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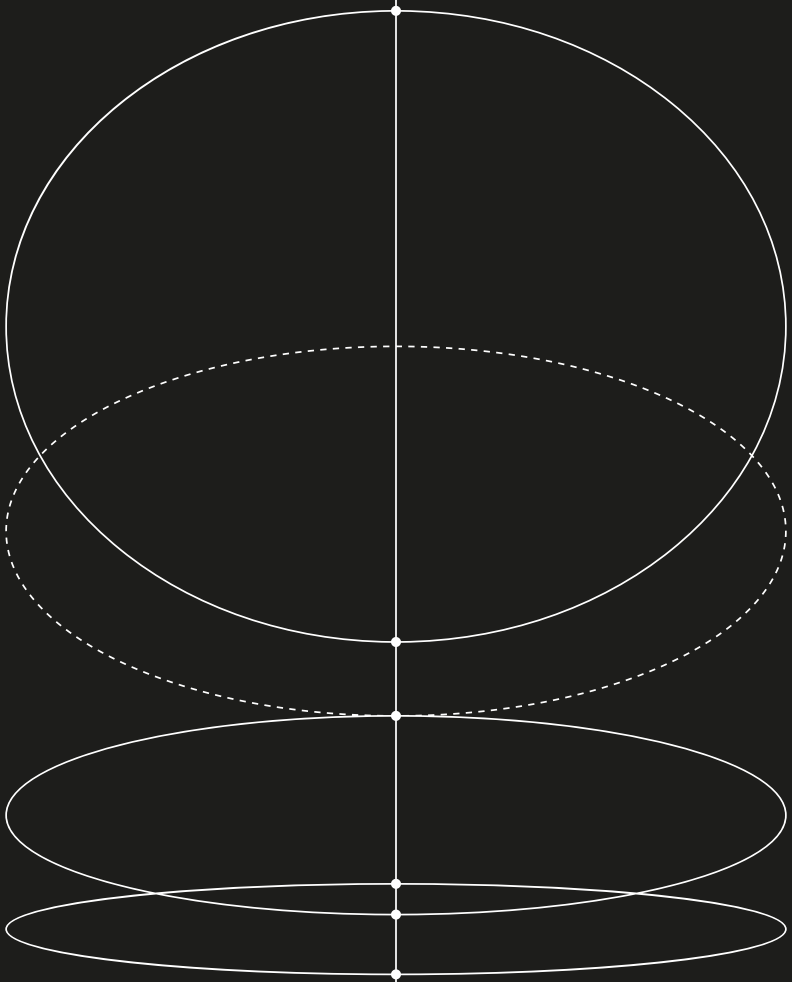
The first publication in a series of articles on the subject of more intelligent organizations.

Written by Jesper Bleeke.

AI Lab / AI factory:

Medfinansieras av Europeiska unionen

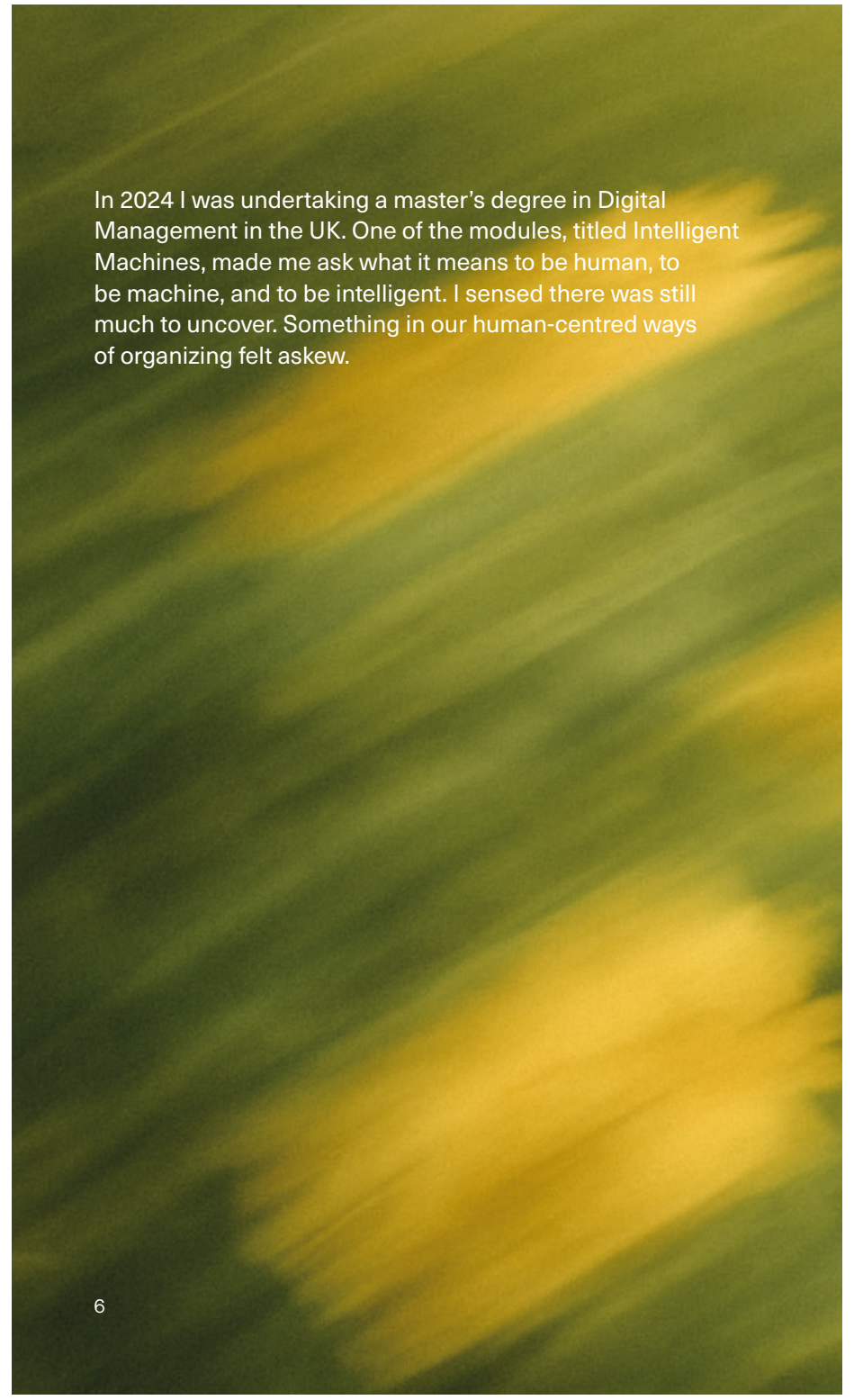


Foreword

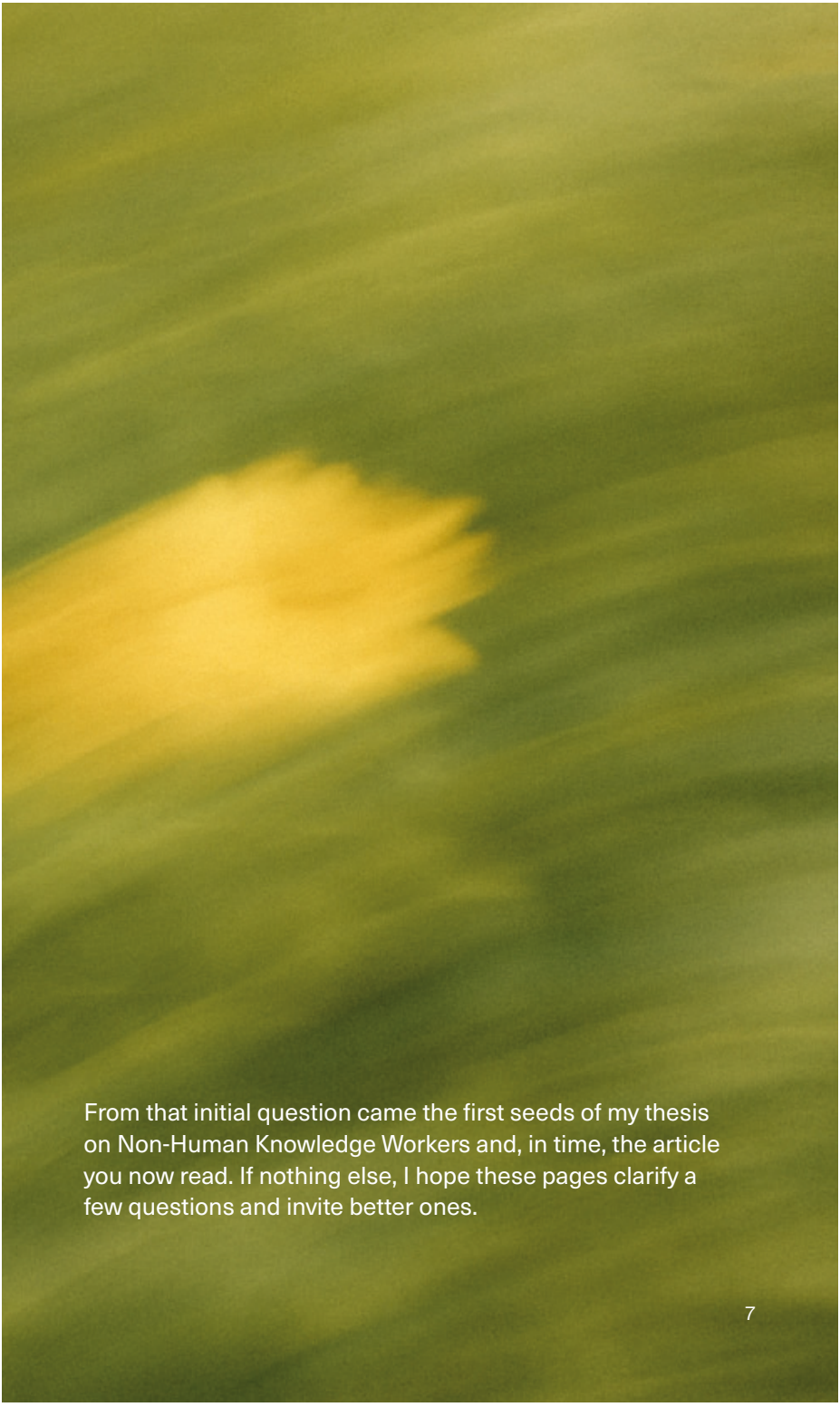
by Jesper Bleeke.

“What does it mean to be human, to be machine, and to be intelligent?“

– Jesper Bleeke



In 2024 I was undertaking a master's degree in Digital Management in the UK. One of the modules, titled Intelligent Machines, made me ask what it means to be human, to be machine, and to be intelligent. I sensed there was still much to uncover. Something in our human-centred ways of organizing felt askew.



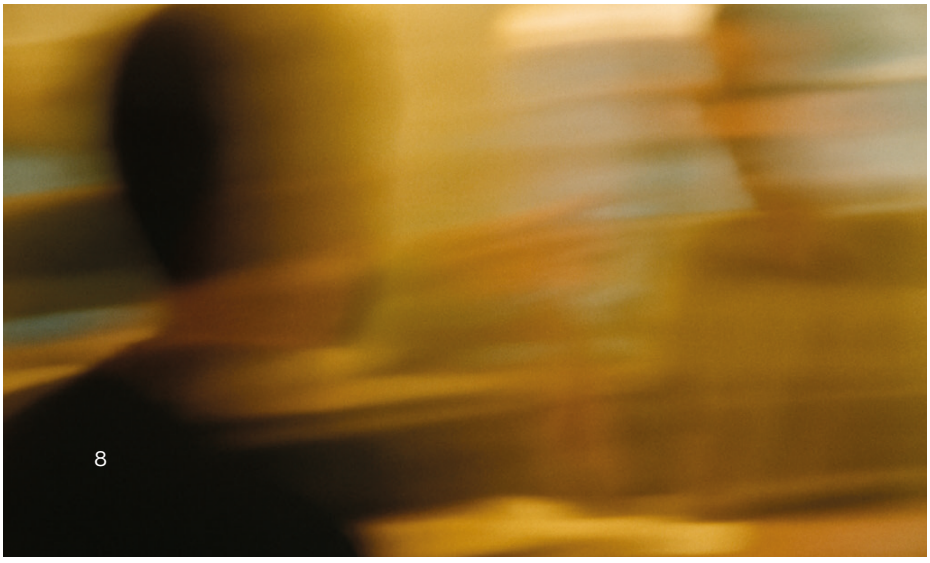
From that initial question came the first seeds of my thesis on Non-Human Knowledge Workers and, in time, the article you now read. If nothing else, I hope these pages clarify a few questions and invite better ones.

Introduction

Organizations still manage AI as an IT toolset; however, it is increasingly assuming the roles of knowledge workers, challenging the human-centric paradigm of organizational design.

Beyond augmentation or automation narratives lies ensembling—a strategy which treats human and non-human knowledge workers as peers.

The article first grounds this claim by (1) comparing adoption strategies (augmentation, automation, ensembling) and (2) comparing organizational models (networks, systems, technology)—in a NHKW-context (the context of advanced artificial agents that perform complex cognitive tasks that create value in organizations).



Background

Technology—the application of theoretical knowledge to practical problems—appears in two forms, tangible like electronic devices and intangible like software and processes. Digital technology converts analog information from physical signals into bits, enabling storage, computation, and transmission at scale.

The proliferation of technologies that rely on digital data representation gave rise to the contemporary Information Age, in which information is a commodified asset and knowledge is the principal driver of economic growth. In this knowledge economy, the production and consumption of goods and services depend on the effective application of the Data-Information-Knowledge-Wisdom (DIKW).

Unstructured data gains context to become information; information integrated with experience becomes knowledge; and applied judgment yields wisdom. This transformation constitutes knowledge work, and the professionals involved are knowledge workers (KWs).

Knowledge appears in two distinct forms, tacit (personal and hard to formalize) and explicit (codified and sharable through documents, databases, or manuals). It is the role of Knowledge management (KM) to convert individual know-how into organizational capability.

In knowledge-intensive firms, where primary assets are intangible and reside in employee expertise, KM is critical because it makes use of the organization's collective intelligence (CI)—the shared capacity to learn, adapt, and solve complex problems across teams. Advances in artificial intelligence (AI) contribute by automating parts of the DIKW pipeline and augmenting knowledge work.

Intelligence

Human Intelligence (HI) spans a wide range of cognitive abilities, including experiential learning, language, abstract reasoning, and complex problem-solving. Artificial Intelligence (AI) can be defined as computer systems designed to perform tasks that typically require HI.

One way AI systems can be described is by the degree of autonomy they possess, from those requiring constant human supervision and intervention even in a closed environment to fully autonomous systems operating independently in open world environments. Artificial Narrow Intelligence (ANI) refers to AI systems designed to perform specific tasks or a limited set of tasks. These systems excel within their narrow domains but lack the ability to generalize.

“The best work still emerges from Human-AI teams, possessing distinctive features compared to Human or AI counterparts, balancing biases and augmenting cognitive abilities.”

Artificial General Intelligence (AGI) is a hypothetical development stage in which AI can understand, learn and apply intelligence across a broad range of complex tasks and domains, mimicking human cognitive capabilities. Artificial Superintelligence (ASI) is a theoretical concept describing AI that surpasses HI in all aspects, including those qualities traditionally associated with human cognition.

A common industry framing outlining the progression from ANI to ASI in economic terms is the five-step framework: (1) Chatbots are conversational interfaces for workers to use; (2) Reasoners are systems that achieve human-level problem solving in predefined tasks. They replace some human workers in an organization and augments others; (3) Agents are capable of autonomous action within human-defined boundaries. Agents can replace most human roles in an organization, carrying out the majority of operations without human intervention; (4) Innovators are capable of invention and innovation, creating new products or services, leading to the final step; and (5) Organizations, systems that could operate a whole organization. This represents the pinnacle of the economic AI model, where no roles remain exclusively human, even managerial ones.

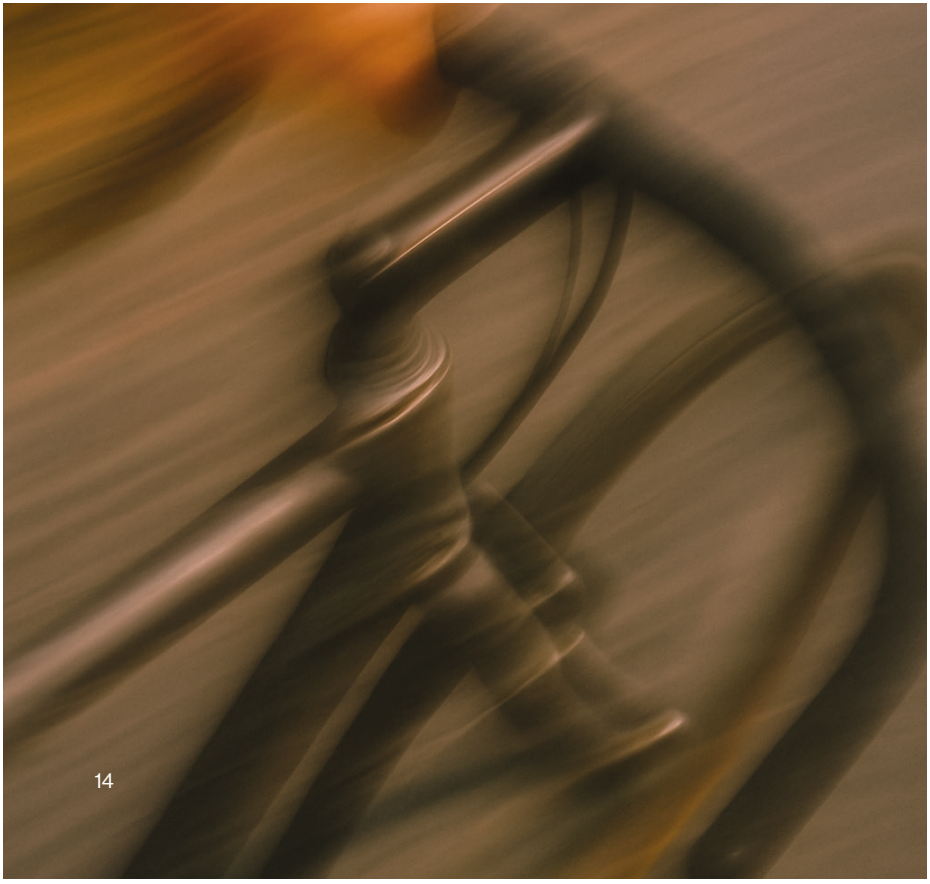
Previous attempts to combine humans (H) and AI have focused on specialization, where each performs different tasks or subtasks. AI automates routine work and augments human expertise, freeing people for higher-order reasoning. AI performs well at pre-defined tasks while humans perform better at open-ended problems such as innovation. The best work still emerges from Human-AI teams, possessing distinctive features compared to Human or AI counterparts, balancing biases and augmenting cognitive abilities.

Dual-process theory distinguishes two interacting modes of thought: System 1 (fast, intuitive, heuristic) and System 2 (slow, deliberate, computational). Humans typically excel at System-1 thinking—intuition, empathy, sociocultural awareness—while AI traditionally scaled System-2 work—large-scale analysis and logical reasoning. In human-in-the-loop (HITL) workflows, continuous human feedback steers the system, aligning outcomes with human values while leveraging machine scale.

"Ensembling fosters an environment where H and AI are equal contributors, unlocking the full potential of AI to the benefit of the organization."

However, today's AI spans the two modes of thinking, making specialization a major constraint. The concept of ensembling introduces a third path, orthogonal to both automation and augmentation. By aggregating the strengths of H and AI without confining them to specialized roles, ensembling fosters an environment where H and AI are equal contributors, unlocking the full potential of AI to the benefit of the organization. This shift is visible in emerging artificial colleagues and even managers. These Non-Human Knowledge Workers (NHKW's) are synthetic agents characterized by the convergence of four attributes distinguishing them from the common AI agent—information processing, knowledge work, task-level employment and comprehensive organizational integration.

AI adoption in business can consequently be divided into two primary approaches: augmentation and automation. Late-stage augmentation predicts one-person companies, where a single individual operates a company with AI assistance. In contrast, late-stage automation predicts zero-person companies, where AI systems are capable of operating an entire enterprise without human intervention. Beyond both lies ensembling—human and non-human knowledge workers as peers—pointing toward systems that are completely integrated.



Organization

Organizational theory has evolved from the classical school of the industrial age—where humans operated technical systems—to the neo-classical school of the digital age—where people collaborate facilitated by technical systems. Despite contemporary organizations exhibiting cyborglike characteristics through intricate human–machine relationships, organizational theory remains fundamentally human-centric. The emergence of Non-Human Knowledge Workers challenges this view.

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Network POV

Traditional hierarchies and static structures have been made redundant as digitalisation necessitates self-organization, cross-functional collaboration, and real-time adaptation. Wirearchy—a conceptualization of organizations as networks built around purpose and knowledge —epitomizes the new model of organizational design where distributed power and digital communication enable knowledge-driven, decentralized decisions.

"Emergent networks matter more than prescribed ones."

Within any organization there are two networks: prescribed (documented roles and processes) and emergent (the informal interactions and relationships that happen in the white space of the organizational chart). Especially in knowledge-intensive companies, emergent networks matter more than prescribed ones.

Where do AI systems fit in? As AI transitions to Non-Human Knowledge Workers, it shifts from hard infrastructure owned by IT to soft infrastructure led by HR. Soft infrastructure is the non-physical support that makes organizations work. It can be illustrated as five layers: Individual (cognition and behaviour), Interpersonal (interactions and relationships), Group (roles and team dynamics), Organizational (values, policies, structure), and Societal (the

wider cultural and regulatory context). These layers are about to be inseparable from the question of AI.

In this sense, NHKWs differ from other AI agents in that they are full participants in the organization's inner workings, including the white spaces of the organizational chart.

Systems POV

Both humans and organizations can be described as information and communication systems—gathering, processing, and exchanging information for various purposes. The term Artificial Information System (AIS) distinguishes engineered systems from natural ones. Systems Theory provides the framework for managing the complexity of such systems, whether biological, social, technological, or a combination thereof, by understanding the interdependent parts that make up a whole.

"This decentralization enhances communication efficiency and capacity to handle complex problems."

An agent is any entity capable of acting autonomously within a specific context, physical or digital. Multi-Agent Systems (MAS) comprise multiple agents—human or artificial—that work to solve tasks that individual agents could not. While single-agent systems are simpler to design and manage, MAS offer several advantages in complex and distributed problem solving.

Since multi-agent systems perform tasks in parallel they work more efficiently than single-agent systems handling tasks sequentially. Additionally, dynamic task allocation and distributed knowledge enable agents to coordinate tasks, adapt to new information and make local decisions without relying on a central decision maker. This decentralization enhances communication efficiency and capacity to handle complex problems. As a result, MAS excel in both collaborative and competitive contexts.

In collaborative contexts, agents with complementary skills cooperate to achieve common objectives, forming communities that enhance collective performance. In competitive contexts, agents model complex group behaviors with simple interactions leading to sophisticated emergent phenomena. In both contexts, it is an evolutionary process that can lead to novel strategies unattainable by single-agent systems.

Technology POV

Organizational technology is a conceptual framework describing the actors, tasks, expertise, methods, and systems by which inputs are transformed into goods and services in the process of value creation.

Tasks refer to activities involved in the value transformation process. Discrete units of value creation—the steps that convert inputs to outputs (research, drafting, reviewing, deciding, fulfilling). Tasks are the "work surface".

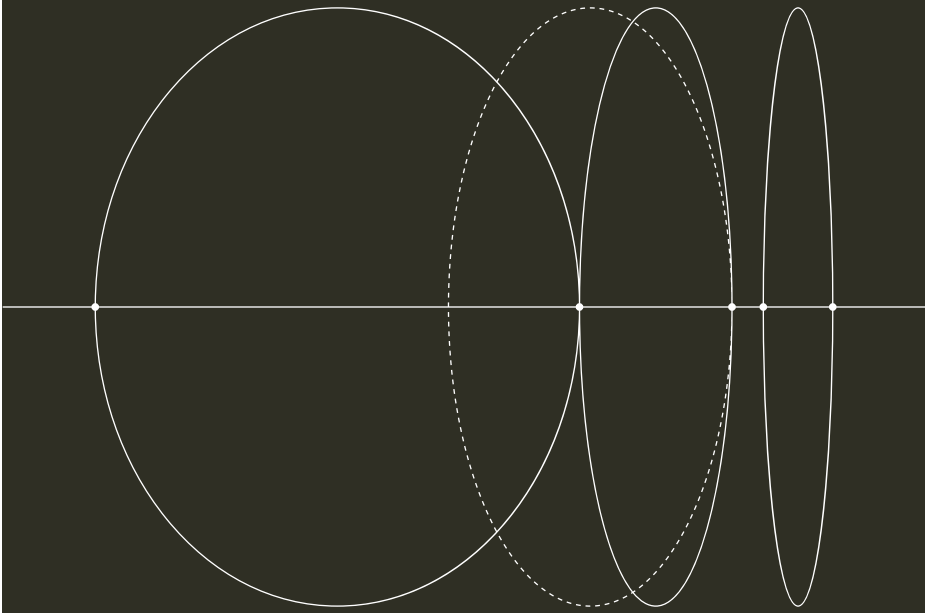
Techne (expertise) refers to specialized knowledge and skills possessed by individual employees and the organization as a whole, which is required to carry out certain tasks. The know-how—tacit and explicit—required to execute tasks to standard. Techne lives in people's heads, in models' learned weights, and in organizational norms.

Techniques (methods) refers to the codified ways techne is applied: procedures, checklists, playbooks, prompts, evaluation rubrics, QA gates. Techniques make expertise portable and improvable.

Technical Systems refers to physical and non-physical tools part of the enabling environment. These systems route information and actions to the right actors at the right time. Technical Core typically refers to the actors that perform the organization's essential work.

"Organizations no longer need to be designed around human limitations, instead organizations may be reimagined as ecosystems that mobilize the collective intelligence of humanity and technology."

The convergence of technological breakthroughs in Non-Human Knowledge Workers transitions AI from Technical Systems, associated with hardware and software tools, to Technical Core, previously associated with humans. As the technical core becomes a design parameter organizations no longer need to be designed around human limitations, instead organizations may be reimagined as ecosystems that mobilize the collective intelligence of humanity and technology.

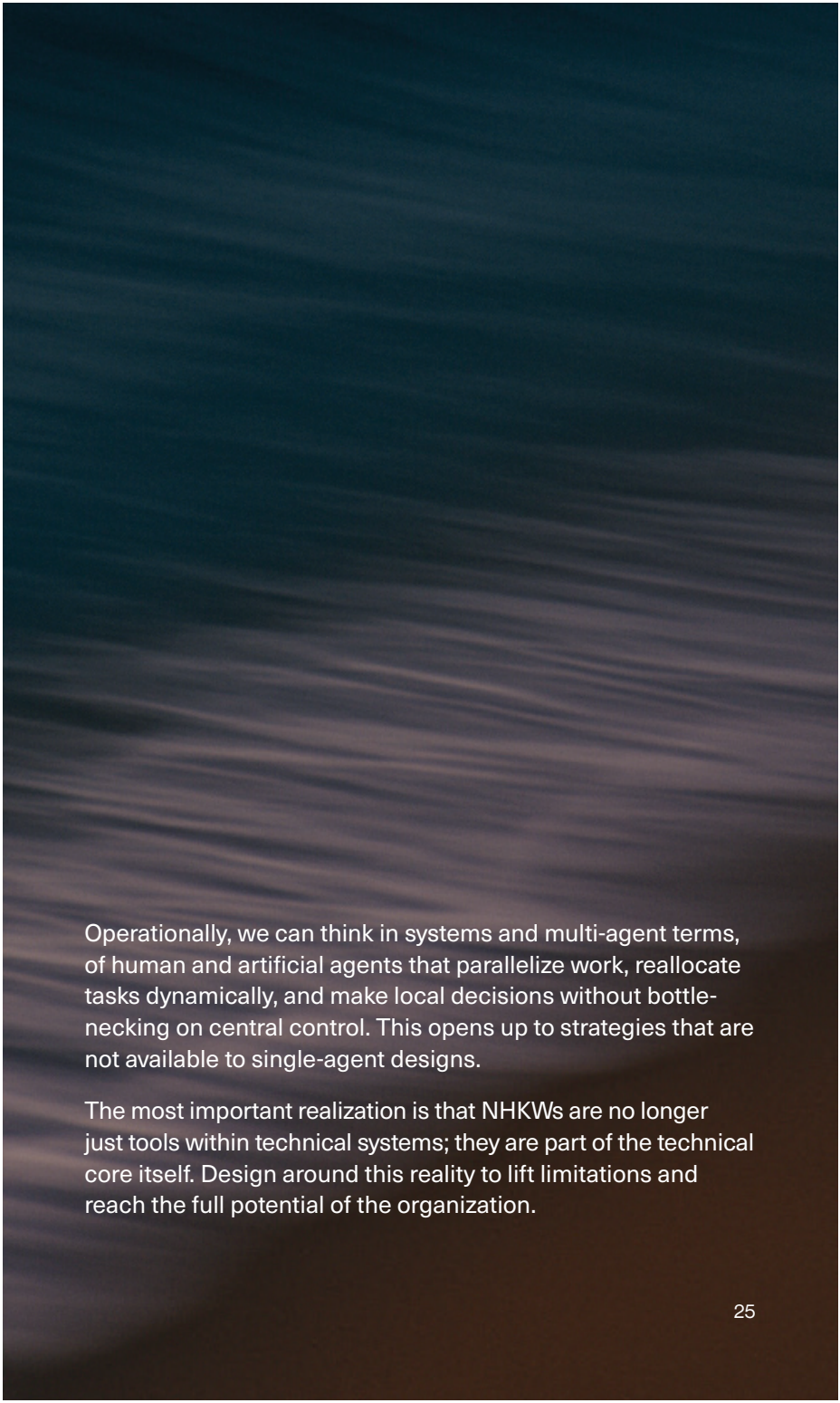


Summary

In the knowledge economy, advantage accrues to organizations that use their Collective Intelligence —not just by digitizing tasks, but by deliberately redesigning how people and machines work together.

Late-stage augmentation (one-person firms) and late-stage automation (zero-person firms) describe important endpoints, yet an overlooked strategy is ensembling: treating human and non-human knowledge workers (NHKWs) as peers who co-produce outcomes rather than as specialists confined to separate lanes.

This requires us to move AI out of the IT basement and into the organization's soft infrastructure —where the corporate culture lives. In networked enterprises, NHKWs don't just execute in the boxes; they also operate in the chart's white spaces where real work flows, which means HR, not engineering, becomes the primary steward of AI.



Operationally, we can think in systems and multi-agent terms, of human and artificial agents that parallelize work, reallocate tasks dynamically, and make local decisions without bottle-necking on central control. This opens up to strategies that are not available to single-agent designs.

The most important realization is that NHKWs are no longer just tools within technical systems; they are part of the technical core itself. Design around this reality to lift limitations and reach the full potential of the organization.

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Tech Concept Lab.

TCL is an accelerator of research and innovation in digital transformation, specialized in generative AI and its future impact on knowledge work. As a non-profit organization we work closely with our partners in Academia, Business and Society to co-create better visions of tomorrow in order to make more responsible decisions today.

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