

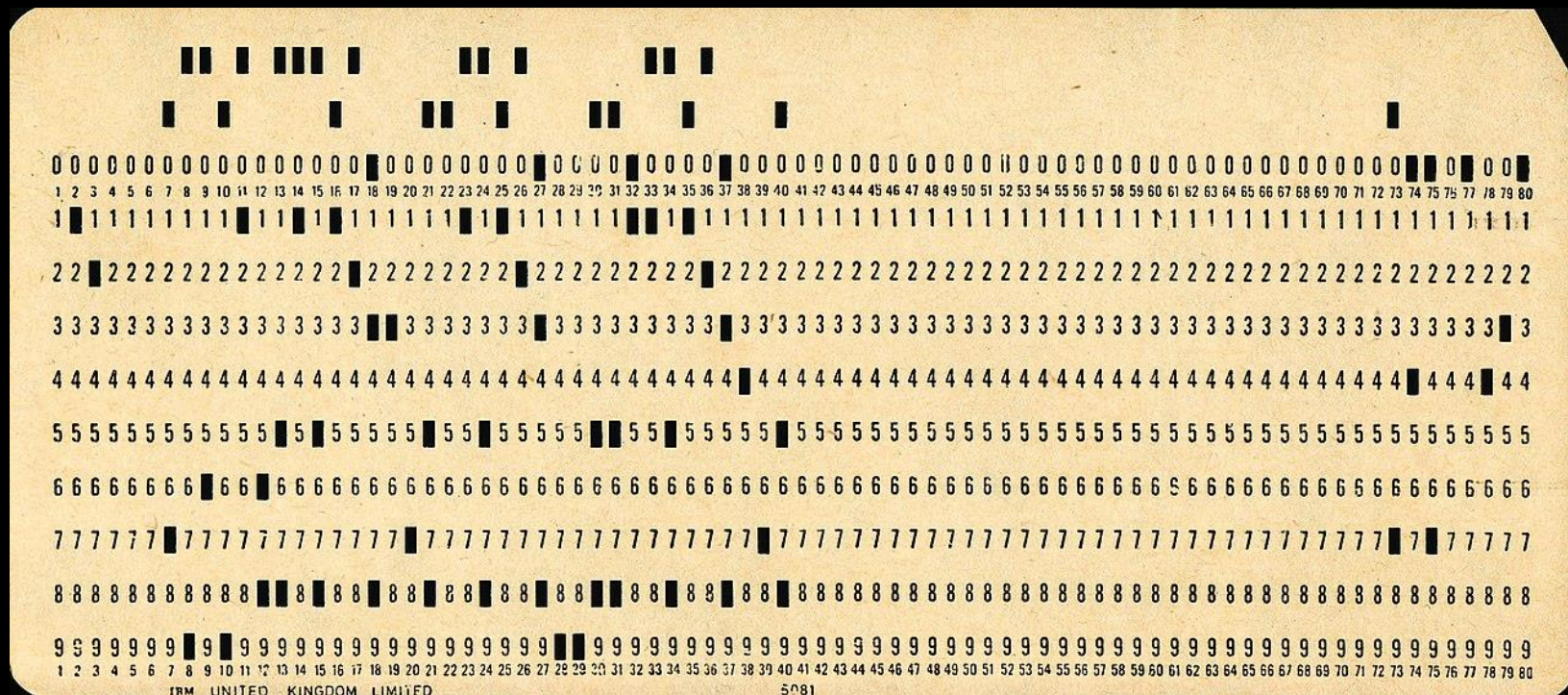
Spatial Dynamics: Linking Human Behavior to Spatial Systems through Emerging Interfaces

dr. Jelle Demanet

Spatial Dynamics
XR Valley
Apollo8.ai
IMEC-MICT-UGENT
ENT.A

GEO AI 2026





**IMPERIAL COLLEGE
TELEVISION STUDIO**



Vintage GCI Based Operating Systems of the
late 1980s and 1990s

by
Ace1000ks1975

✶ Jelle Demanet returns!

How can I help you today?

+

Sonnet 4.6 Low ▾



Write



Learn



Code



Career chat

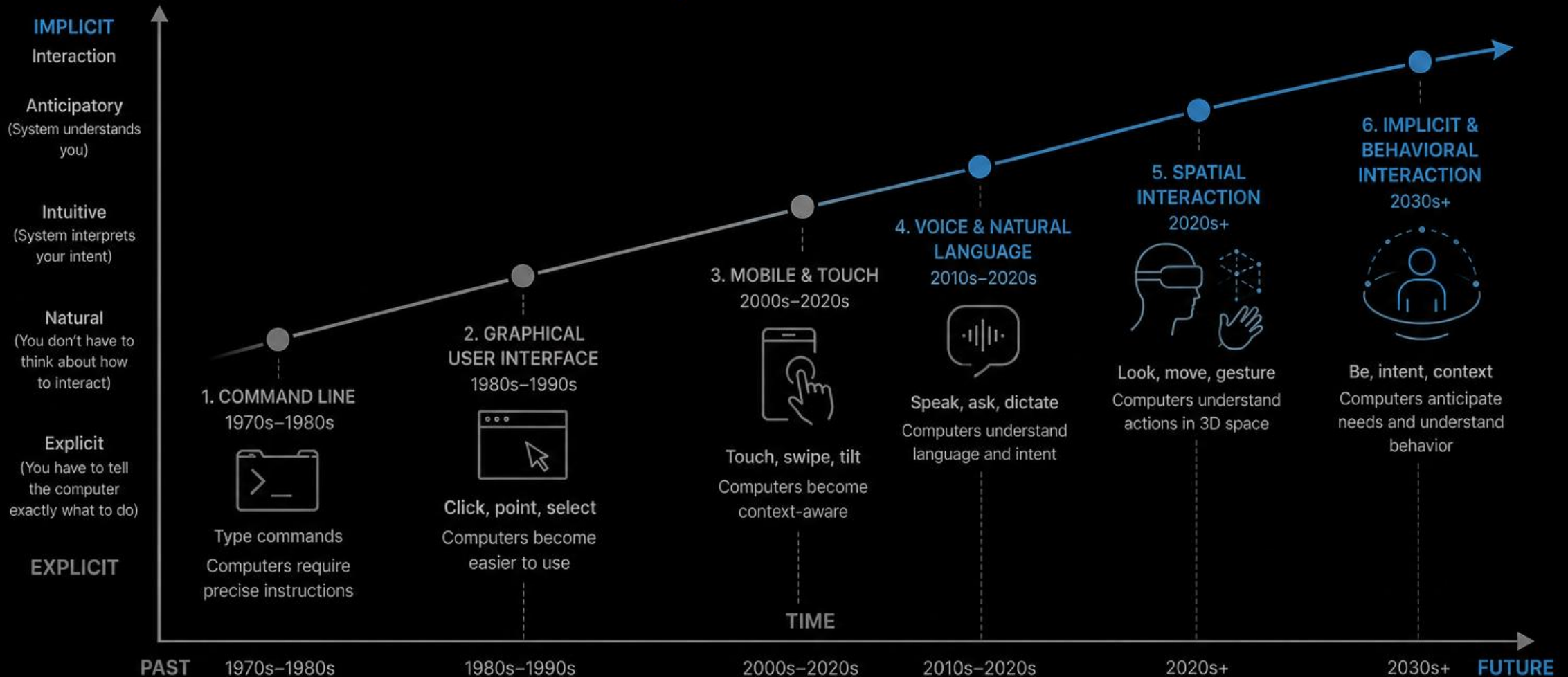


Claude's choice

Mijn advies: ga slapen, morgen komt de Quest Pro en dan test je alles in één keer op de echte hardware! Het project staat helemaal klaar. 😊

THE EVOLUTION OF HUMAN-COMPUTER INTERACTION

From explicit to **implicit** interaction with computers



EXPLICIT

You tell the computer exactly what to do.



DIRECT

You use tools and interfaces to interact.



NATURAL

You communicate in your own way.



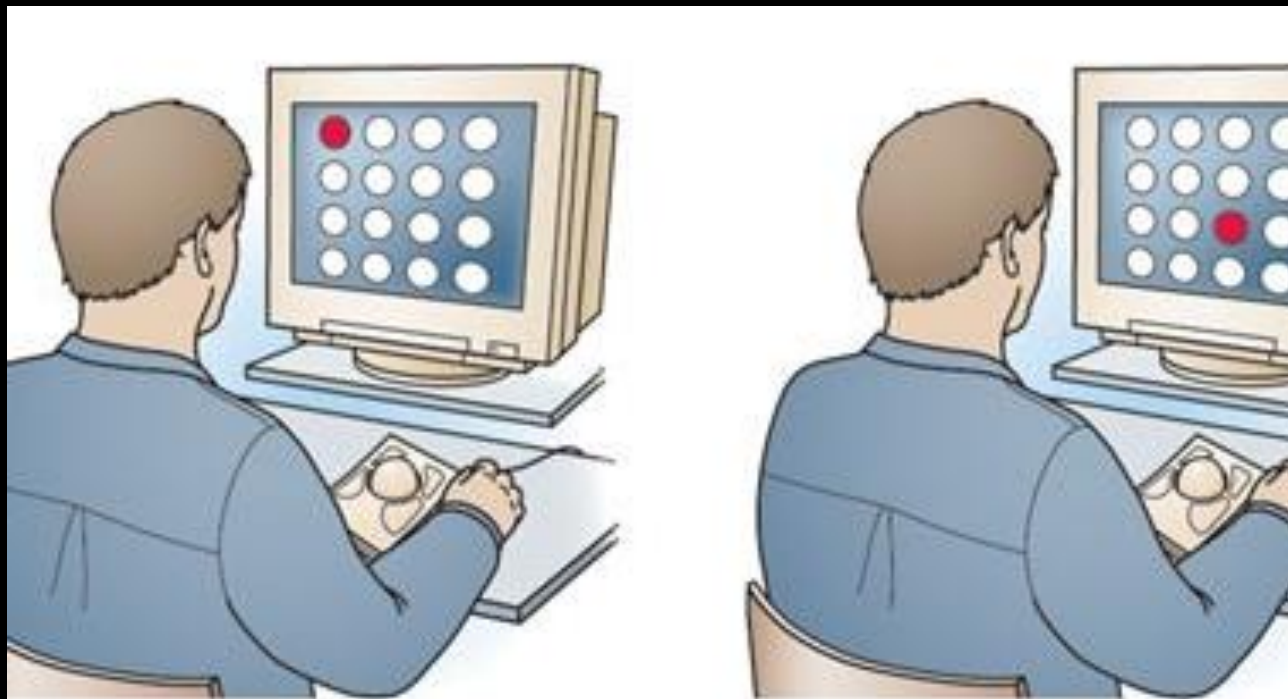
INTUITIVE

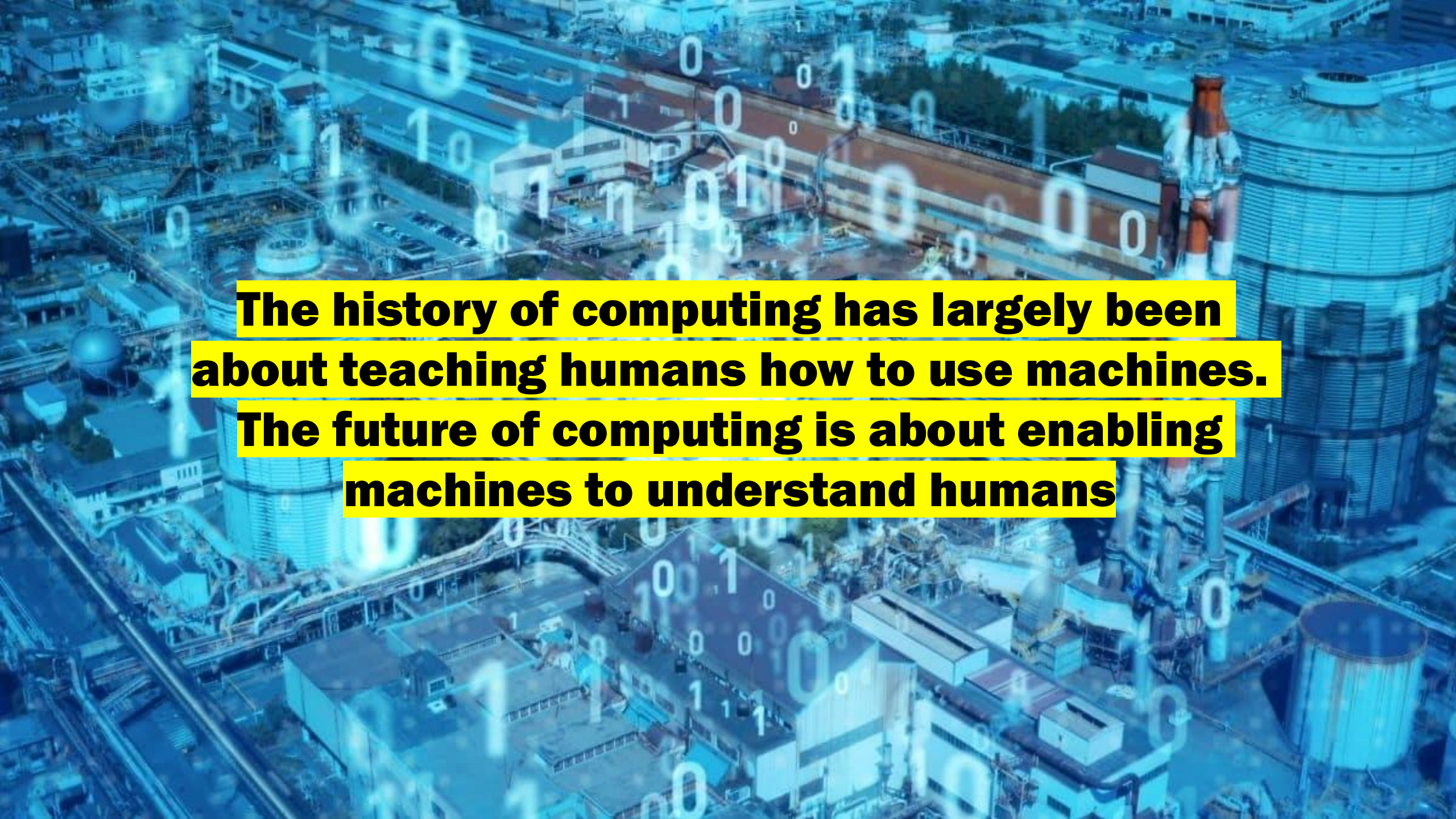
The system interprets your intent.



IMPLICIT

The system understands you — even without explicit input.

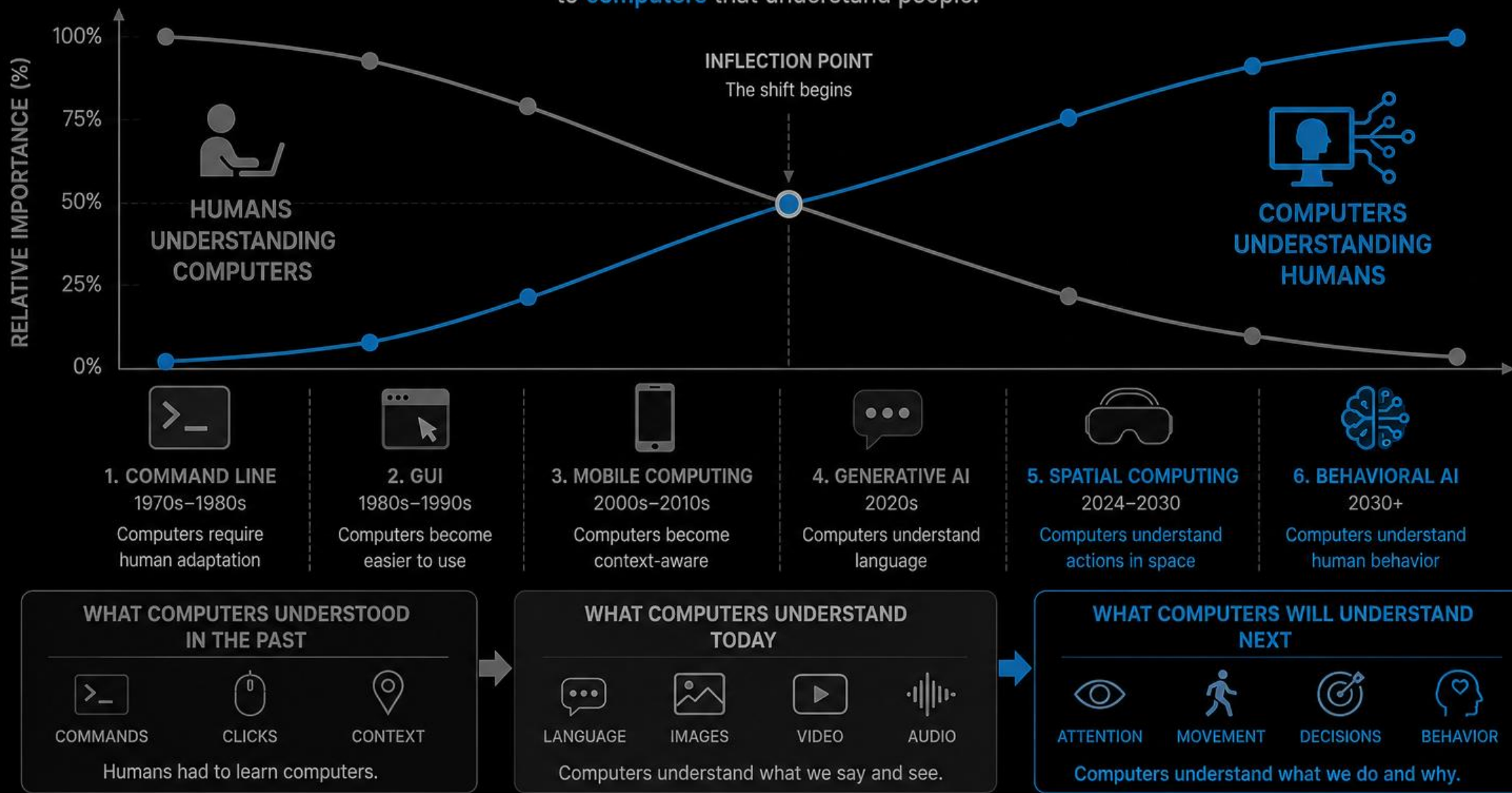


An aerial photograph of a city, likely Tokyo, with a blue tint. The image is overlaid with a digital rain effect of white binary code (0s and 1s) falling from the top. In the center, there is a large yellow rectangular box containing black text.

The history of computing has largely been about teaching humans how to use machines. The future of computing is about enabling machines to understand humans

THE GREAT SHIFT IN COMPUTING

From **people** who have to understand computers,
to **computers** that understand people.







TECHNOLOGICAL ENABLERS

AI

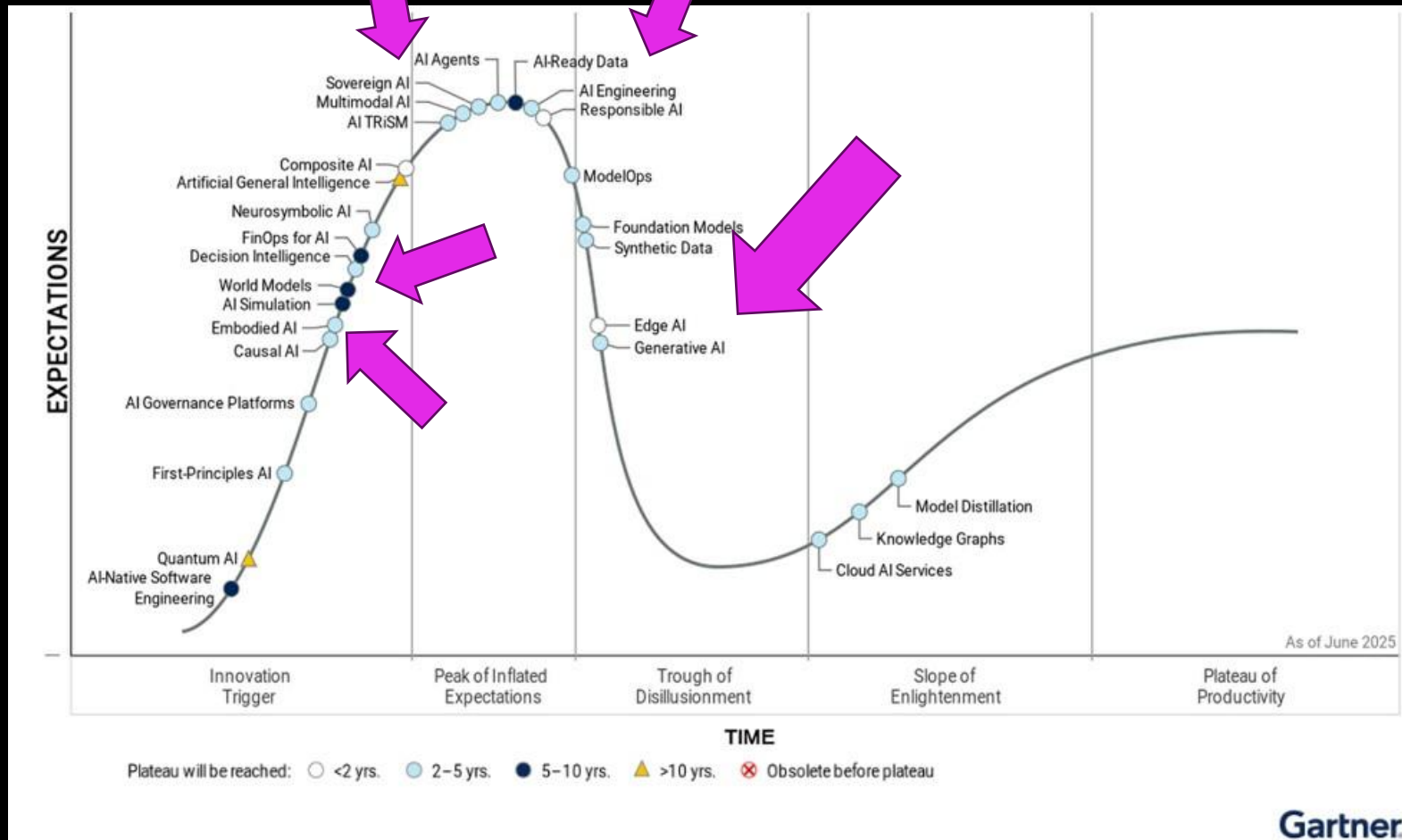
**XR INTERFACES
GAMING TECHNOLOGY**

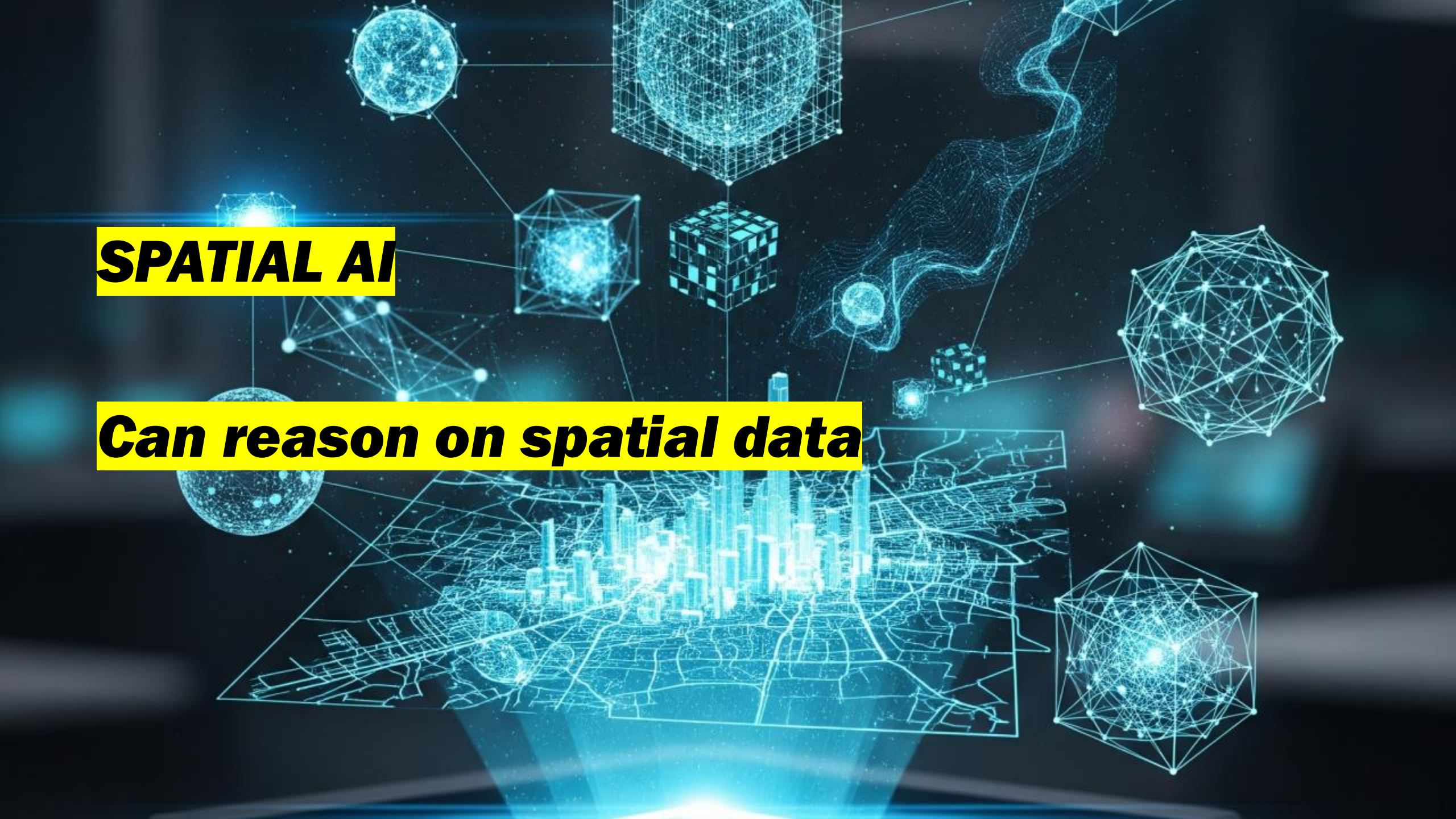
SENSOR TECHNOLOGY

DATA-INNOVATION

**CONNECTIVITY
COMPUTE**

AI Hype cycles: 2025



The background is a dark blue space filled with various glowing, wireframe geometric shapes. These include spheres, cubes, and complex polyhedrons, some of which are interconnected by thin lines. In the lower center, there is a glowing, wireframe map of a city with numerous buildings and streets. The overall aesthetic is futuristic and technological.

SPATIAL AI

Can reason on spatial data

SPATIAL AI: digital twins

SIEMENS







ENT.A



Immersieve Infrastructuur, Live Data & Connected Experiences

Deze roadmap focust op realtime verbondenheid tussen fysieke en digitale ruimtes. Denk aan digitale tweelingen, slimme scenografie en live sensing die zorgen voor efficiënte, veilige en innovatieve entertainmentomgevingen. Dit vormt de "ruggengraat" waarop andere roadmaps steunen.



WORLD MODELS

World model instead of LLM: Yann LeCun's startup receives 890 million euros

The startup AMI Labs, founded by Yann LeCun, has raised around \$1 billion. It is developing AI world models intended to understand the real world.



WORLD MODELS



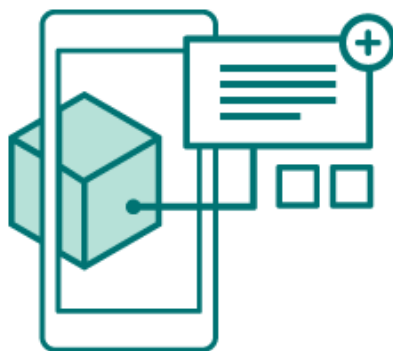
XR INTERFACES GAMING TECHNOLOGY



XR Extended reality

AR

Augmented reality



Virtual images integrated with real world

MR

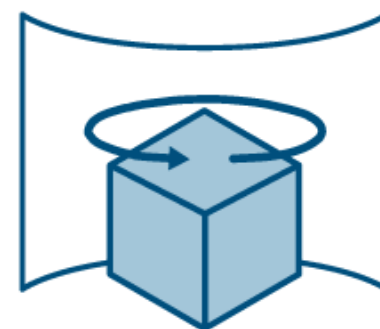
Mixed reality



Merging of the virtual and real worlds

VR

Virtual reality



Completely virtual





Oculus Rift S



VIVE Cosmos



VIVE Focus +



Valve Index



VIVE Pro



Oculus Quest



VIVE XR



Dell Visor



HP MR



VIVE



Asus MR



Acer MR



VIVE Focus



Samsung MR



Pico Neo2



VIVE Elite



Lenovo WMR



Oculus Rift



Oculus Quest 2



Oculus Quest 3



VIVE Focus 3

Meta Orion en Meta Display Glasses



Top 10 Smart Glasses Hardware Companies in 2026



Meta



Google



XREAL



RayNeo



Snap Inc.



VITURE



Brilliant Labs



Even Realities



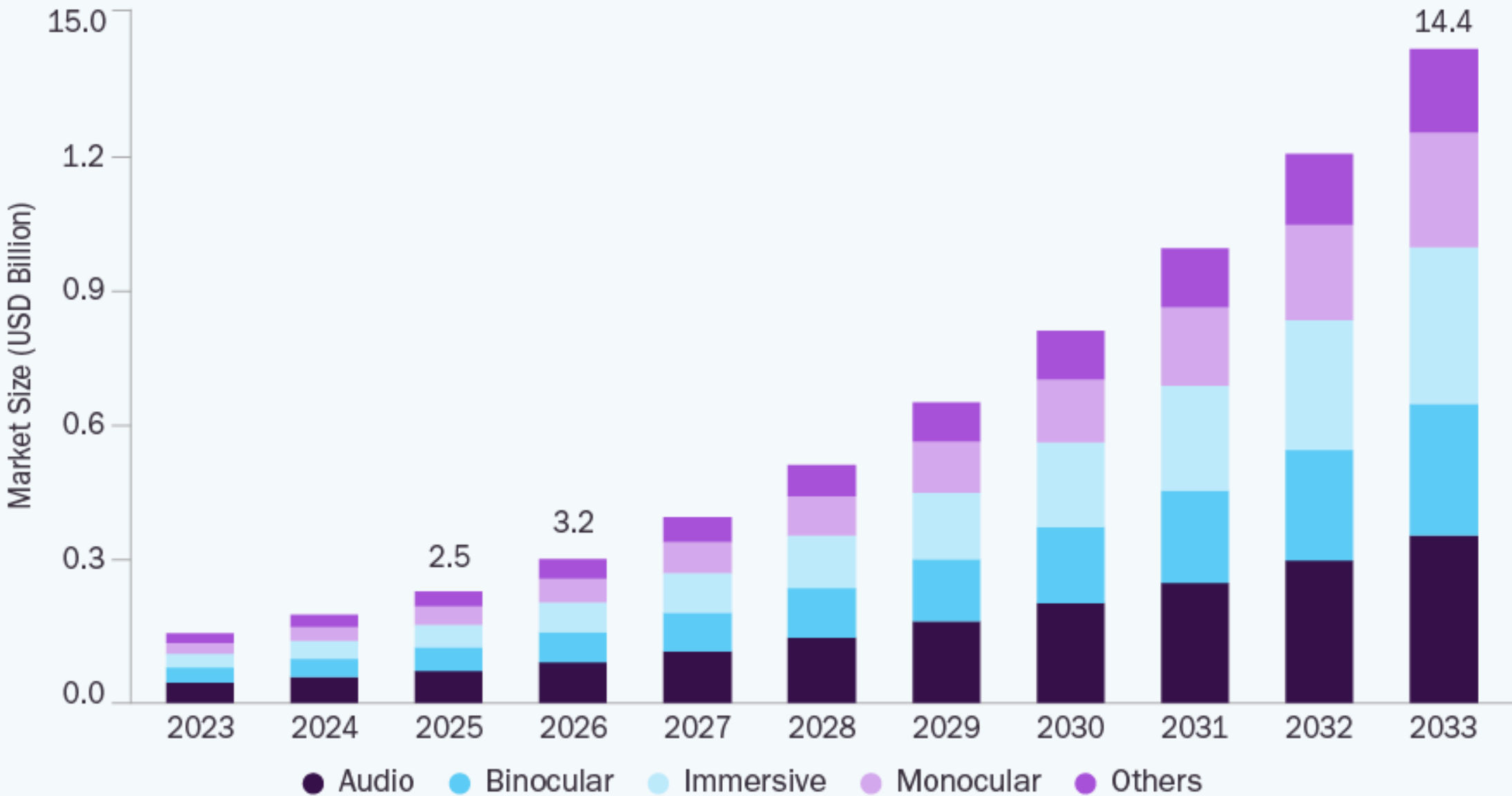
Vuzix



Rokid

Smart Glasses Market

Size, by Type, 2023 - 2033 (USD Billion)



AI Glasses



Camera Voice Interaction AI
Speaker

Display Glasses



Camera Voice + Hand Interaction
AI Speaker Heads Up Display

AR Glasses



Hand Interaction Spatial Mapping
AI Speaker Tracking Cameras
Eye-Tracking Micro LEDs

AI + XR





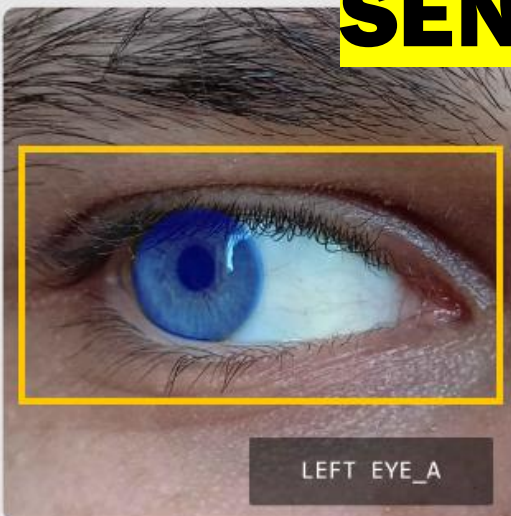
New study reveals motion data can identify people in VR

🕒 Feb 22, 2023, 3:17 pm EST | [Larisa Redins](#)

CATEGORIES [Biometric R&D](#) | [Biometrics News](#) | [Consumer Electronics](#)

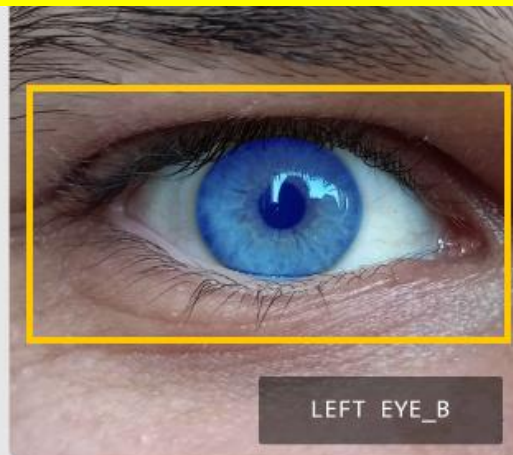
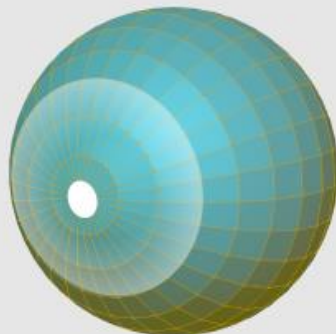


SENSOR TECHNOLOGY



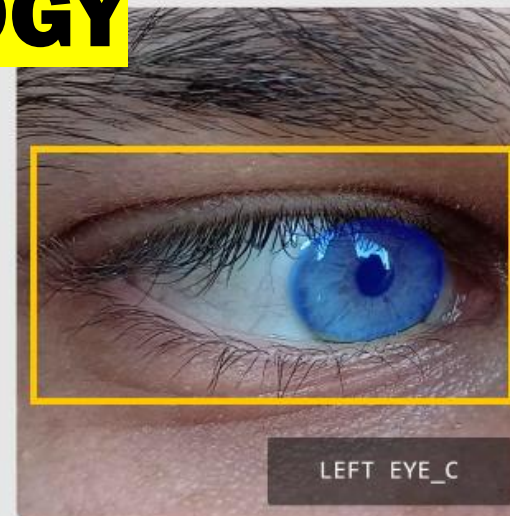
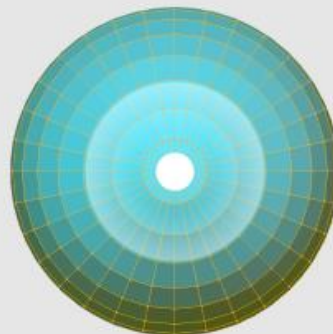
LEFT EYE_A

EYE_YOW: -0.351
EYE_PITCH: -0.296
HEAD_ROLL: 2.269
HEAD_PITCH: -11.139
HEAD_YAW: -29.505



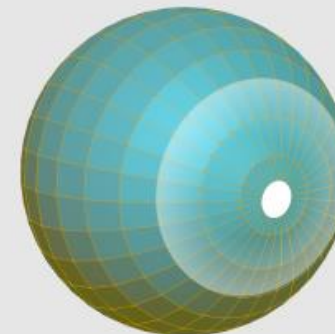
LEFT EYE_B

EYE_YOW: -0.593
EYE_PITCH: -0.042
HEAD_ROLL: 0.279
HEAD_PITCH: -5.429
HEAD_YAW: -3.424



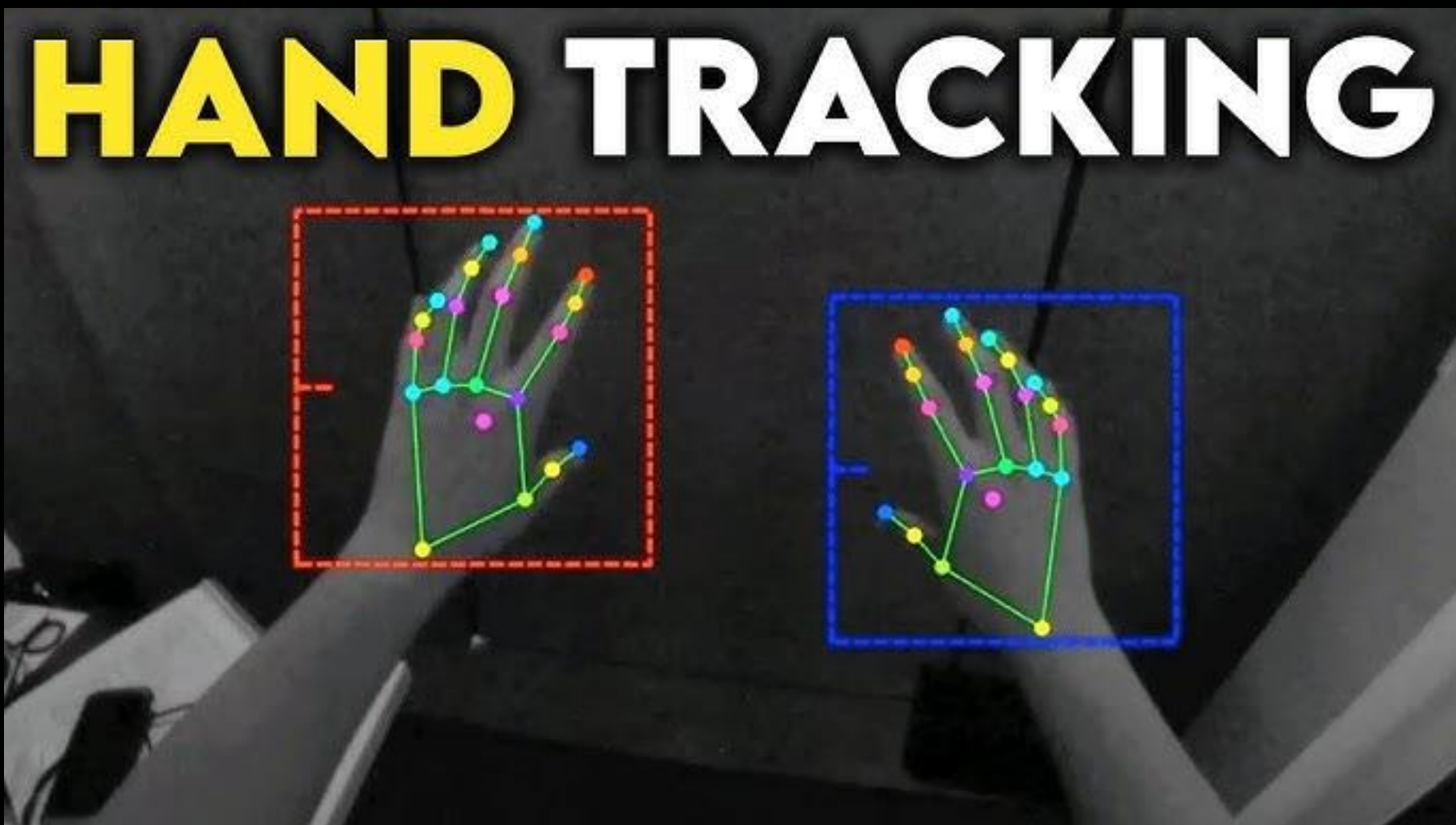
LEFT EYE_C

EYE_YOW: -0.228
EYE_PITCH: -0.709
HEAD_ROLL: 0.652
HEAD_PITCH: -0.102
HEAD_YAW: -2.686

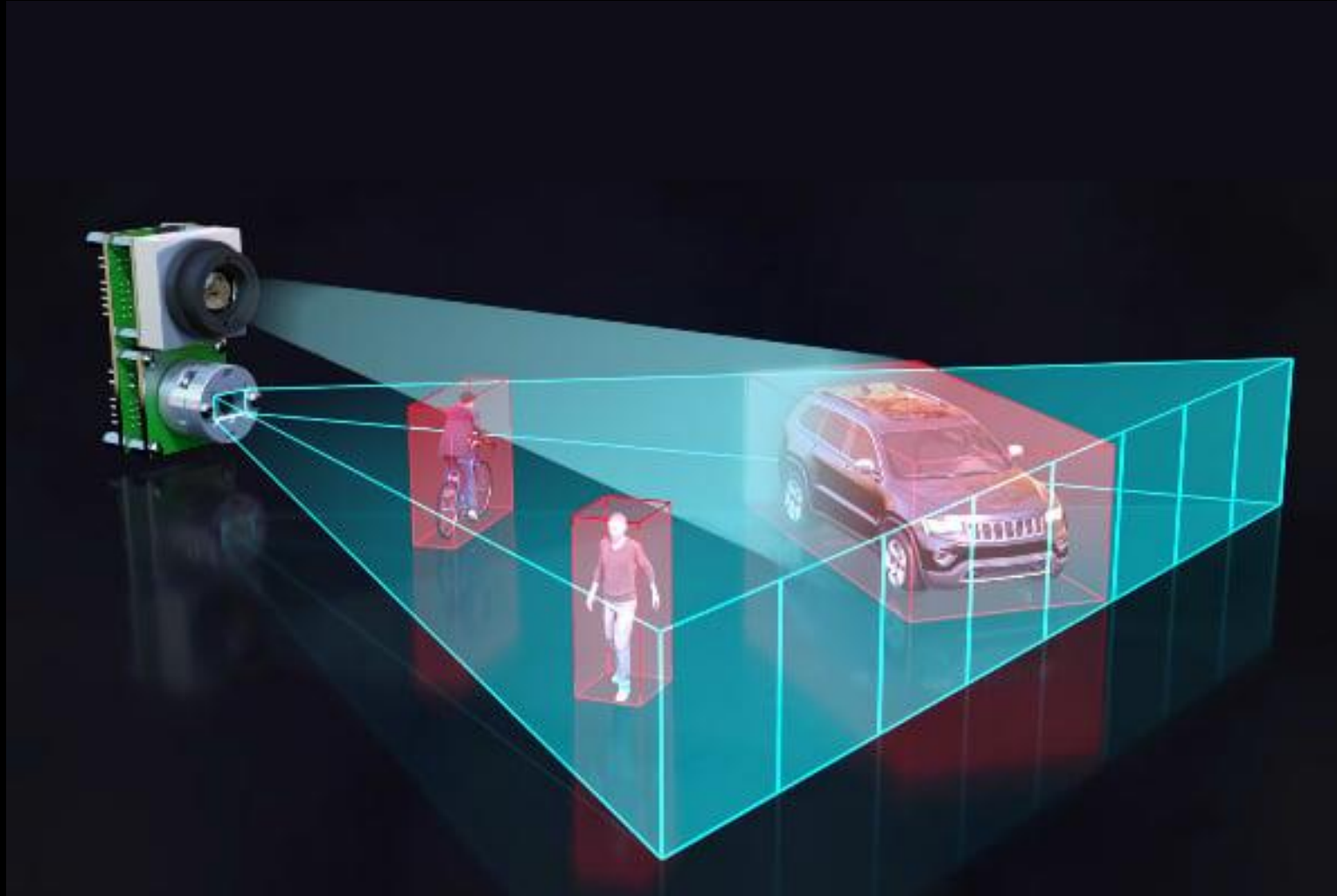


SENSOR TECHNOLOGY

HAND TRACKING



SENSOR TECHNOLOGY





SpatialDynamics

UNDERSTANDING HUMAN BEHAVIOR IN SPATIAL ENVIRONMENTS



SPIN OFF



howest
hogeschool

The logo for howest hogeschool features the word "howest" in a bold, black, sans-serif font. A thin blue diagonal line is positioned above the "o" and below the "e". Below "howest", the word "hogeschool" is written in a smaller, black, sans-serif font.

unec

The logo for unec consists of a small blue square icon to the left of the word "unec" in a bold, black, sans-serif font.

GHENT
UNIVERSITY

The logo for Ghent University features a blue icon of a classical building with columns above the words "GHENT" and "UNIVERSITY" in a blue, sans-serif font.



1. LOW-FREQUENCY HUMAN DATA (TASK OUTCOMES)

- Task performance
- Goal completion
- Errors / accuracy
- Time on task



2. HIGH-FREQUENCY HUMAN DATA (BEHAVIOR STREAMS)

- Eye tracking
- Head movement
- Hand tracking
- Body movement
- Voice & speech



3. ENVIRONMENTAL & CONTEXT DATA (SENSOR INPUTS)

- Machine data
- Environment sensors
- Location / positioning
- System & IoT data



SPATIAL DYNAMICS PLATFORM

Synchronizing human behavior, context and environments in real time



Time Synchronization



Sensor Fusion



Spatial Contextualization



Data Quality

VIRTUAL ENVIRONMENTS



MIXED REALITY ENVIRONMENTS



BEHAVIORAL AI

Turning understanding into action



Understand



Predict



Personalize



Optimize



Act & Protect



HUMAN BEHAVIOR

+



ENVIRONMENT & CONTEXT

+



TASK & OUTCOMES PERFORMANCE

=



BEHAVIORAL AI
REAL-WORLD IMPACT

SPATIAL DYNAMICS STRATEGY

Two Parallel Tracks. One Platform.

TRACK 1

BUSINESS APPLICATIONS

Real Impact. Today.



Continuous delivery of value to customers



SPATIAL DYNAMICS PLATFORM



Secure
Data Layer



Privacy &
Governance

TRACK 2

RESEARCH & INNOVATION

Building the Future.



VALIDATED
INNOVATIONS

DEPLOY TO CUSTOMERS



WIN FOR BUSINESSES

Fast time-to-value with an easy application.
Immediate insights. Measurable impact.



WIN FOR RESEARCHERS

Access to real-world behavioral data.
Freedom to innovate and validate.



WIN FOR EVERYONE

New methods continuously validated
and delivered to customers.

OUR FOCUS TODAY. OUR IMPACT TOMORROW.

Building the leading platform for Behavioral Intelligence in spatial environments

SHORT TERM FOCUS

Delivering value today



HR & ASSESSMENTS

Where we are today

- Assess skills & potential
- Objective behavioral data
- Better hiring & development decisions

IMMEDIATE IMPACT | REAL CUSTOMERS | REAL DATA



LONG TERM VISION

Expanding impact across sectors



REHABILITATION



EDUCATION



PRODUCT DESIGN



ON-THE-JOB GUIDANCE



INDUSTRY & OPERATIONS



One platform. Multiple human-centered applications.
Endless possibilities.



Real users



Real-world behavioral data



Secure & ethical

TECHNOLOGY

Evolving experiences and capabilities



VR

Immersive assessments



XR GLASSES

Mixed reality in real context



MIXED REALITY

Seamless blend of digital & physical



REAL-TIME INTELLIGENCE

Adaptive, contextual real-time applications



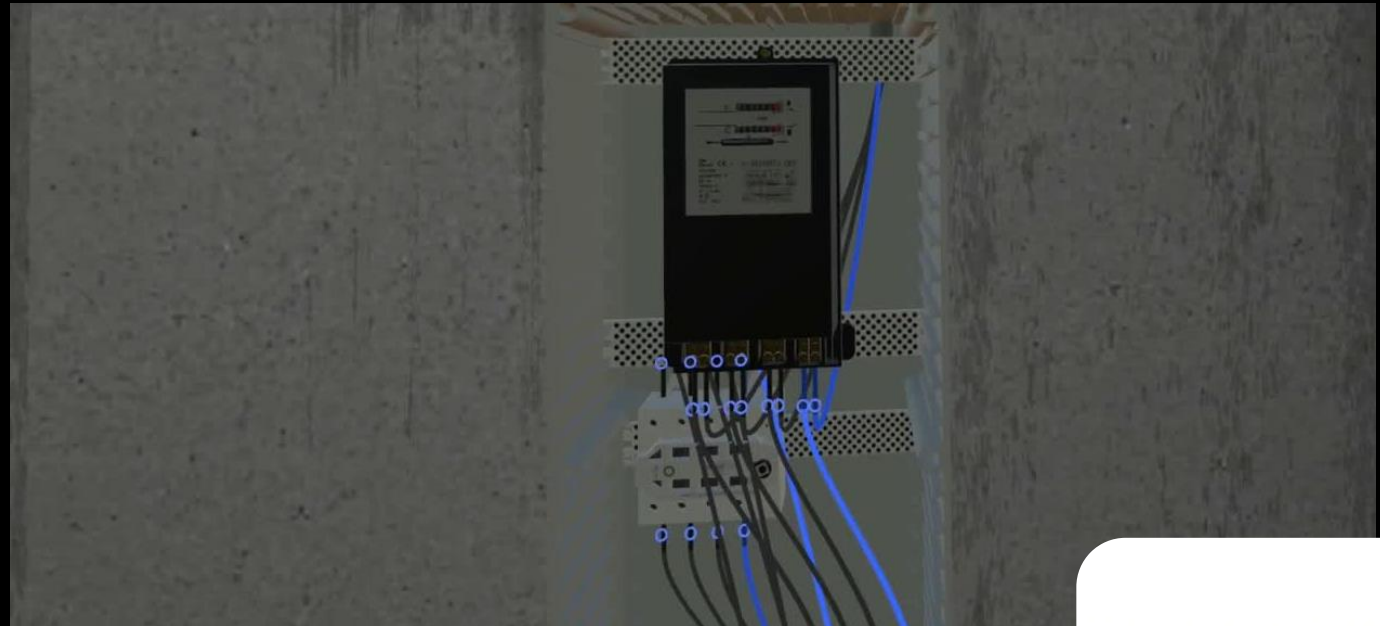
Start with **impact**. Scale with **innovation**. Lead the **future**.



Better insights. Better people. Better performance.

DIGITAL

METERS



Startpoint

Competences

Design

Dev. P1

Dev. P2

Validation

Final

Delivery

Social employment companies

Problem:

- Long subjective test

Solution:

- inclusive VR assessment



**SKILL
SCAN**
Een klare kijk op elk talent.

4WERK
Samen | Sociaal | Duurzaam | Ondernemen



Startpoint

Competences

Design

Dev. P1

Dev. P2

Validation

Final

Delivery



Competencies

- Cognitive flexibility
- Quality control
- ...

Challenges

- Range tasks (inclusivity)
- Language independent
- No controllers

SKILL SCAN

Een klare kijk op elk talent.

4WERK
Samen | Sociaal | Duurzaam | Ondernemen



Startpoint

Competences

Design

Dev. P1

Dev. P2

Validation

Final

Delivery

INFRABEL

Right On Track



Competencies

- Alertness
- Stress resistance
- Asking for help
- Logical thinking under pressure
- Task switching

THE SIGNALBOX



Startpoint

Competences

Design

Dev. P1

Dev. P2

Validation

Final

Delivery





Team

Process

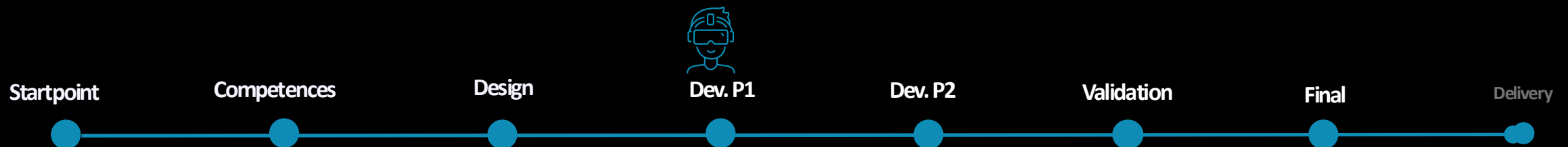
Projects

INFR/ABEL

Right On Track



THE SIGNALBOX





Team

Process

Projects

INFRABEL

Right On Track



User dashboard

Infrabel seinhuis assessment

Kies een gebruiker om
gedetailleerde prestaties te
bekijken

2

Applicatie: 00000000-0000-0000-0000-000000000000

Datacollectie: 02-01-2026 13:14 – 02-01-2026 13:41

■ Hoe interpreteer ik de radarplots en de BIS-score?

Performance (percentile)

16 %

Better than 16 % of all users.

Response time (percentile)

80 %

Faster than 80 % of all users.



Team

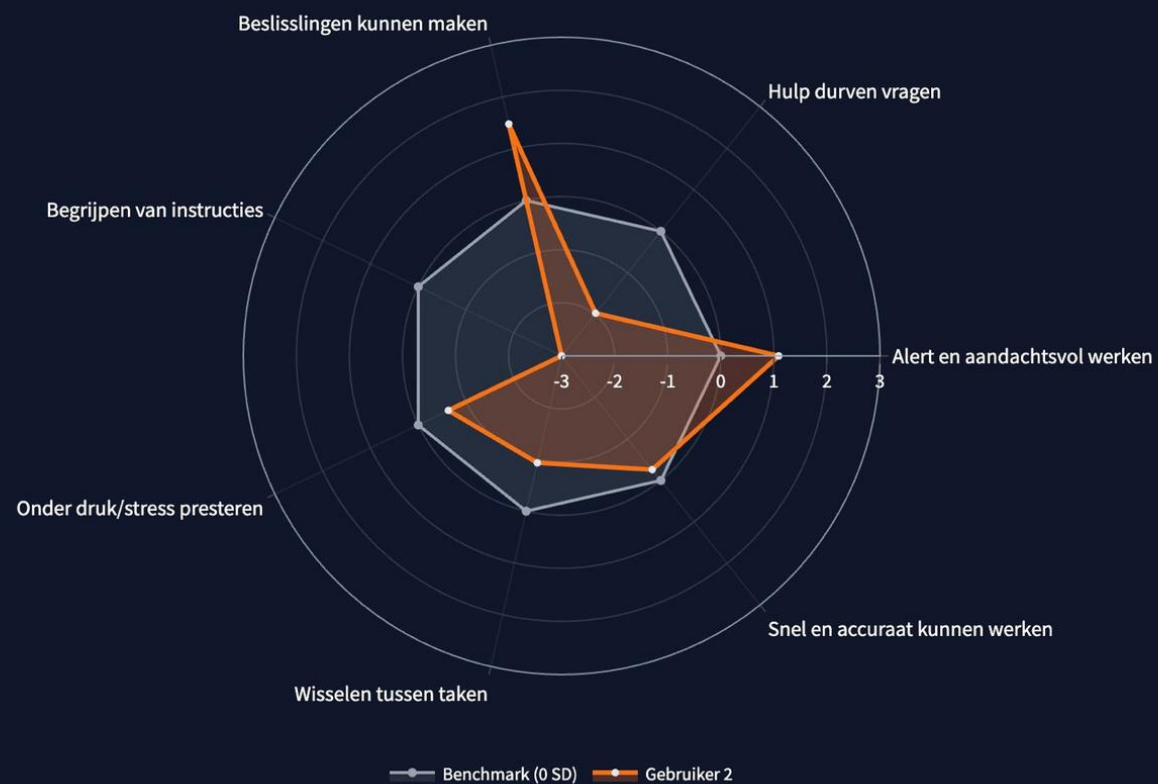
Process

Projects

INFRABEL

Right On Track

Speed-accuracy trade-off per competentie



INFRABEL

Right On Track

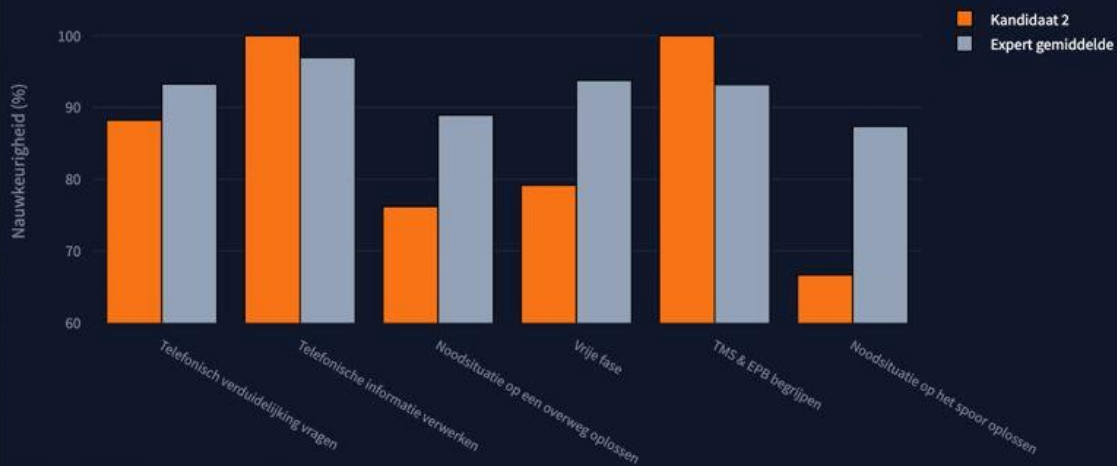
Expert Benchmark

■ Hoe interpreteer ik de expert benchmark?

Expert benchmark Deze grafieken vergelijken de ruwe prestaties van de kandidaat met het gemiddelde van ervaren seinhuiswachters (experten). De oranje balk is de kandidaat; de groene balk is het expertgemiddelde.

- **Nauwkeurigheid:** hoger = beter (meer correcte acties).
- **Responstijd:** lager = beter (snellere reactie).

Nauwkeurigheid per scenario: Kandidaat vs. Expert



Responstijd per scenario: Kandidaat vs. Expert

