Driving Efficiency through an Automation Hierarchy

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Agenda

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- Intros
- Why
- What
- How
- Closing

AI Technical Leader

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University of Colorado Boulder

COLORADO SCHOOL OF MINES | Computer Science

INNOVATION CENTER
of ST. VRAIN VALLEY SCHOOLS

Summary

podcast

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Driving Efficiency through an Automation Hierarchy

Ivan Portilla, Senior Technical Staff Member, Ricoh North America Customer Experience Centers

Today's graphic enterprise operational floor is a mixture of un-codified dashboards, multiple and bespoke programming languages, human knowledge, generational values, and a rolled-up sleeves approach. Explore a real-world example of an automation hierarchy that leads to harnessing the promises of AI while delivering higher efficiency in a production environment. Spend a few minutes applying simplicity to an industry that touches the fabric of our nation each and every day.

https://notebooklm.google.com/notebook/79f61ed8-2b7c-40cf-974a-93789ae88d1e

embodied & autonomous

life partner

Our expectations are out of sync with reality

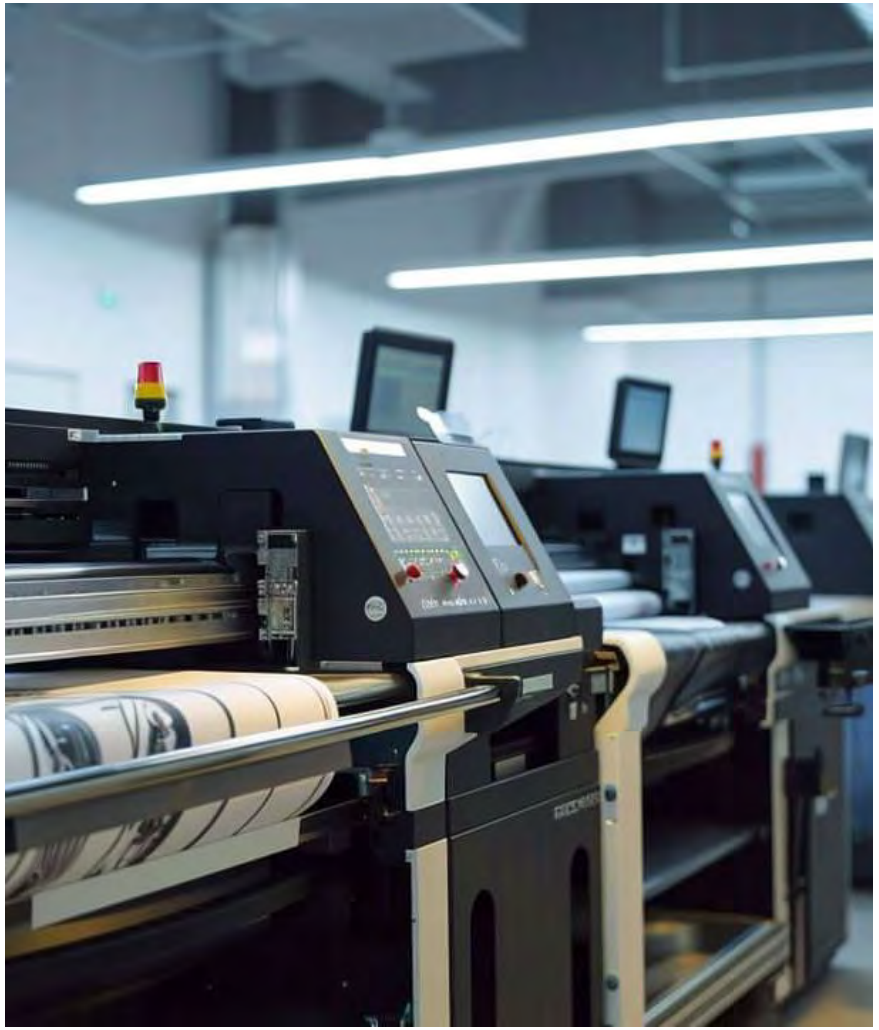
Why AI in Digital Printing?

- Printing is everywhere: from packaging to government documents.
- Commercial digital printing is a massive operation that still relies heavily on manual systems.
- AI offers a chance to streamline, simplify, & scale.

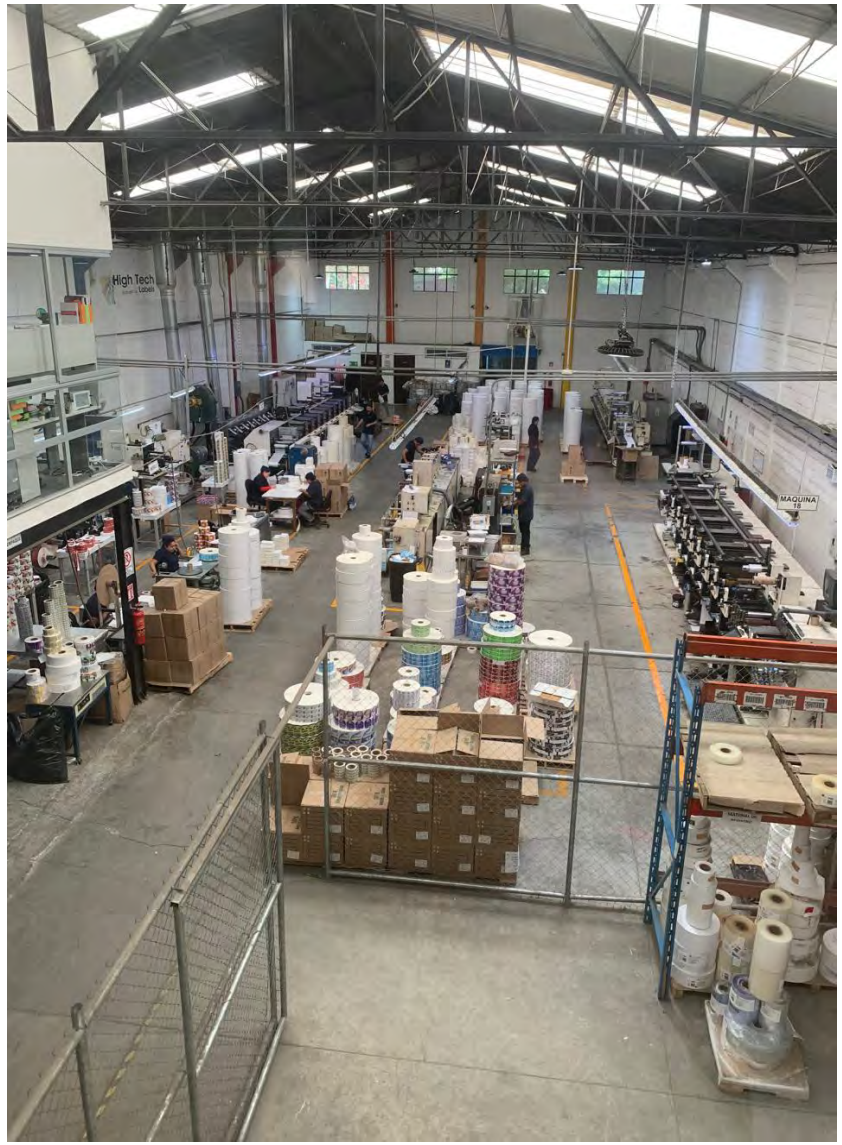
https://www.ricoh-usa.com/en/products

The Current Operational Floor

- Unstructured dashboards
- Multiple, sometimes obscure programming languages
- Reliance on human knowledge & experience
- Strong generational habits and a “hands-on” culture



The Current Operational Floor



What Is an Automation Hierarchy?

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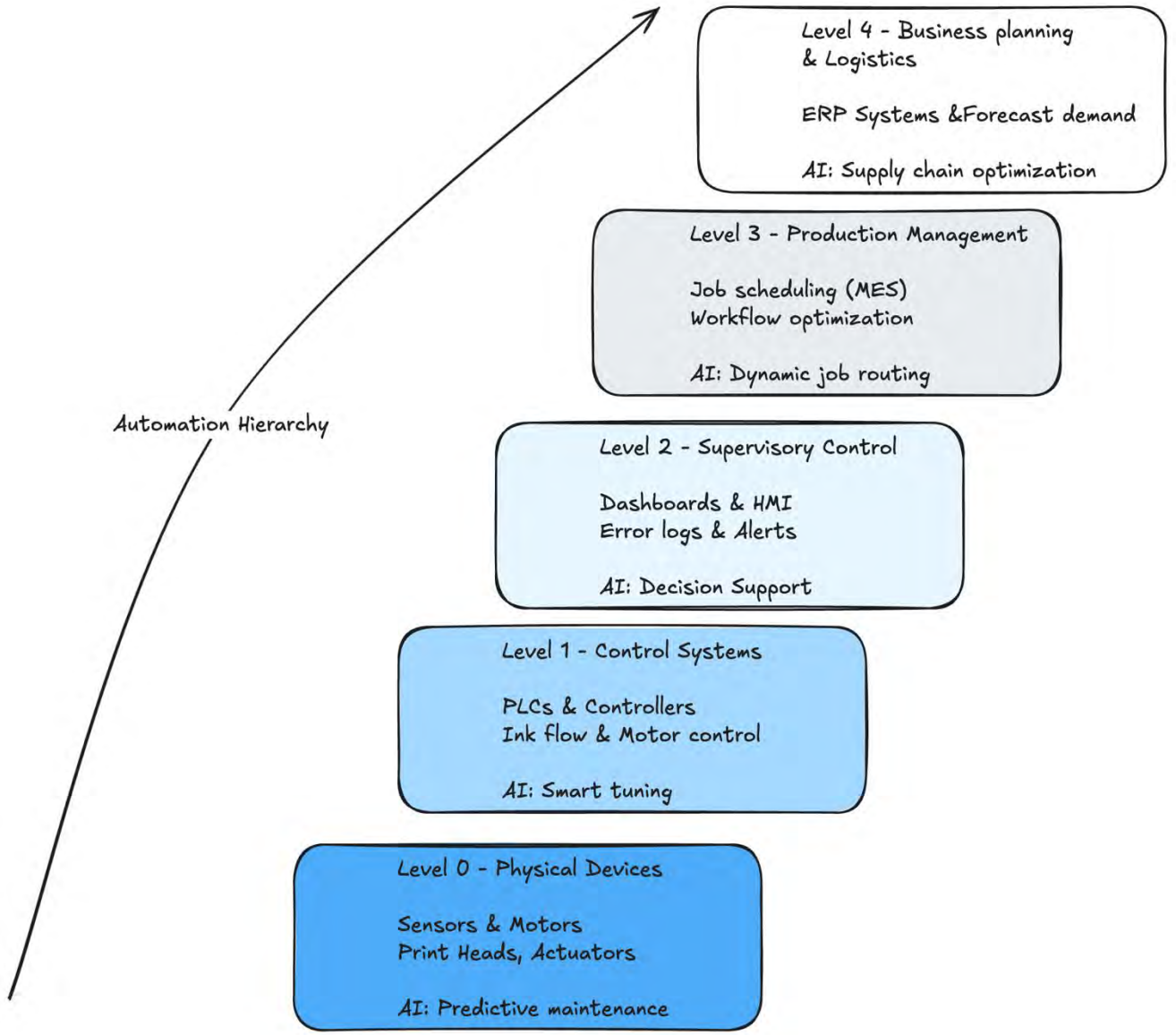
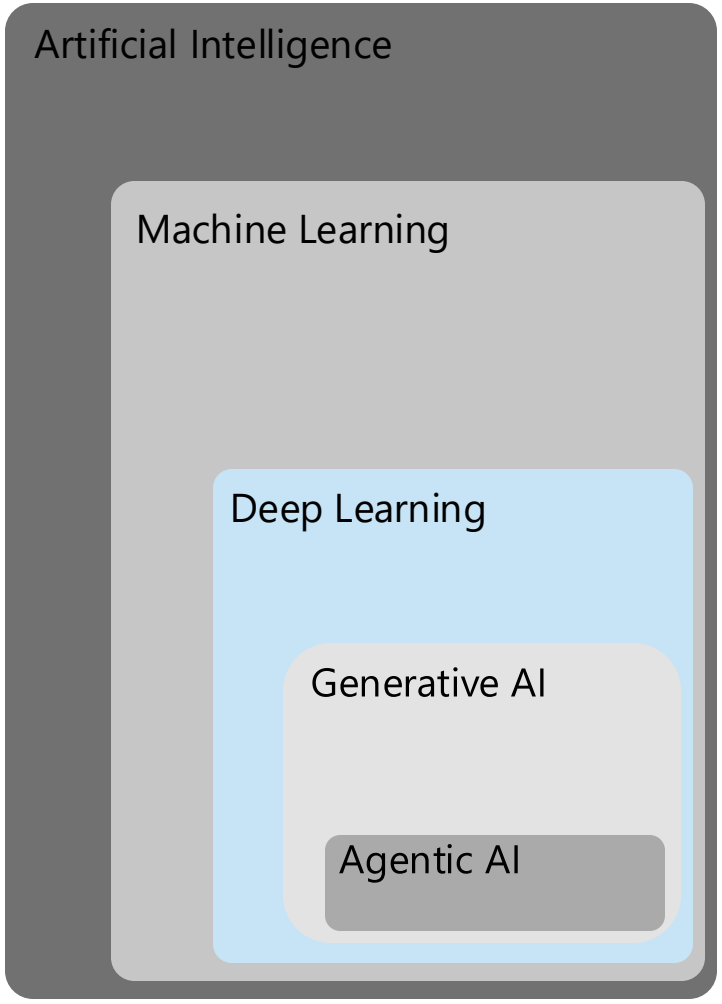
How AI Enhances Each Layer of Production

- Layered approach to automating complex systems
- From basic mechanical processes → smart decision-making with AI
- Provides a roadmap for where & how AI fits



Brief history of artificial intelligence



1956

Artificial Intelligence

Intelligence demonstrated by machines

1997

Machine Learning

Learn from data

2017

Deep Learning

Model after the human brain (Neural Networks)

2021

Generative AI

Create new written, visual, and auditory content

2025

Agentic AI

Can set goals, make decisions, & take actions to achieve those goals

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Generative AI

a type of artificial intelligence that creates new content based on existing data

Generative AI

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The best thing about AI is its ability to ...

learn	4.5%
predict	3.5%
make	3.2%
understand	3.1%
do	2.9%

MSFT partnership with OpenAI

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OpenAI

Ensure that artificial general intelligence (AGI) benefits humanity.

+

Microsoft

Empower every person and organization on the planet to achieve more

GPT-3

Generate and Understand Text

Codex

Generate and Understand Code

DALL·E

Generate images from text prompts

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OpenAI Microsoft

Generative AI

GPT-x

Prompt:

Write a tagline for an ice cream shop.

Response:

We serve up smiles with every scoop!

Codex

Prompt:

Table customers, columns = [CustomerId, FirstName, LastName, Company, Address, City, State, Country, PostalCode]

Create a SQL query for all customers in Texas named Jane
query =

Response:

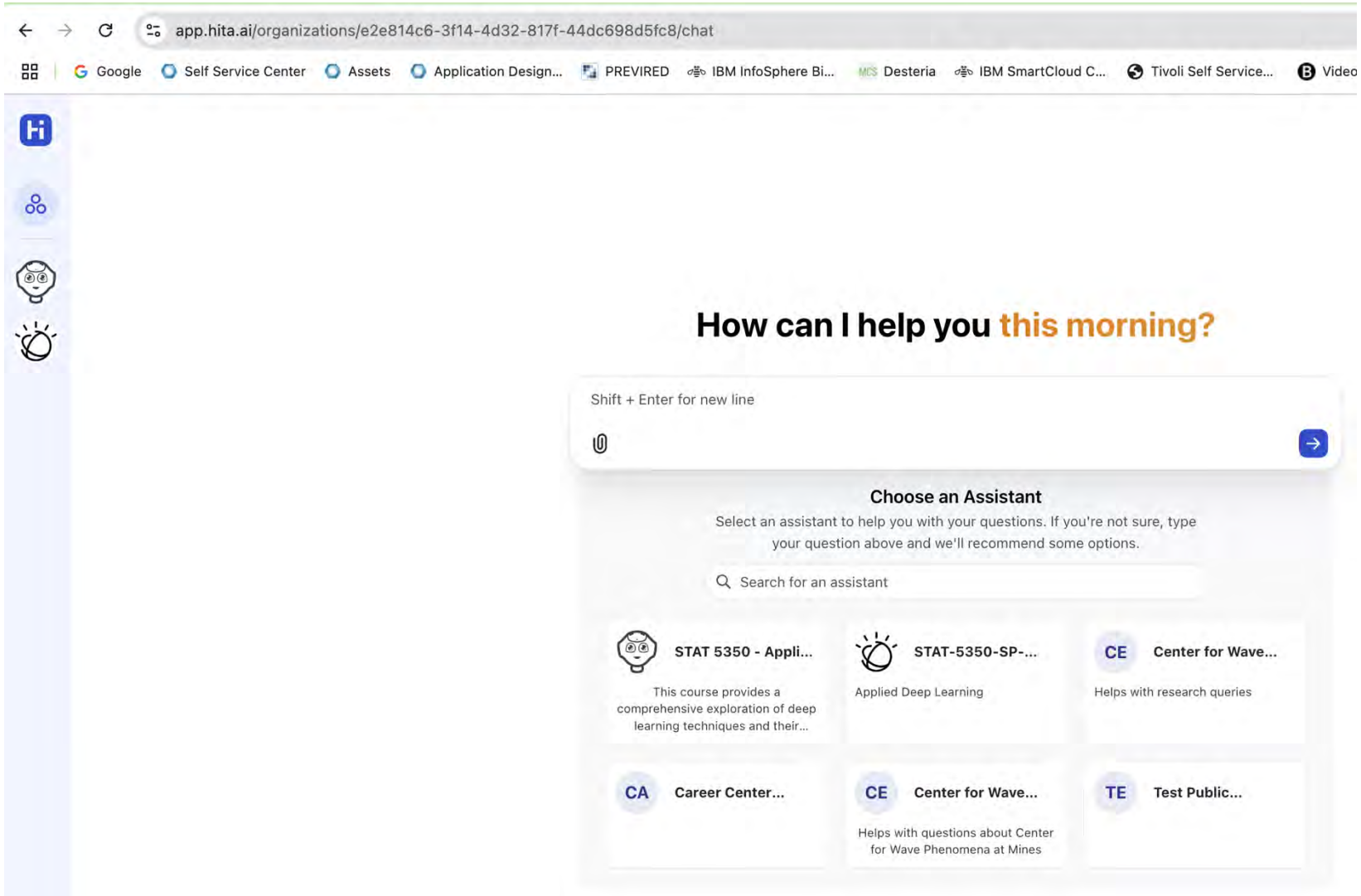
```
SELECT *
FROM customers
WHERE State = 'TX' AND FirstName = 'Jane'
```

DALL·E

Prompt: A white Siamese cat

Response:

Conversational AI



https://docs.hita.ai/user-guide

Text to Image Example

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FLUX.1 [dev]

12B param rectified flow transformer guidance-distilled from FLUX.1 [pro]
[non-commercial license] [blog] [model]

a cowboy on a horse in mars

Run

https://huggingface.co/spaces/black-forest-labs/FLUX.1-dev

Image Generation

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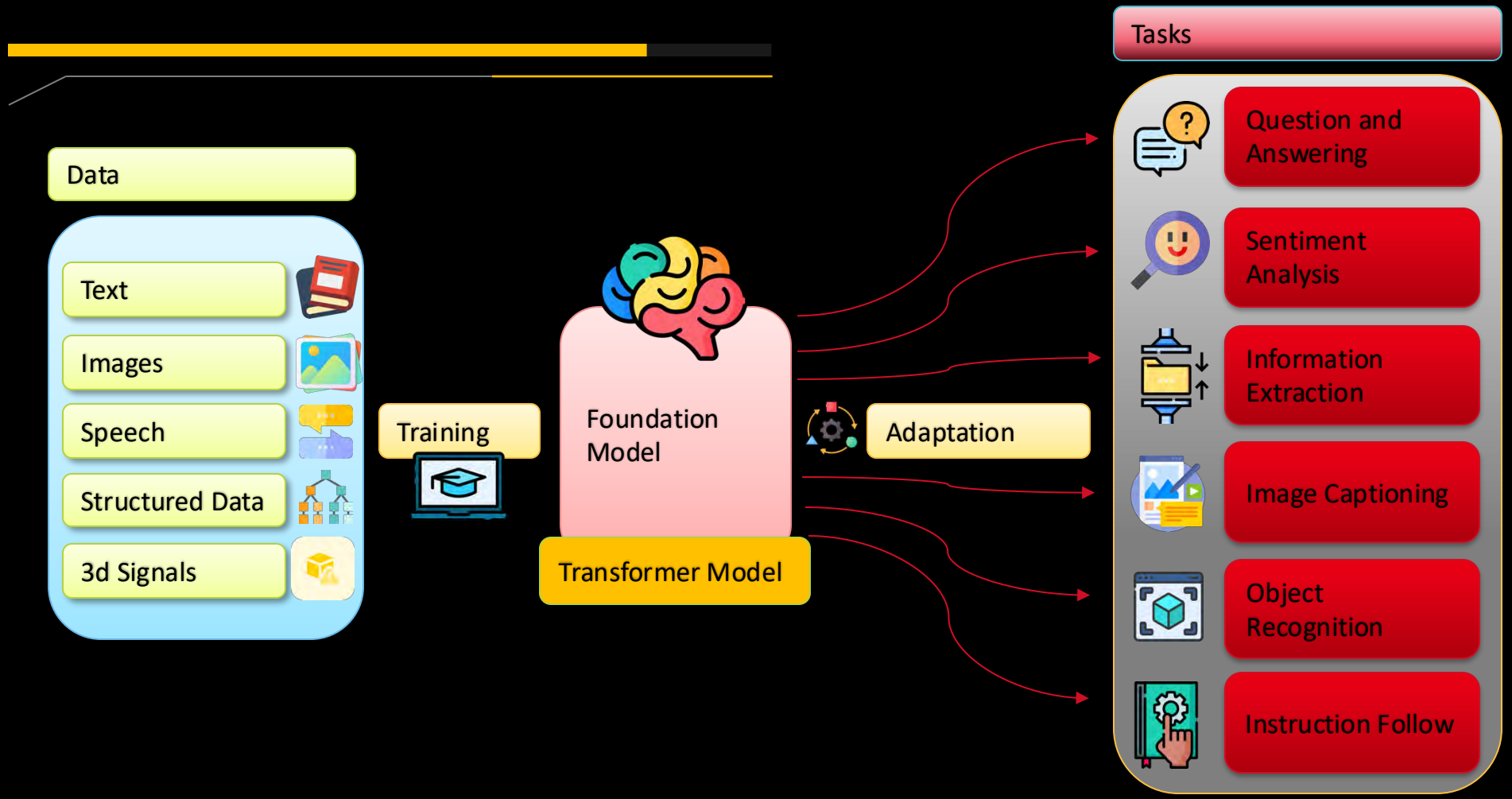
Foundation Models



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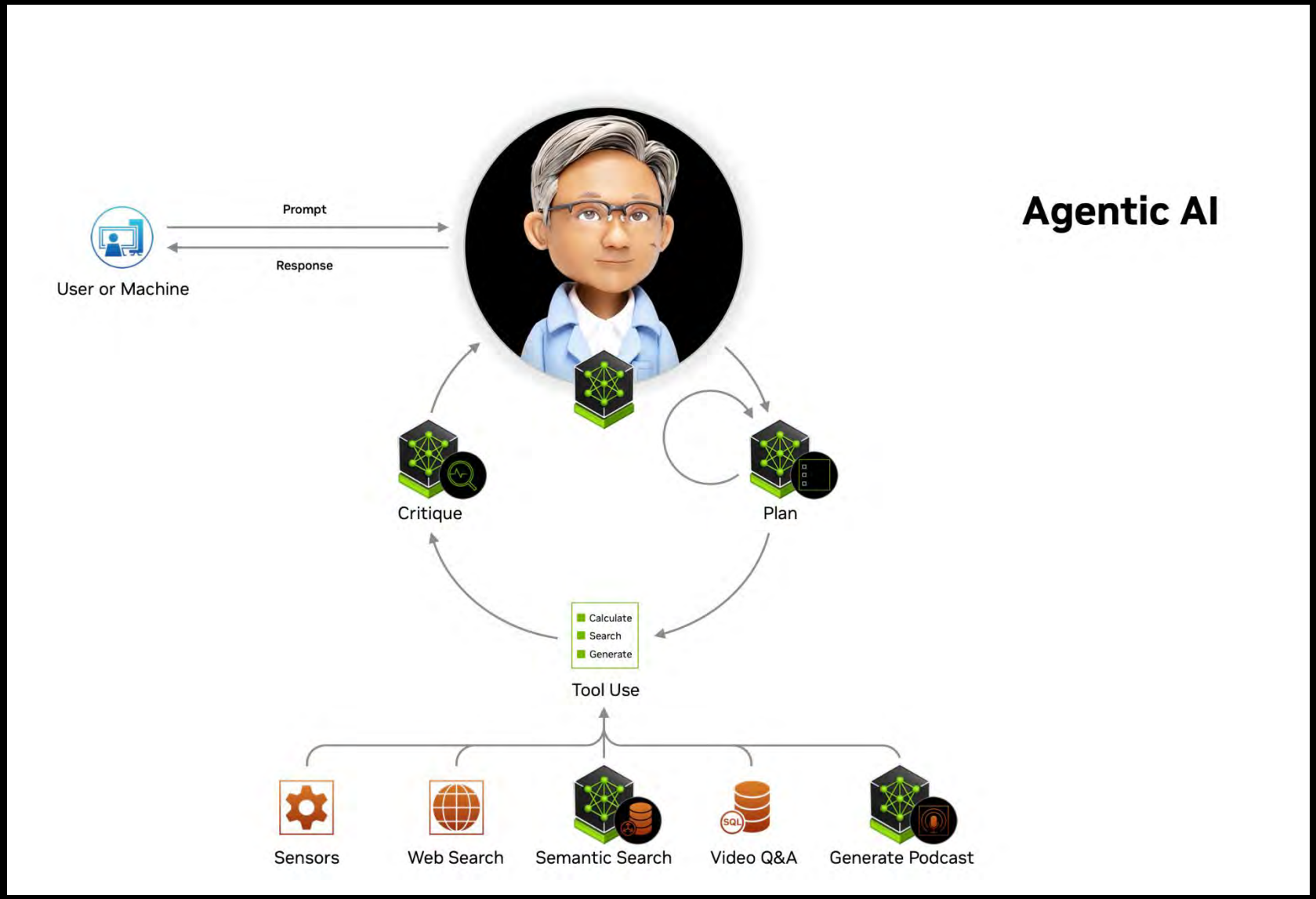
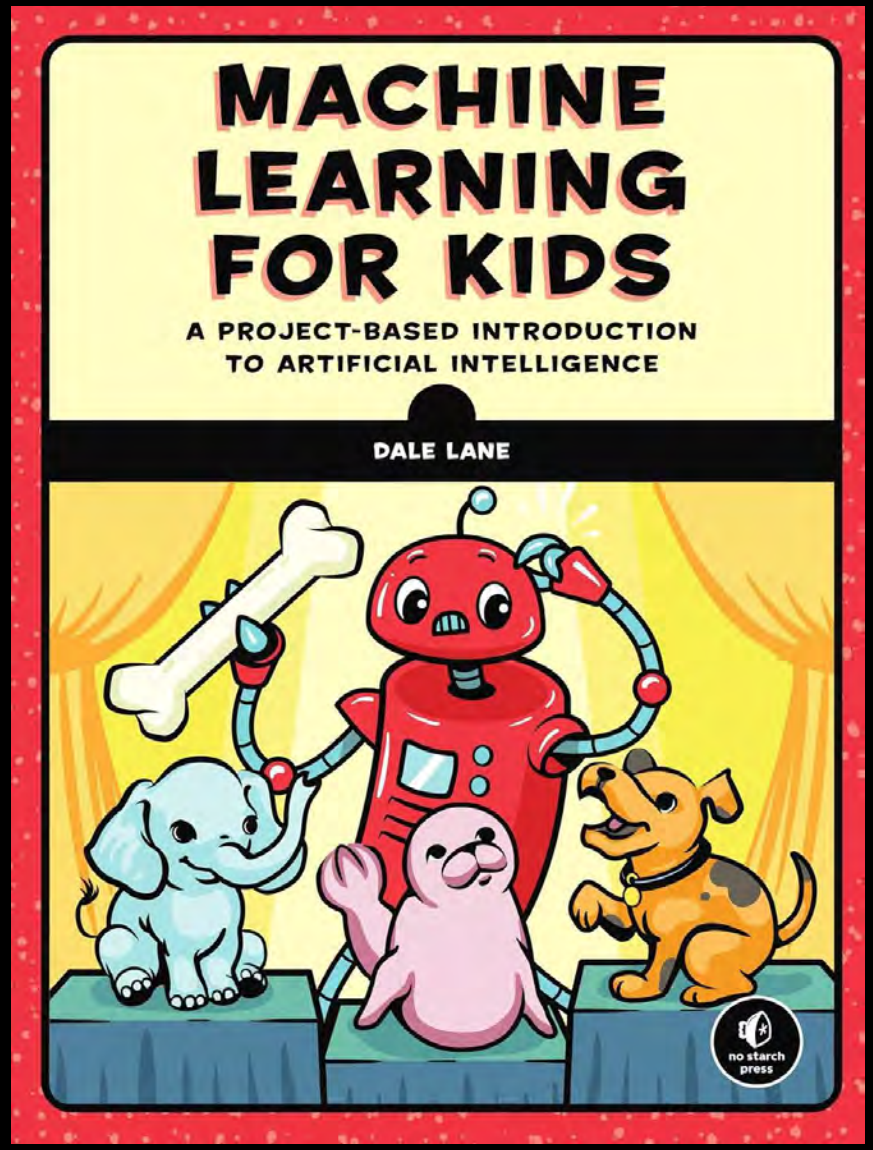
Agentic AI

AI systems that act as autonomous *agents*, capable of making decisions, taking actions, and pursuing goals with minimal human intervention

Agentic AI



How many animals on these pictures?



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Vibe coding

Fast, intuitive coding with AI assistance

What's Changing?

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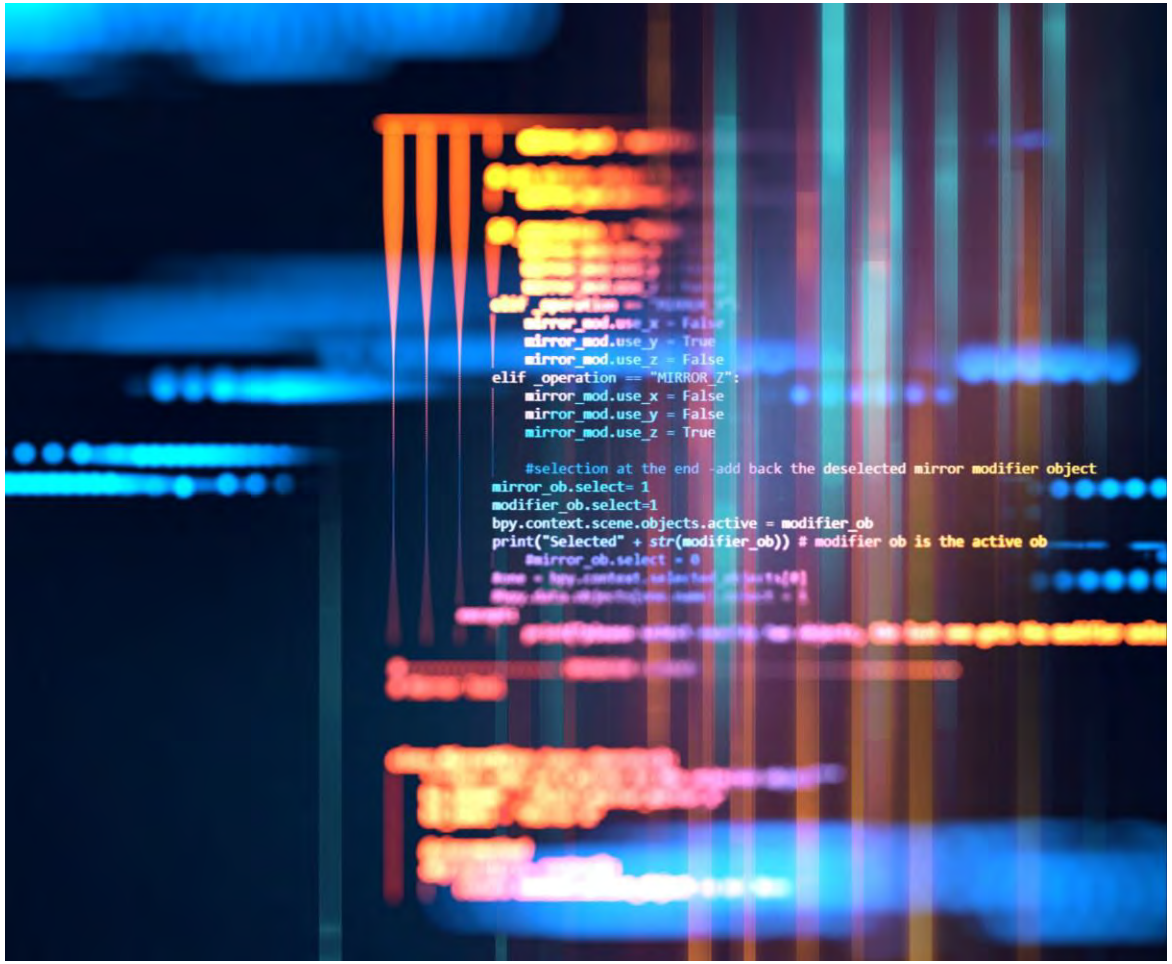
AI tools now co-write code, design systems, & offer intelligent suggestions



- Generation
- Completion
- Explanation
- Translation
- Testing
- Documentation

Code generation

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Write a Python script that connects to a MongoDB database, retrieves documents from a 'users' collection, and prints usernames and their corresponding email addresses.

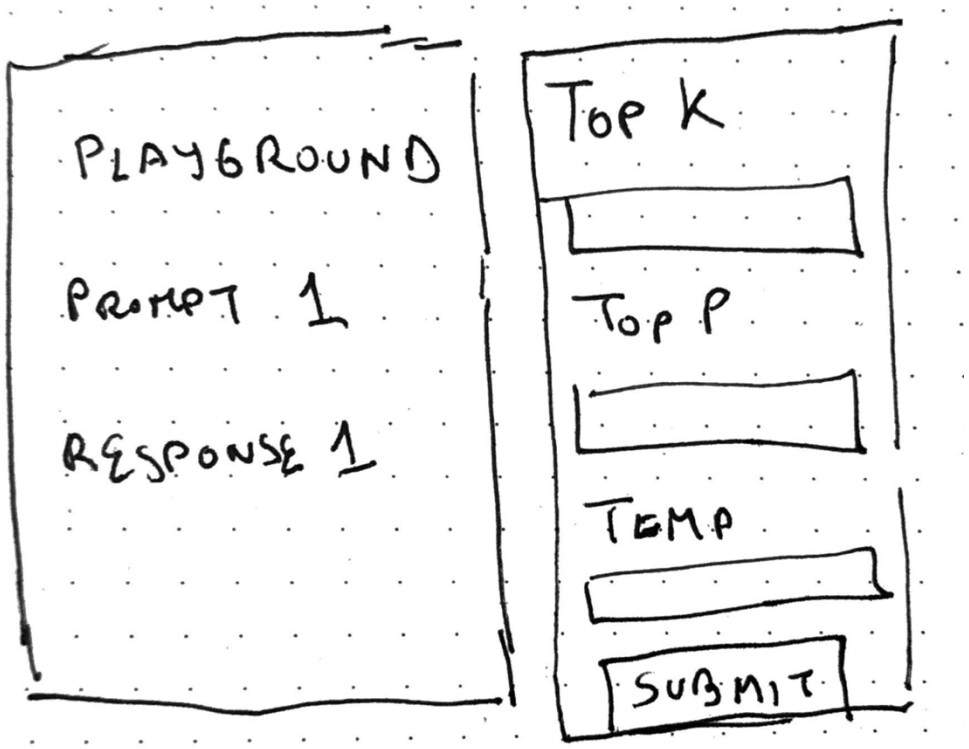
watsonx

```
# Assisted by watsonx Code Assistant
import pymongo

# Connect to MongoDB
client = pymongo.MongoClient("mongodb://localhost:27017/")

# Access the 'users' collection
db = client["mydatabase"]
collection = db["users"]
```

Code generation



Playground

Response 1

Response 2

Response 3

Top K

Enter top K value

Top P

Enter top P value

Temperature

Enter temperature valu

Max New Tokens

Enter max new tokens

Submit

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GitHub Copilot Demo

~~Engineers~~ Anyone can build faster, smarter, & with less manual work

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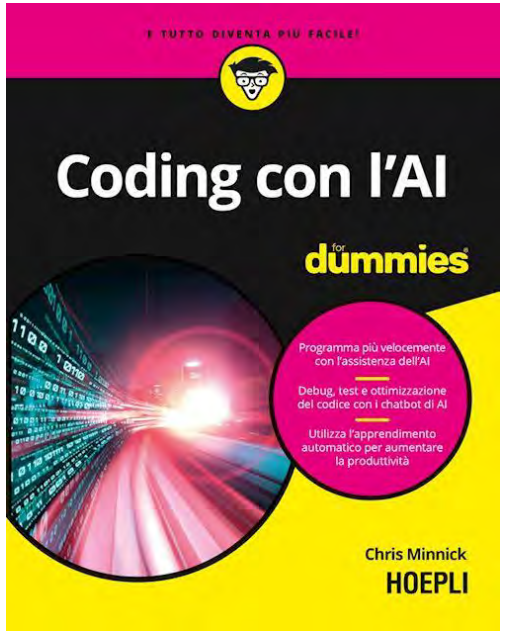


I. Techniques & Technologies

1. Benefits
2. Parsing ML/DL
3. AI coding tools
4. Coding w chatbots

II. Using AI to write code

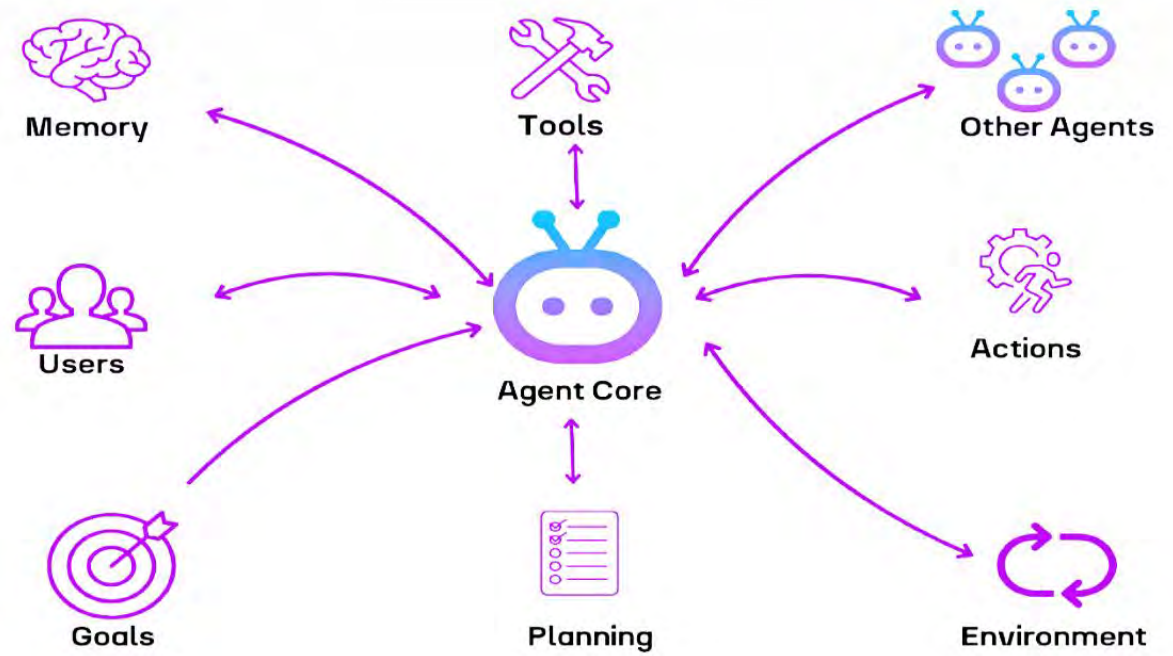
5. From plan to prototype
6. Formatting & improving code
7. Find, eliminate bugs
8. Translate & optimize code

III. Test, Document & Maintain code

9. Testing your code
10. Documenting you code
11. Maintaining your code

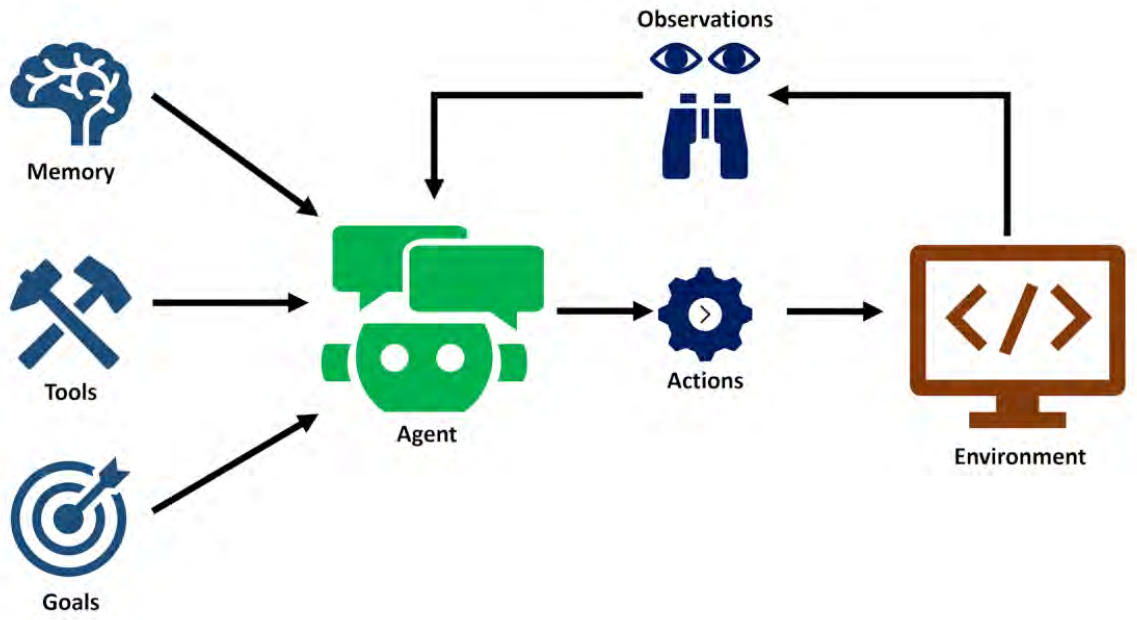
The Role of GenAI, Agents, and AI-Driven Coding

- **Generative AI**: Simplifies coding, UI generation, troubleshooting
- **Intelligent Agents**: Monitor, react, and optimize processes
- **AI-driven coding**: Translates goals into efficient programs (vibe coding)



Real-World Example – AI in Action

- A production environment before vs. after automation hierarchy
- Measurable gains: fewer errors, faster turnaround, reduced waste
- Human-machine collaboration: not replacement, but augmentation



Real-World Example – AI in Action

VC80000 Maximizes Productivity through Automation

- Ricoh's VC80 customer calculated a 56% increase in productivity over their prior system.
- System wide architecture redesign to promote advanced automation to maximize OEE with minimal operator skills.
- Fully automated press and substrate setup with continual real time monitoring and correction to ensure consistent output over time.

Human Factors Still Matter

- Why human expertise is still essential
- Designing with generational knowledge in mind
- AI as a *partner* in operations, not a replacement

Simplicity is Key

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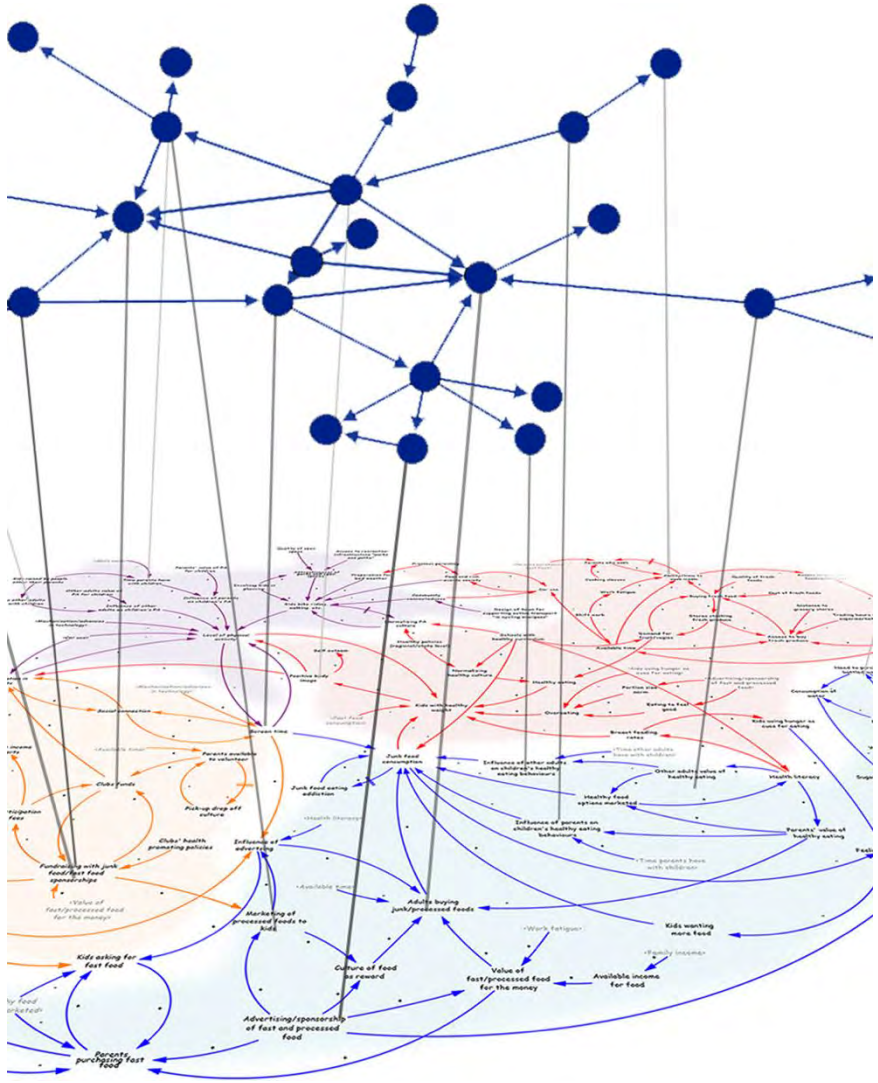
- Even complex systems can be made simple with good design and AI
- Automation doesn’t mean complexity — it means clarity
- What this means for the next generation of technologists



Simplicity is Key

http://lawsofsimplicity.com/

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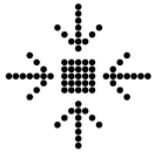


LAW 1 / REDUCE

The simplest way to achieve simplicity is through thoughtful reduction.

LAW 2 / ORGANIZE

Organization makes a system of many appear fewer.

LAW 3 / TIME

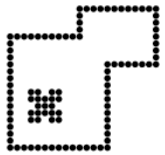
Savings in time feel like simplicity.

LAW 4 / LEARN

Knowledge makes everything simpler.

LAW 5 / DIFFERENCES

Simplicity and complexity need each other.



LAW 6 / CONTEXT

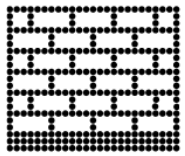
What lies in the periphery of simplicity is definitely not peripheral.

LAW 7 / EMOTION

More emotions are better than less.

LAW 8 / TRUST

In simplicity we trust.

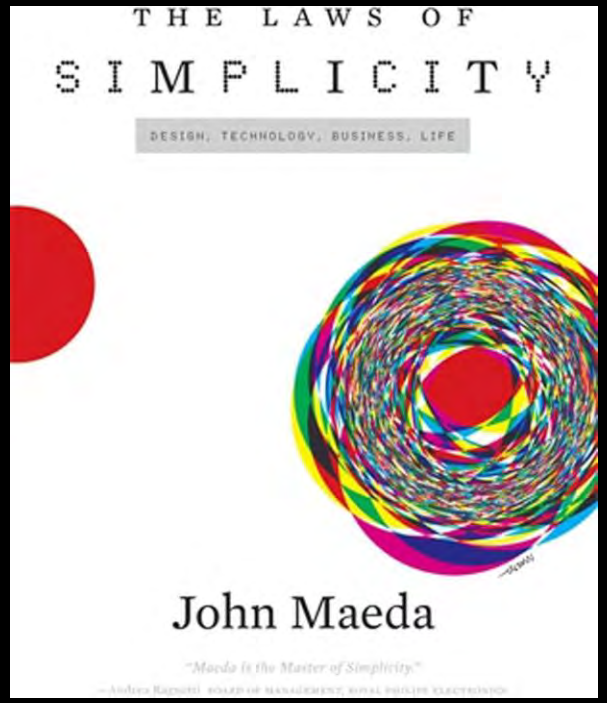


LAW 9 / FAILURE

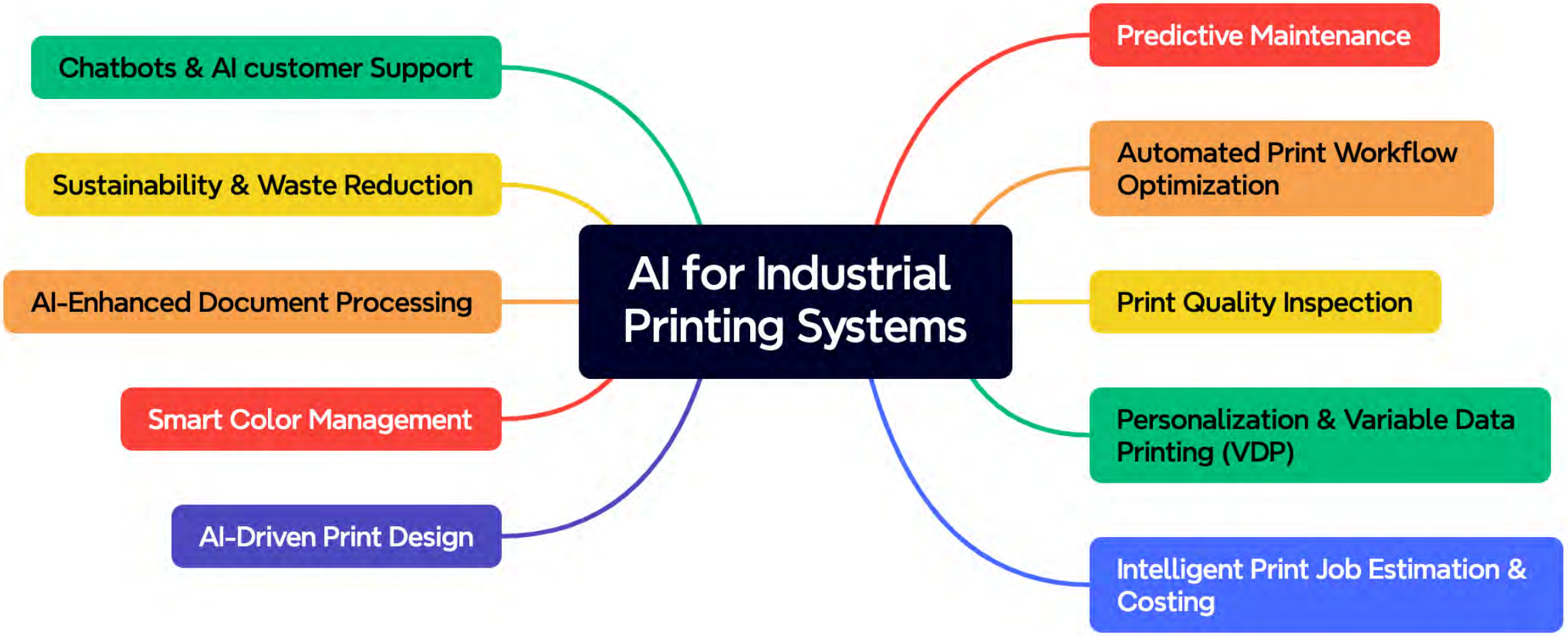
Some things can never be made simple.

LAW 10 / THE ONE

Simplicity is about subtracting the obvious, and adding the meaningful.



Some uses cases of AI for Digital Printing



Why This Matters to You

- AI isn’t just for tech giants—every industry needs it
- Commercial printing supports critical infrastructure, education, commerce
- Opportunity for innovation and impact

Takeaways

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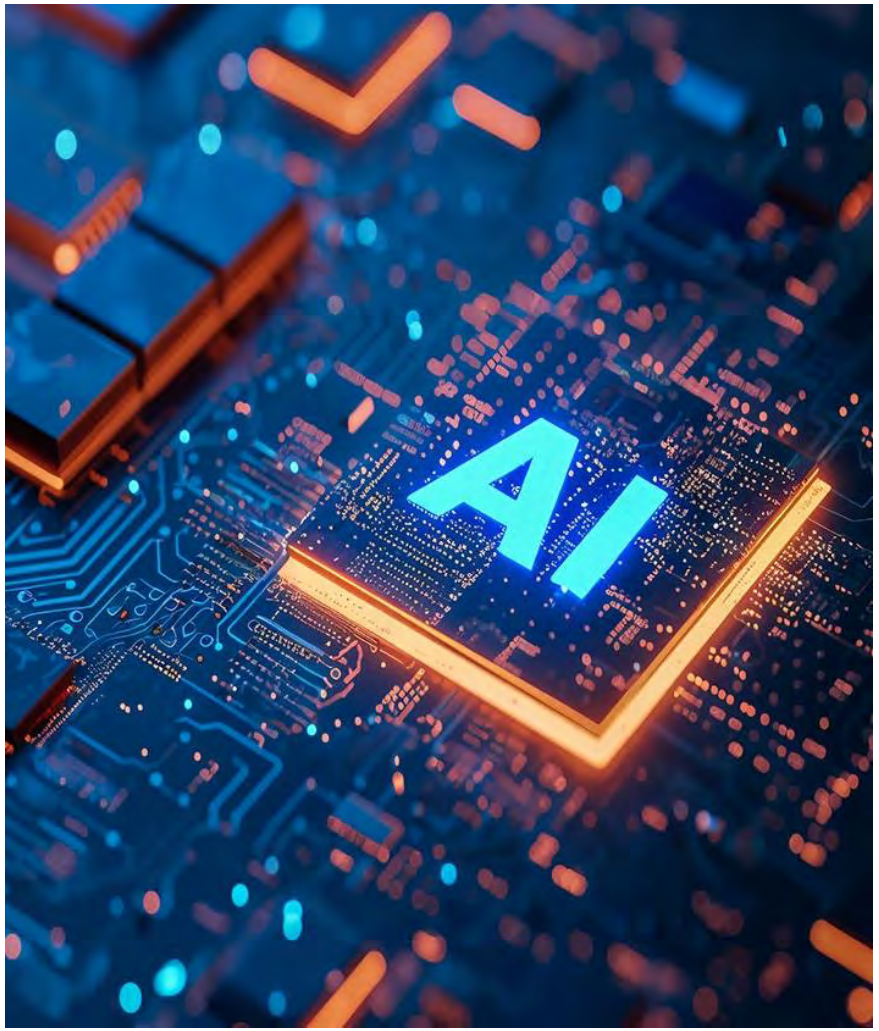
- Digital printing is a living lab for AI transformation
- Automation hierarchy (AI) helps structure change
- You can be part of this revolution

Q&A

- AI’s role in production
- Career paths in industrial AI
- Ethical or human-centered design in automation



Closing

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We are hiring

https://careers.ricoh-usa.com/

Slides:

https://github.com/iportilla/TAGA

Contact info

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