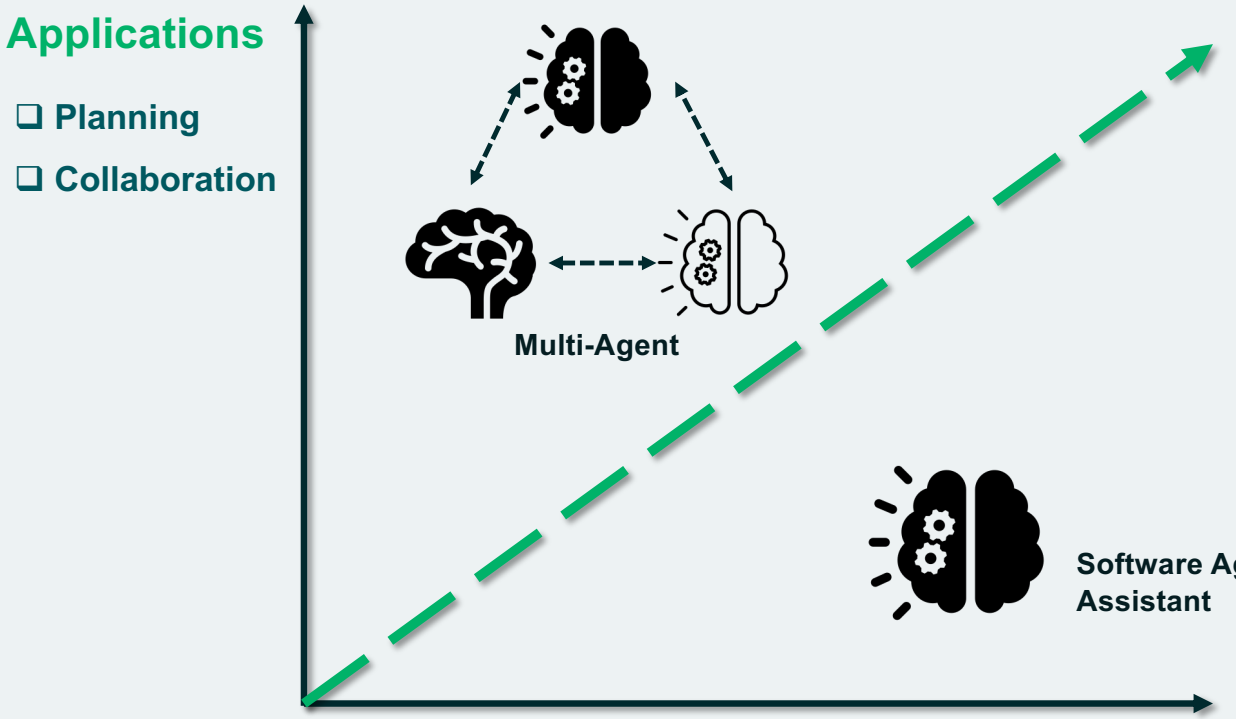
From LLMs to Multi-Agents Systems

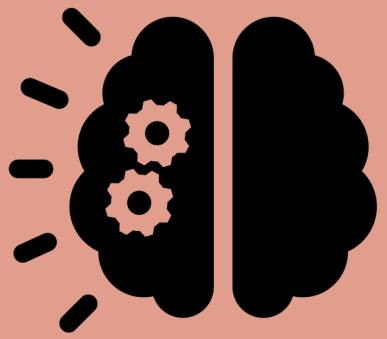
Agents & GenAI

UQÀM

LLM / GenAI – Current main challenges



What is a “AI Agent”?



- ❑ Autonomy (vs. “Object”)
- ❑ Reflection
- ❑ Communication

~~New Concepts~~

Distributed artificial intelligence (Wikipedia)

In 1975 ***distributed artificial intelligence*** emerged as a subfield of artificial intelligence that dealt with interactions of intelligent agents.[2] Distributed artificial intelligence systems were conceived as a group of intelligent entities, called agents, that interacted by cooperation, by coexistence or by competition. DAI is categorized into multi-agent systems and distributed problem solving.[3] In multi-agent systems the main focus is how agents coordinate their knowledge and activities.

Some time ago…

New Web Site Trial

New Offcial Page (Test version)
Japanese Page (Test version) (Test version often contains o

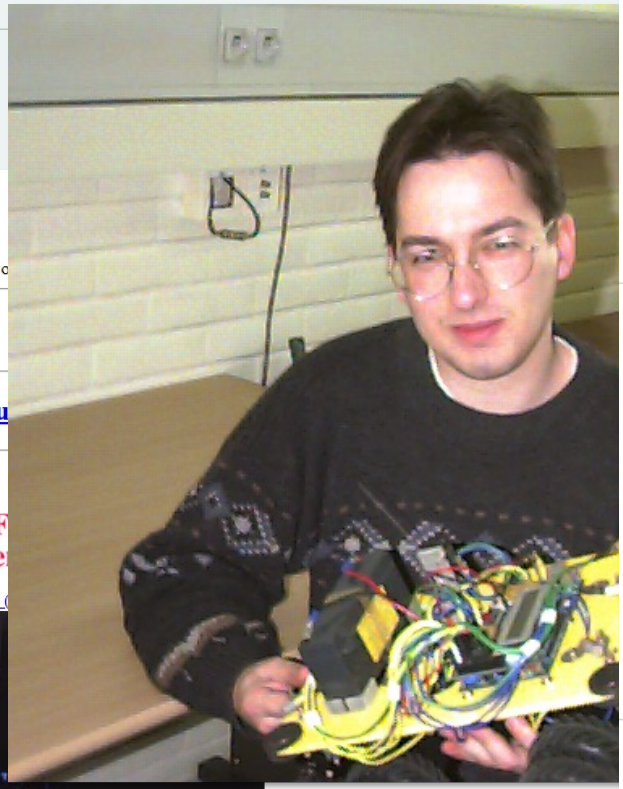
Quick look at RoboCup.
Powerpoint Presentation Version 0.5 (in Japanese).
Powerpoint Presentation Version 0.5 (in English).

A list of RoboCup related papers (pu

RoboCup-97
Nagoya, Japan

The F
Socce

The First RoboCup comptetition will be held at IJCAI-97 (



Toward an Ontology-based Web Data Extraction

Article June 2002 · 143 Reads · 31 Citations

Hicham Snoussi · Laurent Magnin

Many web sites provide regularly updated data in a fixed structure.

Share

Heterogeneous Web Data Extraction using Ontology

Article May 2002 · 45 Reads · 21 Citations

Hicham Snoussi · Laurent Magnin · Jian-yun Nie

Multi-agent systems can be fully developed only when they have access to a large number of information sources. These latter are becoming more and more available on the Internet in form of web pages. This paper does not deal with the problem of information retrieval,...

Read more

Share

Our guest agents are welcome to your agent platforms

Conference Paper March 2002 · 11 Reads · 24 Citations

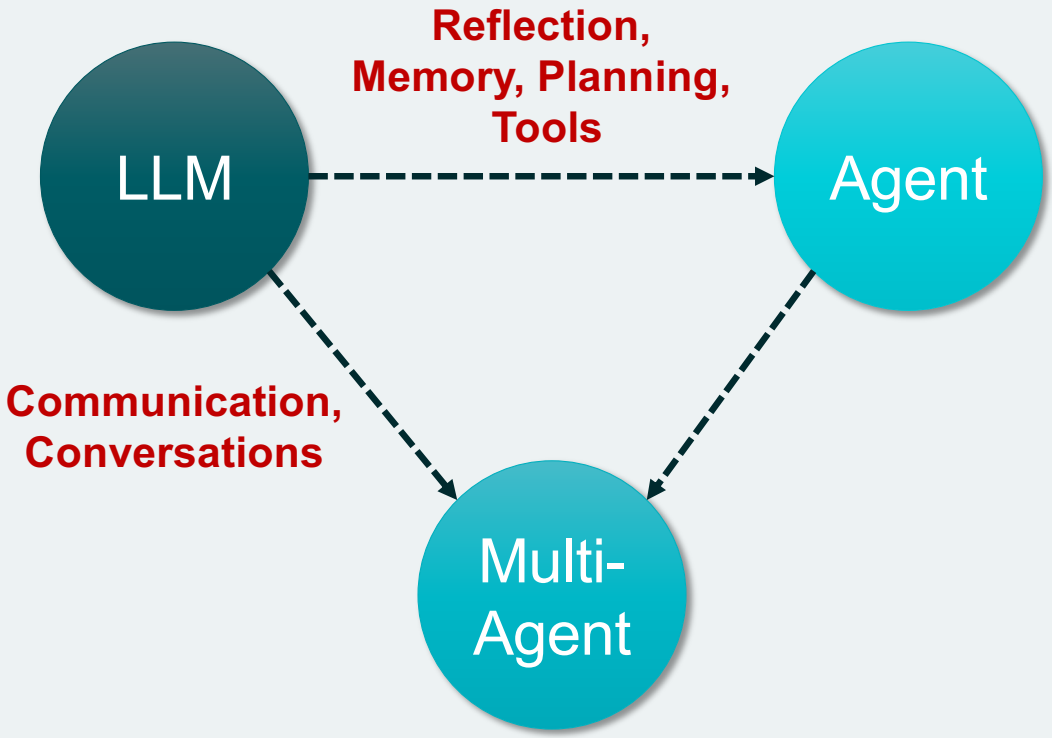
Laurent Magnin · Viet Thang Pham · Arnaud Dury · [...] ·

Arnaud Thiefaine

Multiagent applications will appear more and more in open, heterogeneous, evolving and distributed environments, such as the Internet. In order to run in such environments, agents will need to adapt themselves to new platforms and protocols. We propose a model of...

Read more

The contribution(s) of LLMs



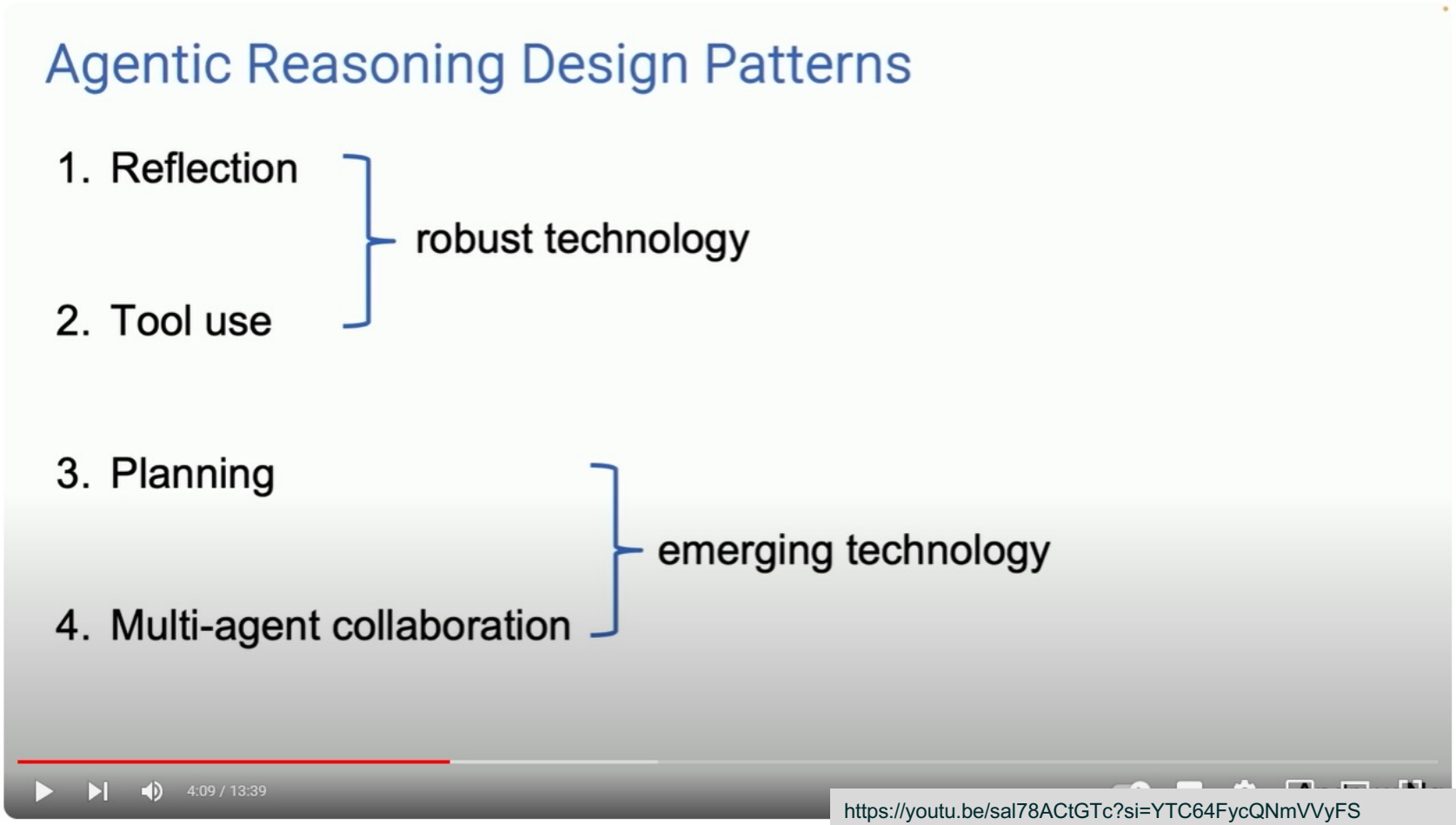
Agent + Agent = Crew

```
# Define your agents with roles and goals
llavabot = Agent(
    role="Image Interpreter",
    goal="Give details on images",
    backstory="""You are a chatbot that is specialized in interpreting provided images.""",
    verbose=False,
    allow_delegation=False,
    llm=ollama_llava,
)

claim_agent = Agent(
    role="Claim Agent",
    goal="You're a claim agent",
    backstory="""You are a claim agent working for an insurance company.
    You are responsible for determining if a vehicle is a total loss or not based on the damages description.""",
    verbose=False,
    allow_delegation=False,
    llm=ollama_llm,
    tools=[rag_guidelines_tool]
)

image_description = "Describe in details the dommages of this unique vehicle in the form of a bullet list."

# Create tasks for your agents
task1 = Task(
    llm=ollama_llava,
    description=f"""{image_description} {front_image} {back_image}.""",
    agent=llavabot,
)

task2 = Task(
    description="""Based on the provided damages descriptions, determine if that car is likely a total loss or not.
    Justify your opinion by listing the potential required repairs in a bullet format.""",
    agent=claim_agent,
)

# Instantiate your crew with a sequential process
crew = Crew(
    agents=[llavabot, claim_agent],
    tasks=[task1, task2], #task1_1, task1_2, task1_3
    verbose=2,  # You can set it to 1 or 2 to different logging levels
)
```

Is it a mature technology?

YouTube CA

Rechercher



https://youtu.be/sal78ACtGTc?si=YTC64FycQNmVVyFS
https://www.deeplearning.ai/the-batch/how-agents-can-improve-llm-performance/

What's next for AI agentic workflows ft. Andrew Ng of AI Fund

Sequoia Capital
29 k abonnés

S'abonner

4,6 k | Partager | Télécharger | Clip | ...

UQÀM

1. Reflection

Total Loss?


Is this vehicle a total loss?
Prompt: think step by step
Multiple “Specialized” LLM

What's next for AI agentic workflows ft. Andrew Ng of AI Fund

1. Reflection

Please write code for {task}

Here's code intended for {task}:

```
def do_task (x):
    ...
```

Check the code carefully for correctness, style and efficiency, and give constructive criticism for how to improve it.

```
def do_task(x): ...
```

```
def do_task_v2(x):
```

```
def do_task_v3(x):
```

Coder Agent
(LLM)

There's a bug on line 5. Fix it by …

It failed Unit Test 3. Try changing …

Prompt Engineering & Sequence of calls to LLMs are **Common Practices**

2. Tool Use

Total Loss?


Which vehicle in this image?
Specific tool: Image Segmentation
semantic_segmentation = pipeline("image-segmentation", "nvidia/segformer-b1-finetuned-cityscapes-1024-1024")

Total Loss?

[Prompt]: "Describe in detail the damages of this unique vehicle in the form of a bullet list."

[Image Interpreter] Task output: The image provided shows a vehicle that has been involved in an accident resulting in significant damage. Here are the details of the damages visible in the image:

- The front end of the vehicle appears to be crumpled and deformed, indicating a forceful impact.
- The hood is dented and damaged, with parts of it possibly bent or crushed.
- There may be scratches or paint chips on the exterior surfaces, such as the doors and fenders.
- The windows, if any, are likely shattered or cracked due to the impact.
- The suspension system may have been compromised, leading to potential issues with the handling of the vehicle.
- The tires may be damaged or flat, making it unsafe to drive the vehicle as it is.
- The engine compartment could also have sustained damage, which would require a professional assessment before the vehicle could be driven again.
- It is possible that the interior of the vehicle has been damaged, but this cannot be confirmed without further inspection.

Web Crawler,
Code Interpreter,
Image generator, etc.
are potential **TOOLS**

3. Planning

Total Loss?


What type of damages?
Which vehicle in this image?
Is there any other images of this vehicle?
What are the rules to determine a total loss?
How to determine the cost(s)?
What to do?

Total Loss?

3) What type of damages?

2) Which vehicle in this image?

1) Is there any other images of this vehicle?

4) What are the rules to determine a total loss?

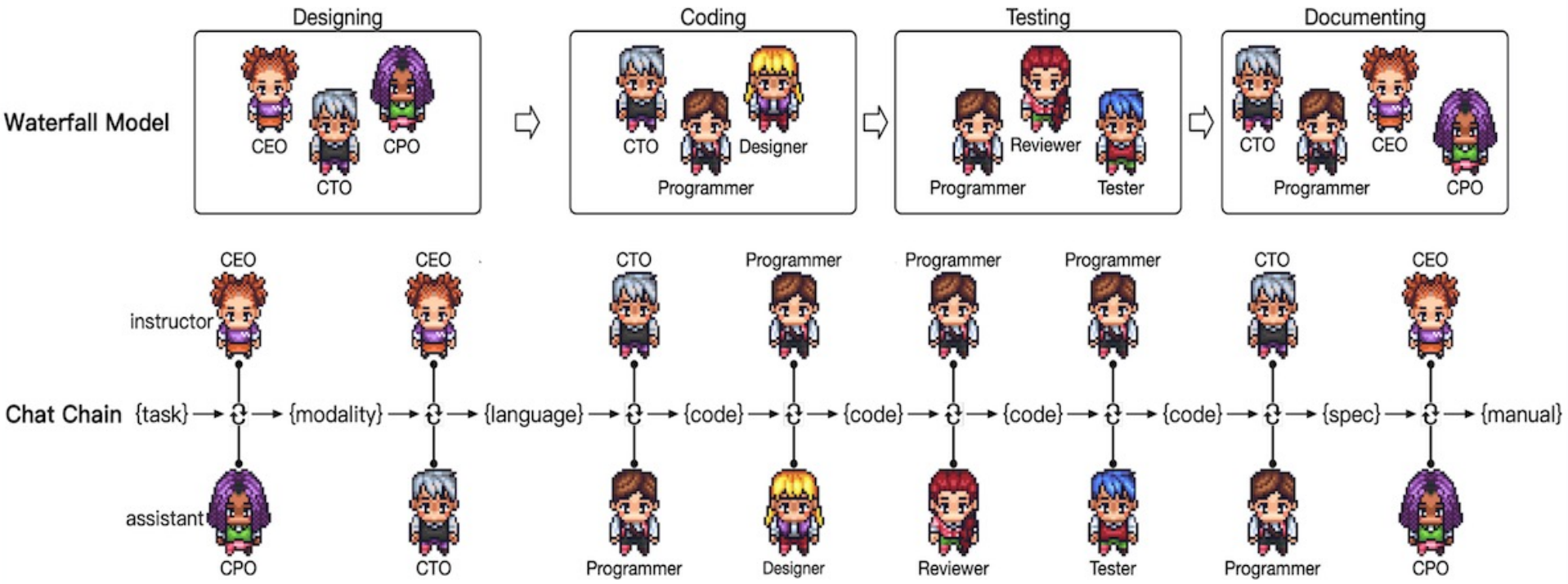
5) How to determine the cost(s)?

In which order?

When you cannot
advance step by step,
you must **PLAN**

4. Multiagent collaboration

Agentic Design Patterns: Multi-Agent Collaboration



Proposed ChatDev architecture. Image adapted from "Communicative Agents for Software Development," Qian et al. (2023).

From Non-Agentic to Agentic Workflows

LLM-based agents

Non-agentic workflow (zero-shot):

Please type out an essay on topic X from start to finish in one go, without using backspace.

Agentic workflow:

Write an essay outline on topic X

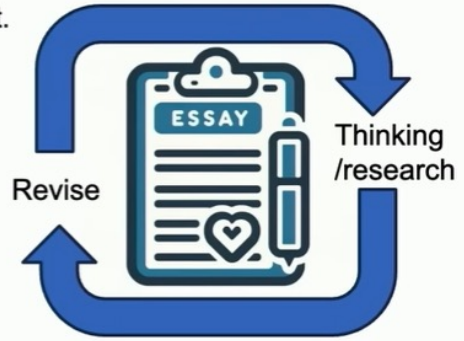
Do you need any web research?

Write a first draft.

Consider what parts need revision or more research.

Revise your draft.

....



What's next for AI agentic workflows ft. Andrew Ng of AI Fund

5. In the Industry


Google Ger
AI Agents
Google Gemini AI Agents
Next 2024 - GeeksforGee
Meet Llama 3.1
70B
OPENAI
INTRODUCING
SWARM
MULTI-AGENT FRAMEWORK
Search
GET STARTED
Overview
Quickstart
Concepts
Models
Libraries
Changelog
CAPABILITIES
Text generation
Vision
Function calling
JSON mode
Advanced usage
ENDPOINTS
Chat Completions
Databricks, Groq, Dell, Azure, Google Cloud, and Snowflake offering services on day one.
Try Llama 3.1 405B in the US on WhatsApp and at meta.ai by asking a challenging math or coding question.
files they reference in the Messages they create.

AI Agents Have Arrived

Google Cloud

Prep: Robert Maciejko (not pictured)

Agent type	Task	Examples
Customer	Enhance customer interactions and service across various channels	SAMSUNG, Alaska Airlines, ING
Employee	Improve productivity by automating tasks and providing support	McDonald's, Bayer, Uber
Creative	Support creative tasks in marketing and design for content generation	Carrefour, WPP, P&G
Data	Enable advanced data analysis, helping to uncover insights and inform decisions	Spotify, McLaren Formula 1 Team, orange
Code	Assist developers in improving software quality and speeding up development	Commerzbank, wayfair, Capgemini
Security	Boost cybersecurity efforts through automated monitoring and threat detection	BBVA, Pfizer, charles SCHWAB

Source: “101 real-world gen AI use cases from the world's leading organizations” - Google Cloud, picture - Midjourney

Conclusion & Perspectives

GenAI Agents –
A ***robust technology*** that
enhances LLM/GenAI capabilities

GenAI MultiAgents –
An ***emerging technology***
that could become a ***game changer***