

Deploying AI in the corporation: Frontiers and Foundations of Generative AI, LLMs, knowledge graphs, Agentic Workflows, and Cognitive Cartography

Instructor: Manolis Kellis, MIT CSAIL

Dates: January 9–10, 2025 (Friday–Saturday)

Format: Two-day in-person executive program

Schedule: 8:30–11:30 AM and 1:00–4:00 PM each day

Pre-Program: Optional: Participants work with organizers to create an anonymized dataset to use in class.

Post-Program: Optional 3-week project continuation and presentation

Course Overview

This course teaches executives how to design and lead organizations that think and learn as intelligently as the technologies they now employ. It frames artificial intelligence not as a product to be adopted, but as an analytical model for understanding how enterprises process information, make decisions, and adapt to feedback. Participants will develop a working grasp of the **cognitive architecture** of modern organizations—how data becomes knowledge, how reasoning becomes workflow, and how actions generate measurable learning.

The program introduces the principles of **cognitive cartography**—the science of representing knowledge as structure. Through this framework, participants will learn to translate core business disciplines—strategy, operations, finance, and innovation—into interpretable, machine-compatible geometries. They will work directly with examples of embeddings, ontologies, and hierarchical maps to see how information, decisions, and incentives form the architecture of collective intelligence.

Each concept is paired with practical design work. Executives will model one of their own enterprise processes as an **agentic system**, identifying the roles, tools, workflows, and feedback loops that define it. By the end of the program, participants will have produced a detailed **Enterprise Cognitive Blueprint**—a scalable plan for integrating data, reasoning, and action within their organization.

Premise: Visual Data Science and Cognitive Cartography

Artificial intelligence is no longer just a toolset—it's a **new language of management and cognition**.

This program helps executives re-envision their enterprises as **cognitive systems**—living networks of data, reasoning, and action.

Participants will:

- **Visualize** their organizations as cognitive landscapes through **cartography and representation learning**.
- **Translate** business frameworks into **AI-native geometries**—maps, ontologies, gradients.
- **Design** agentic architectures that connect knowledge to execution.
- **Deploy** intelligent workflows and governance models that enable continuous learning.

The course blends the depth of MIT CSAIL with the strategic and reflective rigor of Sloan Executive Education.

Learning Outcomes

By the end of the course, participants will be able to:

1. **See** their organization as a map of meaning rather than a chart of functions.
2. **Translate** strategy, finance, operations, and leadership into cognitive structures.
3. **Design** agentic workflows that sense, reason, act, and learn.
4. **Deploy** adaptive, explainable systems within their enterprise.
5. **Lead** cognitive transformation with clarity, governance, and purpose.

Day 1 – Seeing and Structuring the Cognitive Enterprise

Session 1 — Cartography, Cognition, and the Geometry of Meaning

Friday 8:30 – 11:30 AM | Lecture + Visualization Workshop

Objective

Shift participants from thinking of AI as technology to understanding it as a *way of knowing*.

Introduce **cognitive cartography**—the art and science of mapping meaning.

Content Focus

- The philosophy of cognitive cartography: *meaning as geometry*.
- Embeddings, maps, ontologies, and hierarchies — how knowledge gains structure.
- Category theory and systems thinking — seeing organizations as logical systems.
- Visual data science and the geometry of insight.
- Demonstration: from text and metrics to semantic landscapes.

Pre-work Submit one organizational dataset (e.g., reports, communications, market data).

In-class Visualize that dataset as a cognitive landscape; identify clusters, gradients, outliers.

Outcome They “see their organization think” and grasp that *every system of action is first a map of meaning*.

Session 2 — Translating Business Structure into Cognitive Cartography

Friday 1:00 – 4:00 PM | Executive Workshop

Objective

Show how many concepts taught in business school—strategy, finance, operations, leadership—map naturally into the cartographic paradigm.

Participants reinterpret MBA frameworks as **geometries of cognition**.

Content Focus

- Strategy as topology: competitive landscapes and white-space discovery.
- Operations as vector fields: workflows, constraints, and feedback loops.
- Finance as metric space: value, risk, and time as gradients.
- Marketing as clustering: segmentation and differentiation as proximity logic.
- Organizations as graphs: networks of roles and influence.
- Translating Porter, Kotter, Kaplan, Christensen into maps and gradients.
- How these structures become machine-interpretable in AI systems.

Workshop

Teams pick a familiar management framework and re-express it as a **map**: entities → relationships → forces → gradients. Discuss new insights from viewing business structure spatially.

Outcome

Participants see that **business reasoning is already geometric**—and that AI now makes it operational.

Day 2 – Designing and Deploying Organizational Intelligence

Session 3 — Designing the Agentic Enterprise: Architecture, Orchestration, and Feedback

Saturday 8:30 – 11:30 AM | Lecture + Design Studio

Objective

Move from cognitive mapping to system design.

How intelligent organizations are architected—how data, people, and tools interact through agents and workflows, and how feedback drives learning.

Content Focus

- Anatomy of an agentic system: sensors (data), reasoning (maps), actors (agents), feedback (learning).

- Workflows as circuits of cognition: sensing → reasoning → acting → learning.
- Orchestration design: balancing human-in-the-loop and automation.
- Feedback loops and reinforcement: the organization as adaptive learner.
Metrics of cognition: speed of insight, transparency, reuse, alignment with strategy.

Studio Exercise

Participants model a real enterprise process as a *cognitive circuit*:

- identify agents and roles,
- define inputs and outputs,
- draw feedback and governance loops.

Outcome

A blueprint showing **how organizational intelligence actually flows**—where cognition lives, stalls, and learns.

Session 4 — Deployment and the Enterprise Workbench: Actions, Agents, and Applications

Saturday 1:00 – 4:00 PM | Capstone Workshop + Project Launch

Objective

Translate enterprise activity into the **language of the cognitive workbench**—agents, tools, workflows, recipes, and protocols.

Participants integrate everything they’ve built into deployable systems tailored to their own organizations.

Content Focus

- From knowledge to action: expressing strategy, meetings, and operations as agentic systems.
- Recipes and protocols: codifying “how we analyze,” “how we decide,” “how we learn.”
- Governance and accountability in cognitive systems.
- **Vertical exemplars (as seed examples):**
 - *Healthcare & Biomedicine* — patients, genes, drugs, clinical reasoning.
 - *Teams & Collaboration* — coordination, task maps, project flow.
 - *Education & Knowledge Systems* — training, learning loops, organizational memory.
 - *Innovation & Research* — patents, startups, discovery workflows.
 - *Finance & Policy* — risk, regulation, legal reasoning.
- Participants build from **their own pre-submitted enterprise examples** to design live applications.

Workshop Structure

1. **Translation:** Convert a real organizational process into Mantis syntax—agents, tools, workflows, feedback.
2. **Vertical Mentoring:** Faculty share vertical archetypes from the IAP course for inspiration.
3. **Blueprint Creation:** Each participant drafts an **Enterprise Cognitive Blueprint**.
4. **Capstone Launch:** Blueprints become the foundation for projects to be refined and presented in three weeks.

Outcome

A practical deployment plan linking knowledge, reasoning, and action—an initial **Cognitive Workbench** for each participant’s enterprise.

Post-Course Project (3 Weeks)

Participants continue developing their **Enterprise Cognitive Workbench Projects**, applying course frameworks to live data.

They will:

- Expand cognitive maps with real inputs.
 - Refine agentic workflows and feedback loops.
 - Define success metrics and governance.
- Final presentations showcase applied systems and learning outcomes.

Program Summary

Session	Theme	Mode	Outcome
1	Cartography & Cognition	Lecture + Visualization	Map of meaning
2	Business Structure → Cognitive Cartography	Workshop	MBA frameworks as spatial reasoning
3	Designing the Agentic Enterprise	Lecture + Studio	Cognitive architecture & feedback loops
4	Deployment & Enterprise Workbench	Workshop + Capstone	Enterprise Cognitive Blueprint & project launch