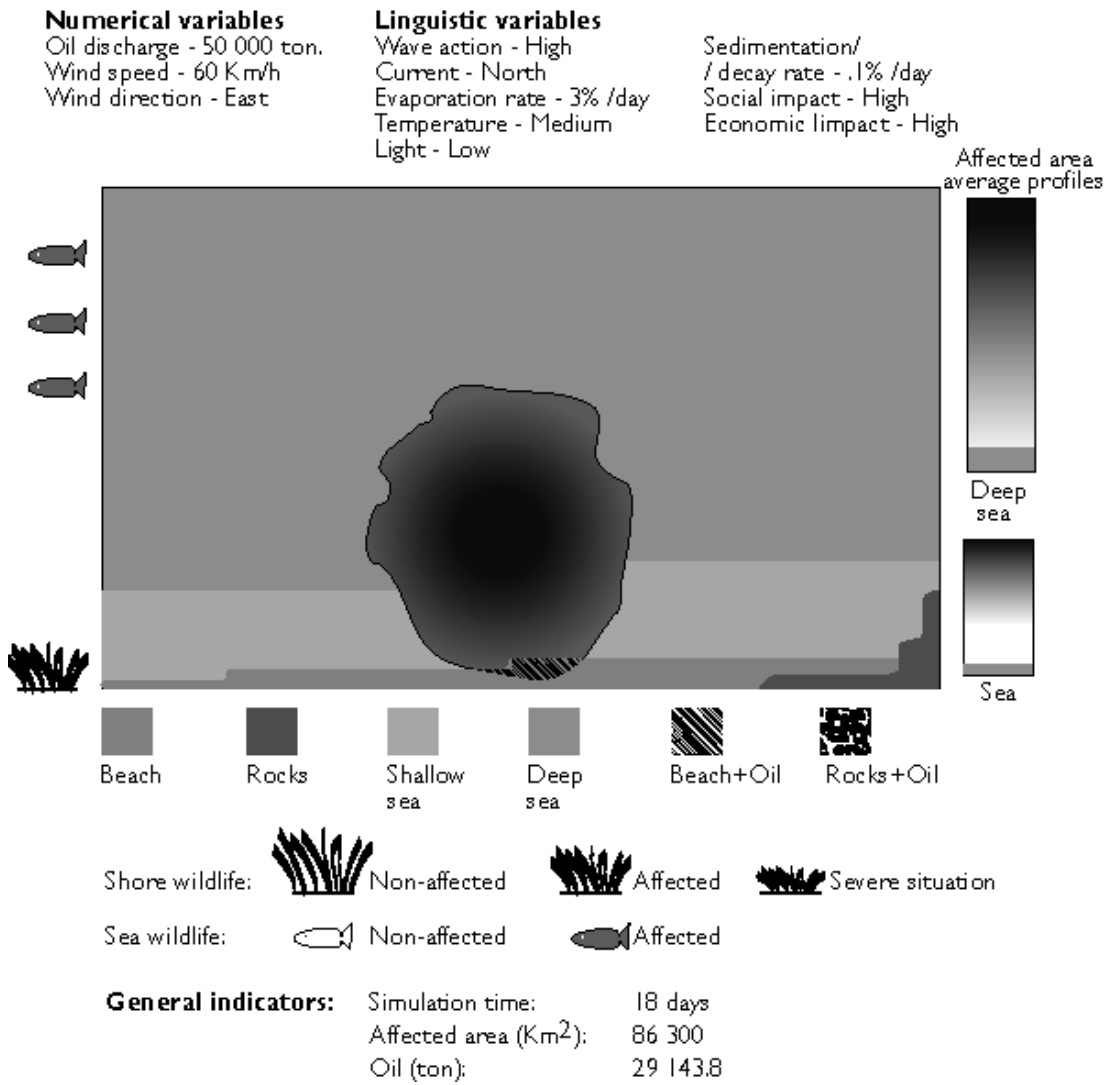
Towards an Internet of Nature (IoN)

Antonio Camara

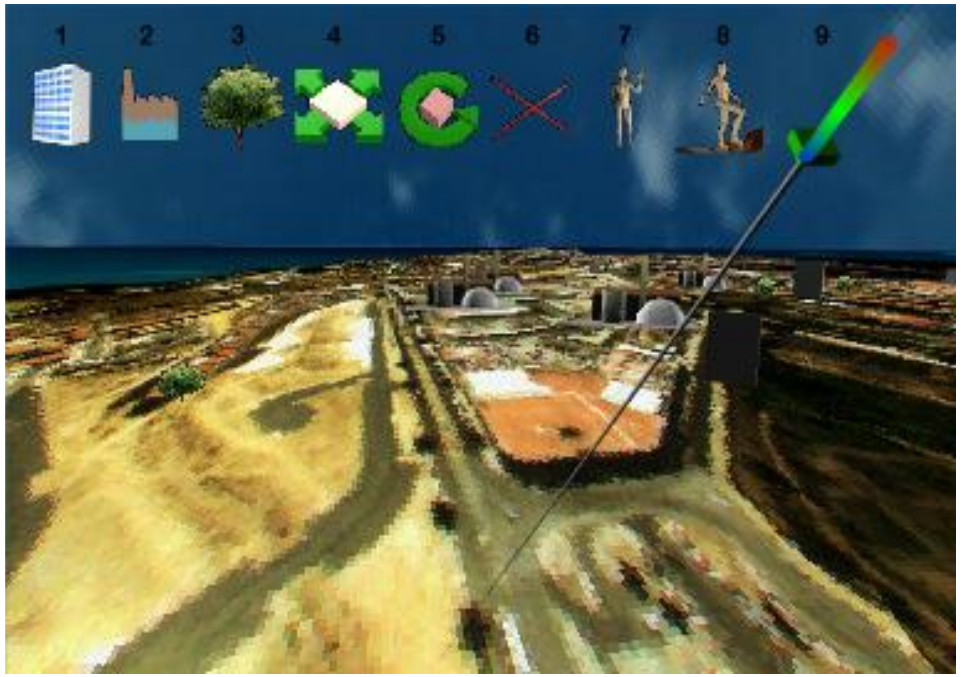
June 2024

Multidimensional (multimodal) simulation (1990)



Virtual reality and ecosystems (1995)

Virtual Tejo user interface



Tool Legend
1. Create Building
2. Create Factory
3. Create Tree
4. Translate Object
5. Rotate Object
6. Delete Object
7. Move/Stop Toggle
8. Fly/Walk Toggle
9. Virtual pointer

Digital Portugal-SNIG

the first Web (1995) and Virtual Reality based spatial data infrastructure (1998)

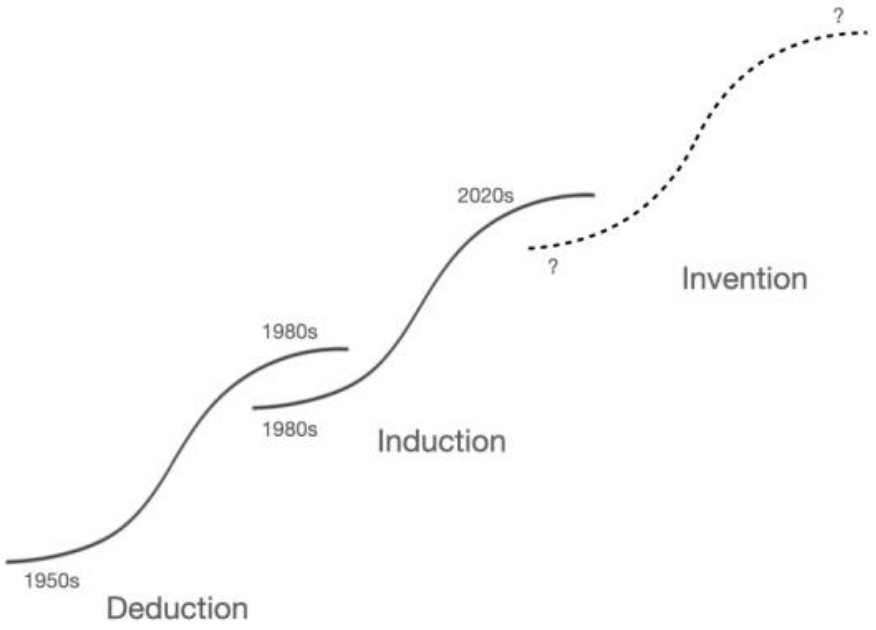
Humans, Machines and Nature

Humans

Humans and Machines

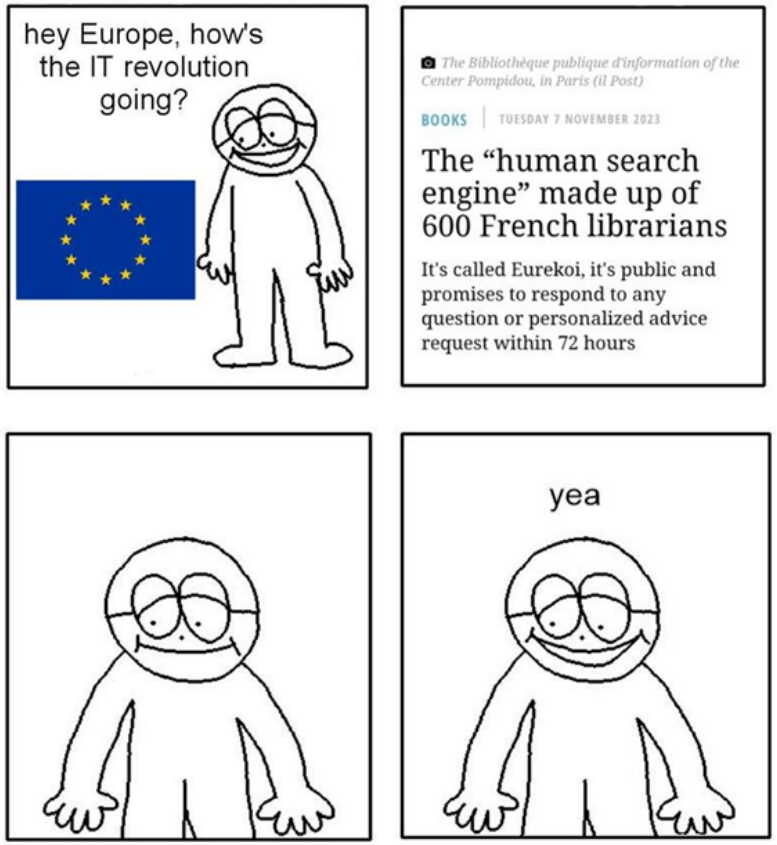
Humans and Nature

Humans, Machines and Nature
In 2050

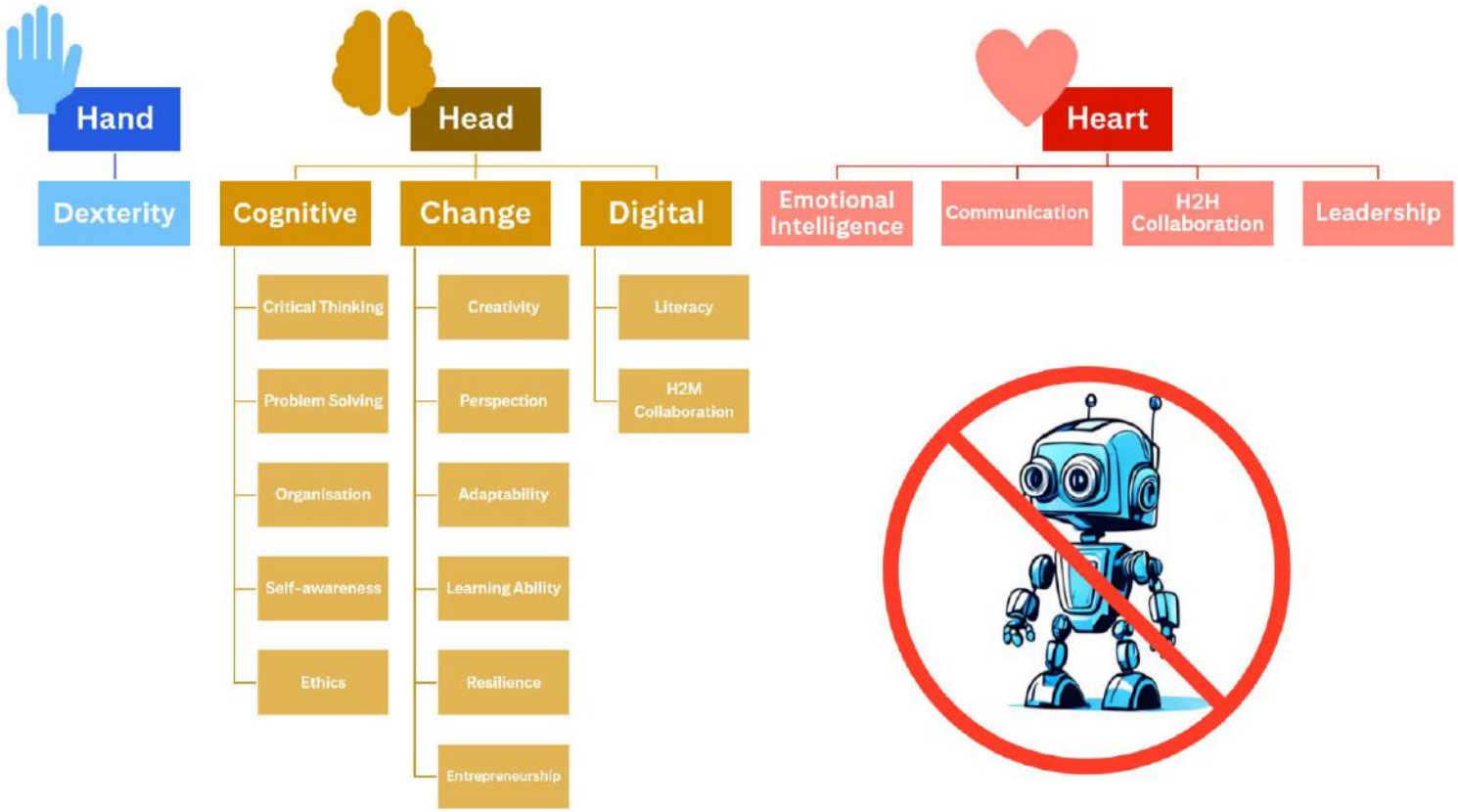


[10 Grand Challenges We Will Face in 2050]

Humans



We must love the French



[What Machines can not master]

Humans and Machines

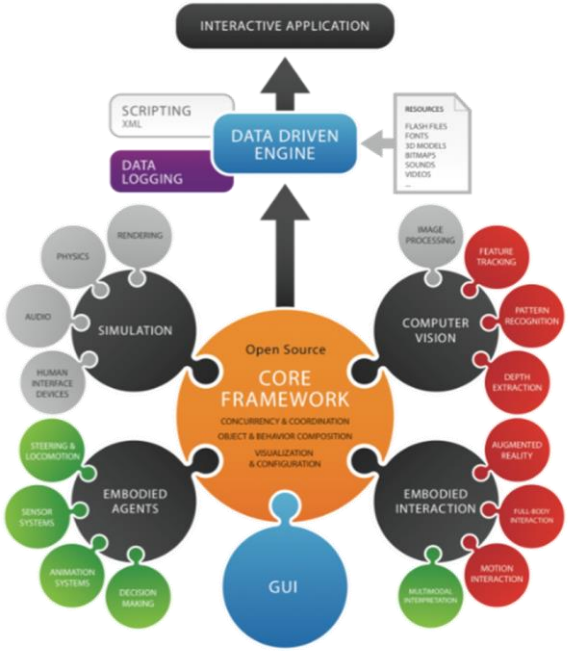
Spatial Computing base knowledge- AI/AR/VR/Robotics

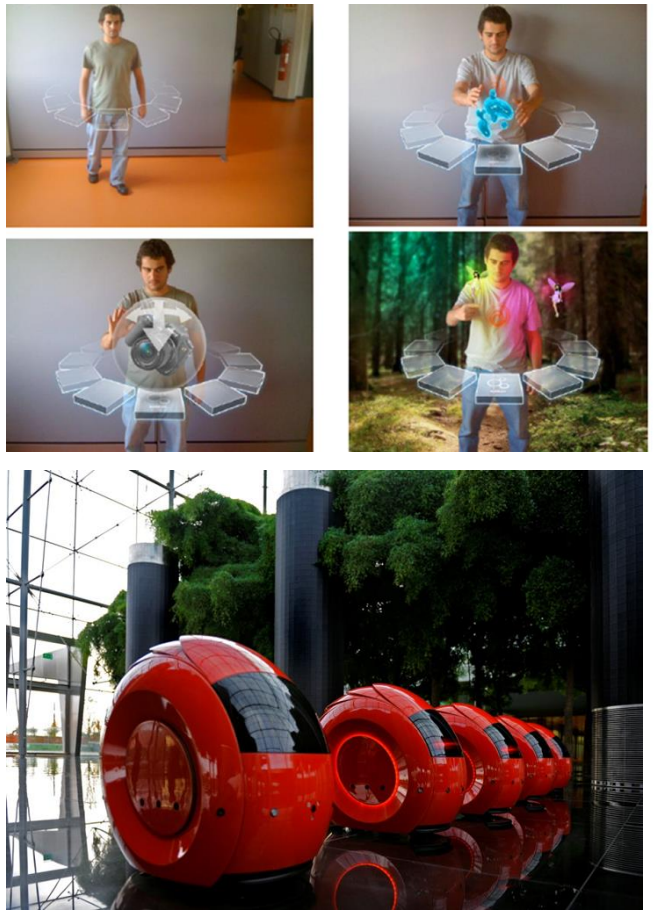
YVision mathematics

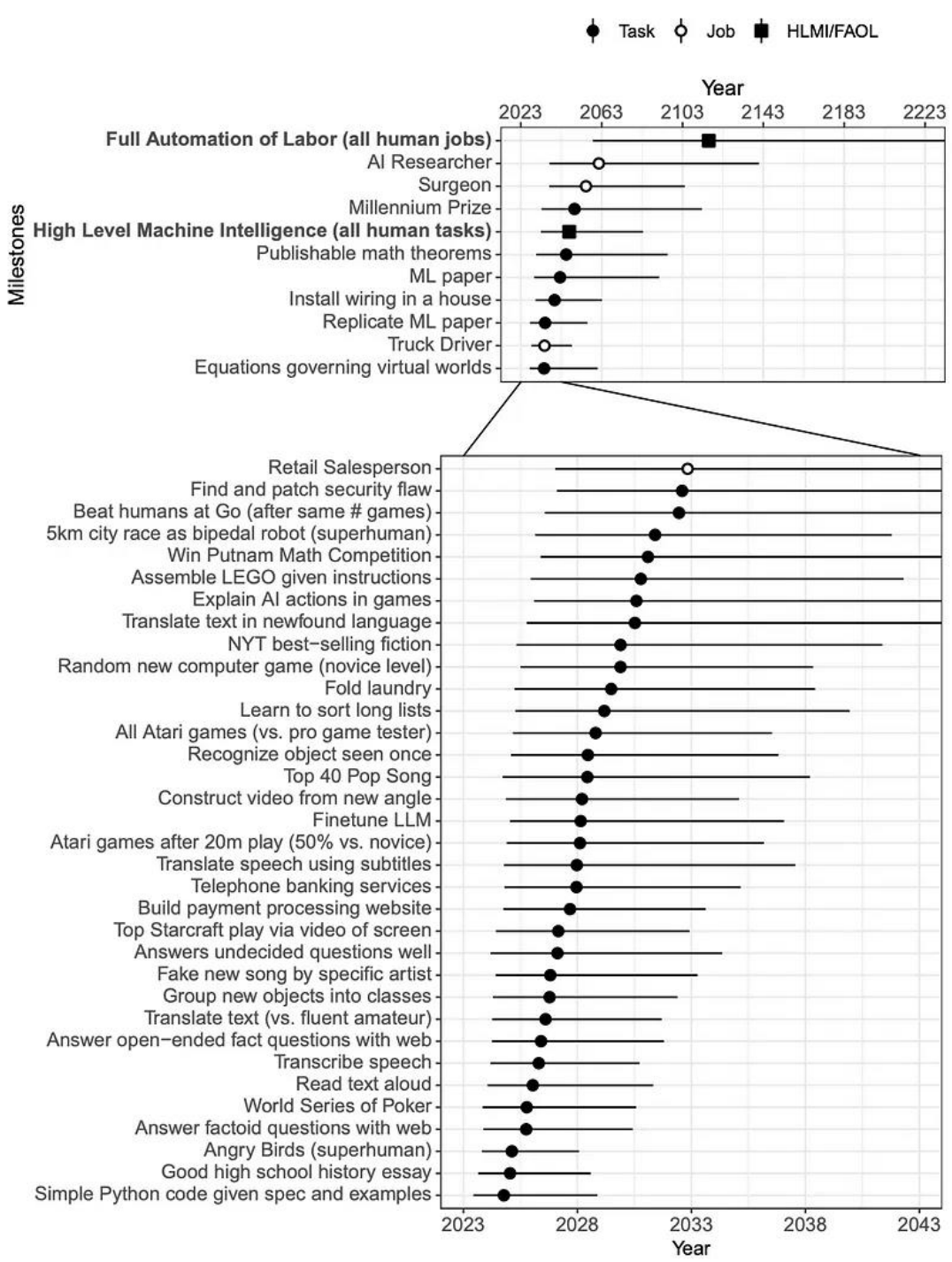
- 3D Rendering: Linear Algebra - Differential Geometry - Geometry (Projective Transformations)
- Physics Simulation: Linear Algebra - Differential Calculus - Integral Calculus - Numerical Analysis (for approximating continuous mathematics)
- Computer Vision: Linear Algebra - Geometry (Homographies, Projective Transformations) - Cellular Automata - Convolutions - Fourier Analysis
- Synthesis and Transform Audio: Fourier Analysis, Synthesis and Transform
- Machine Learning: Statistical Analysis - Artificial Neural Networks - Principal Component Analysis - Regression - Function Approximation
- Evolutionary Computation Core Framework: Lambda Calculus (root of functional programming) - Turing Machines - Theory of Computation

[The YDreams Collection]

Spatial Computing developments







High-Level Machine Intelligence- HLMI (2047)

Full Automation of Labor (2116)

Cezary Gesikowski, Redefining Tomorrow: AI Researchers Unveil a Startling Future, February 2024

Humans, Machines and Nature

AI and Nature

[Large Language Models Empowered Agent-based Modeling and Simulation: A Survey and Perspectives]

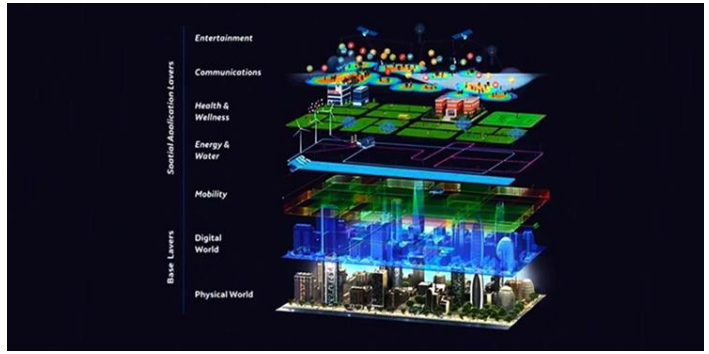
Spatial Computing and Nature

The Data World

The Augmented World

The Digitally Twinned World

The Virtual World



Humans and Nature Services

The opportunities

Intrinsic services

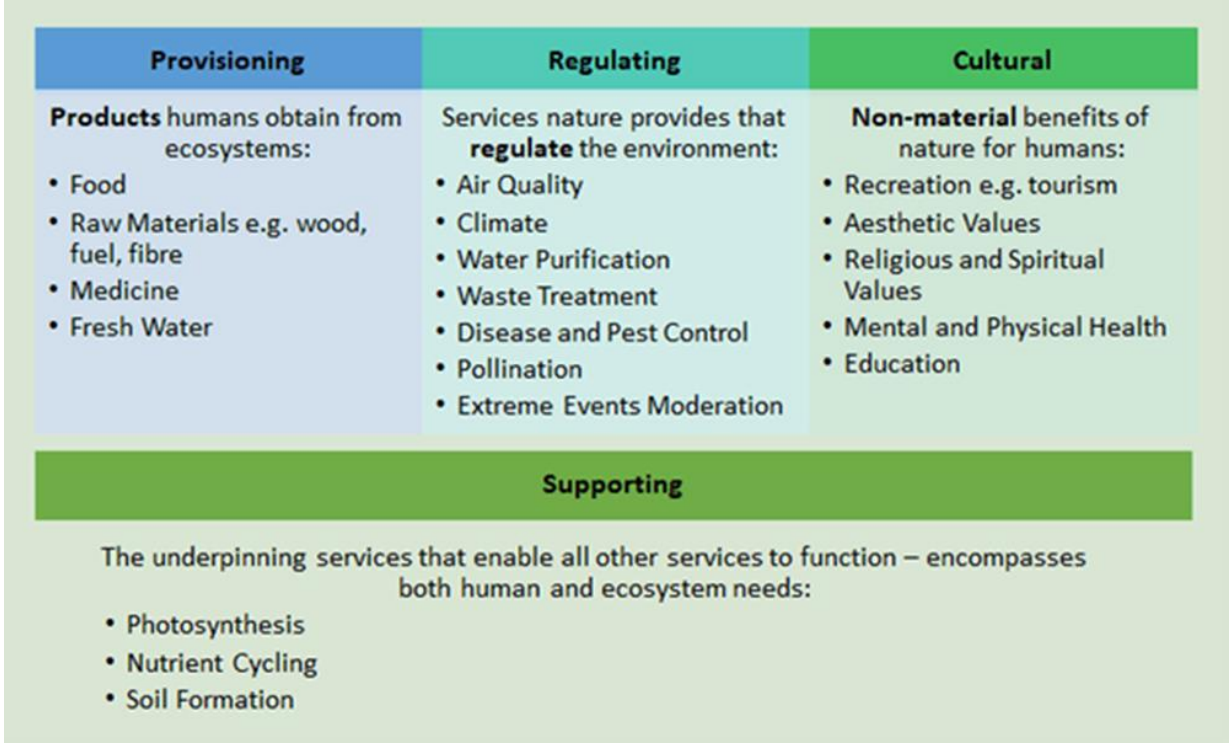
The Real, Data, Augmented and Digitally Twinned Worlds

Offset services

The Digitally Twinned World

Derivative services

The Real and Virtual Worlds



Ecosystem Services: the Fundamentals

Humans, Machines and Nature- The Internet of Nature (IoN)

AI and Nature

Environmental Quality Monitoring and Management

Smart Infrastructures

Nature Conservation and Restoration

Natural Resources Management

Natural Disaster Management

Environmental Quality Control

Spatial Computing and Nature

Augmented Reality (AR) for Infrastructure Inspection and Maintenance

Virtual Reality (VR) for Training and Simulation

Digital Twins for Asset Management

Spatial Analytics for Planning and Optimization

Geospatial Visualization for Emergency Response

Environmental Monitoring

Interactive Public Engagement

IoN: Agents and Nature

Agents

- AA (precision agriculture)
- AB (biodiversity conservation and restoration)
- AC (carbon removal)
- AW (water availability)

Will call Functions (mathematical models and other frameworks) or use Large Multimodal Models (fine tuned with appropriate content reflecting existing relevant knowledge) to ensure transitioning between system states

Nature

Will be referenced and monitored using local and remote sensing

Agents and Nature

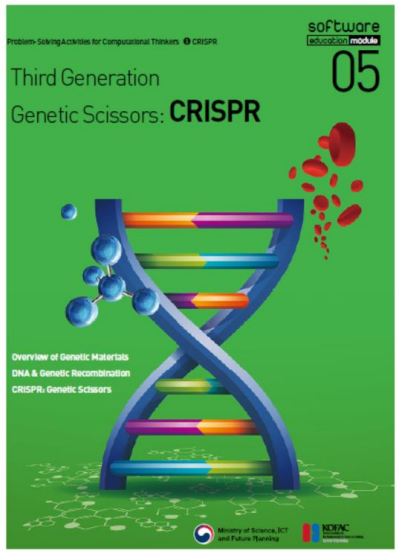
Agents' engines and data will be set up in motion ("the input stage") and its results observed ("the output stage") using a virtual representation of Nature

IoN development rom 2024 to 2054

The knowledge transition

Learning from KOFAC (South Korea) program for 9th year students

1 Artificial Intelligence
2 Driverless vehicles
3 Internet of things
4 Virtual reality
5 CRISPR
6 Space launch vehicles
7 Natural disasters
8 Smart medicine
9 Game engines
10 Sports statistics



Alexander Von Gabain on EU's Innovation Model

Societal Transformation 2018-2037: 100 anticipated radical technologies, 20 regimes, case Finland

The environmental, social, governance and financial transitions

Coordinated Governance of Decentralized Autonomous Organizations (DAOs)

New Generation Communication, Telepresence and Teleoperation Platforms (the new Decision Theaters)

Multi-level Markets: new generation Capital Markets, full blown Nature Markets (water, carbon, bio-diversity)

DAOs, A Canon