AI for Good

New Internet Design II – Agentic AI Ecosystem

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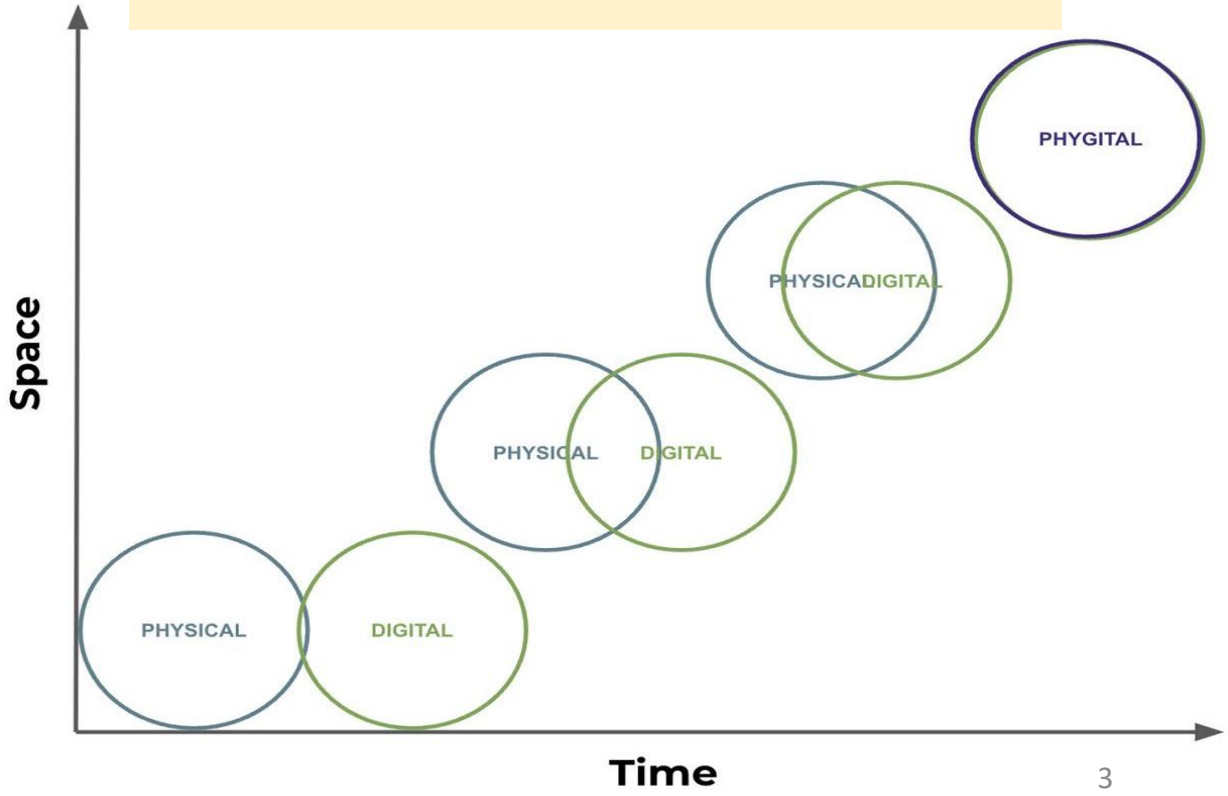
Contents

Digital Economy

- Platforms
  - Sharing participation/subscription
- Phygital era
  - On-Offline connection
  - Cyber-Physical Fusion
- Commons
  - Digital Assets
  - PCI Participation, Collaboration and Incentives

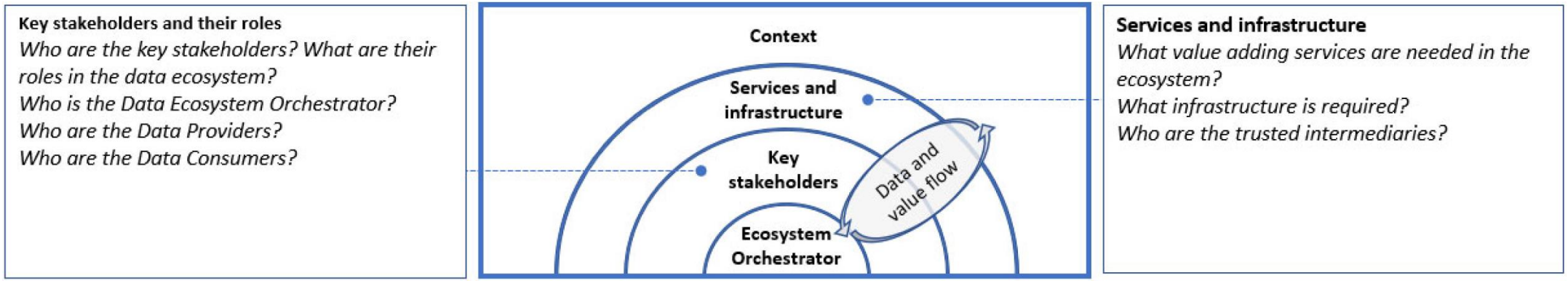
- **Commons (Concepts)**
  - Community
  - Transparency
  - Collaboration
  - User sovereignty
  - Incentives
  - Democratic decision making



The Ecosystem (scaling up)

- **The ecosystem of ecosystems**
  - Technology ecosystems
    - e.g., 5G/6G, Clouds, IoT, Big Data & AI, etc.
  - Vertical domain specific ecosystems
    - e.g., industrial, health, energy, etc.

Data spaces as ecosystem



Declaration for the Future of the Internet

- An Internet that can deliver on the promise of connecting humankind and helping societies and democracies to thrive.
- The Internet should operate as **a single, decentralized network of networks**
  - Protection of Human Rights and Fundamental Freedoms
  - A Global Internet
  - Inclusive and Affordable Access to the Internet
  - Trust in the Digital Ecosystem
  - Multistakeholder Internet Governance

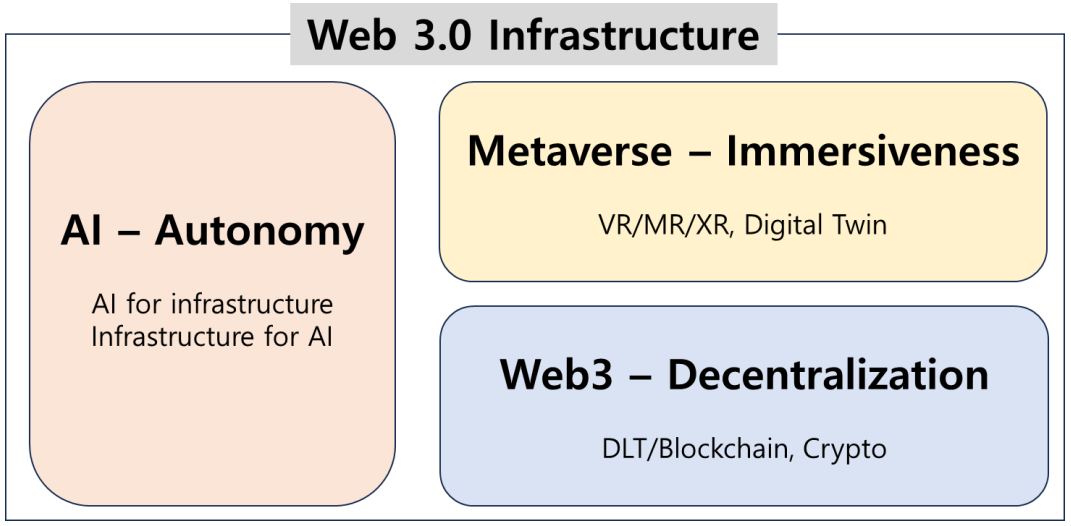
https://www.state.gov/declaration-for-the-future-of-the-internet

Open Protocols

An effective regulatory framework will clearly differentiate between applications and protocols.

New Internet – Web 3.0 and Web 4.0

- Web 3.0 is the evolution of the Internet towards **user-centric intelligent services**
- From sharing economy to protocol economy (Commons)



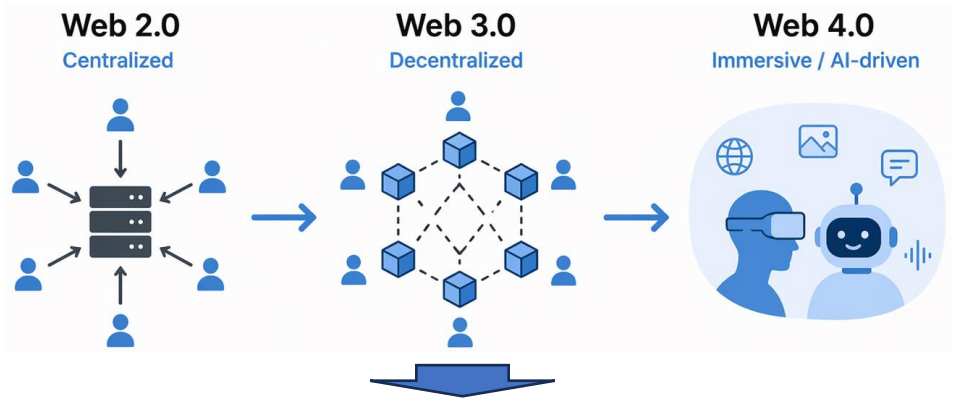
- **Web 4.0**
  - **Collaborative and User-Centric**
  - **Intelligent and Personalized**
  - **Interconnected and Immersive**
  - **Decentralized and Secure**
  - **Data-Driven**

Web 1.0: The era of the static Internet
Web 2.0: The participative, interactive era
Web 3.0: The networked future
Web 4.0: The intelligent future

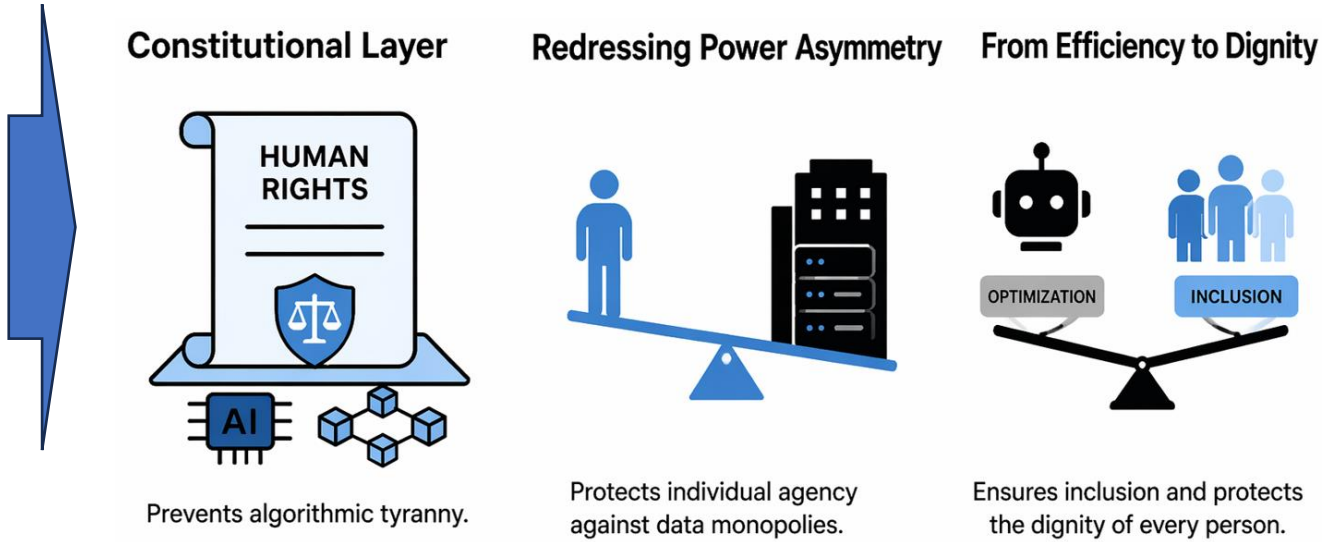
Why Human Right?

Human Rights in the Era of Web 3.0 & 4.0

Web 3.0 & 4.0 - Human-Centricity



The Core Philosophy of Human Rights



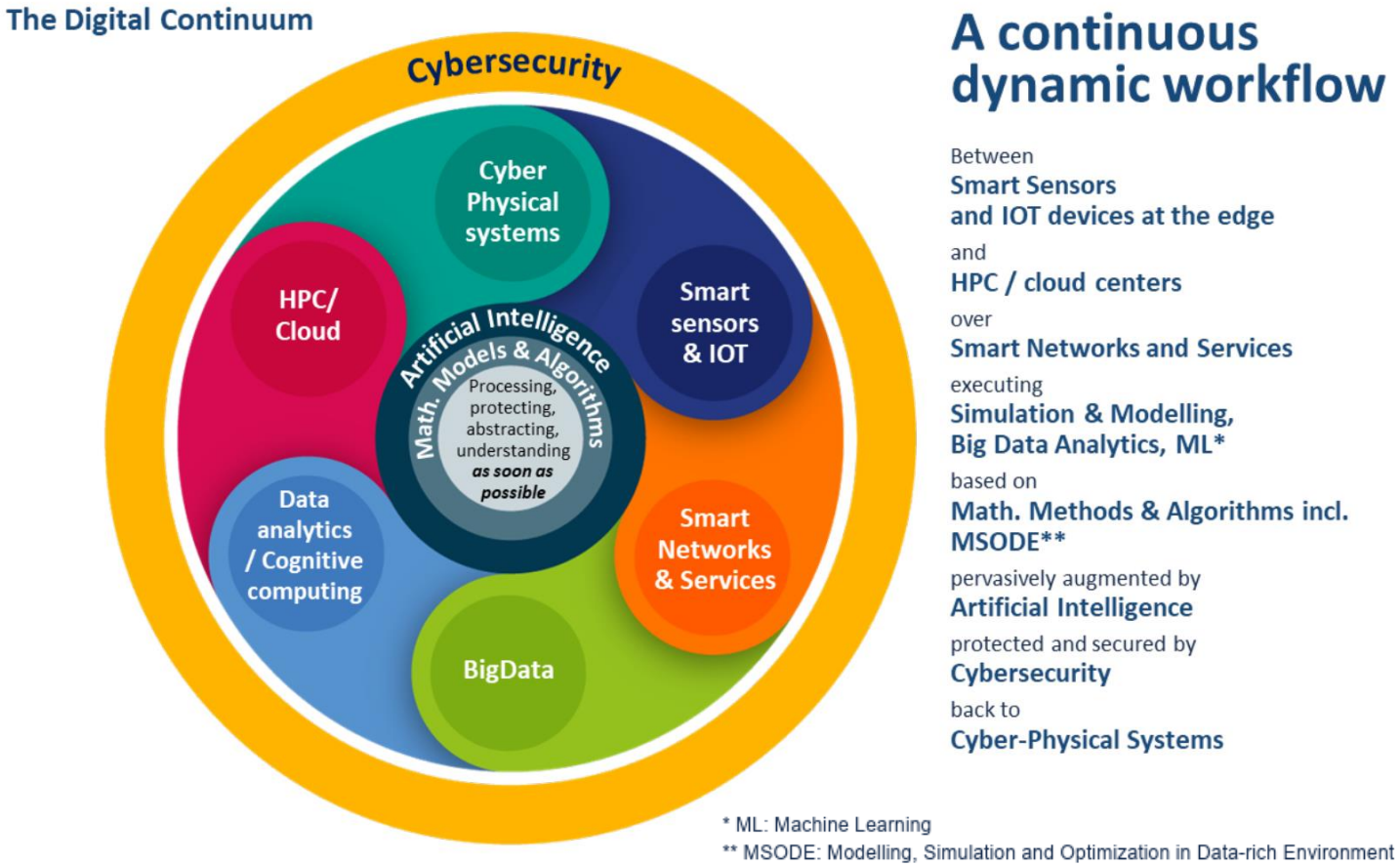
IEEE 7000, ISO/IEC JTC 1/SC 42, EU AI Act

Technology is the '**means**,' while human rights are the '**end**.' Technology dictates **HOW** we live, but human rights determine **WHY** we must remain human.

Human Rights-by-Design is not an option; it is **a technical requirement for global interoperability**.

Towards AI Infrastructure

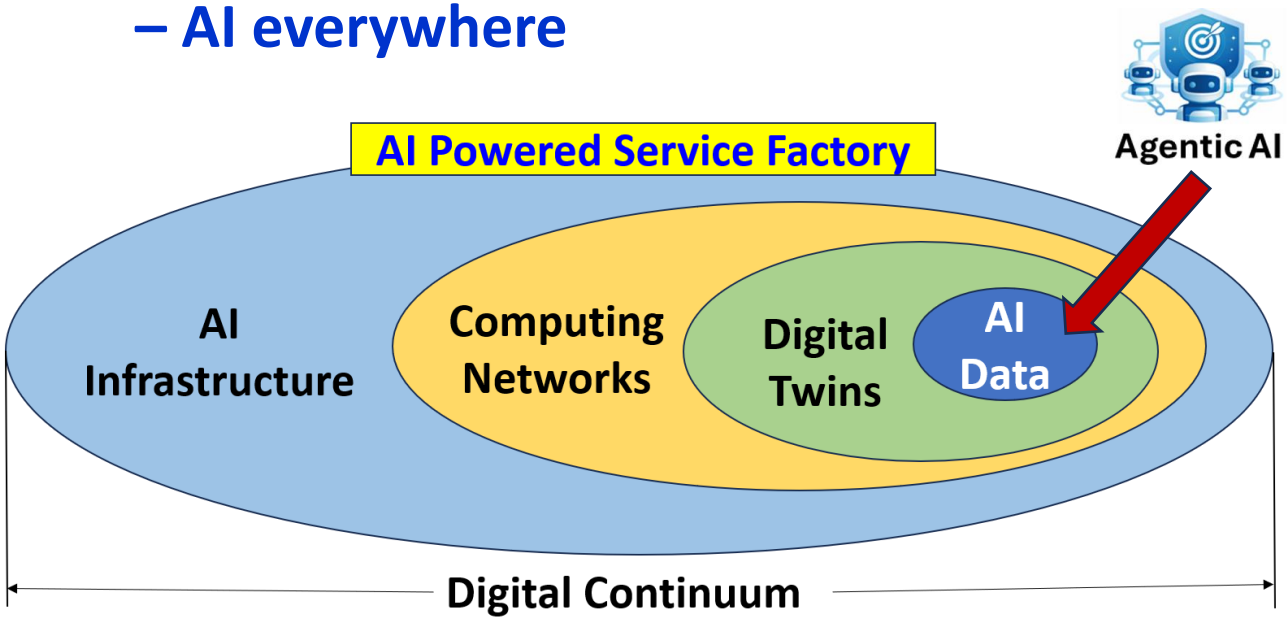
- **AI for Infrastructure**
  - how AI-inspired techniques can pilot and monitor the continuum and, in so doing, provide solutions
- **Infrastructure for AI**
  - re-designing the infrastructure to efficiently deal with data analysis and machine learning
- **AI for Science, Industry and Societal Challenges**
  - the ever-increasing need to exploit AI techniques for extreme-scale, combining Data and Compute through the interpretation and coupling of computing results, measurements and observations



https://etp4hpc.eu/digital-continuum/

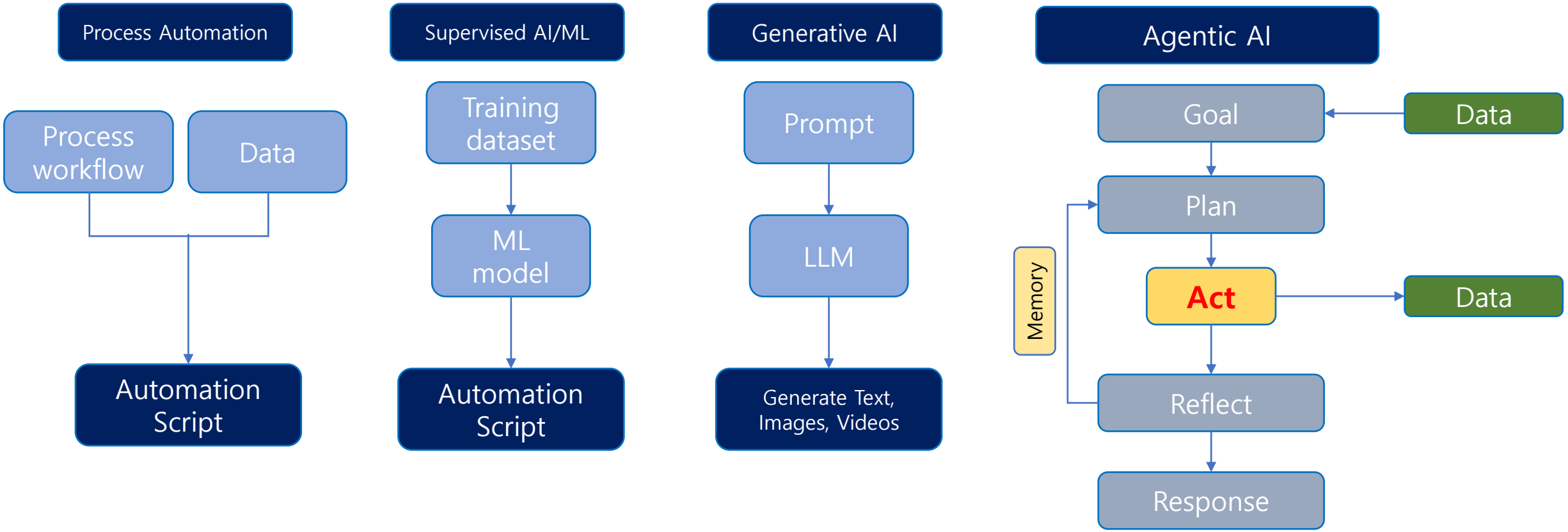
The Role of AI Infrastructure

- Fully automated infrastructure with connected intelligence
  - **Trustworthy Decentralized AI Infrastructure – AI everywhere**



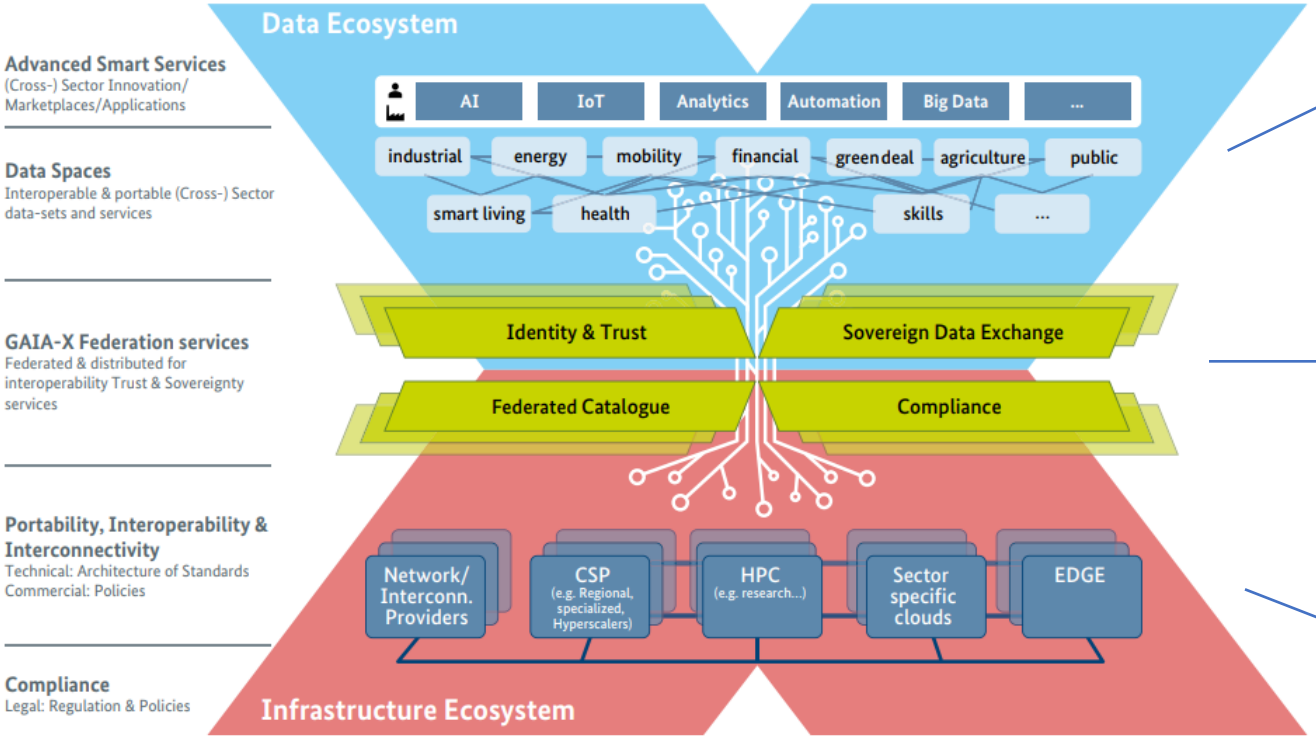
- From Cloud to Edge: Decentralization
- AI/Computing/Trust Native: In-network native and modular approach (energy efficient)
- Multi-tier heterogeneous resources: Minimizing complexity with AI (Agentic AI)
- Service mining: Crowd driven AI-powered Trustworthy Service Composition
- Trustworthy services: TrustChain (Lightweight distributed ledger with smart contract)
- Autonomous operations: SelfOps (Self-evolving and self-adapting service operations)
- Participation, Collaboration and Incentives: Collaboratively Evolving Platforms at Scale

Agentic AI Evolution



Agentic AI Ecosystem

EU GAIA-X



Large-Scale Federated Agentic AI Ecosystem

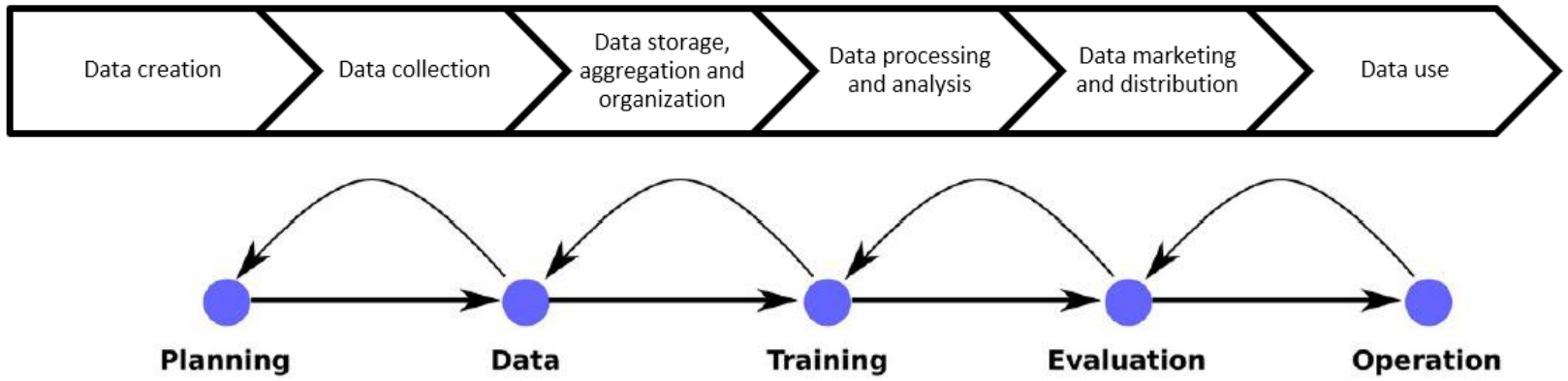
Agentic AI Services
Agentic Orchestration

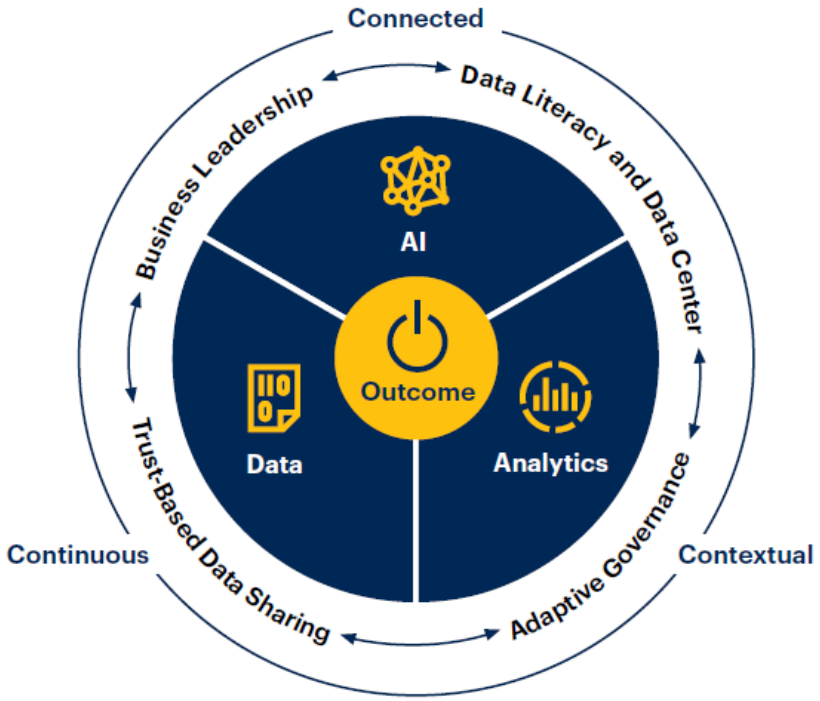
Agentic AI Platform
as AI Service Factory

AI Infrastructure
Device-Edge-Cloud Continuum

Collaboratively Evolving Infrastructure

- Self-evolving and self-adapting
- AI-Ops
- Data lifecycle
- Workflow management





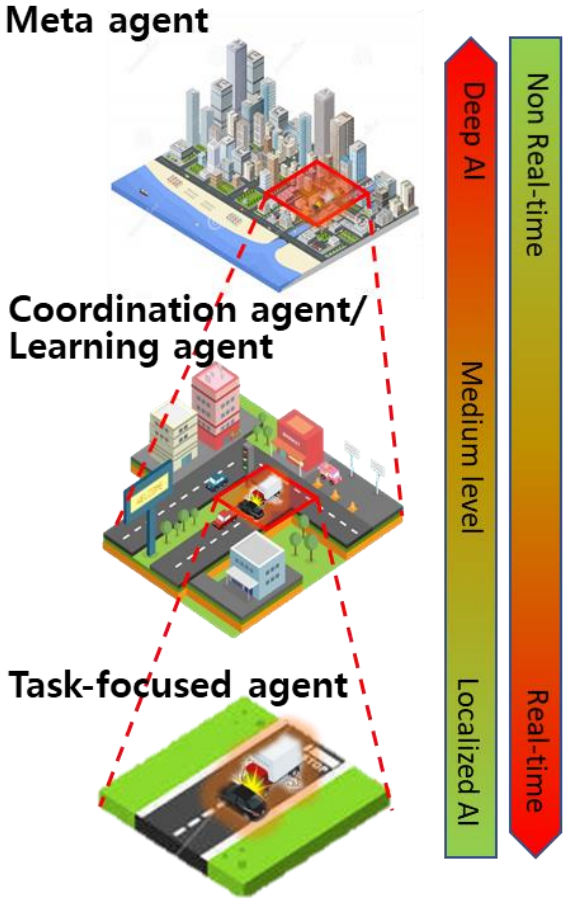
Source: Gartner

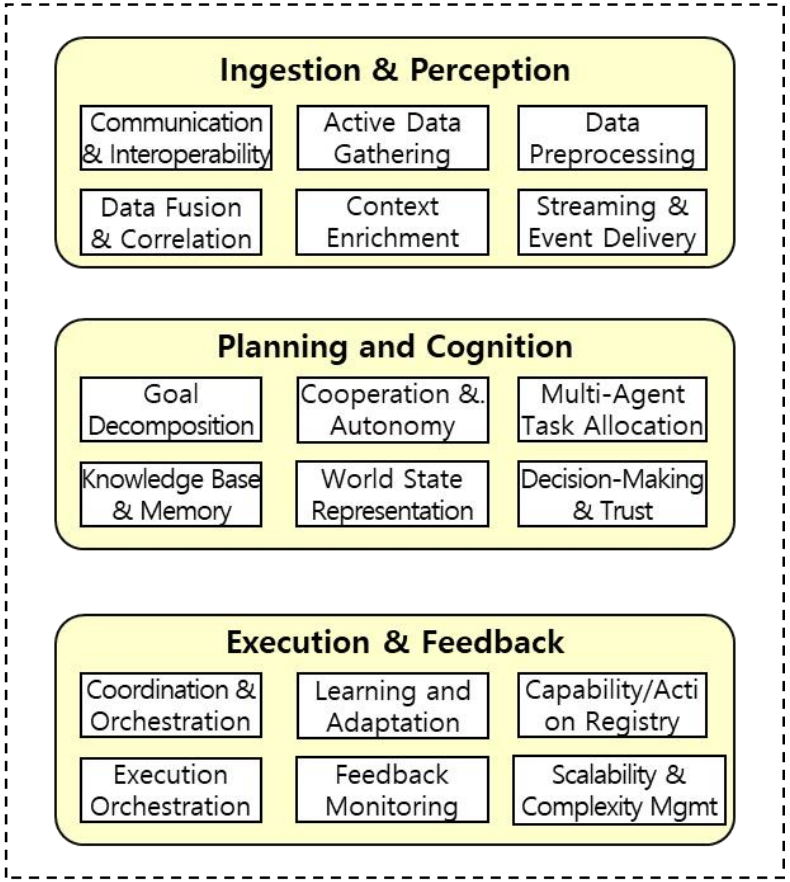
AI Agent Collaboration – Agentic Mesh

- The process of networking multiple, specialized AI agents to solve complex tasks
- Why Agents Collaborate
  - Task Decomposition, Role Specialization, Improved Accuracy and Autonomy
- Common Design Patterns
  - Manager-Worker (Hierarchical), Reviewer-Creator (Feedback) and Swarm (Decentralized)
- Core Technologies and Protocols
  - Orchestration Frameworks, A2A (Agent-to-Agent) and Shared Memory
- Challenges and Considerations
  - Complex Orchestration, Cost and Latency, Trustworthiness

An example – Multi-Agentic AIoT

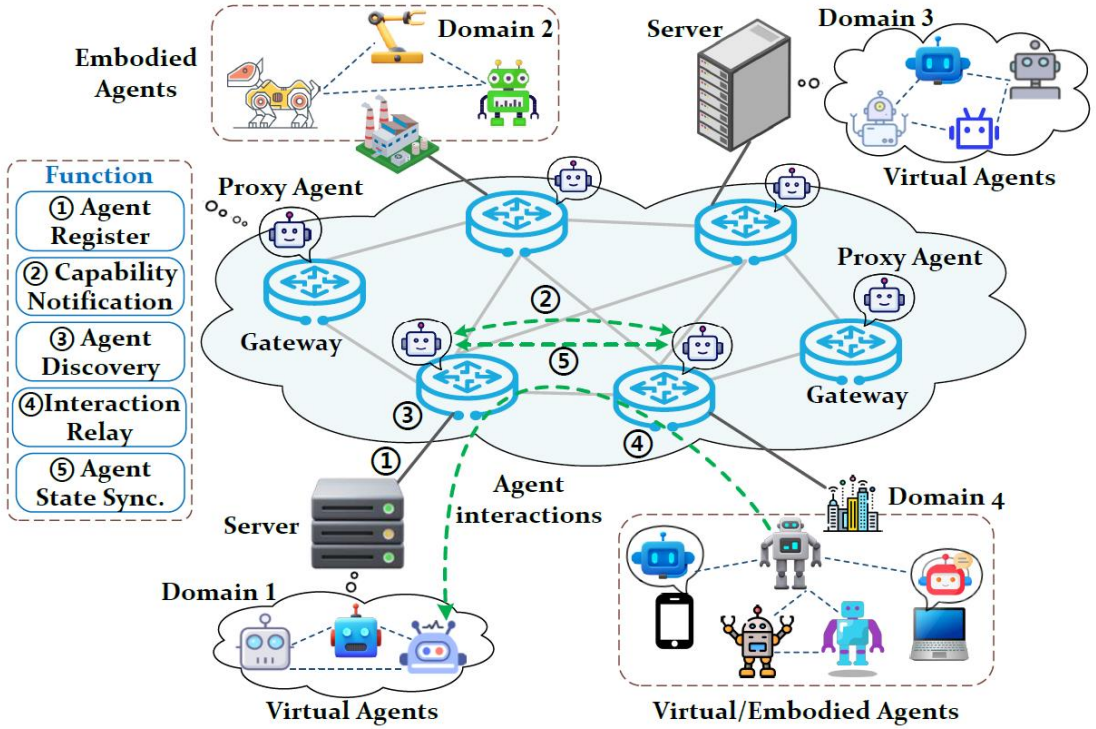
- **Task-focused agents** directly sense, plan, and act to achieve localized goals.
- **Coordination agents** orchestrate multiple agents, determine task sequences, and optimize parallel execution.
- **Learning agents** update models and policies based on operational feedback (including privacy-preserving/federated methods).
- **Meta agents** set global objectives, policies, and governance and align subordinate agents accordingly.



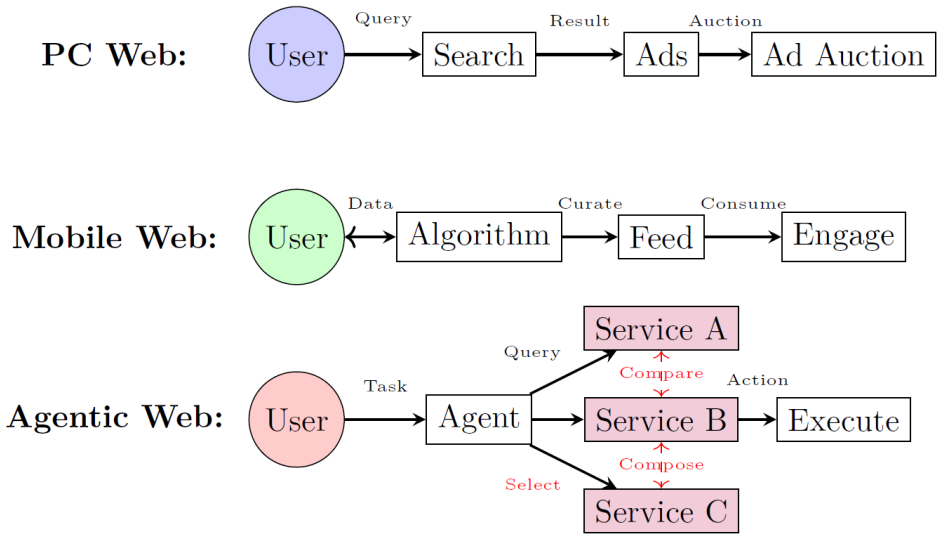


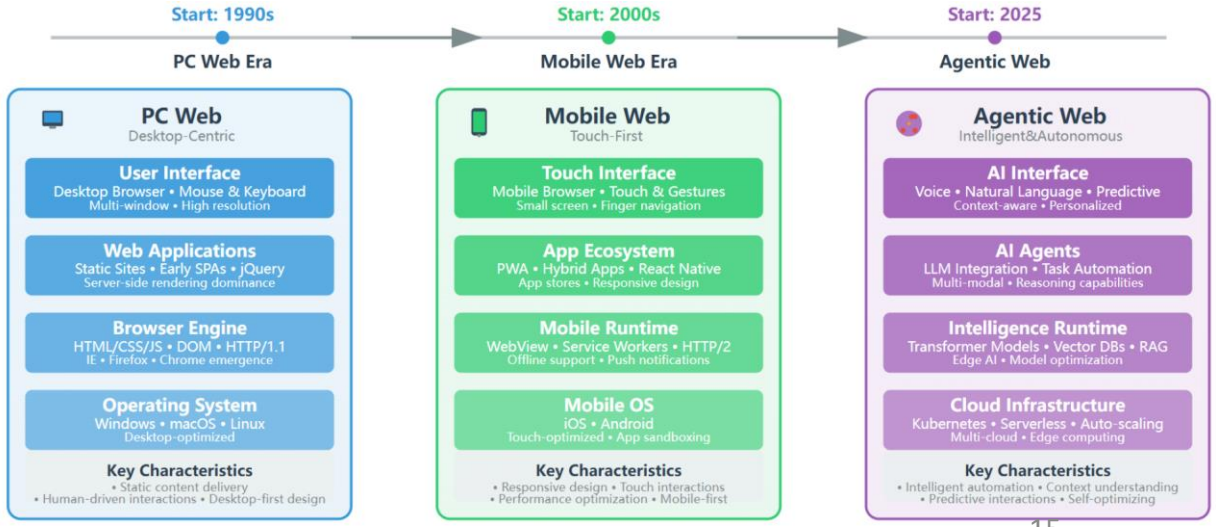
Conclusion – Towards Internet of Agents

The **Internet of agents** (IoA), also referred to as the **agentic web**, emerges as a foundational infrastructure for next-generation intelligent systems that enables seamless interconnection, autonomous agent discovery, dynamic task orchestration, and collaborative reasoning among large-scale virtual/embodied agents.



https://arxiv.org/abs/2505.07176





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