LeverX

INNOVATE TODAY
TO LEAD TOMORROW

Retrieval Augmented Generation (RAG)
in SAP BTP

Global System Integrator Trusted by Fortune 500 Companies

800+
clients

1,600+
employees

950+
successful projects

20
years of close collaboration with SAP

9
countries

14
offices

15
time zones
UTC-8 to UTC+6

LeverX

LeverX is an international company with vast expertise serving companies all over the world. We power companies' digital transformation and provide our partners and customers with a full range of high-quality services, from consulting and implementation to support.

emer||ne

Operates as a part of LeverX and provides full software development services for startups and established companies in both consumer and enterprise areas.

SAP Gold Partner

member of the SAP AppHausNetwork

aws PARTNER Advanced Tier Services

Google Cloud Partner

Microsoft Solutions Partner

SAP Global Strategic Supplier

ISO 9001 LL-C (Certification)

ISO 27001 LL-C (Certification)

ISO 55001 LL-C (Certification)

ISO 22301 LL-C (Certification)

Presenters

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Head of Automated Information
System Development,
LeverX

Background

*Today the typical office worker spends **10%** of their time on manual data entry into business applications, such as the ERP system, CRM or spreadsheets. In total, they spend over **50%** of work time creating or updating documents, eg. PDFs, spreadsheets or word documents.*

workfellow.ai

*Employees spend **1.8 hours** every day searching and gathering information.*

McKinsey & Company

Percent of hours worked today that can be automated by 2030

21.5%
Without generative AI

29.5%
With generative AI

McKinsey & Company, 2023

Motivation

6
workshops

As a part of annual LeverX Innovation Forum and Design Thinking customer workshops

70
participants

Our valued customers and partners from different industries and teams
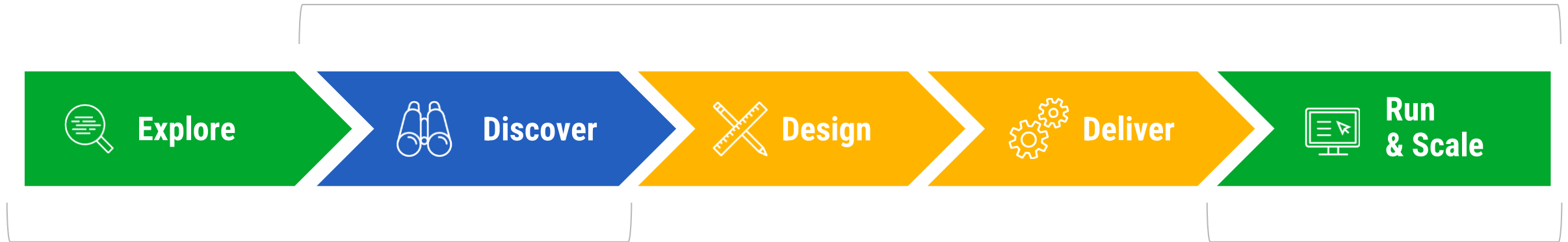
LeverX
AppHaus

Proven SAP methodology

3

The most popular use cases connected with AI

Execution

LeverX BTP Enterprise Evolution Center Team

| Explore | Discover | Design | Deliver | Run & Scale |

LeverX AppHaus | member of the SAP AppHaus network

LeverX Operations Team

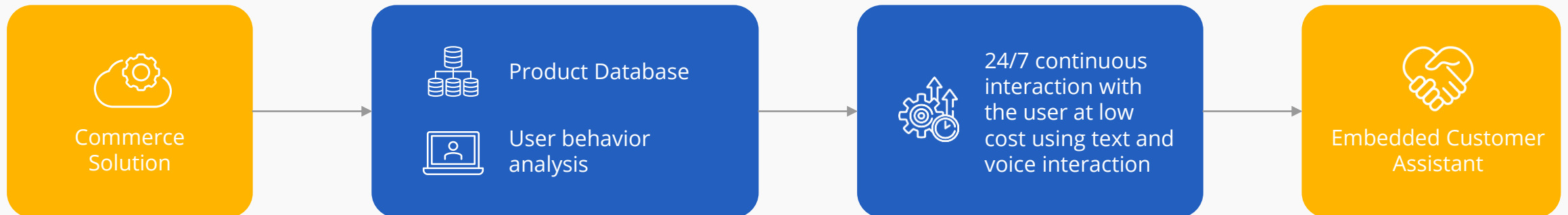# Use Case #1. Customer Service

Challenge

- The huge product knowledge base
- Structured and unstructured data
- Communication in many languages
- Necessity to cover 24/7 interval

Benefits

- Improving the quality of customer service
- Available 24/7
- Reduces the cost of customer service
- Collecting data required for marketing strategies

Solution

Commerce Solution → **Product Database / User behavior analysis** → **24/7 continuous interaction with the user at low cost using text and voice interaction** → **Embedded Customer Assistant**
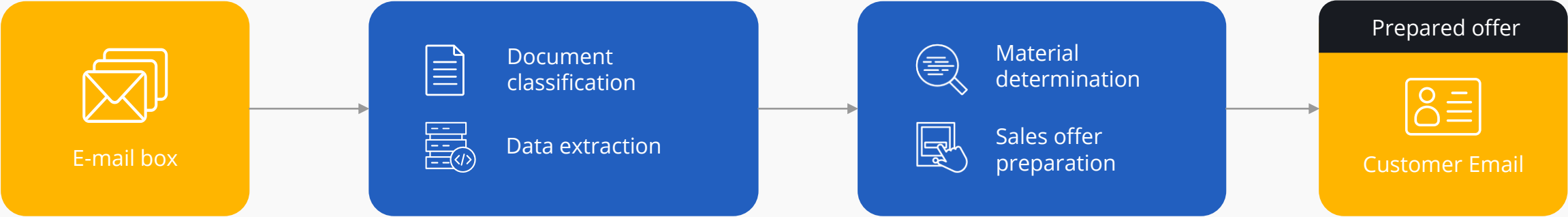
Use Case #2. Sales Engine

Business challenge

- Large amounts of customer inquiries
- Time-consuming task in the sales department
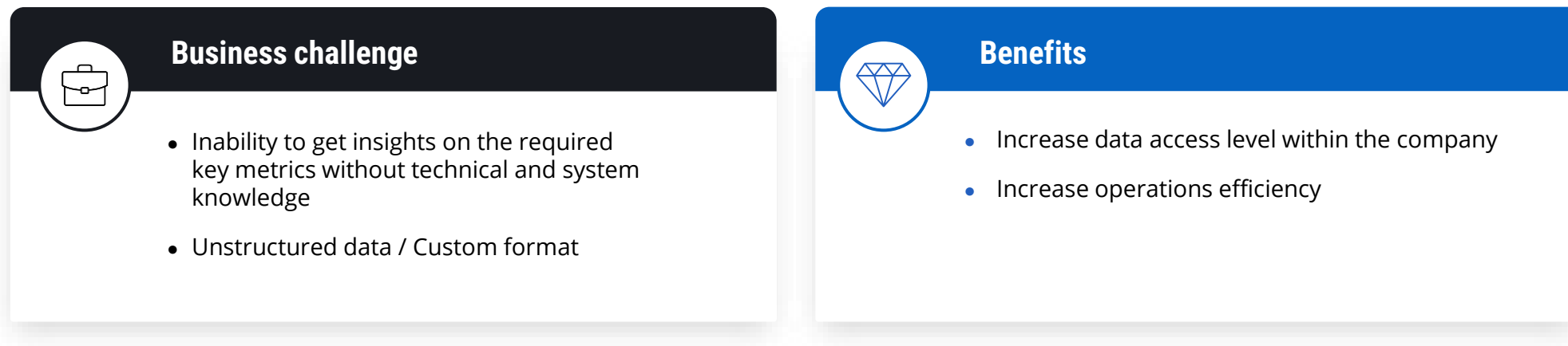- Various formats of incoming requests

Benefits

- Reducing redundancy, time and manual work, increase efficiency
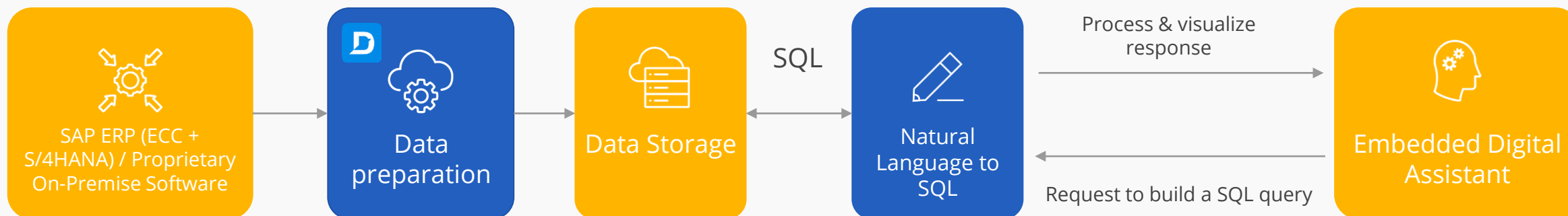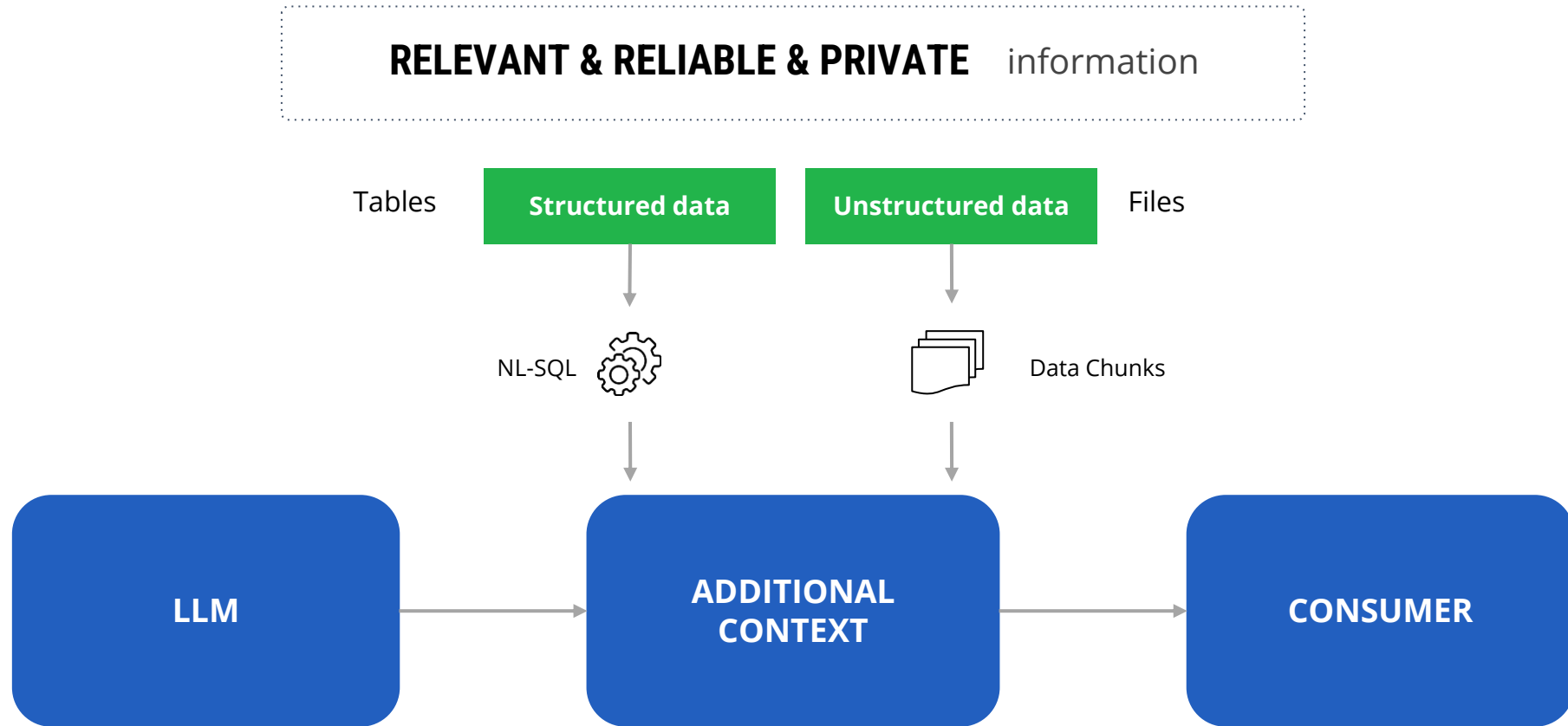- Enable teams to Focus on strategic tasks and strategic customers

Solution

E-mail box → Document classification / Data extraction → Material determination / Sales offer preparation → Prepared offer / Customer Email

Use Case #3. Chatting with the data

Business challenge

- Inability to get insights on the required key metrics without technical and system knowledge

- Unstructured data / Custom format

Benefits

- Increase data access level within the company

- Increase operations efficiency

Solution

SAP ERP (ECC + S/4HANA) / Proprietary On-Premise Software → Data preparation → Data Storage ← SQL → Natural Language to SQL

Process & visualize response →

Embedded Digital Assistant

← Request to build a SQL query

Why Retrieval Augmented Generation (RAG)?

RELEVANT & RELIABLE & PRIVATE information

Tables | **Structured data** | **Unstructured data** | Files

NL-SQL

Data Chunks

LLM → **ADDITIONAL CONTEXT** → **CONSUMER**

Via external documents, embeddings, prompt engineering, data input conversion and a vector database

POC

Phase 1

Analysis of existing emails and mapping it to DB products using OpenAI and custom algorithms. Releasing it in a separate research report for evaluation algorithm matching score. Using Azure infrastructure for OpenAI API and attachments parsing.

Phase 2

Providing question answering solution by conversion natural language into SQL queries. PoC will handle questions for finding products of a particular size or shape.
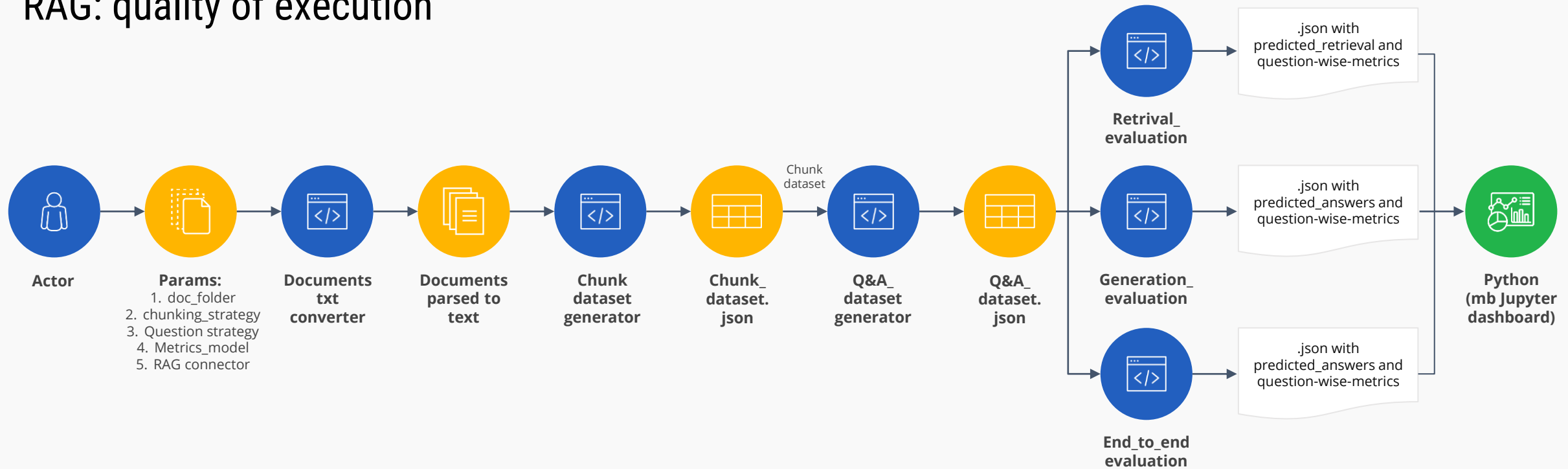
Phase 3

Creation web single page application based on Streamlit in customer infrastructure which allows to enter email text and attachment and see suggested mapping with existing database, and also have a chat functionality that returns mapping to existing products.

Phase 4

Wrapping algorithms into API to consume via UI.

RAG: quality of execution

Pipeline diagram labels

Actor → Params:
1. doc_folder
2. chunking_strategy
3. Question strategy
4. Metrics_model
5. RAG connector

→ Documents txt converter → Documents parsed to text → Chunk dataset generator → Chunk_dataset.json (Chunk dataset) → Q&A_dataset generator → Q&A_dataset.json

Retrival_evaluation → .json with predicted_retrieval and question-wise-metrics

Generation_evaluation → .json with predicted_answers and question-wise-metrics

End_to_end evaluation → .json with predicted_answers and question-wise-metrics

→ Python (mb Jupyter dashboard)

Goal	Approaches	Results
Measure quality of RAG system in numbers: 1. Same model over different datasets (validate model stability) 2. Different models on same dataset (to compare models) 3. (stretch goal) Our approach vs SaaSes (like ChatGPT)	1. Retrieval evaluation 2. Generation evaluation 3. End-to-end evaluation	1. There is no one-size-fits-all solution 2. Experimental pipeline configuration improvement 3. Combination of automated and human evaluation

Unstructured data problem

Problem: ⟶

- Complexity in understanding data in various formats (CAD, PDX, etc.)

- Processing photos including handwritten text

Solution:

1   **Extract data from various sources**

2   **Use OCR to process handwritten text (if required)**

3   **Data pre-processing**

4   **Chunk size & strategy optimization**

Synonyms problem

Problem:

- Different ways to access the data by different people which need to be supported by Natural Language to SQL transformation

- Professional and unclear terminology

Solution:

1 **Analyze queries and responses**

2 **Create possible synonyms base**

3 **LLM prompt engineering**

Accuracy & Scale problem

Problem:

- Not concrete answers (for example when LLM can't decide)

- This correlates with data growth

Solution:

1 **Data preparation & cleanup**

2 **LLM prompt engineering**

3 **Verification & adjustments**

SAP BTP Services and Capabilities

Systems

S/4HANA

3rd Party ERPs

Proprietary Software

Commerce Solutions

SAP BTP

Application Runtime & Automation

Micro services & UI of the digital assistants

Build Code

Build Executable Process AI

AI Core & AI Launchpad

Generative AI Hub

Analytics Cloud

Just ASK

Data Persistence

HANA Cloud with vector support

Ops Automation

Automation Pilot

Foundational Model Provider

LLM

Conclusions

SAP's GenAI Mail Insights

The scenario presents a comprehensive SaaS solution for enhancing customer support within a travel agency, utilizing advanced email insights and automation.

https://github.com/SAP-samples/btp-cap-genai-rag

FEBRUARY 8, 2024

Webinar #1
Use cases and best practices in SAP BTP integration

FEBRUARY 22, 2024

Webinar #2
Automating manual routine tasks using AI and SAP Build Process Automation

MARCH 7, 2024

Webinar #3
SAP BTP as a platform for SAP and non-SAP systems extensions development

MARCH 21, 2024

Webinar #4
Intelligent technologies: SAP BTP and its AI capabilities

APRIL 4, 2024

Webinar #5
SAP Datasphere & SAP Analytics Cloud: central enterprise data & analytics layer

APRIL 18, 2024

Webinar #6
SAP BTP landscape modernization best practices

Elevate Your Business with SAP Business Technology Platform

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Thank you!

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