HYPHAEIC RESEARCH, TECHNOLOGIES & SYSTEMS

PROSPECTUS GUIDE

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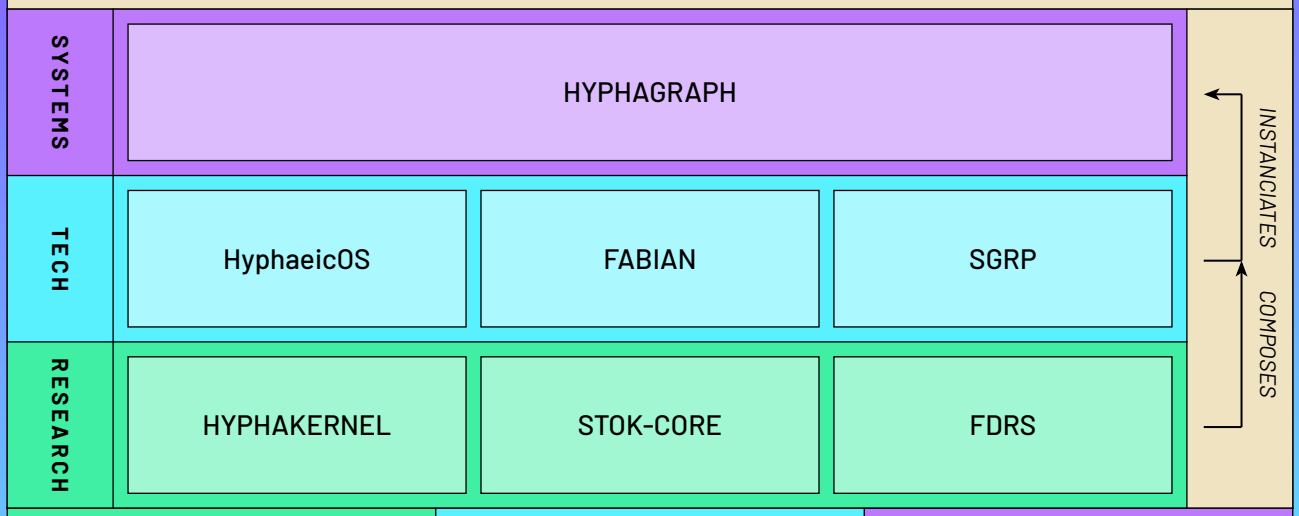
HYPHAEIC

This document describes our formal engineering work across three layers. Research provides the foundational tooling. Technologies are the usable implementations of that research. Systems are the emergent, abstract patterns that arise from technology activity. They are not objects, they are process.



RESEARCH

foundational, enable technologies

HYPHAKERNEL

Dynamic Bare-metal Rust exokernel for metal-level computation as isolated WASM processes with deterministic, clockless scheduling. structurally similar to mycelial hypha.

STOK-CORE

GPU-accelerated State-Time Option Kernels generating real-time predictive maps for goal-conditioned agents.

FDRS

Variable-radix computational geometry enabling isolated, orthogonal timeline operations with seamless phase transitions.

TECHNOLOGY

tangible, operationalise systems

HyphaeicOS/HYPHOS

Portable mesh compute substrate for instanciating Hyphagraphs, acting as a network 'spore' for physical distributed control and embodied AGI.

FABIAN

Self-sustaining on-chain prediction markets that bootstrap liquidity and resolve outcomes via public data ingestion.

SGRP

Alignment research programme developing economically-grounded, self-regulating autonomous agents.

SYSTEMS

emergent, abstract patterns

HYPHAGRAPH

Emergent decentralised compute fabric with a hierarchical unified address space. This is the abstract network topology constructed by the Hyphakernel and instanciated by HYPHOS.

TECHNOLOGY

AGENCY RESEARCH

SGRP *Symbol Grounding Research Programme*

Agency research program utilising empowerment & valence as intrinsic control drivers linked to irreversible value expenditure to create meaningful internal symbols. We seek to demonstrate that imposing physical-like constraints on digital intelligence naturally fosters self-regulation, efficiency, and a grounded understanding of consequence. Consequence grounds meaning.

THE GROUNDING PROBLEM

Grounding internal symbols fails because they are cheap. Meaning is expensive.

BARE-METAL HYBRID OS

HYPHAEICOS *Sovereign Compute Substrate*

INTERACTIVE DEVICES

User-facing frontend with GUI, built on HYPHOS. Access & contribute to the Hyphagraph—a decentralised compute & data fabric—from any device. Hardware-agnostic WASI/WASM sandboxed miniOS that runs atop existing operating systems. Enables open access & contribution to STOK-FDRS dAgentic systems and other shared state systems.

HYPHOS - RTOS

Deterministic, headless hybrid RTOS distributable for robotic embodiment & Hyphagraph instanciation. The Hyphakernel provides WASI-bound WASM hooks directly into the kernel for WASM-level kernel control. Probes, interfaces, "infects" until full body control. The Hyphagraph becomes continuous bodily state topology.

THE SUBSTRATE PROBLEM

Agents need sovereign, portable compute; whether interfacing with users or growing into physical bodies. They must be OF the world.

INFORMATION MARKETS

FABIAN *Costly Sensor-Actuator Substrate*

Autonomous, self-contained prediction modules that continuously operate on-chain markets for recurring real-world data. Bootstraps liquidity, resolves outcomes via scheduled public data ingestion, rolls capital and state forward without reliance on centralised marketplaces or operators. Agents wager on outcomes, pay for world-model updates with real, irreversible cost.

THE PERCEPTION PROBLEM

Discerning reality from perception is costly.

RESEARCH

LOCALITY	**FDRS** *Function-Defined Radix Systems*	A computational substrate where the numerical base at any position is dynamically determined by a context-dependent function, creating a variable-resolution ultrametric geometry that allows discrete state machines to operate across orthogonal timelines.	*"What does 'here' mean?"*
PLANNING	**STOK-CORE** *State-Time Option Kernels*	GPU-Accelerated Feasibility Maps. State-Time Option Kernels (STOK) in Rust using the Burn framework. It leverages GPU-accelerated JIT fusion for Feasibility Iteration to generate real-time predictive maps for goal-conditioned agents.	*"What can I reach from here?"*
HARDWARE	**HYPHAKERNEL** *Bare-Metal WASM Exokernel*	Rust exokernel that enables dynamic, bare-metal kernel control and alteration by isolated WebAssembly processes, governed by a logical execution clock that decouples 'time' from hardware speed to ensure deterministic, ultra-low-latency performance with a deterministic scheduler that can do future projection.	*"How is 'here' constructed & executed?"*

HUMANISM

HOW THEY LINK

Both the STOK-CORE and Hyphakernel utilise FDRS for their functionality, while we label FDRS as research, it is more accurate to describe it as foundational mathematical study, an ongoing process of discovery.

STOK-CORE	*planning view*
Asks “can I get there from here?” using FDRS’s tree to measure distance in both state and time. Skills compose like phrases in a shared language.	

HYPHAKERNEL	*substrate view*
Runs the math on metal. Counting overflows become clock ticks. Cylinder neighborhoods become cache zones. The geometry stays consistent from theory to silicon.	

Provides the shared vocabulary: a way of structuring space, time, and composition that both planning and execution can speak. It defines what what “here” means, how time composes, why bounds are provable.

FDRS	*Adaptive multi-base number systems*

SYSTEMS

HYPHAGRAPH *Decentralised Compute & Data Fabric*

Process, enacted locality, and a continuous state of “here”.

A unified, hierarchical address space that spans whatever the Hyphakernels run on. RAM, storage, network — collapsed into a single locality with no distinction between “local” and “remote.”

Topology emerges from operation, not configuration. Systems inhabit the graph directly: coordination is co-presence, not communication. Extension is growth, not integration. The shape is the substrate: a rack, a body, a swarm, a hand. Substrate agnostic self-organisation.

COMPOSITIONAL

Hyphakernels compose the graph into being.

FLUID

No fixed topology. Shape follows process.

PROCESSUAL

Exists only while being enacted. No pause. Only witness.

FRACTAL

Emergent, Self-organising hierarchy

UNIFIED MEMORY

No replication. No consensus. Shared State

Direct memory access over raw Ethernet frames.

RADIX TIME

Time as structure. Measured in state transitions, not seconds.

Different depths tick at different cadences.

Same logic, any silicon. Deterministic.