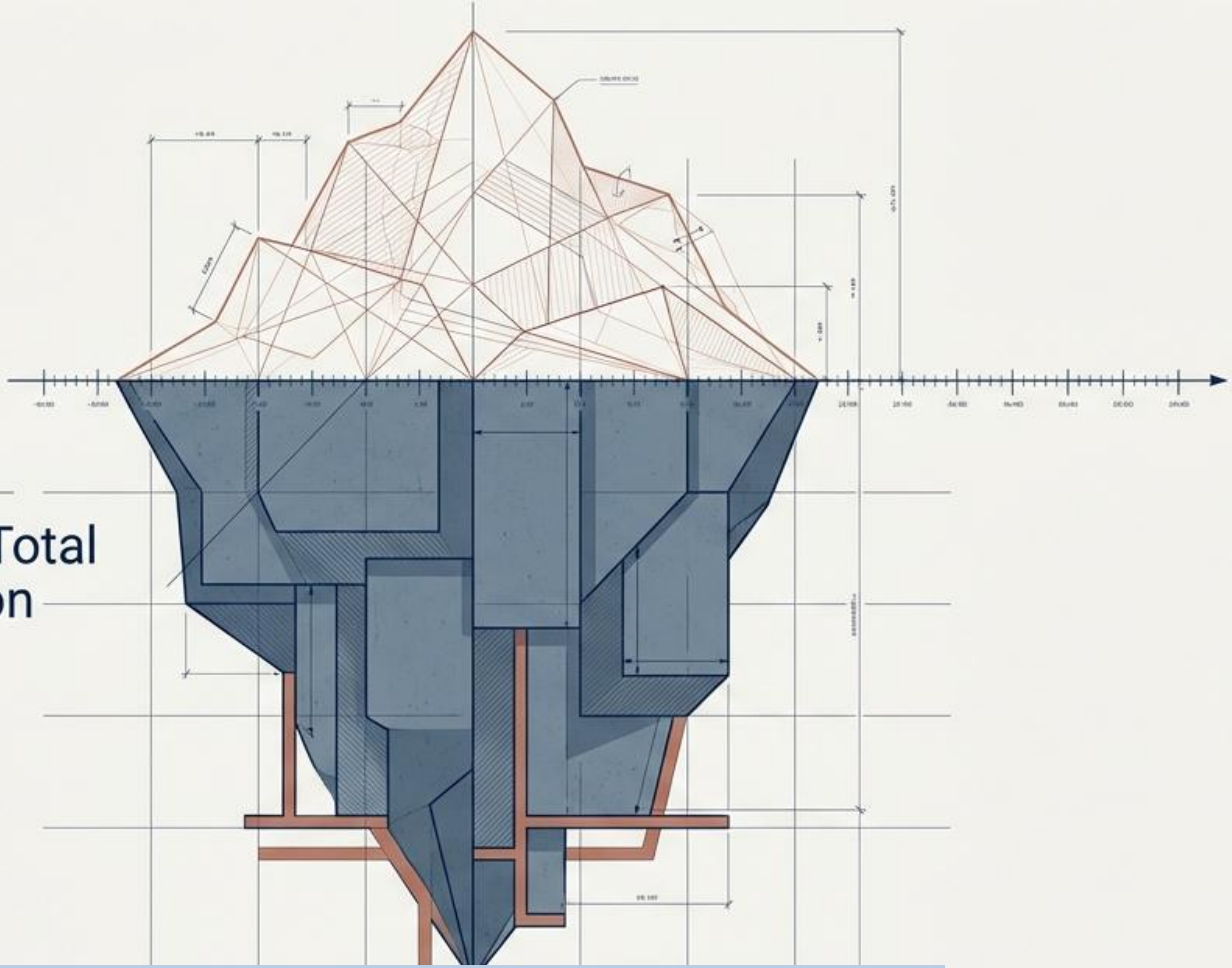
NOTI HAIM
SYSTEM ENGINEERING AND PROJECT MANAGEMENT

Noti Haim

Design To Lifecycle Cost (DTLC)

Engineering the Total Economic Horizon



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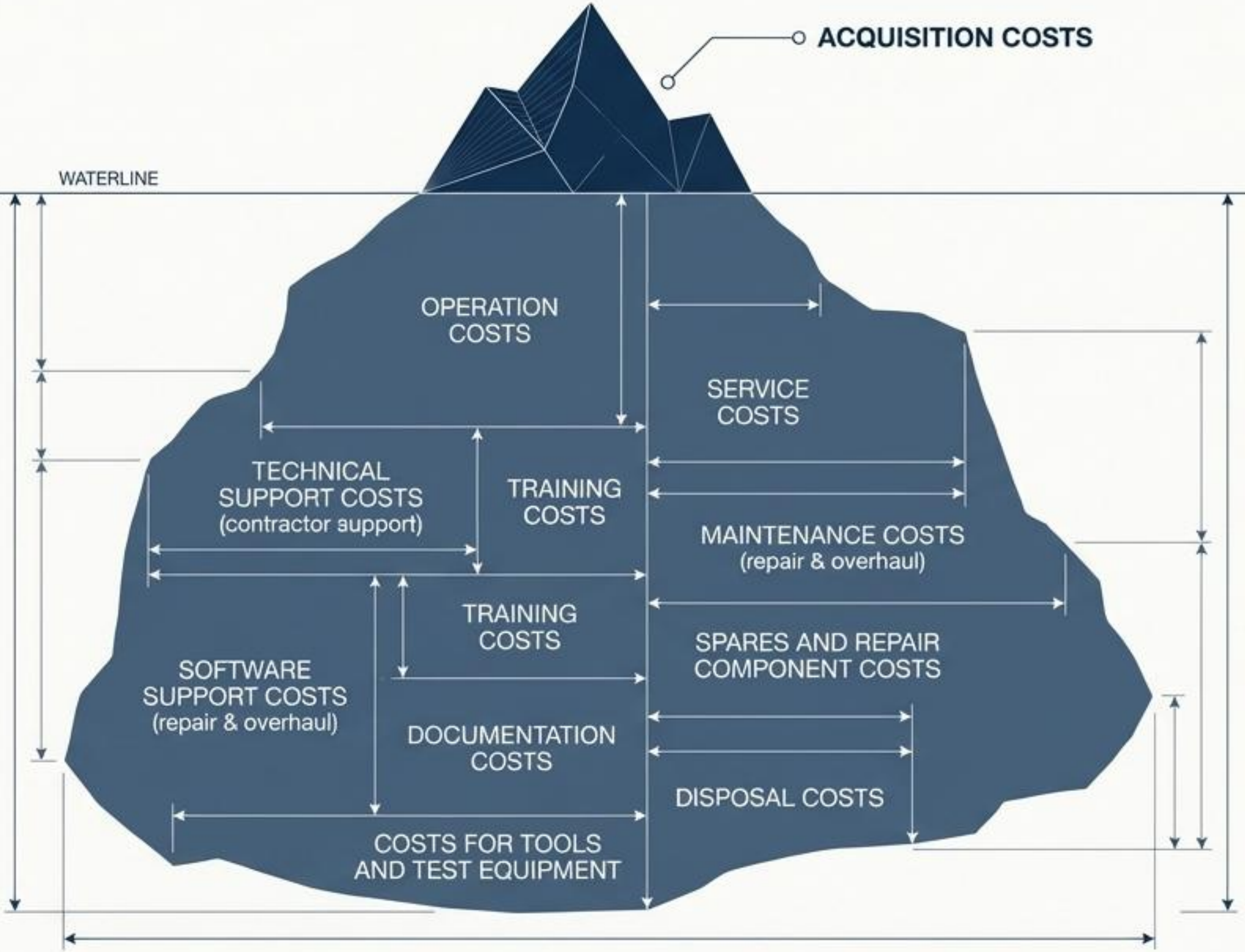

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The procurement price is merely the tip of the iceberg. The overwhelming majority of a product's financial financial weight is consumed in operational use and long-term maintenance.

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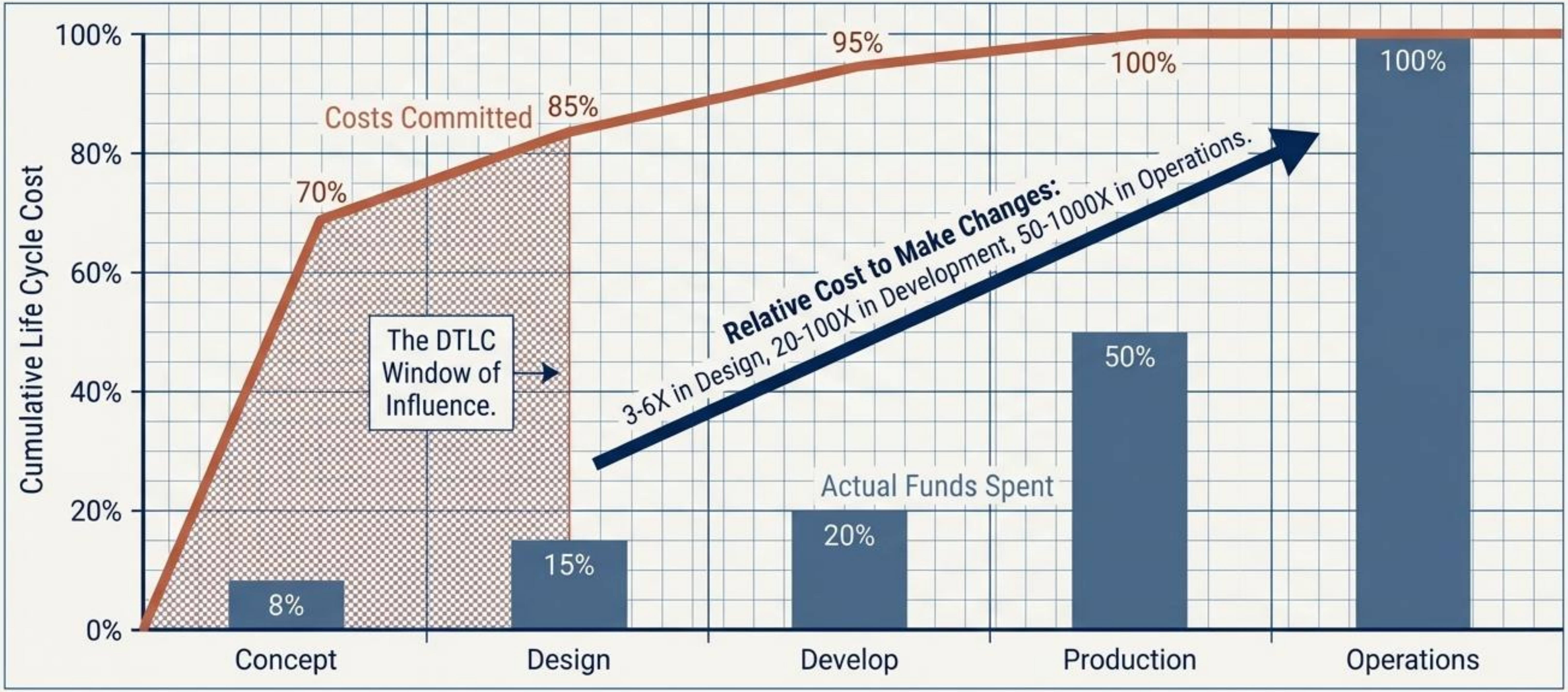
The DTLC Dilemma: By the time capital is actually spent, 85% of the total cost has already been locked in by early design choices.



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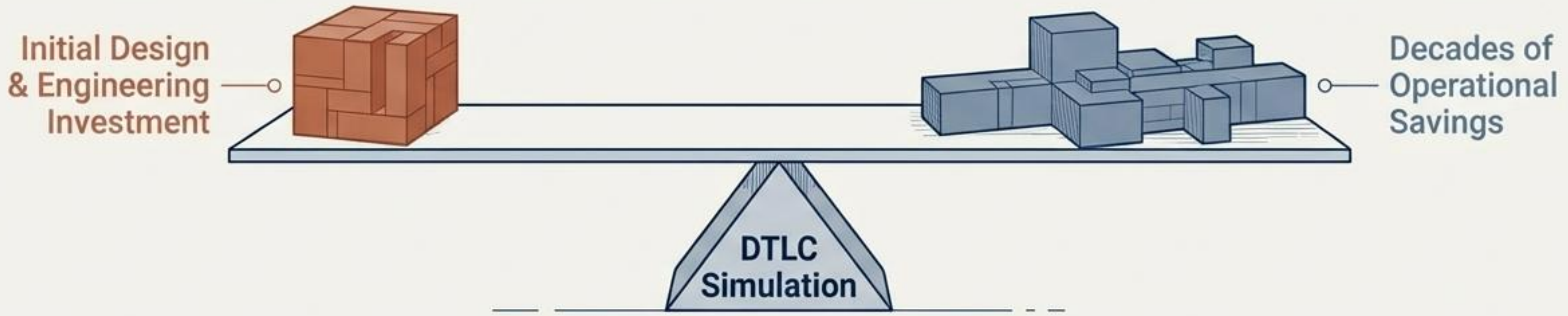
Defining the DTLC Paradigm

Design To Lifecycle Cost is a systemic design and development process aimed at minimizing the total cost of ownership by simulating and analyzing LCC impacts from Day 1.



1. Simulating the consequences of changing system workpoints.

2. Comparing alternatives to identify LCC-reducing modifications.

3. Analyzing risk and sensitivity to model uncertainties.

4. Identifying the primary drivers of lifecycle costs to provide accurate budgetary forecasting for the client.

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THE COMPETITIVE EDGE

DTLC provides the verifiable data required to win tenders by proving long-term value to the client, moving the conversation past initial sticker shock.

EU PUBLIC PROCUREMENT DIRECTIVE 2014/24/EU

EU Public Procurement Directive 2014/24/EU explicitly promotes LCC as a methodology to assess the Most Economically Advantageous Tender (MEAT). The directive defines "life cycle" as all consecutive/interlinked stages from research, development, and production through maintenance, use, and final disposal.

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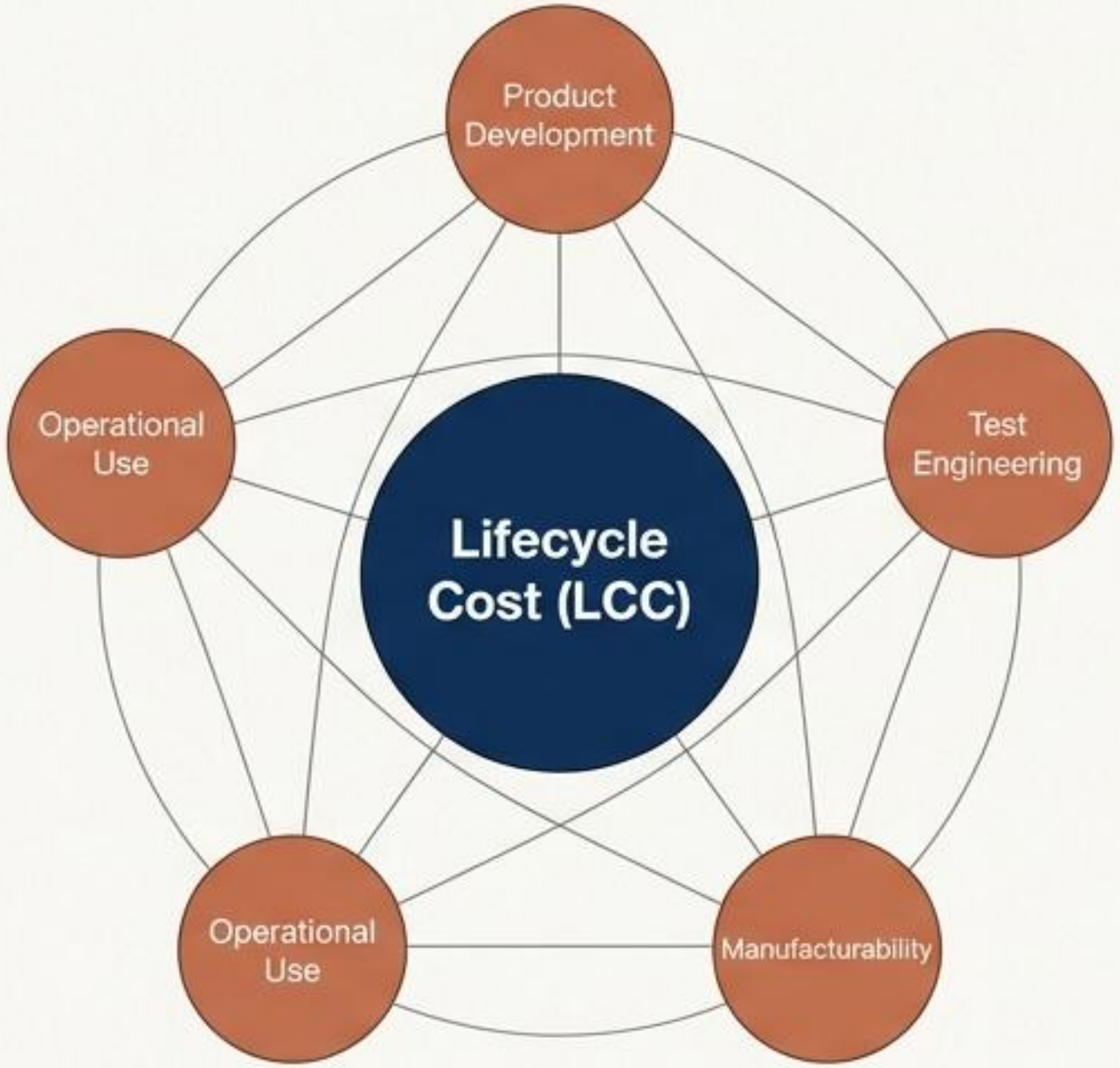
The Engine of Systemic Optimization

Optimizing LCC is non-linear. Because parameters are highly interdependent, improving a single metric in a vacuum is dangerous. For example, artificially increasing reliability may drastically inflate the product's recurring engineering (RE) costs. True DTLC requires analyzing the entire economic ecosystem before finalizing a design.



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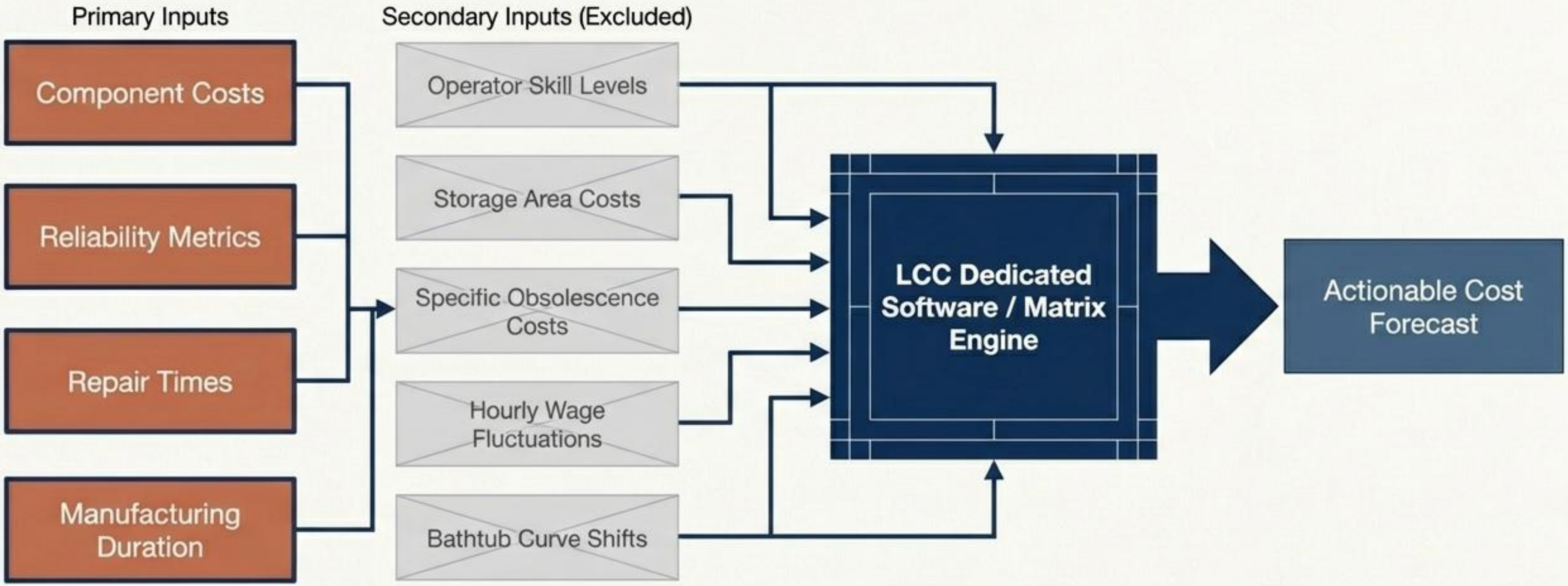
Designing the LCC Economic Model

To maintain a functional and actionable model, complexity must be managed. The model must focus exclusively on primary, first-order variables that drive lifecycle costs. Including second-order parameters overcomplicates the simulation and obscures the critical engineering trade-offs.



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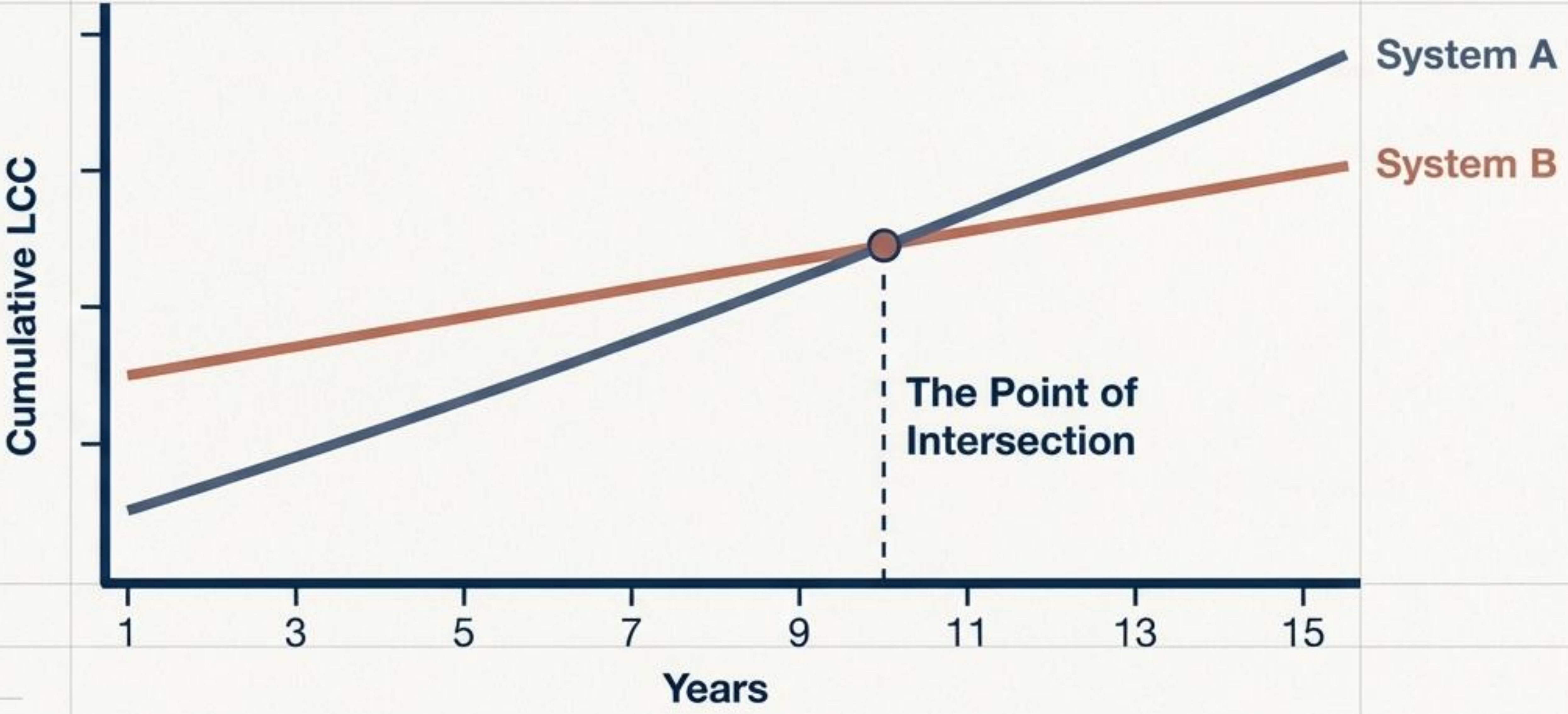
Cumulative Lifecycle Cost Analysis



The Anatomy of a Trade-Off: System A is the obvious choice for a short-term deployment. But past the point of intersection, System B's higher upfront engineering investment generates compounding financial returns.

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Parameter Focus	Upfront Investment Required	The Concession	Long-Term LCC Benefit
Built-In Test (BIT)	Upgrading hardware & software	Reduced base reliability (more parts) & higher unit cost	Drastically improved fault detection & fewer external test assets.
Automated Test Equipment	High upfront development cost	Requires specialized engineering resources early	Minimizes operator involvement, cutting production and repair times.
Level of Testing	Developing component-level test equipment	Slower, more expensive manufacturing setup	Much faster, highly targeted field repairs compared to system-level-only testing.
Maintainability Design	Increased initial product cost (e.g., modular design)	Unprofitable if the product has a short lifespan	Massive reduction in long-term maintenance labor and downtime.

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Total Lifecycle Cost Analysis: Hybrid Car vs. Petrol Car (5-Year Timeframe at 20,000 km/year)

Cost Component	Hybrid Car	Petrol Car
Initial Investment	€ 22,000	€ 18,000
Fuel/Operating Costs	€ 4,274	€ 9,616
Maintenance & Other	€ 4,897	€ 5,787
Total LCC	**€ 1,991,660**	**€ 2,414,510**

Real-World LCC Application: A higher initial acquisition cost frequently masks a significantly lower Total Lifecycle Cost. The engineering mandate is to design for the bottom line, not the starting line.

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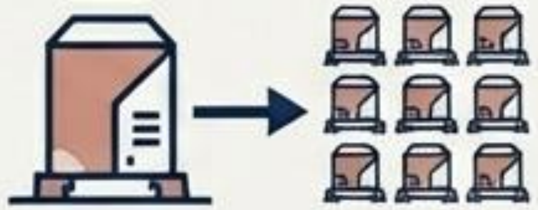
Business Strategy as a Technical Driver
at a Technical Cost

There is no universal 'perfect' design. The business plan dictates the mathematical constants, which in turn force shifts in the optimal technical workpoint.

Single bespoke units vs. mass-produced fleets entirely change the viability of automated test equipment and tooling investments.



Production Volume

Elesstricient of units vs. contrtataility entirely change the viability of automated test equipment and tooling investments.

Target Market & Support

The client's inherent capabilities (e.g., local mainte-maintenance tiers vs. dedicated contractor company) dictate the required maintainability design.

Project Lifespan

Engineering for an optimal 20-year LCC creates a radically different technical workpoint than engineering for a 2-year lifespan.

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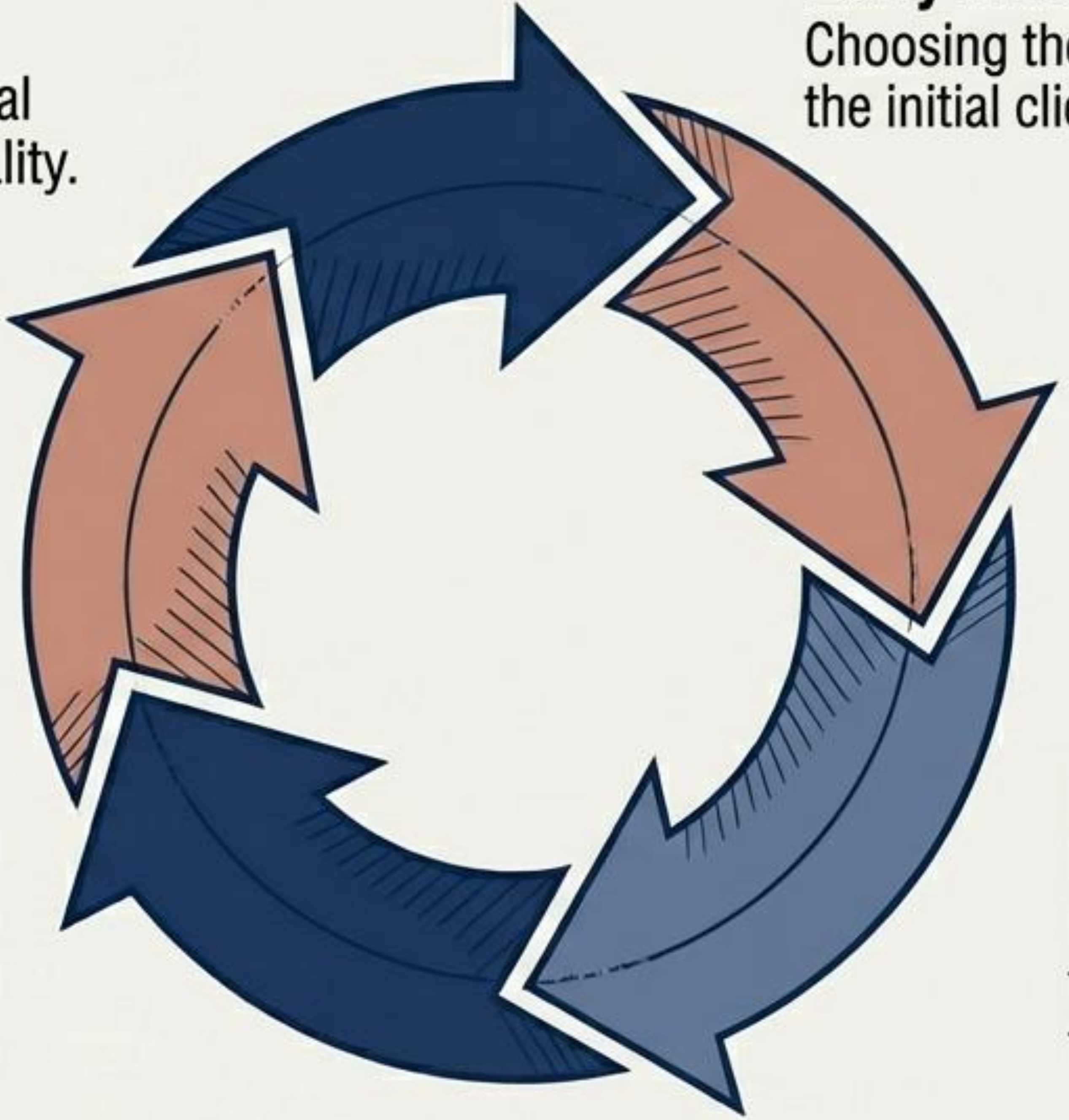
The DTLC Lifecycle Process

Not a one-time calculation, but a continuous control loop that dynamically updates as theoretical design solidifies into physical reality.



Early Modeling
Choosing the baseline workpoint during the initial client proposal phase.

Risk Analysis
Identifying uncertainties in the model (e.g., component yield rates, unproven reliability metrics).

Requirement Derivation
Extracting hard system requirements (RE costs, repair times, manufacturing times) from the economic model.

Continuous Control
Measuring against the model during design reviews and updating assumptions as reality sets in.

Iterative Optimization
Running the loop multiple times to refine the final technical workpoint.

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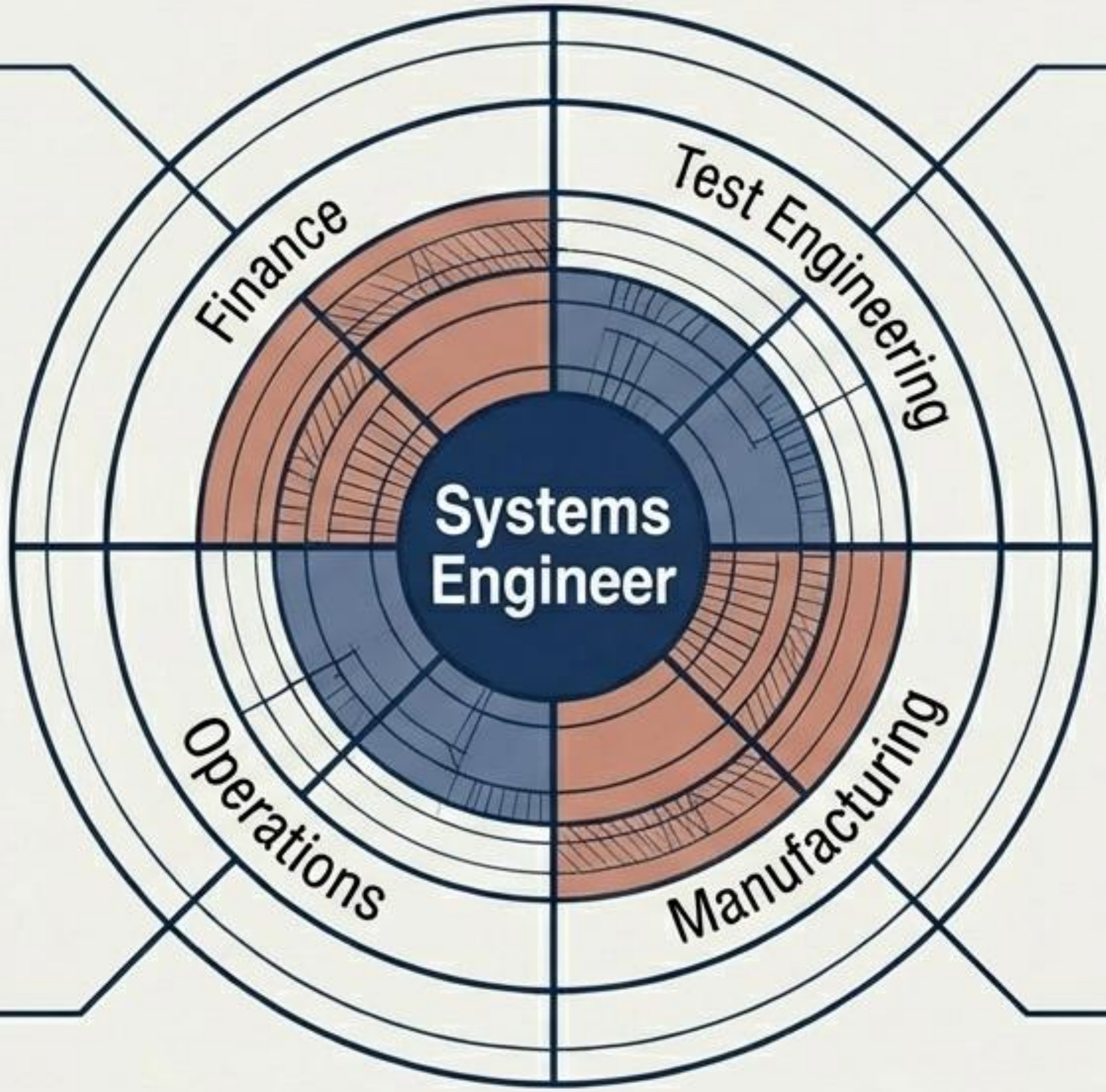
The Orchestrator: The Systems Engineer

Holistic Vision:
Maintains the macro-view of the product's lifespan from early concept to end-of-life.

Economics to Engineering:
Translates abstract financial goals into rigid, testable system requirements.



Model Architect:
Builds and owns the LCC model, forcing cross-disciplinary collaboration to evaluate technical alternatives.

Risk Navigator:
Actively tracks uncertainties and forces reality-checks at major project milestones and reviews.

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Synthesis: The Complete DTLC Vision

Technical brilliance without economic foresight is a liability. Design To Lifecycle Cost is the architectural blueprint that bridges the gap between early engineering intent and long-term financial reality. By expanding our horizon beyond the acquisition tip of the iceberg, we engineer systems that don't just perform—they endure sustainably.

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