

New reality

#DataRich
#InformationPoor

Operational Insight

#HeadCount
isnotequalto
#SkillCount

Data keeps growing
Expertise keeps shrinking



The experts that built our systems are walking out the door...

**Silver
Tsunami**

Retirement

Turn Over

**Employee
Mobility**

Compliance

Policies

Industry 4.0

**New
technologies**





**Declining
seniority**

**Rising
Training time**



**Turning
Point**



4 Plant Memories

Visual

Hidden

Machine

Human

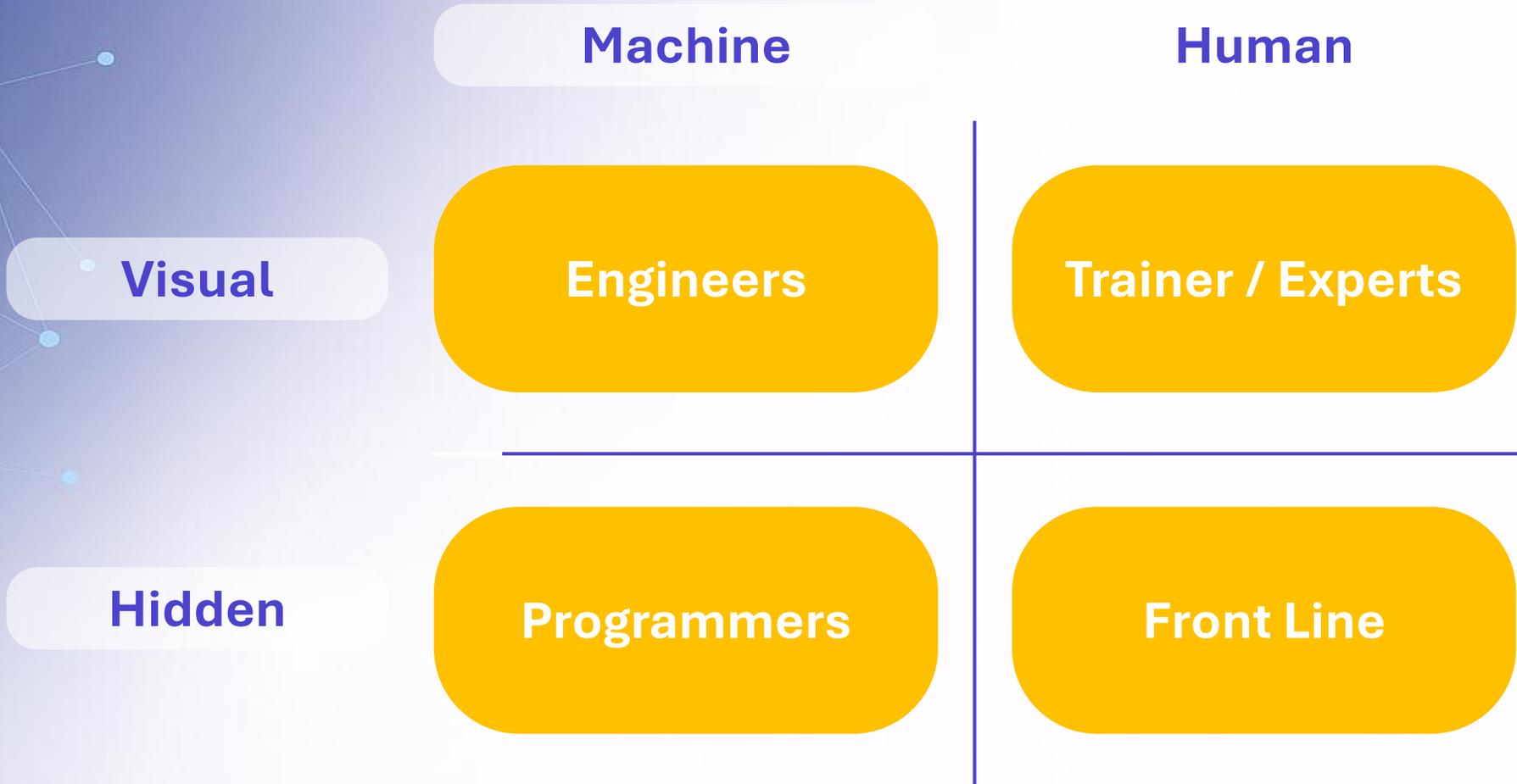
Machine
Data

Theoretical
Instructions

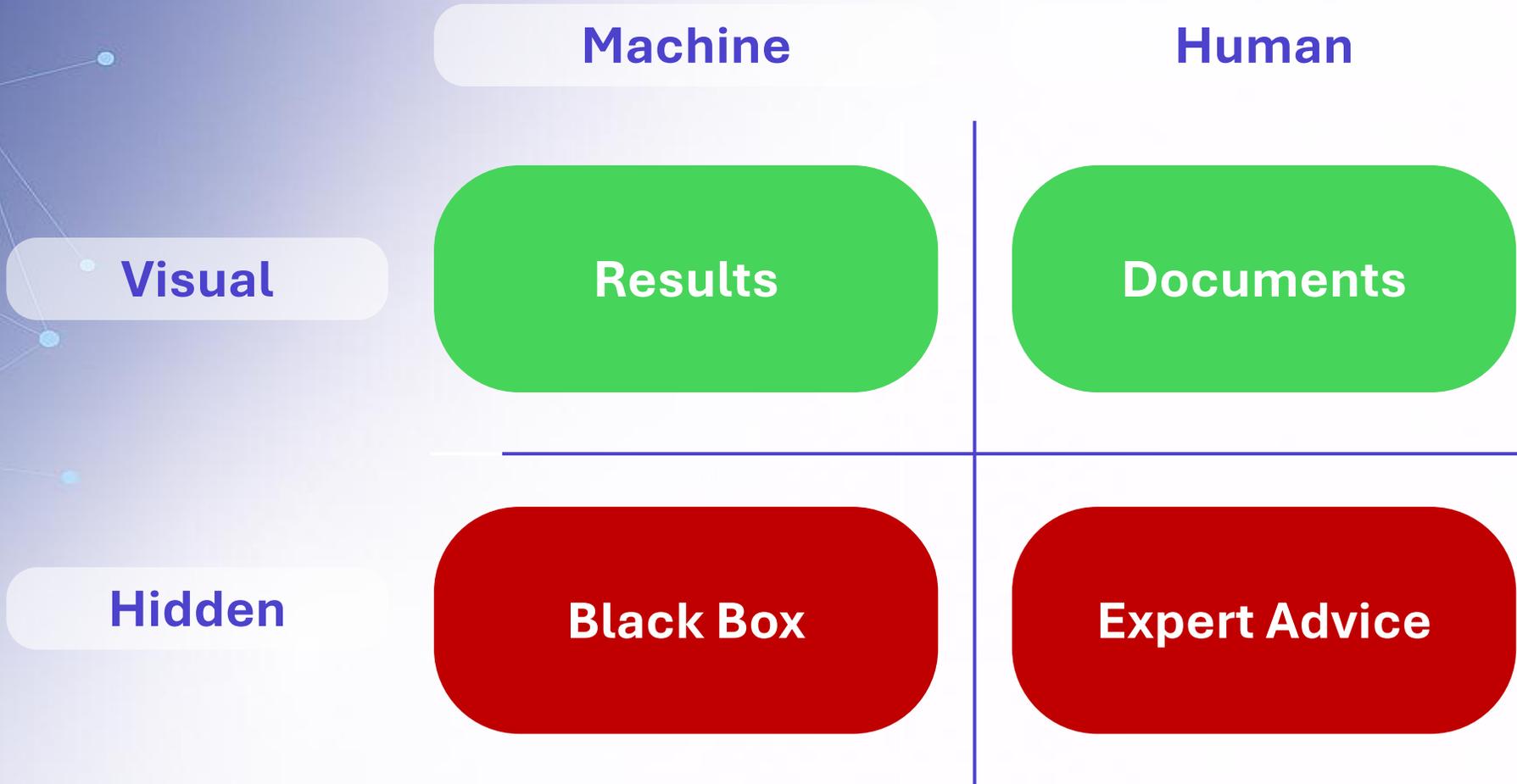
Programme
Logic

Tacit
Know-how

4 Plant Personas



Shopfloor visualisations



Analog shopfloor visualisations

Results

Whiteboards

Documents



Standard Work

SDCA

Knowledge

Content

S T A N
D A R D
W O R K

What?

SDCA

PDCA

Consistency

L E A D
E R S
S T A N
D A R D
I Z E D
W O R K

How?

Skill

PDCA

Culture

S T A N
D A R D
I Z E D
W O R K

When?

Standardize

Do

Plan

operations
Reduce variation

improvements
Raise the bar

Act

Check

Act

Standard work

leadership

Standardized work

**Every improvement
adds complexity**

**and compliance
multiplies it**

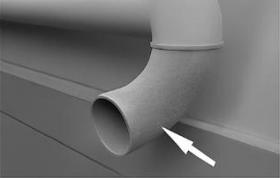


Capability Building



Skill Cards

Theme	MACHINE CLEANLINESSMPROVENT	OPL No:
Location	CARDING SECTION	10/11/2025
Type	<input type="checkbox"/> Problem	<input checked="" type="checkbox"/> Basic Knowledge

<p>Suction nozzles must be cleaned daily to maintain suction efficiency.</p>			
 <p>Dust accumulation inside suction nozzles reduces airflow efficiency.</p>	<p>Dust accumulation inside suction nozzles reduces airflow efficiency.</p>		
 <p>Clean nozzles daily and confirm with red tag. Maintain suction perform-</p>	<p>Clean nozzles daily and confirm with red tag. Maintain suction performance.</p>		
Prepared by:	Approved by:	Dept.:	Active
Mr.XXXXX	Mr.YYYYY	Carding	

One Point Lessons

Stop relying on experts to teach
Make expertise flow in operations



DIGITAL

Standard Work

Consistency

Leadership Standard Work

Culture

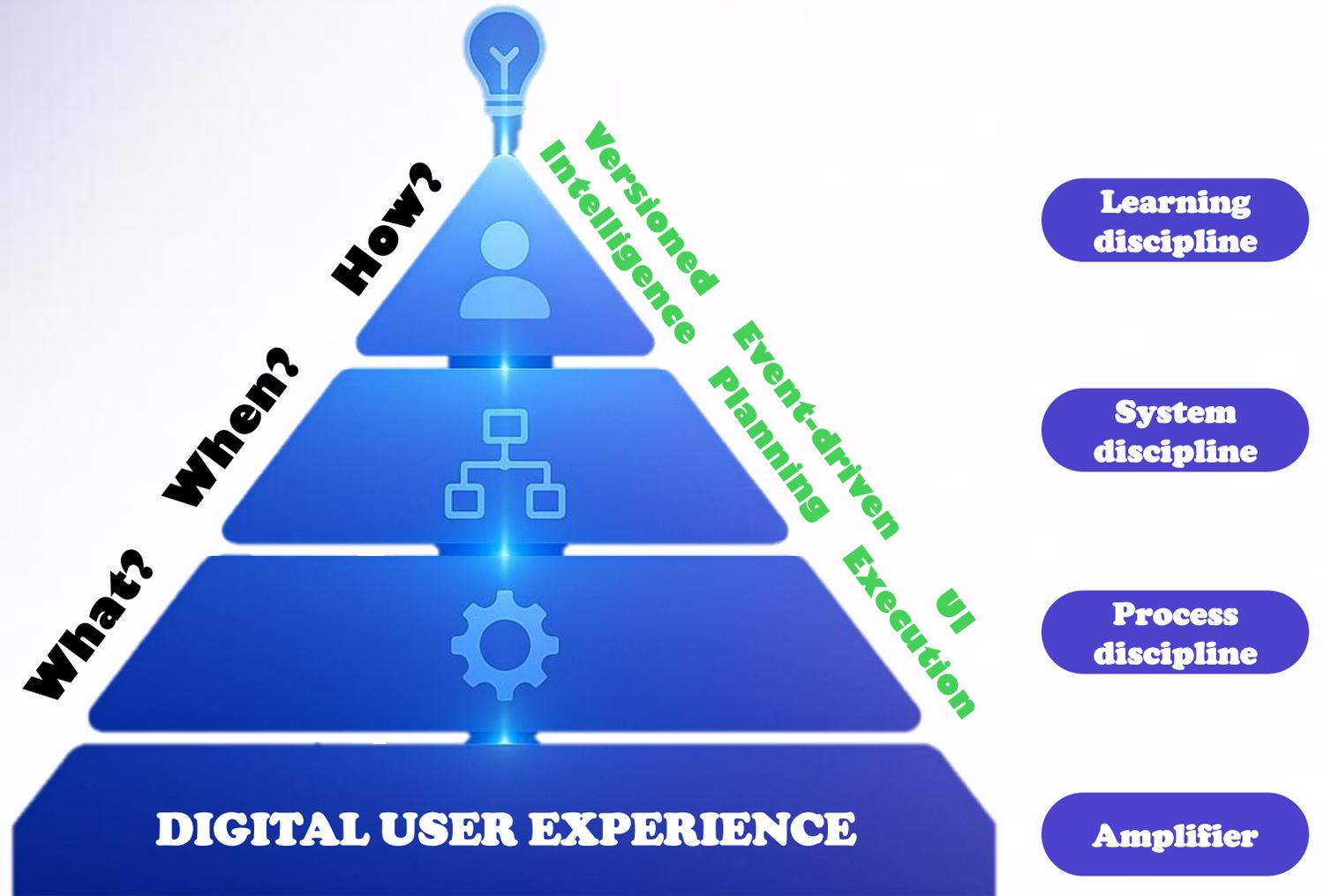
Standardized Work

Content

Standard Work

Coherence

System integrations



**Inverted
Digital twin**



Process

**Plant
Collective
Memory**

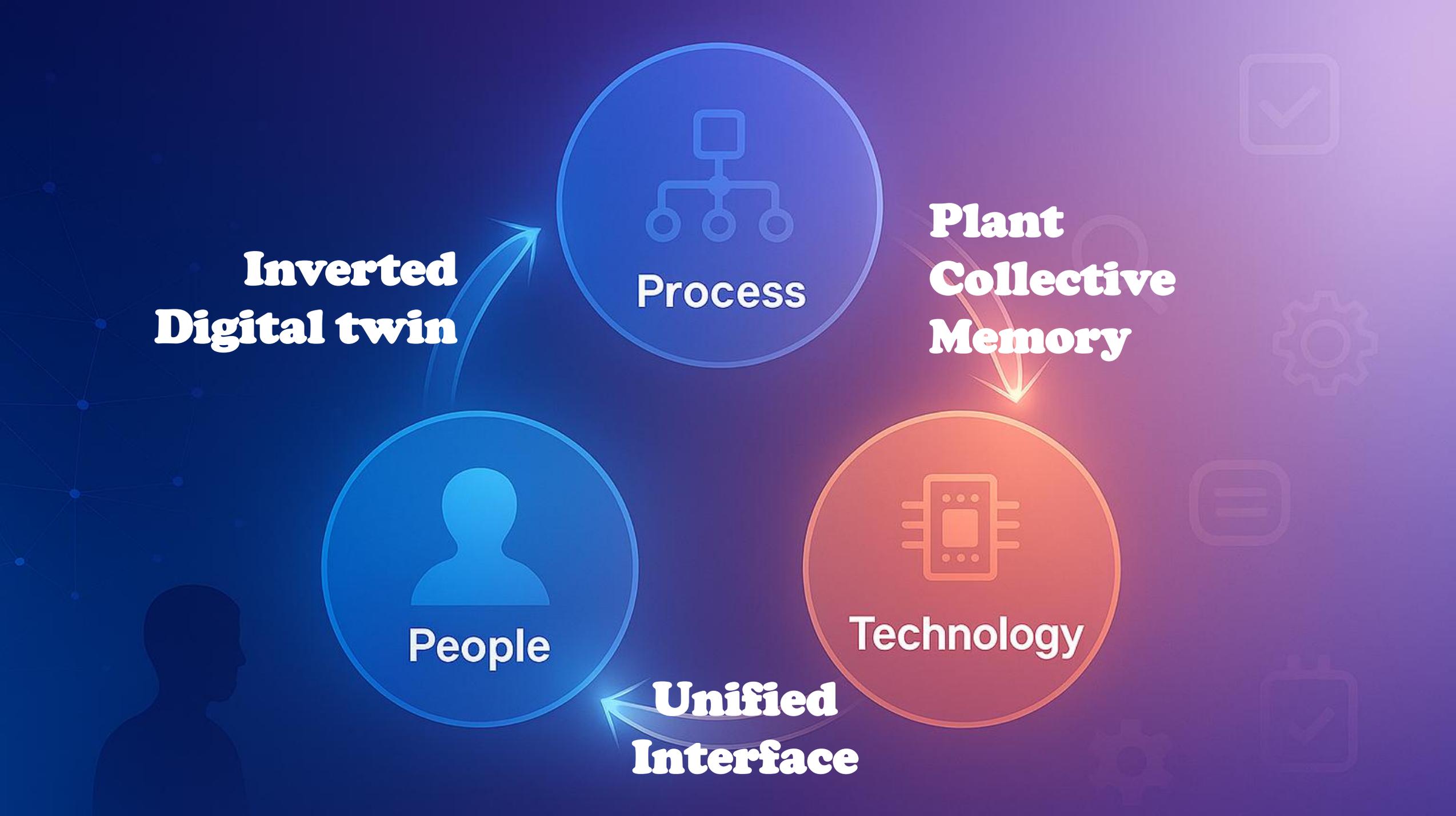


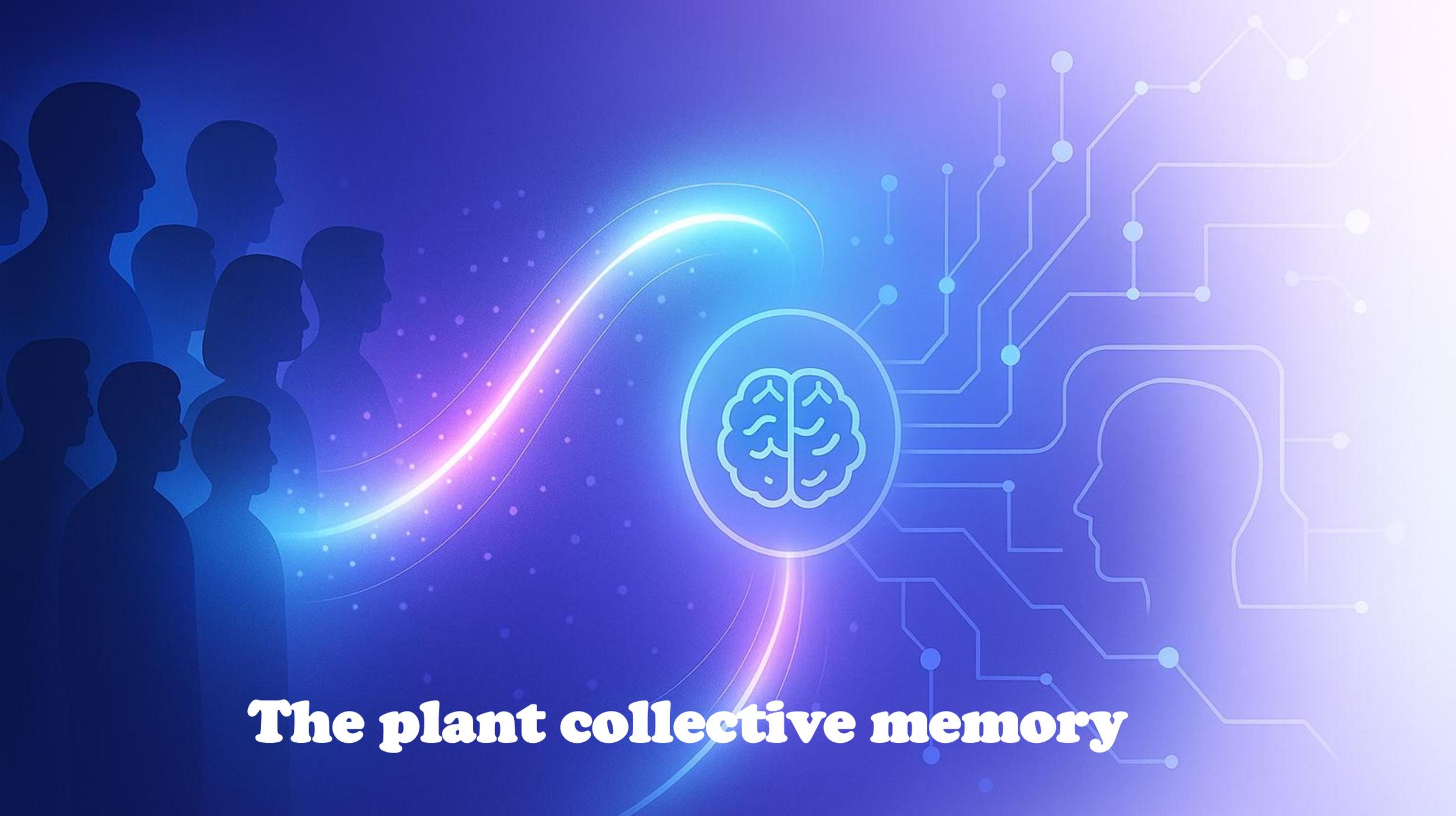
People



Technology

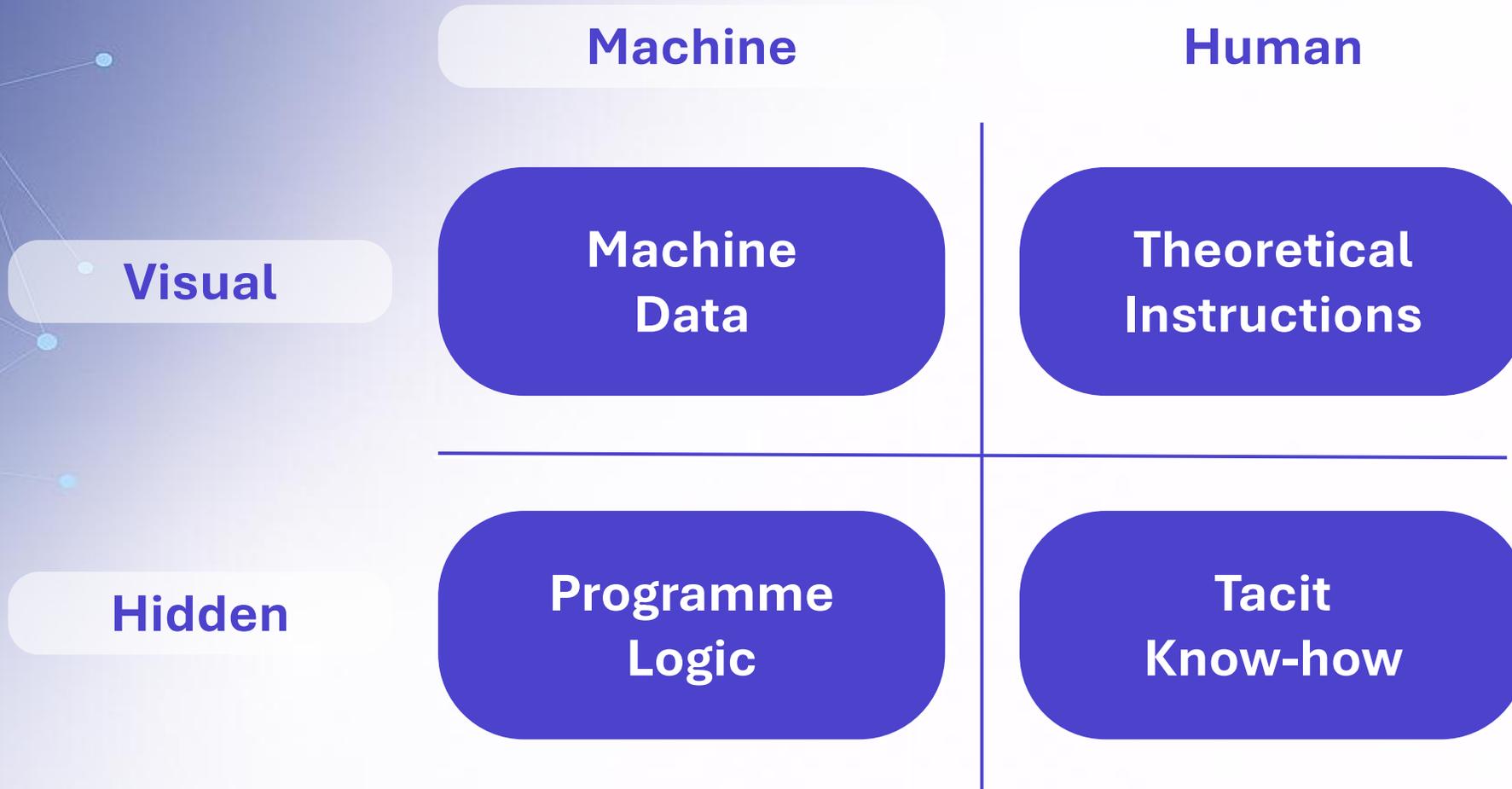
**Unified
Interface**



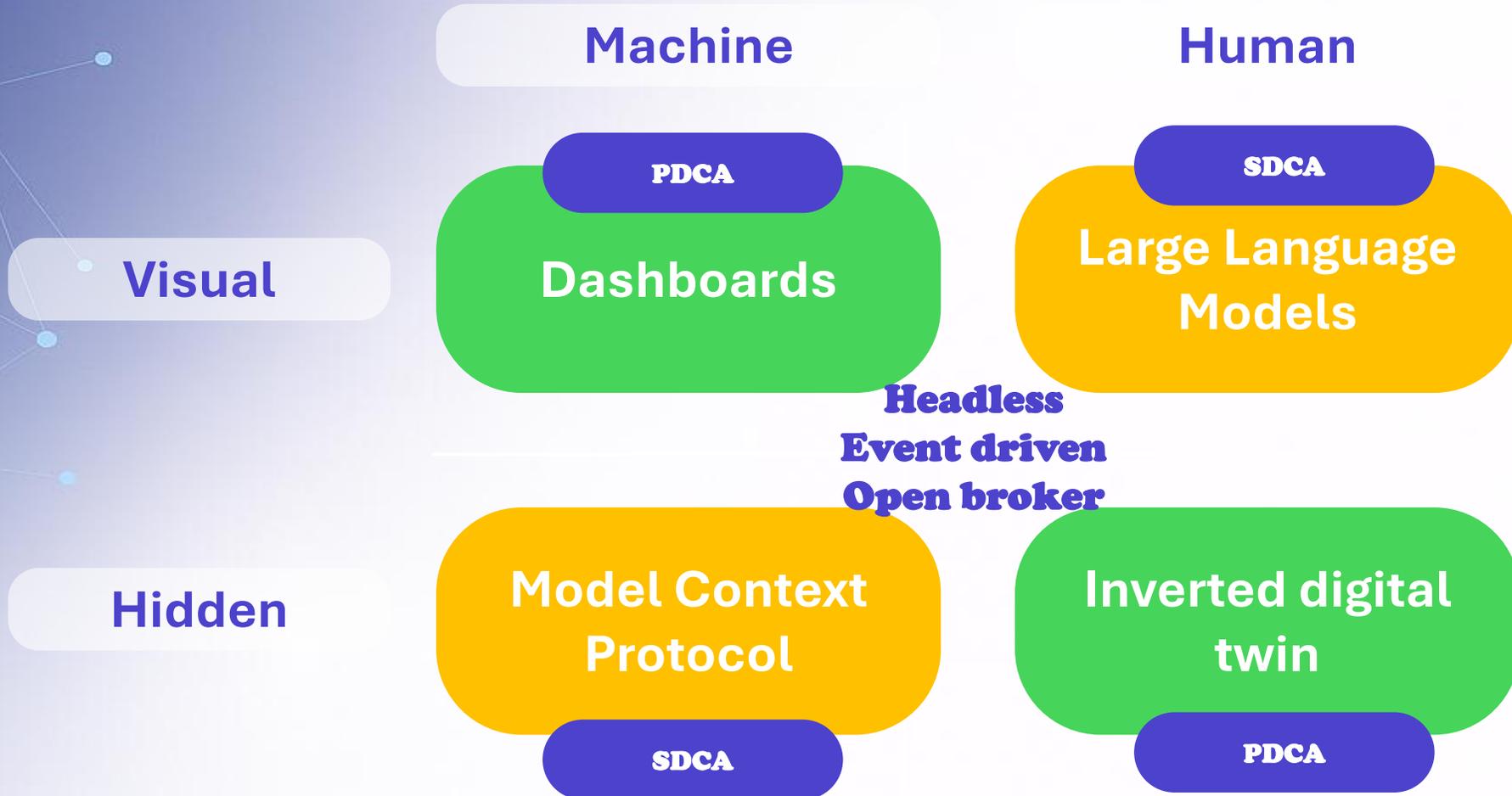


The plant collective memory

4 Plant Memories



Plant Collective Memory



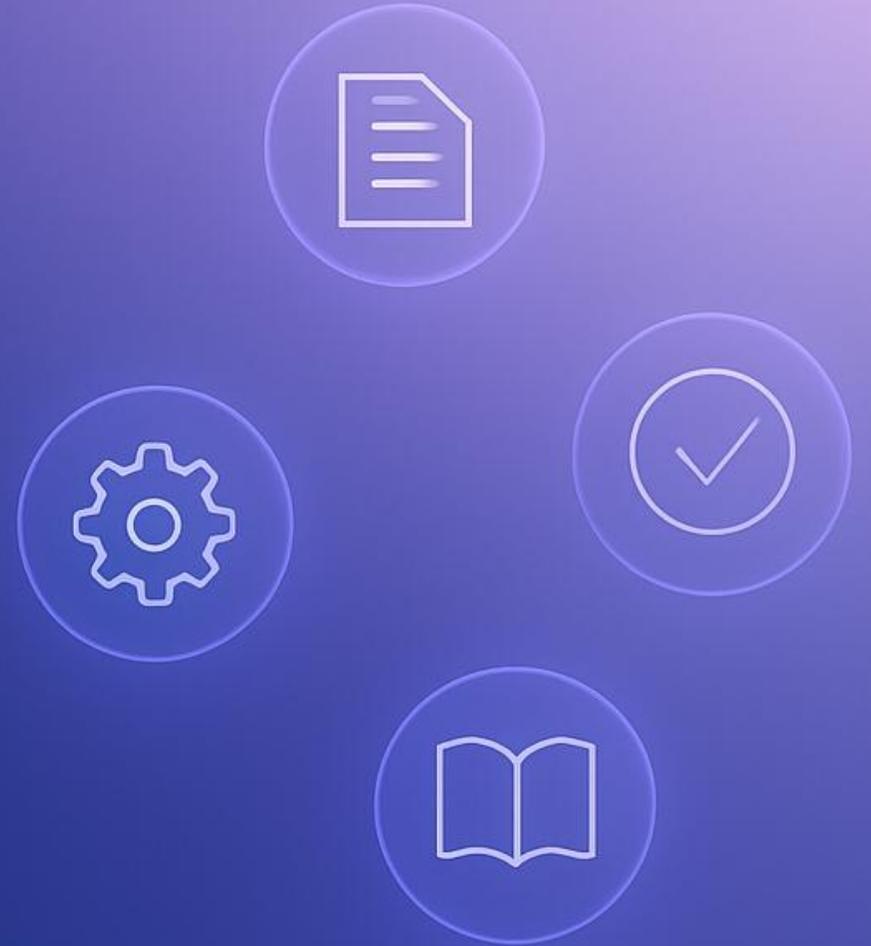
Plant Collective Memory



A unified interface...



OR



...standalone applications

But I have an app for that...

1

Apps don't have integrated workflows

☞ **Apps can build digital walls**

2

Apps are user-centric (no equipment nor product structure)

☞ **Apps can results in duplicate admin**

3

Apps use common components consistently

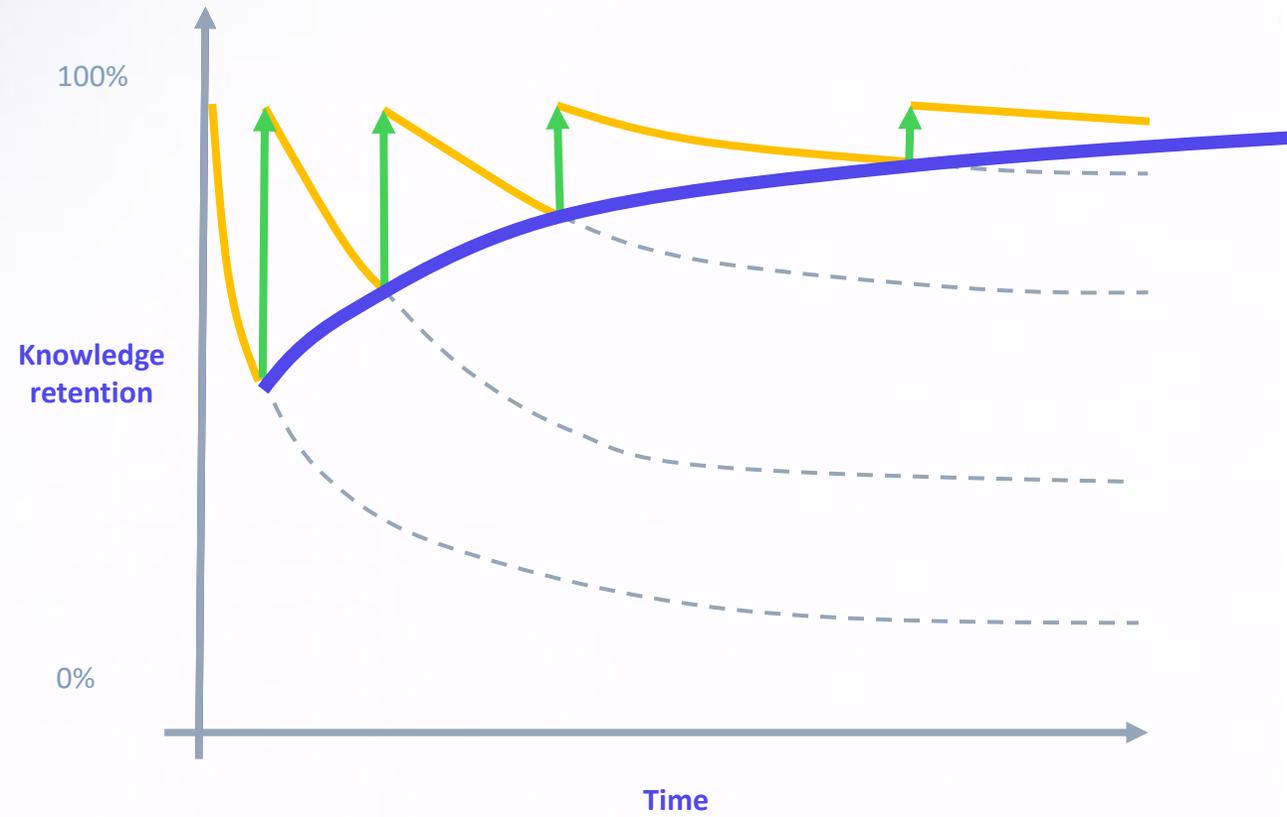
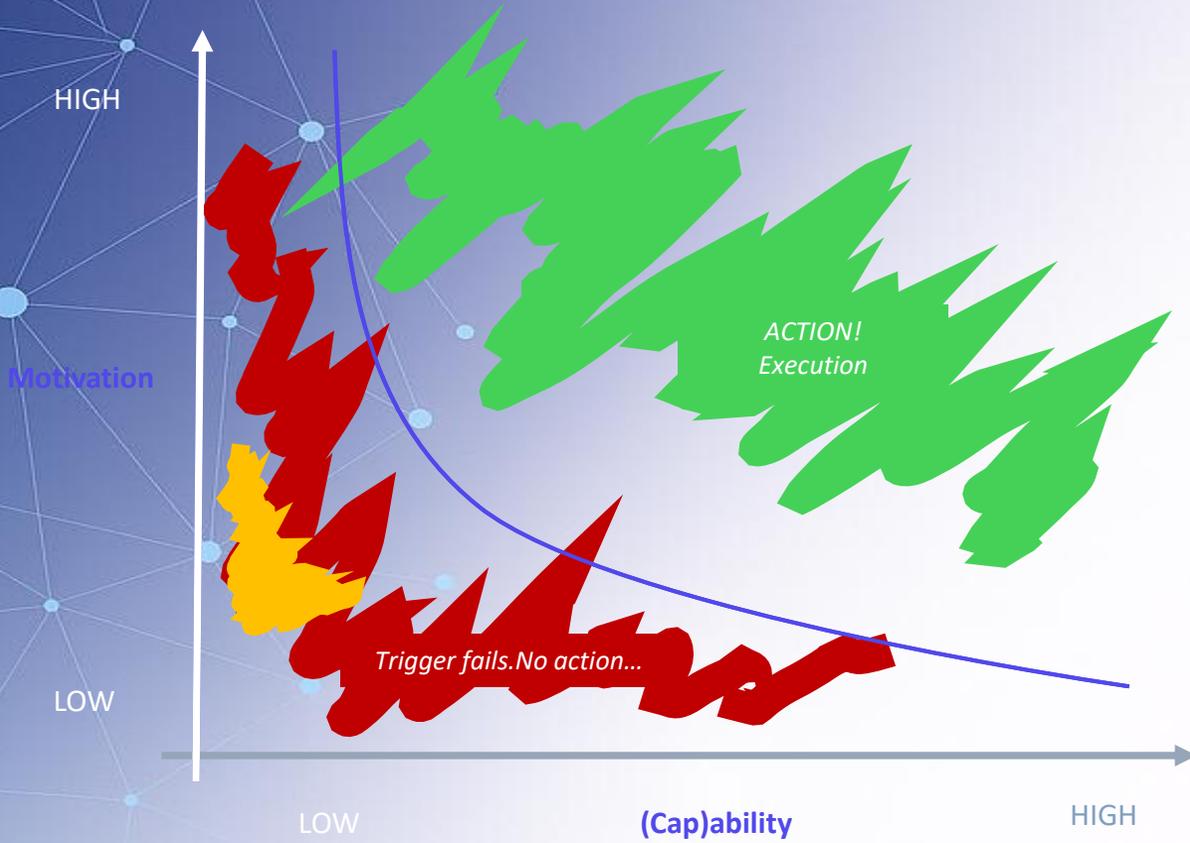
☞ **Apps can require long training time**

4

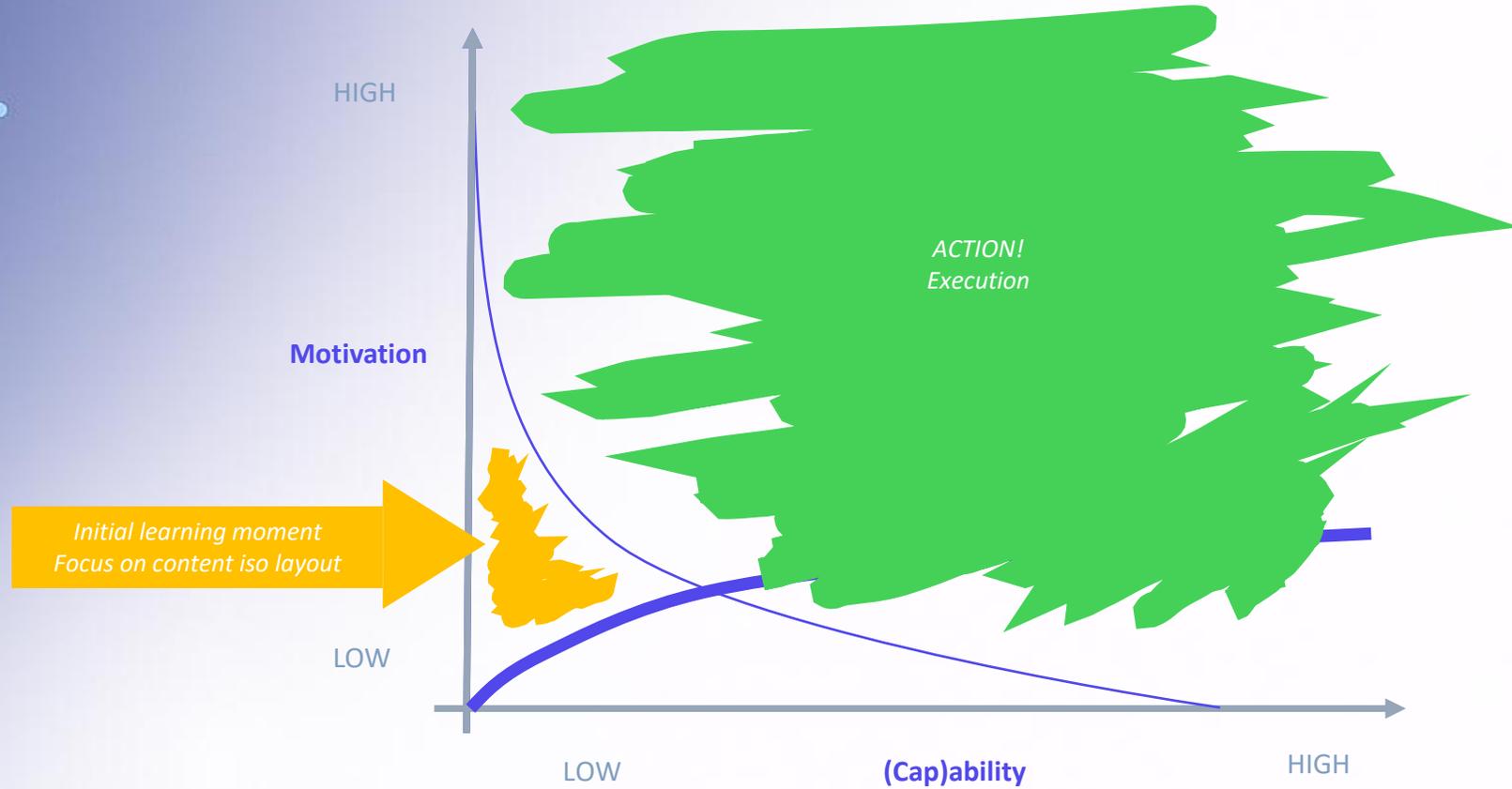
Apps thrive on WiFi/Mobile networks

☞ **Apps can break security protocols**

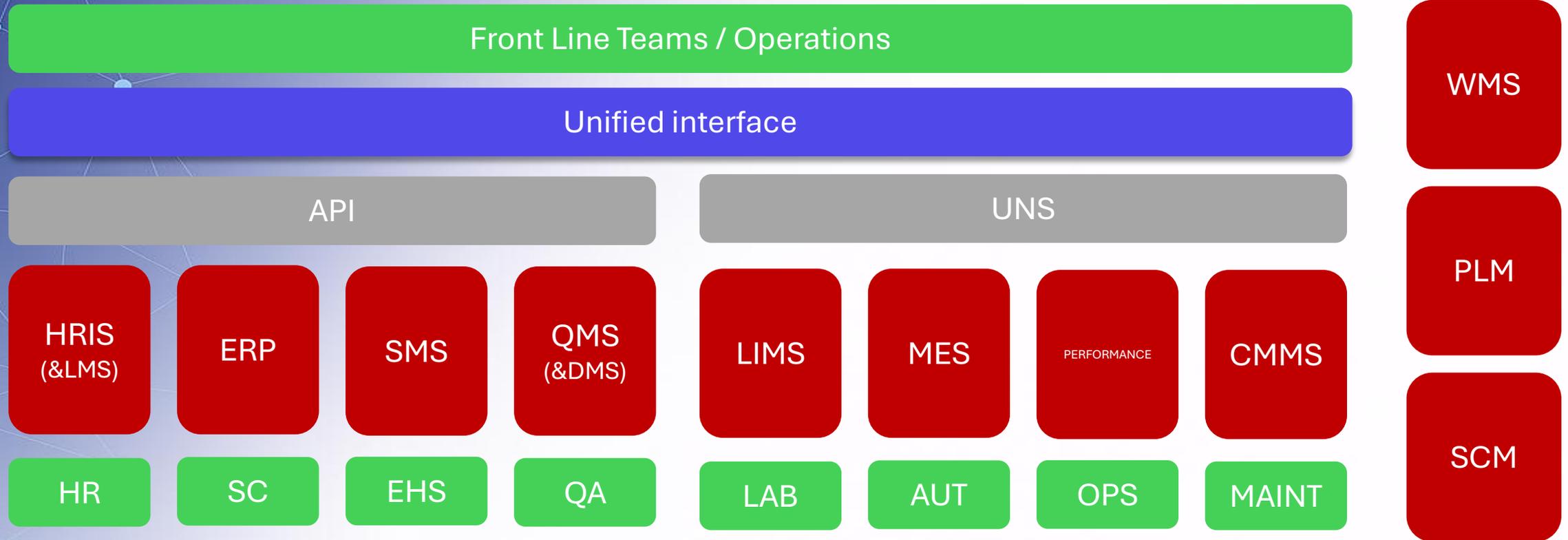
2 Psychology lessons



Human Centric Manufacturing



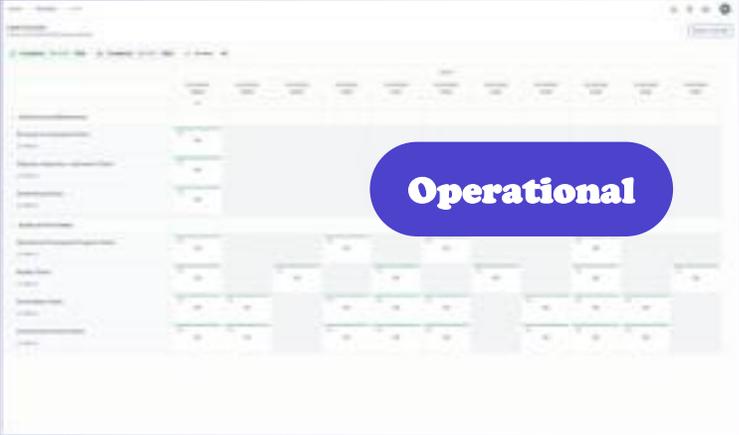
Frontline teams focus on content



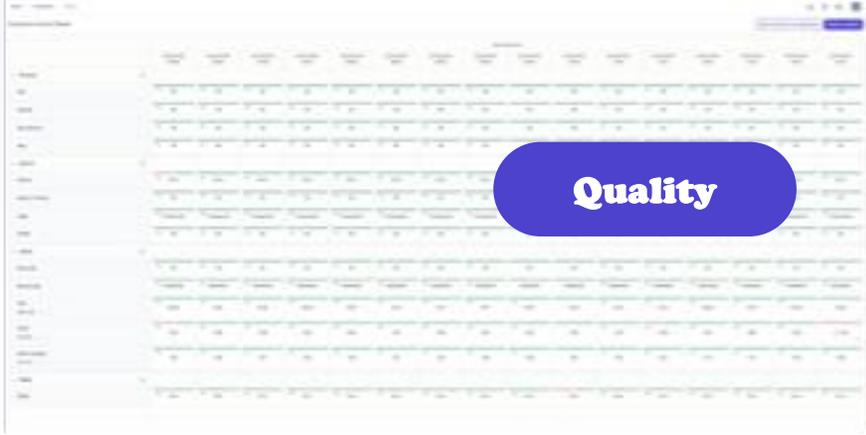
Frontline teams focus on content



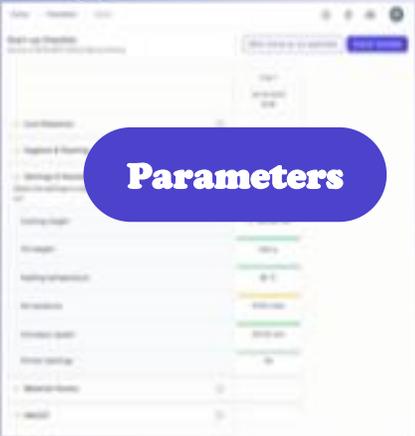
FLT



Operational



Quality



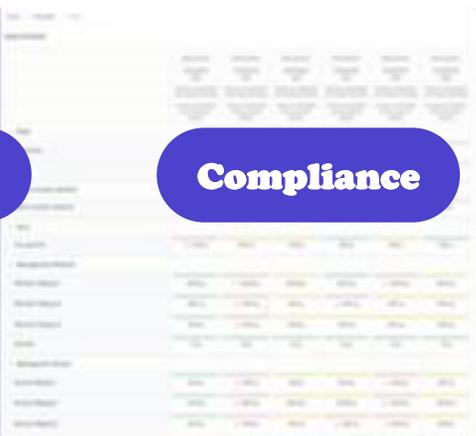
Parameters



Line clearance



Leadership



Compliance



Safety

Operating model

A large, bold, white 'X' mark is positioned on the left side of the slide, centered vertically. It is set against a background of a blue gradient with a network of light blue lines and dots on the left side.

**Manufacturing System
Management System
Work System
Operating System
Standardization System**

Efficiency program / Lean program / TPM / IWS / TQM / TPS /

Output from Plant Collective Memory

Do now

4 items · 2 require immediate action

- Start-up checklijst** Flanders' Food Demo 🕒 overdue by 3h
18/36 (50%) | ✓ 18 pending
- Start-up checklijst** Flanders' Food Demo 🕒 due in 1h 2m
MS 0/22 (0%) | ✓ 22 pending
- Gewitechenblad**
44/55 (400%) | ✓ 6 pending | 📄 x 5

[View all \(4\)](#)

Upcoming

8 items · 1 starting soon

- Geëscaleerde Handhaving** 🕒 starts in 2h 15m
✓ 14 checks | 📄 x 3
- Start-up checklijst** 🕒 starts in 1d 4h
✓ 9 checks
- Geregistreerd Kernoverzicht** Zenith Demo 🕒 starts in 3d
AM ✓ 22 checks

[View all \(8\)](#)

Running

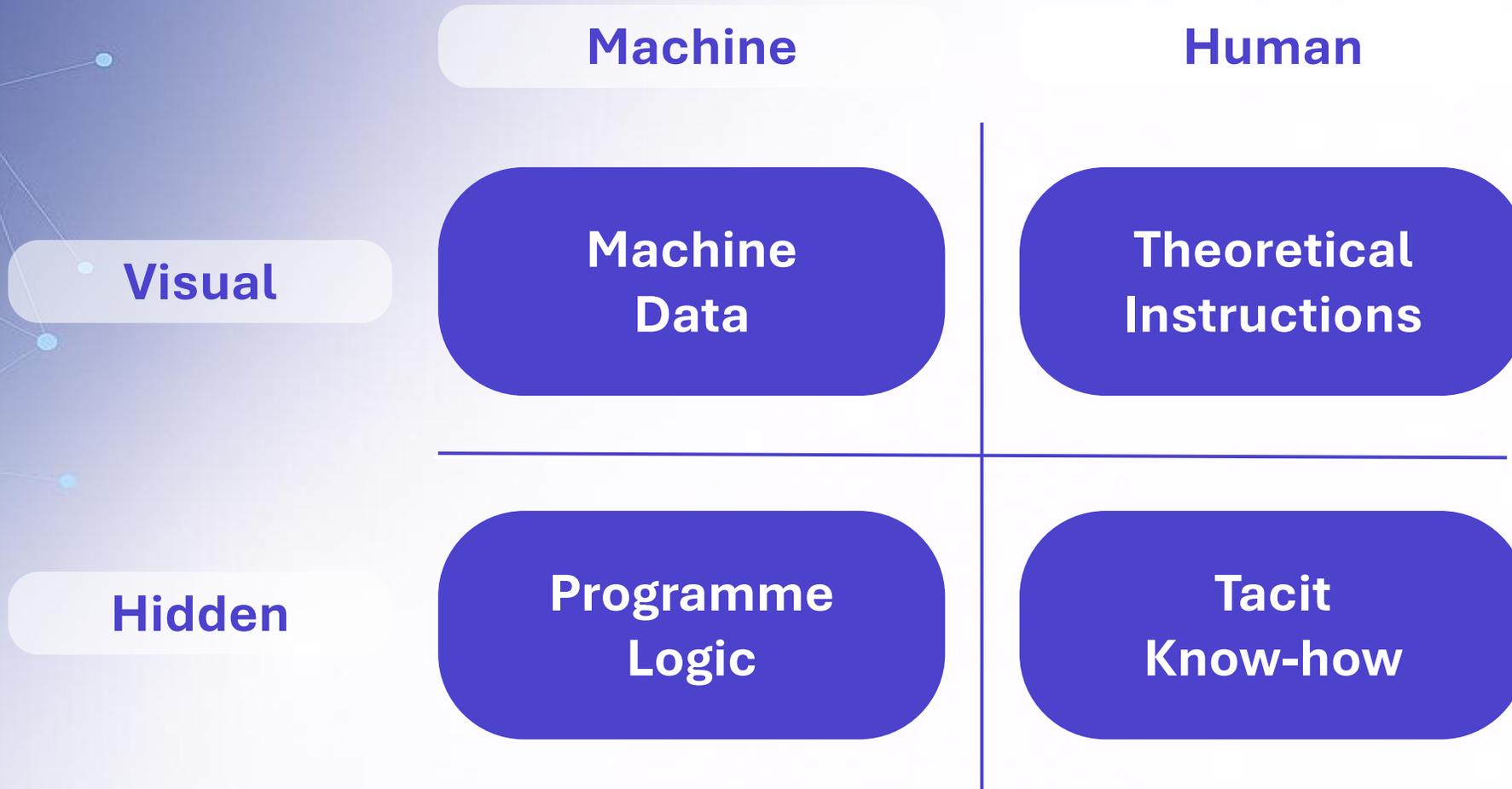
- # PO1001 Line 01** 🕒 overdue by 3h
115/500 (23%)
Granola Honey Almond 500g production
- # PO1001 Line 01** 🕒 due in 1h 29m
115/500 (23%)
Granola Honey Almond 500g production
- # CO488 Line 02** 🕒 01/04/2025 12:00
21750/45312 (48%)
Oats Cluster Mix → Honey Almond changeover

Planned

The inverted digital twin



4 Plant Memories

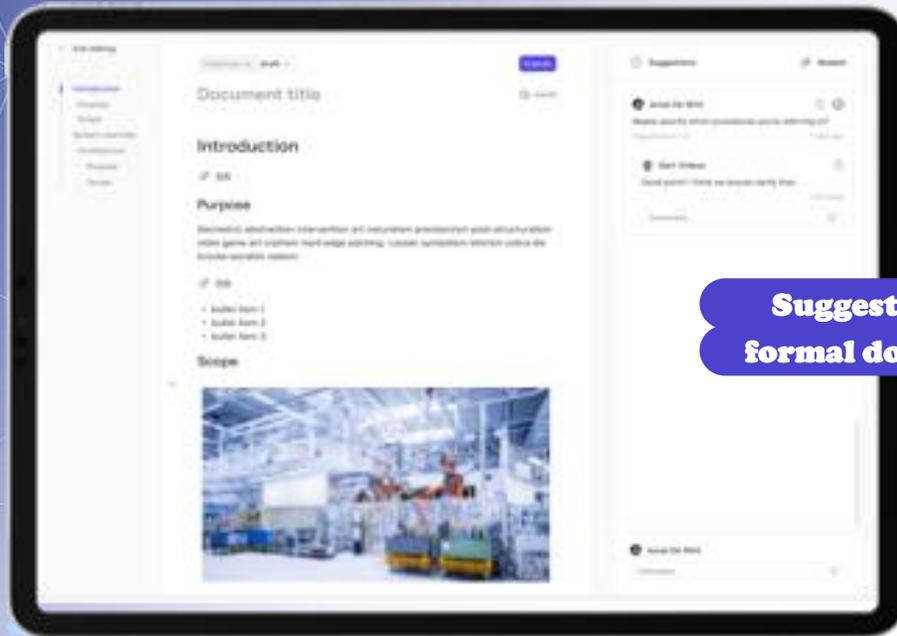


But they can always give feedback

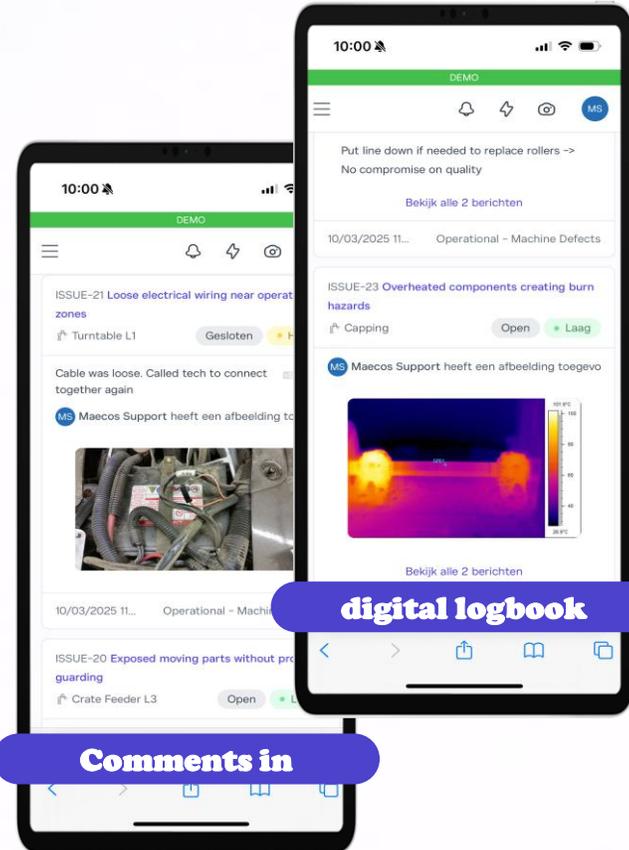
- 1** **Processes take longer in reality than intended**
 - 👉 **Motivated employees will go extra mile**
- 2** **Conversations need to be planned**
 - 👉 **Frontline teams work in shifts...**
- 3** **Closed information by default**
 - 👉 **Heavy effort for single improvement**

Inverted digital twin

Human PDCA



Suggestions on formal documents



digital logbook

Comments in

Inputs for Plant Collective Memory

Equipment
flow-wrapper

Component
sealing jaw

Failure mode
not returning

Breakdown
stopped
unexpectedly

At 14.32 the **flow-wrapper** stopped unexpectedly. The **infeed conveyor** kept running but the sealing **unit failed to close**. The operator heard an **unusual rattling noise** coming from the right-hand side of the sealing jaw assembly. After stopping the line, we noticed that the **sealing jaw** was not returning to its home position. No alarms were shown on the HMI, but **manual cycle** function also failed to move the jaw. Shift technician inspected the mechanism and found that the **linkage arm** connecting the servo to the sealing jaw had come loose, The retaining bolt still there but the nut had vibrated off. We reattached the linkage and tightened fasteners.

Settings
manual cycle

Defect
rattling noise

Procedure
reattached linkage

Downtime
18 minutes

**Inverted
Digital twin**

PDCA

**Leadership
Standard Work**

**Versioned
Intelligence**



Process

**Plant
Collective
Memory**

**MCP LLM
UNS MQTT
Dashboards**

SDCA

Standard Work

**UI
Execution**

People

PDCA

**Standardized
Work**

SDCA

Technology

**Event-driven
planning**

**Unified
Interface**

SDCA

operations

PDCA

improvements

Plant Collective Memory

Unified Interface

Inverted Digital twin

Standard Work

Standardized work

Leadership Standard Work

Future is hybrid

Future is supported

Future is human

