CatDT - Executive Summary

Modern supply chains are modular, interconnected *systems of systems*, yet today's enterprise tools do not represent them that way: ERPs, TMS/WMS platforms, dashboards, and simulation engines manage transactions and operations, but treat the network as a fixed, monolithic structure rather than as interoperable components. This prevents companies from assembling, simulating, and redesigning their supply chains compositionally, creating structural blind spots and fragility. The **COVID-19 pandemic** exposed these weaknesses at a global scale, generating over **$1 trillion in supply-chain losses**. Companies could not simulate disruptions, coordinate across layers, or redesign flows. These failures were failures of *modeling architecture*. COVID did not create the fragility; it revealed it.

Nearshoring in the MX–US–CA corridor now presents a generational opportunity to build supply-chain networks that are **robust, predictable, and sustainable from the start**. The lesson is clear: **we cannot repeat the structural mistakes COVID-19 exposed**, and these weaknesses can be corrected *by design* using modern compositional modeling. CatDT provides this architectural foundation.

What is CatDT? **CatDT is a compositional digital-twin engine for supply chains, implemented as an enterprise software platform.** It provides a unified modeling framework in which facilities, processes, transportation modes, constraints, and flows function as interoperable components—enabling **modular analysis**, precise disruption modeling, and **mathematically grounded system behavior**. Users can design and compare network configurations, run **multimodal simulations in a single environment**, assess resilience, and optimize flows across complex systems. Built **on top of existing enterprise systems**, CatDT extends ERPs, TMS/WMS platforms, and optimization tools. This architecture represents a **significant leap forward in digital-twin technology**, bringing composability, predictive consistency, and system-wide design intelligence into an industry that lacks them.

Market Opportunity The markets for supply-chain software, digital twins, optimization tools, and network-design systems represent a multi-billion-dollar opportunity, with demand accelerating as nearshoring reshapes the MX–US–CA corridor and forces companies to redesign networks at unprecedented scale. CatDT targets a broad range of potential customers, including major North American logistics operators such as JB Hunt, Hub Group, XPO, Amazon Freight, and GMT; manufacturers and 3PLs active in the nearshoring corridor (e.g., GM, Samsung, Flex, DHL Supply Chain, C.H. Robinson); and key logistics partners in Mexico—such as Coppel Logística, Traxión, Solistica, and FEMSA Logística—who represent strong candidates for early pilots and rapid validation.

Business Model CatDT will be commercialized through paid pilots and annual enterprise licensing. Early pilots with logistics operators and manufacturers will validate CatDT's ability to model multimodal flows, compare network configurations, and support strategic planning. As organizations embed CatDT into their design workflows, revenue transitions into recurring enterprise contracts. Over time, CatDT's compositional modeling approach generalizes to **other emerging supply-chain ecosystems**—from Asia to the Middle East—positioning it as a foundational design layer in an increasingly multipolar world.

Technology & Defensibility CatDT adds a modeling layer that integrates with and extends ERPs, TMS/WMS platforms, and existing optimization tools—offering capabilities they cannot provide. Its mathematical foundation enables system-wide consistency and modular network design, creating an architecture that is technically difficult to replicate and forming a strong defensibility moat.

Current Status & Traction CatDT has a defined architectural framework and a clear development roadmap for its digital-twin engine. The initial working prototype is planned for early 2026, followed by expanded engagement with supply-chain and logistics stakeholders. Early conversations indicate strong interest in predictive tools that unify planning, simulation, and execution. CatDT builds on extensive research and teaching experience in category theory, optimization, and applied mathematical modeling.

Team CatDT is led by a founder with a PhD in mathematics and deep expertise in **category theory, compositional modeling, and applied mathematical systems**. With over a decade of research, publications, and teaching experience, the founder brings rare insight into modeling and optimizing complex systems compositionally. CatDT is supported by PhD-level collaborators and industry-experienced programmers who will contribute to prototype development and early pilots.

Fundraising CatDT is raising a micro-pre-seed round to complete the **initial working prototype**, advance the compositional modeling engine, expand engagement with **supply-chain and logistics stakeholders**, and prepare for early pilot projects. Funding supports product development, targeted industry outreach, and the technical infrastructure required for initial commercialization. The 6–12-month roadmap delivers meaningful product validation and prepares the company for a seed round.