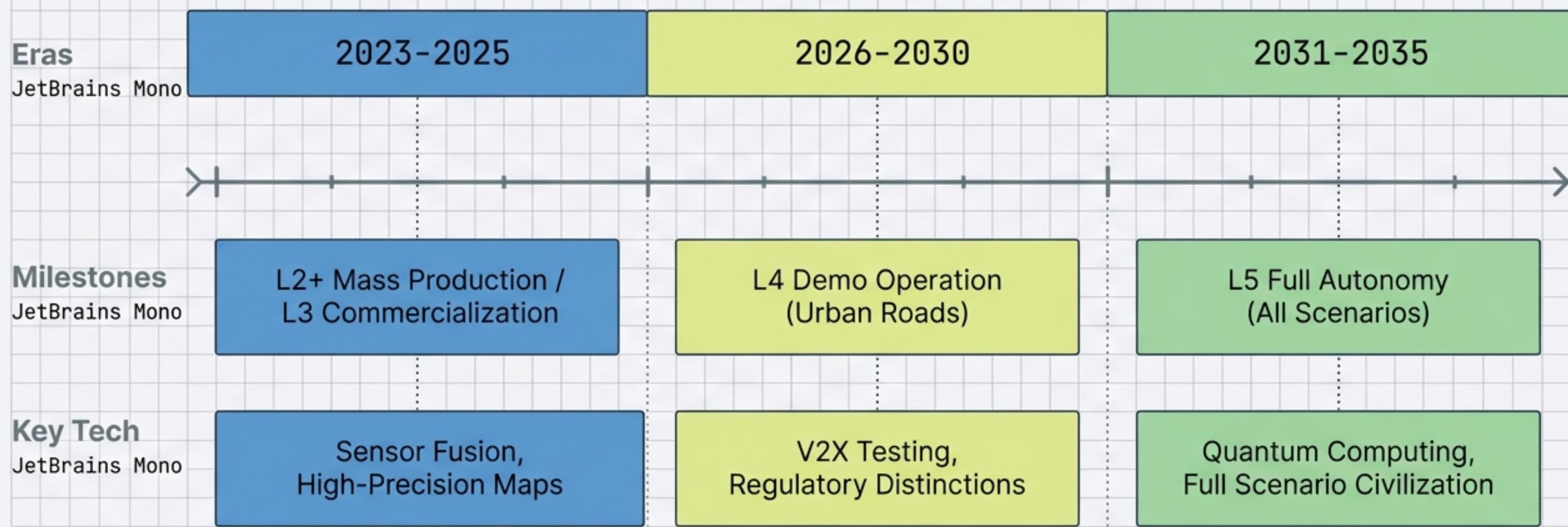
DEFINITION

A TRM is a dynamic planning instrument that aligns Market Needs and Business Goals with Technology Capabilities over time.

It visualizes the critical path of technologies, skills, and resources required for organizational objectives.

Macro Case Study: Autonomous Driving

Decade-Long Roadmap (2023–2035)



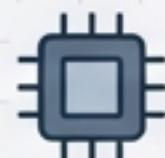
Micro Case Study: Smart 3D Camera

System Architecture & OPM

System Decomposition



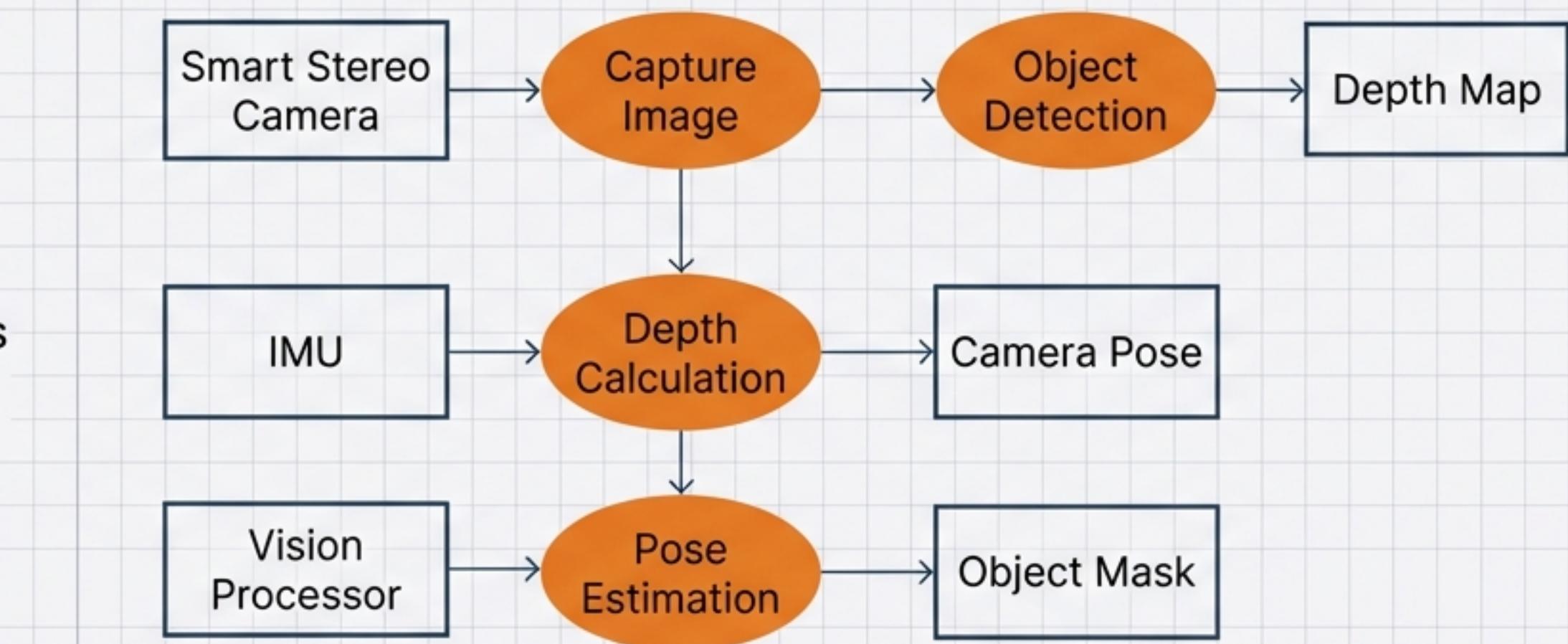
Sensors: Optical sensors, Infrared projectors.



Compute: Embedded processors (parallax, depth calculation).
JetBrains Mono



Algorithms: Neural networks (object recognition, SLAM).



Defining Success: Figures of Merit (FOM)

Performance Targets for Mobile Robotics

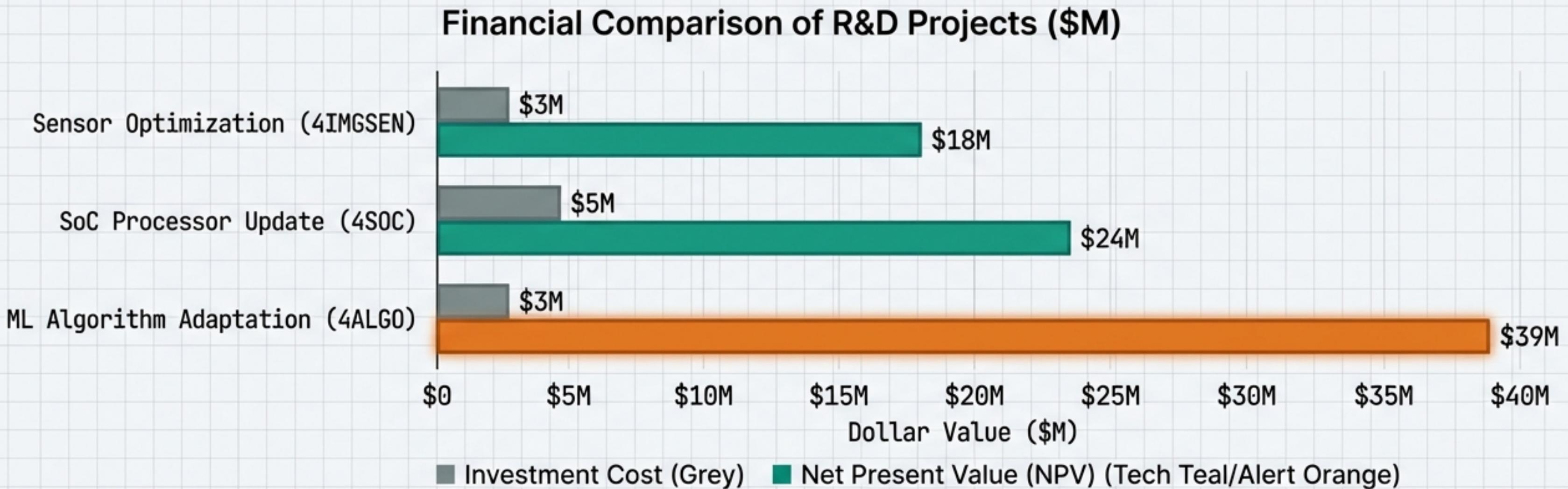
Metric	Target	Rationale
Power Consumption per Depth Pixel	< 1 $\mu\text{W}/\text{px}$	Critical for battery life in mobile robots
Frame Rate	200 fps	High-speed scanning and motion
Resolution	1272 × 720 px	Standard definition depth accuracy
Range	0.5 to 20+ meters	Versatile operating environment
Onboard Processing	Full (Depth + Pose + AI)	Edge computing requirement

Competitive Advantage

Target specs aim to outperform competitors (e.g., Stereolabs ZED) specifically on power efficiency (~1 $\mu\text{W}/\text{px}$ vs ~25 $\mu\text{W}/\text{px}$).

The Business Case: R&D Prioritization

Financial Modeling & NPV Analysis



Strategic Conclusion: The Roadmap prioritizes “ML Algorithm Adaptation”. It aligns with the strategic driver of edge-computing and yields the highest Return on Investment (ROI) for the lowest capital expenditure.