Proposed functionalities and architecture of the SFIDA2 project, a challenge for the Italian Armed Forces

Lt. Col. Romano DELL'AERE

Agenda

Intro... short version

Requested Functionalities

System Architecture and AI implementation

Next Steps and challenges

Objectives: SFIDA 2

Create a **Learning ecosystem** that integrates digitized resources of various kinds and Artificial Intelligence algorithms in order to allow the development of **Integrated Digital Curriculum** with both traditional and innovative methodologies,
in an agile and flexible manner, to meet the **continuous learning and reskilling** needs of Defense personnel… and has to be interoperable with the existing learning systems, not supersede them…

…And has to be property of Defence.

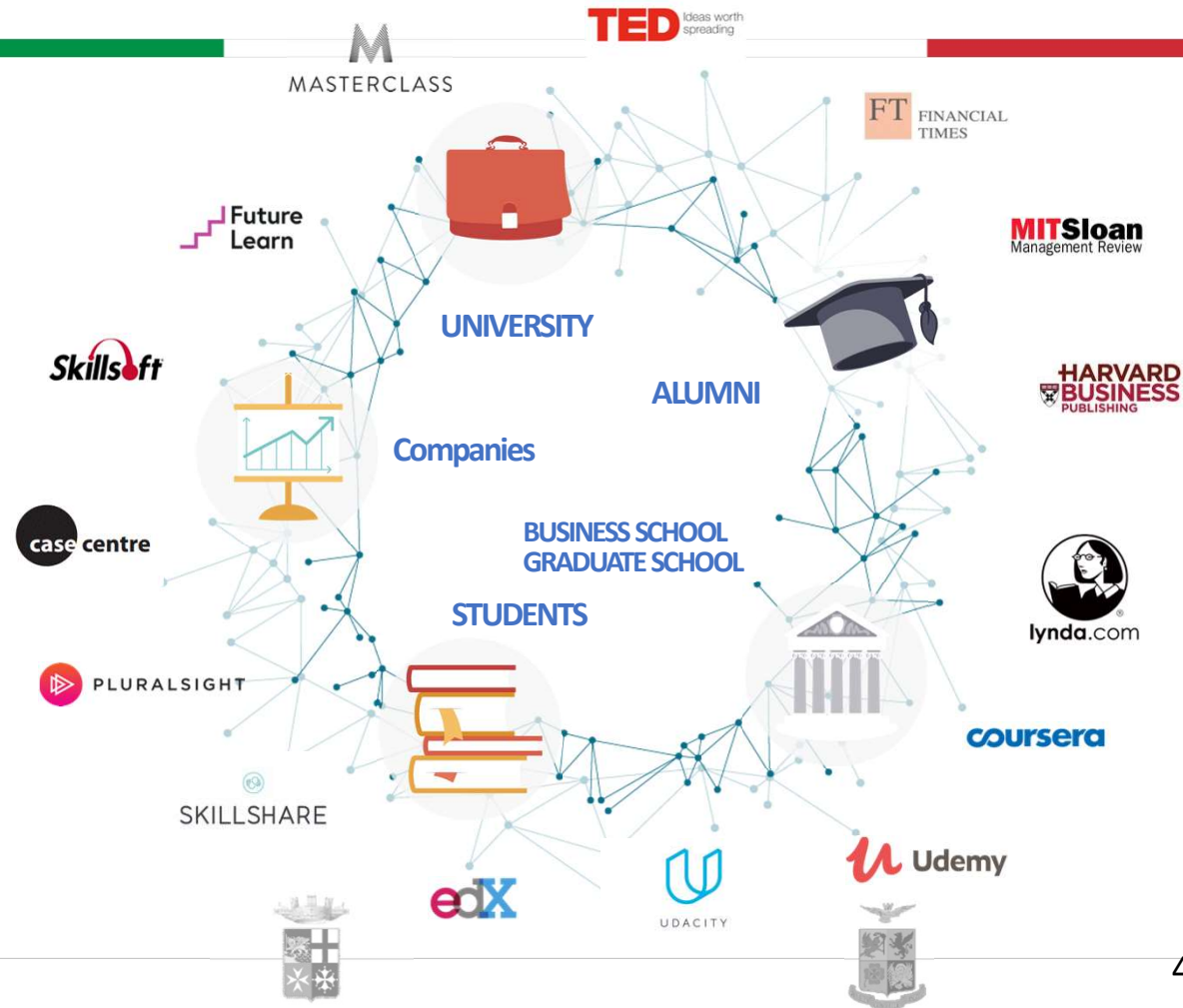# So many Actors…

…and the winner is???

Polytechnic University of Milan

Artificial Intelligence Research and Innovation Center

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Functionalities

Survey:

- Support the learner with ad hoc study material related to the assignment — 2
- Identification of the most suitable courses related to the assignment — 2
- Flexible, agile, continuous learning — 7
- Diversification and personalization of the educational offering — 3
- Autonomy in updating courses (integration with existing platform)
- Incentive for training — 6
- Feedback integration — 3
- Reports — 1

Proposal:

- 5 RECOMMENDATION
- 3 SUMMARIZATION
- 3 ASSISTANT
- 2 QUIZ GENERATION
- 2 MULTI MODALITY
- 3 COMMUNITY
- 2 ACTIVE RECALL OPTIMIZATION
- 2 SEARCH AND INTEGRATION
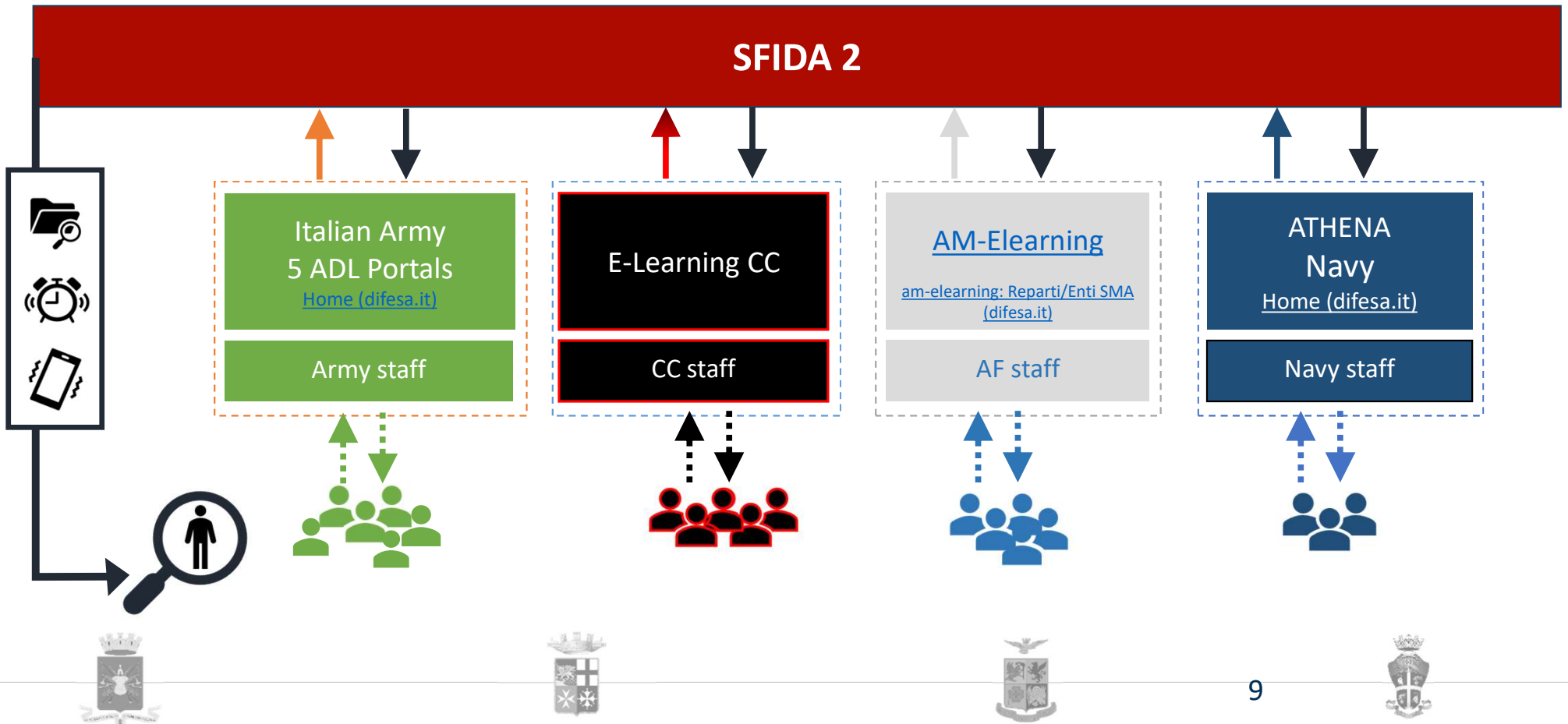- 2 EVALUATION

Integration with existing LMS

SFIDA 2

Italian Army
5 ADL Portals
Home (difesa.it)

Army staff

E-Learning CC

CC staff

AM-Elearning

am-elearning: Reparti/Enti SMA (difesa.it)

AF staff

ATHENA
Navy
Home (difesa.it)

Navy staff

Requested Functionalities

SFIDA 2

Support to faculty/curriculum development (Admin Interface)	SUPPORT TO LEARNER (Student Interface)	SUPPORT TO CONTENT CREATION (Teacher Interface)
RECOMMENDATION	RECOMMENDATION	
COMMUNITY	DIGITAL ASSISTANT	
SEARCH AND INTEGRATION	SUMMARIZATION	SUMMARIZATION
ACTIVE RECALL OPTIMIZATION	MULTI-MODALITY	
EVALUATION	QUIZ GENERATION	QUIZ GENERATION

Legenda
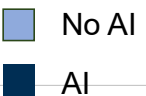
No AI

AI

Recommendation

SFIDA 2

Support to faculty/curriculum development (Admin Interface)	SUPPORT TO LEARNER (Student Interface)	SUPPORT TO CONTENT CREATION (Teacher Interface)
RECOMMENDATION	RECOMMENDATION	

Definition

Recommendation System is an AI model designed to automatically suggest services or content to users based on their preferences and past behaviors

Objectives:

- Recommend courses based on the skills needed to fill a position, or best for the carrier;
- Recommend people suitable for a position based on courses taken and skills acquired
- Recommend assignments to users based on courses taken and skills acquired

Recommendation

Objectives:

- Recommend courses based on the skills needed to fill a position, or best for the carrier;
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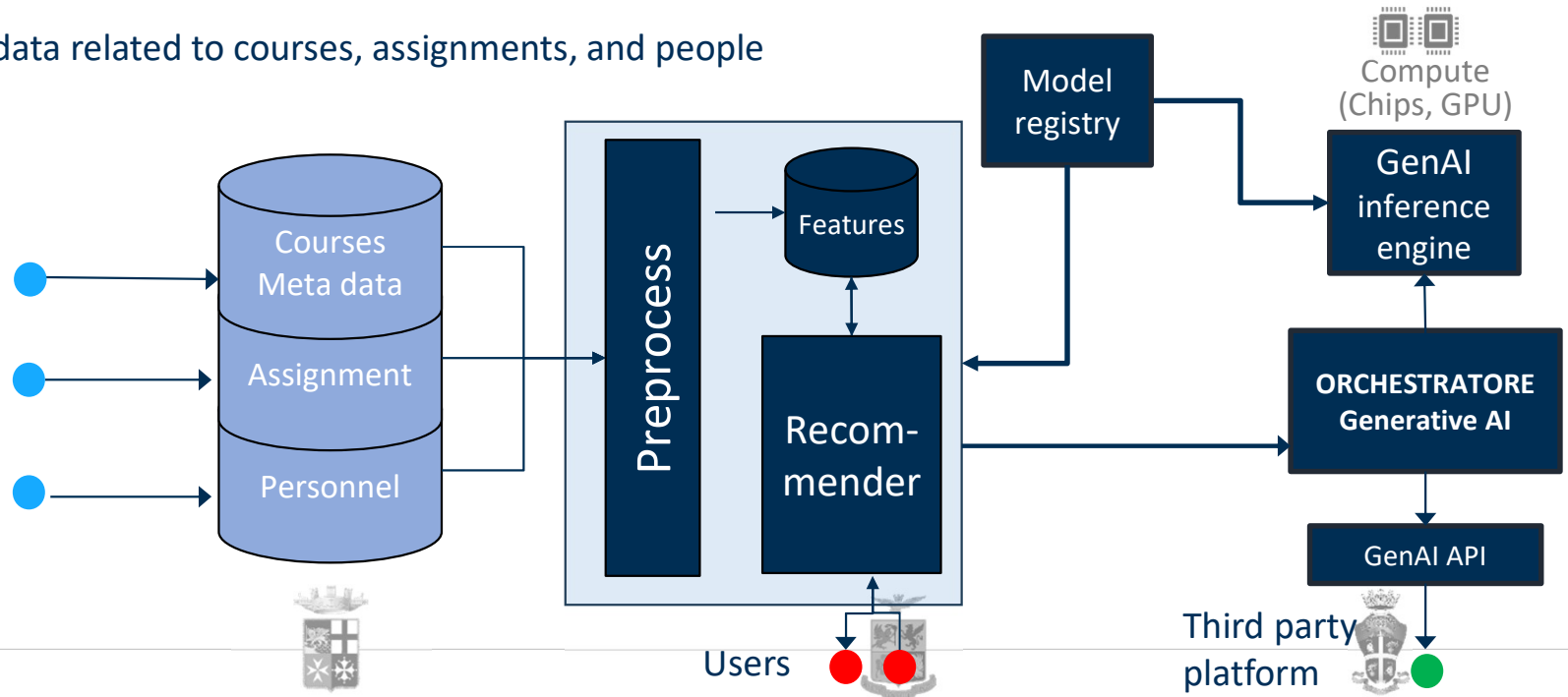- Recommend assignments to users based on courses taken and skills acquired

Focus on the analysis of data related to courses, assignments, and people

Search and Integration

SFIDA 2

Support to faculty/curriculum development (Admin Interface)	SUPPORT TO LEARNER (Student Interface)	SUPPORT TO CONTENT CREATION (Teacher Interface)

SEARCH AND INTEGRATION

Definition

The Search systems provide content (text documents, videos, audio…) or references to content (links, directories…) related to a specific topic requested by the user, as well as references to entire courses.

Objectives:
- Search for educational content or external documentary sources
- Indicate supplementary educational material or entire courses from public sources/organizations

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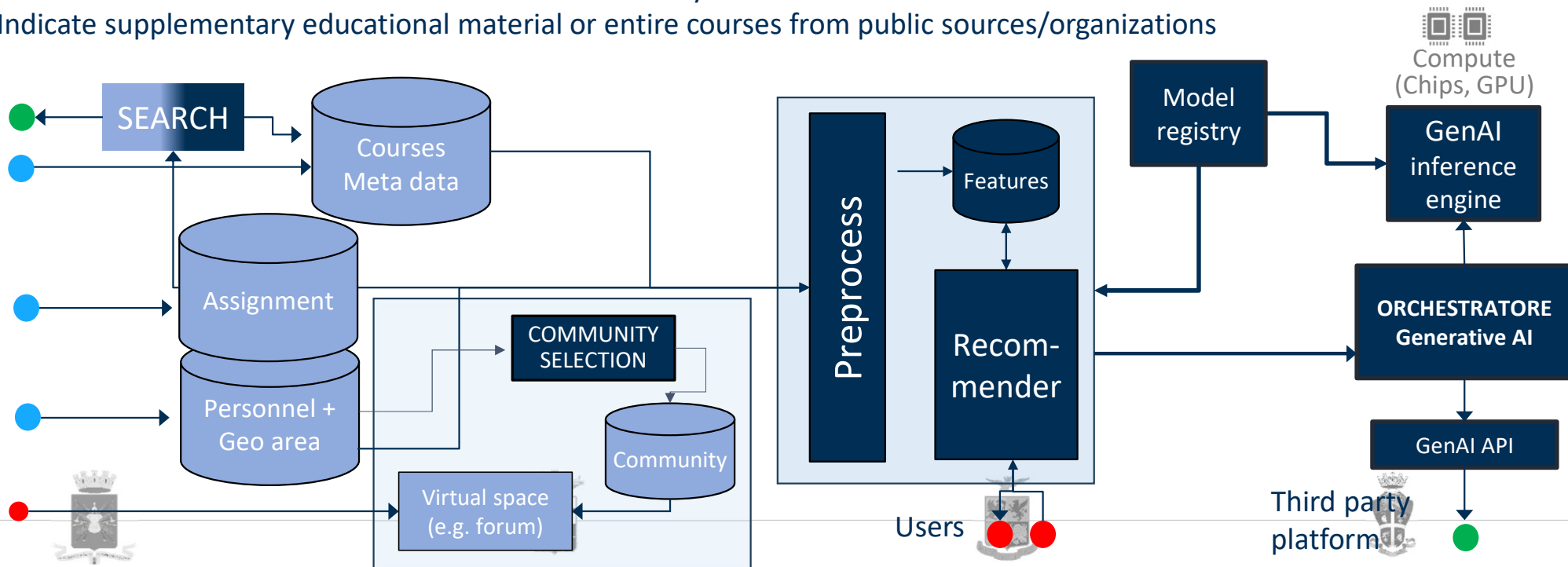- Indicate supplementary educational material or entire courses from public sources/organizations

Active Recall Optimization

SFIDA 2

Support to faculty/curriculum development (Admin Interface)	SUPPORT TO LEARNER (Student Interface)	SUPPORT TO CONTENT CREATION (Teacher Interface)

ACTIVE RECALL OPTIMIZATION

Definition:
An Active Recall propose short tests after a certain predetermined period of time, from the end of the course, with the goal of retaining as much knowledge as possible on specific topics.

Objectives:
- Maximize knowledge retention.
- Analyze students' response to recall stimuli to better plan when to carry out recall actions for different individuals.

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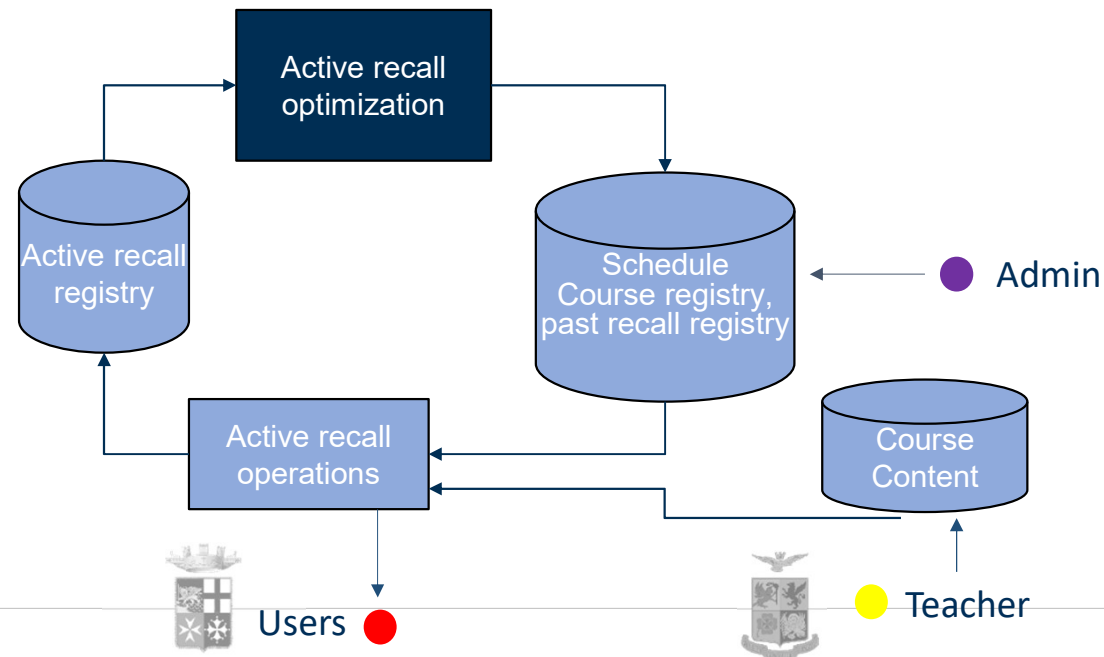
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Overall SFIDA2 Architecture
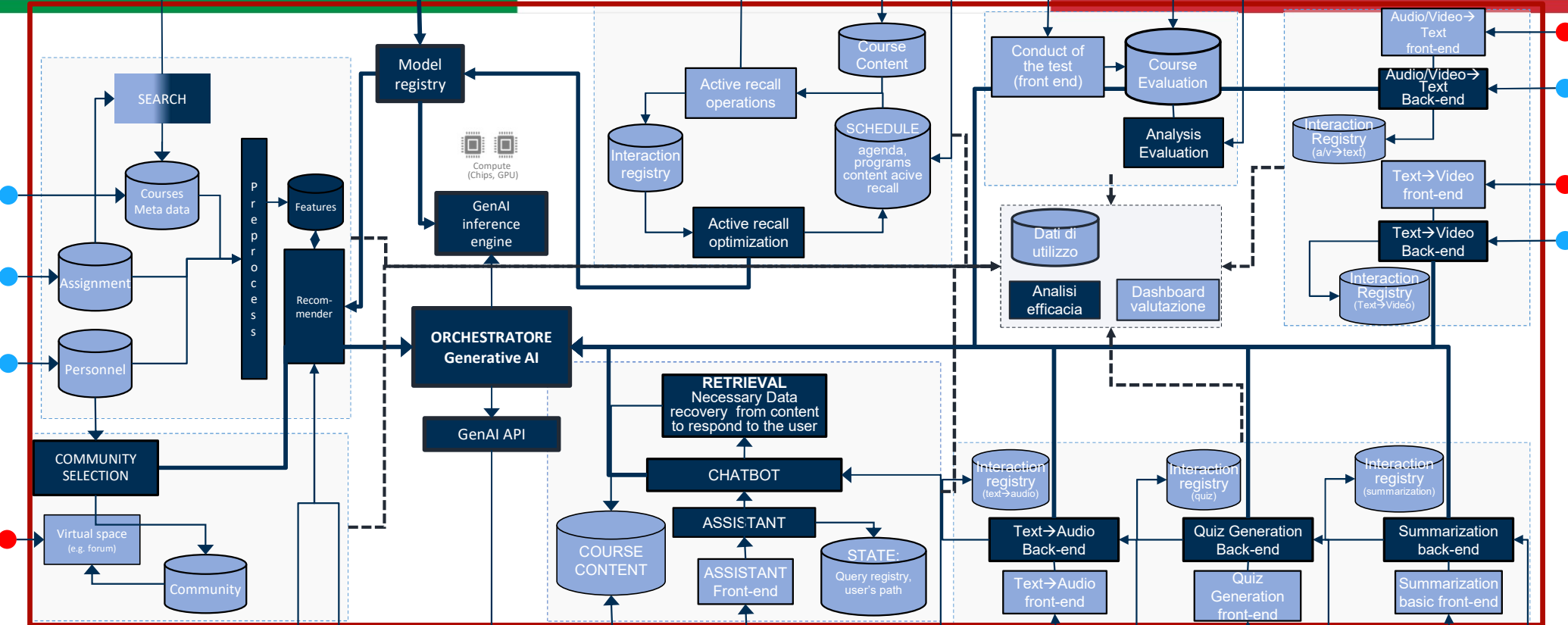
Overall System Architecture

SFIDA 2

Infrastructure & Tooling

Active recall optimization

Evaluation

Intelligent analysis of skills, courses, and assignments

Recommendation, Community, Search

Generative AI models

Learning assistant

Gen AI high-level capabilities

Summarization, Quiz generation, Multi modality

Legenda

☐ No AI ■ AI

Overall System Architecture

SFIDA 2

Model registry

Compute (Chips, GPU)

GenAI inference engine

Intelligent analysis of skills, courses, and assignments

Recommendation, Community, Search

ORCHESTRATOR Generative AI

GenAI API

Active recall optimization

Evaluation

Learning assistant

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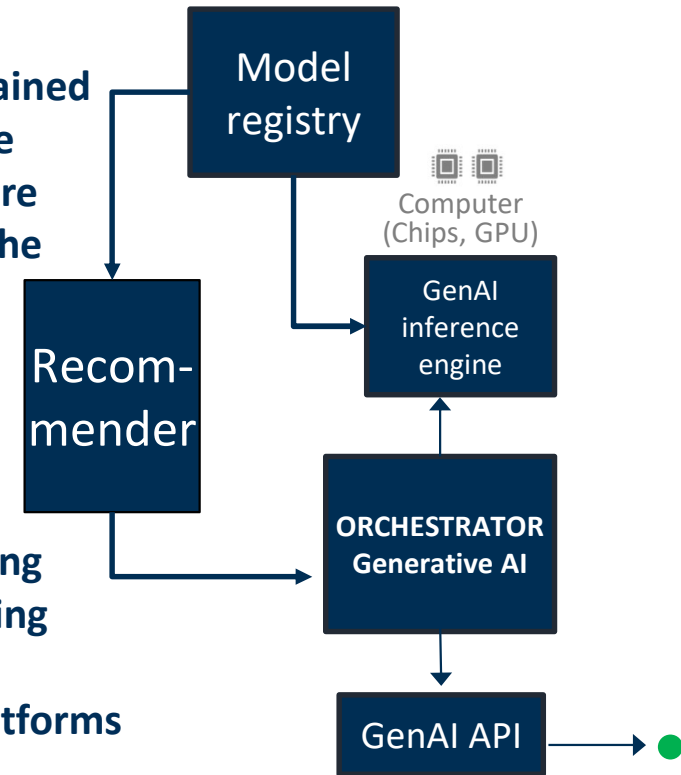
Audio/Video→

CO...
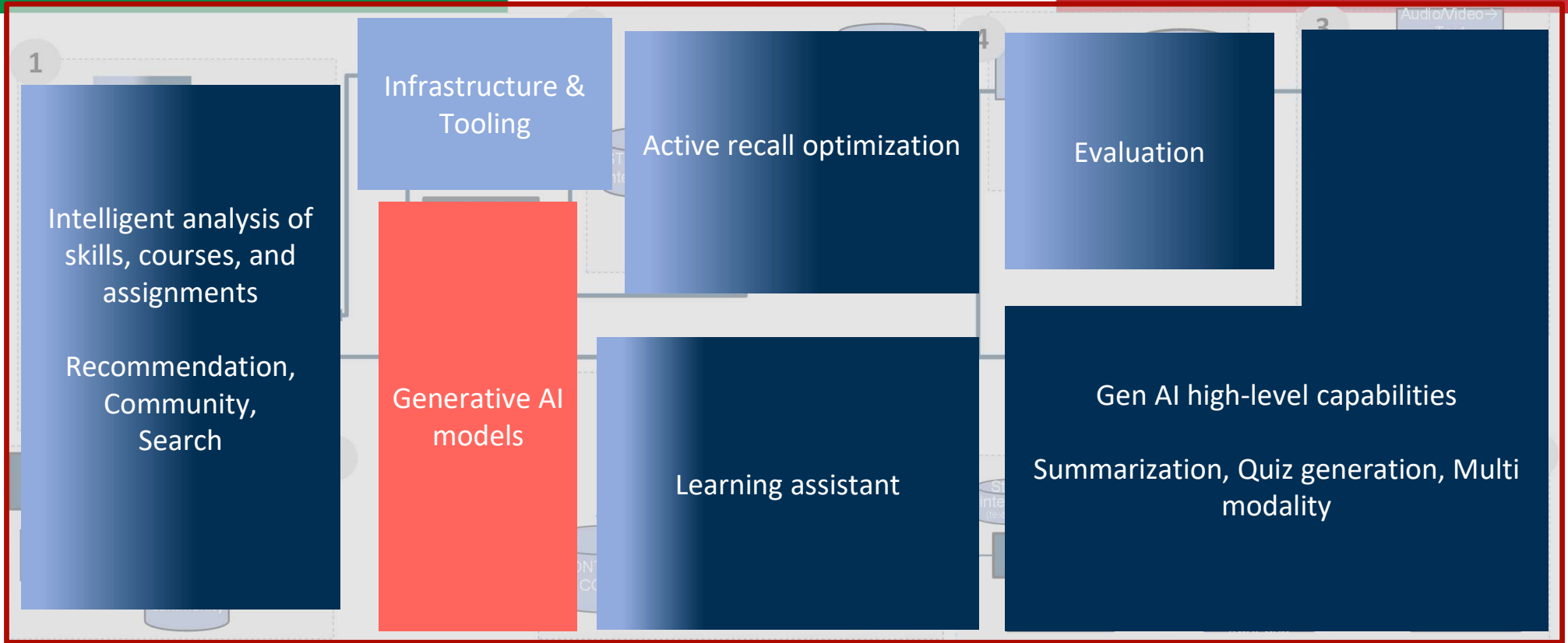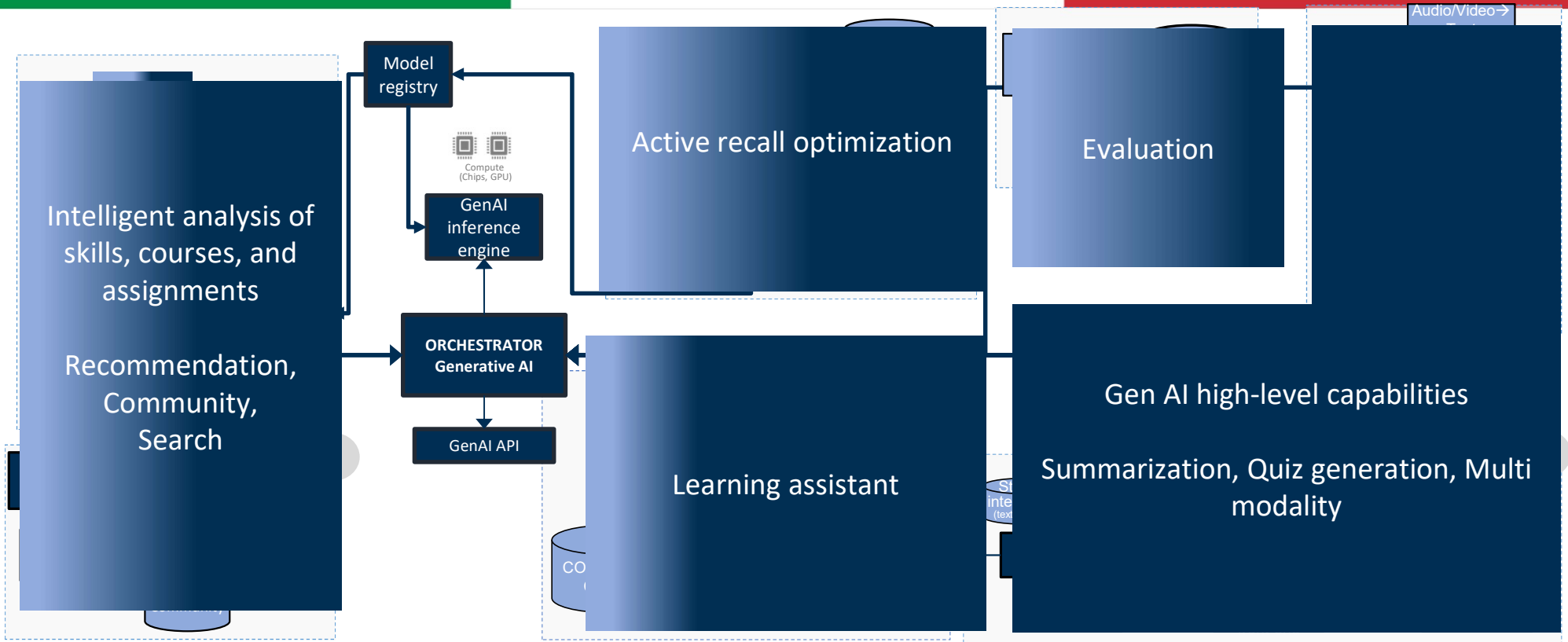
Legenda

☐ No AI   ■ AI

Overall System Architecture

- **Model Registry:**

module that implements a true registry of all Machine Learning models trained for various functionalities, along with all the necessary metadata to ensure appropriate governance processes (e.g., data tracking from which they were trained, time intervals, model versions, performance characteristics, and the target for use in the case of customized models)

- **Generative AI Inference area:**

This area encompasses all the modules required for efficient, compliant, and standardized access to foundational Generative AI models (e.g., Large Language Models). Access to these models can occur in one of two opposing modes, which in SFIDA2 are mediated by an orchestrator capable of deciding when it is more appropriate to use one or the other.

- **API Access to Models Managed by Service Providers via Third-Party Platforms**
- **Local Inference on an Internal Computational Cluster**

Model registry

Computer (Chips, GPU)

GenAI inference engine

Recom-mender

ORCHESTRATOR Generative AI

GenAI API

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Step 1, 2, ...

01

- ✓ **Recommender** (data preprocessing & feature extraction, Course recommandation)
- ✓ **Summarization**
- ✓ **Quiz generation**
- ✓ **Gen AI inference** (orchestrator, API interface o local inference cluster)
- ✓ **Evaluation** (data collection and integration)

02

- ✓ **Active Recall** (operationalization)
- ✓ **Multimodality** (text to speech, speech to text)
- ✓ **Recommender** (Content recommandation)
- ✓ **Ricerca** (Integrazione data sources)
- ✓ **Evaluation** (KPI visualization and evaluation)
- ✓ **Gen AI inference** (API interface o local inference cluster)

03

- ✓ **Community**
- ✓ **Ricerca** (course scraping)
- ✓ **Assistant**

04

- ✓ **Multimodality** (text to video)
- ✓ **Active Recall** (optimization)
- ✓ **Recommender** (assignment → personnel, personnel → assignment)

The Roadmap ...2025-2026

Challenges

- Implementation effort (make vs buying)

- Secure sharing and management (transit and storage) of sensitive data

- Need for specialized and high-profile skills for the development of certain components (e.g., Generative AI models, active recall optimization)

- Timelines for collecting historical data for the development of some models (e.g., active recall optimization)

- Platform maintenance (requires a team with specific skills)

Integration with existing LMS

SFIDA 2

Italian Army Elearning	E-Learning CC	Air Force-Elearning	Navy Elearning
Army staff	CC staff	AF staff	Navy staff