COMPONENTS OF AN AI PIPELINE

Working Group on AI for Modeling

Brussels, December 2025

European Commission

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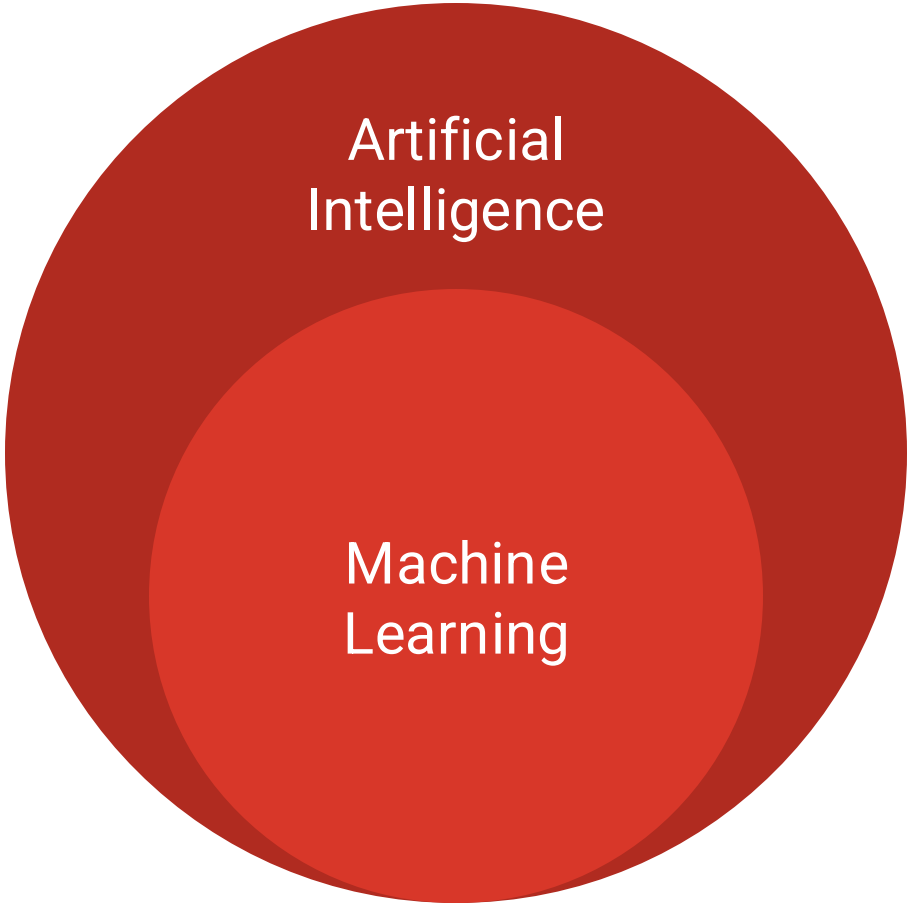

"A machine learning pipeline is the **systematic process of designing, developing and deploying** a machine learning model."

(Belcic & Stryker, IBM)

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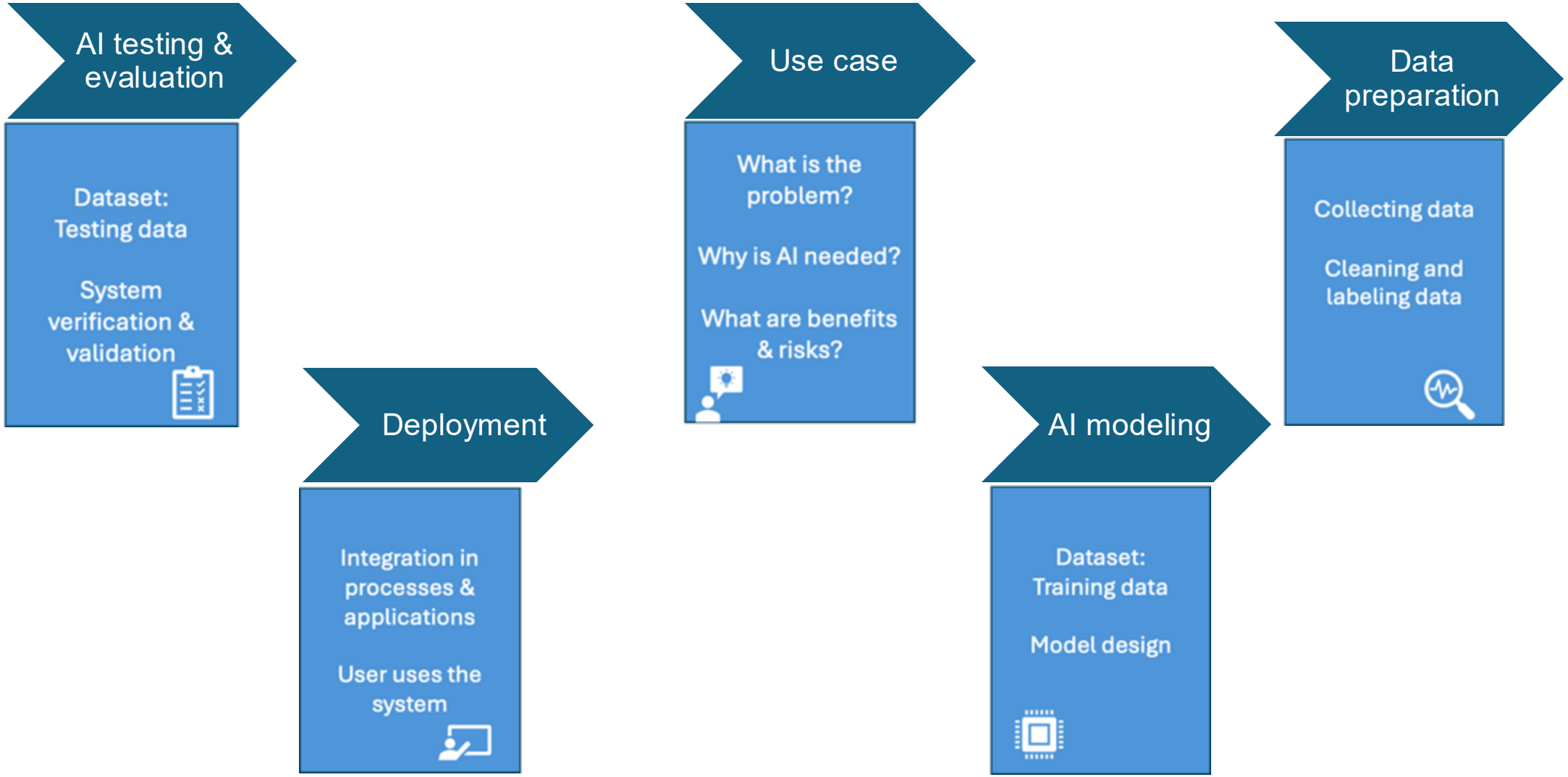

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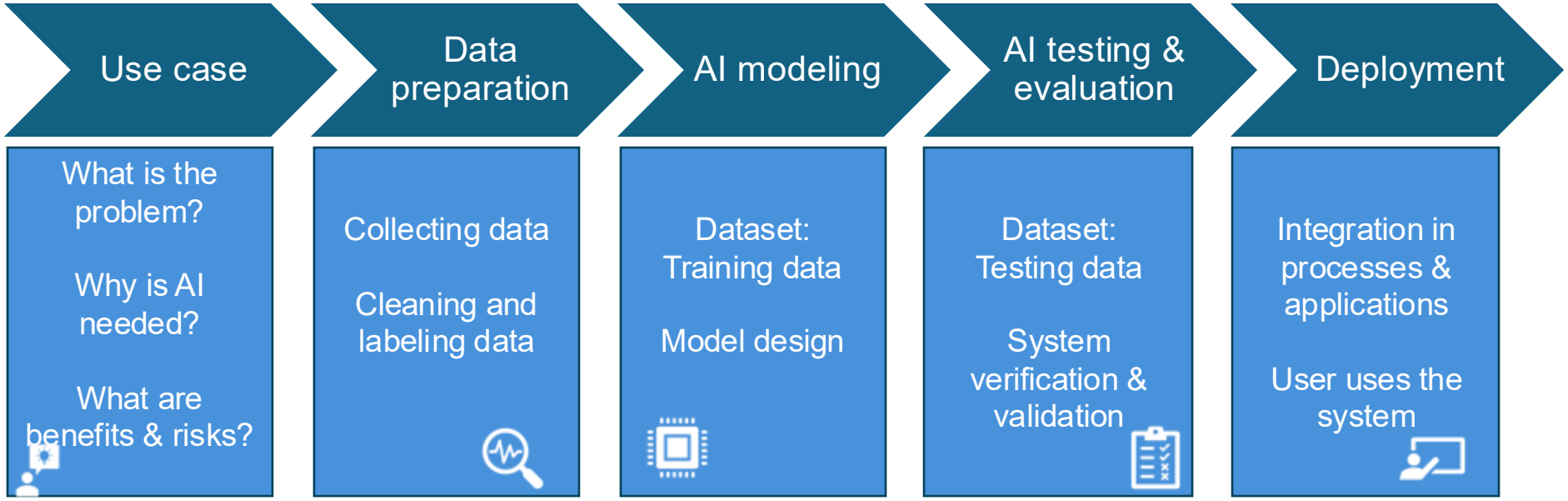

(*adapted from* Vincenzi et al., 2024)

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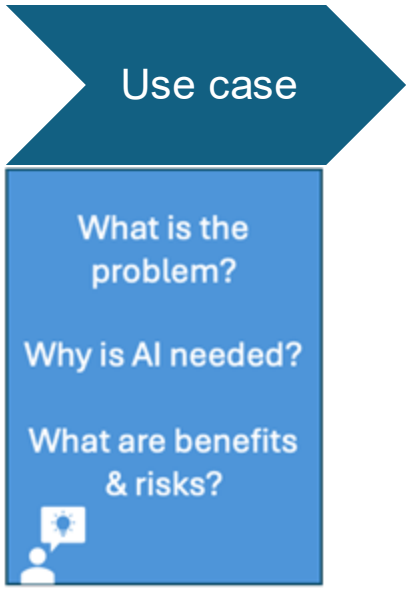

Firefighters try to extinguish a wildfire near the town of Olympia, Greece on 5 August 2021. (source: CNN World)

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Use case

What is the problem?

Why is AI needed?

What are benefits & risks?

Before and after flooding: aerial pictures of the city Altenahr, Germany. (source: Deutsche Welle)

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Data preparation

Collecting data

Cleaning and labeling data

FireCube: A Daily Datacube for the Modeling and Analysis of Wildfires in Greece

Prapas, Ioannis[1] ; Kondylatos, Spyros[1] ; Papoutsis, Ioannis[2]

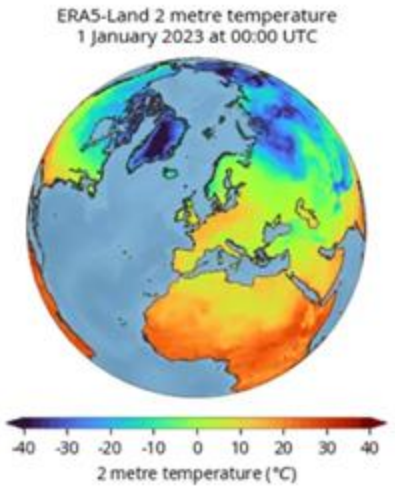
dataset_greece.nc

This dataset is meant to be used to develop models for next-day
contains the following variables for the years 2009 to 2021 at a d

ERA5-Land hourly data from 1950 to present

Overview | Download | Documentation

ERA5-Land is a reanalysis dataset providing a consistent view of the evolution of land variables over several decades at an enhanced resolution compared to ERA5. ERA5-Land has been produced by replaying the land



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AI modeling

Dataset:
Training data

Model design

AI testing & evaluation

Dataset:
Testing data

System verification & validation

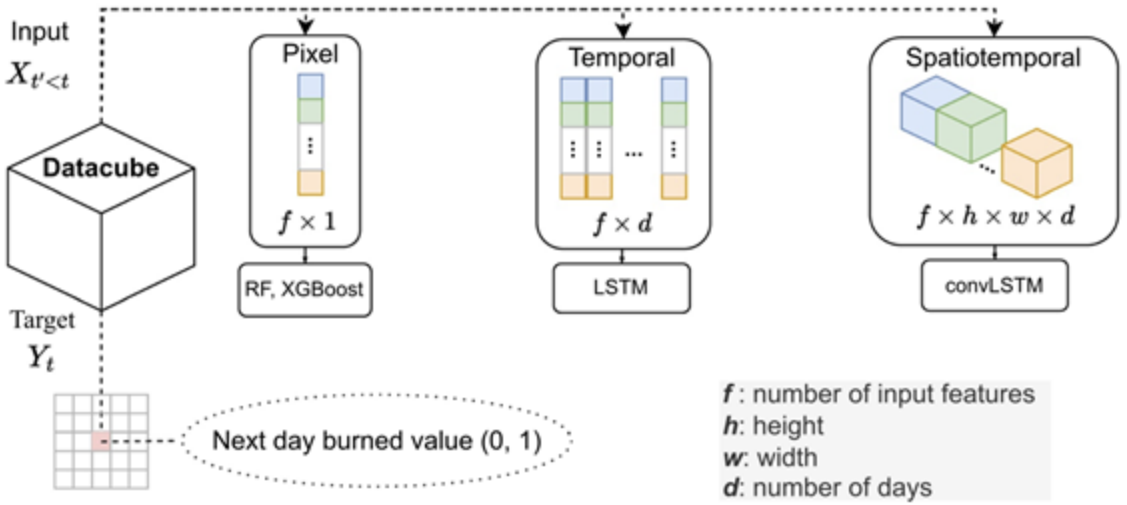

Image from Kondylatos et al. (2022)

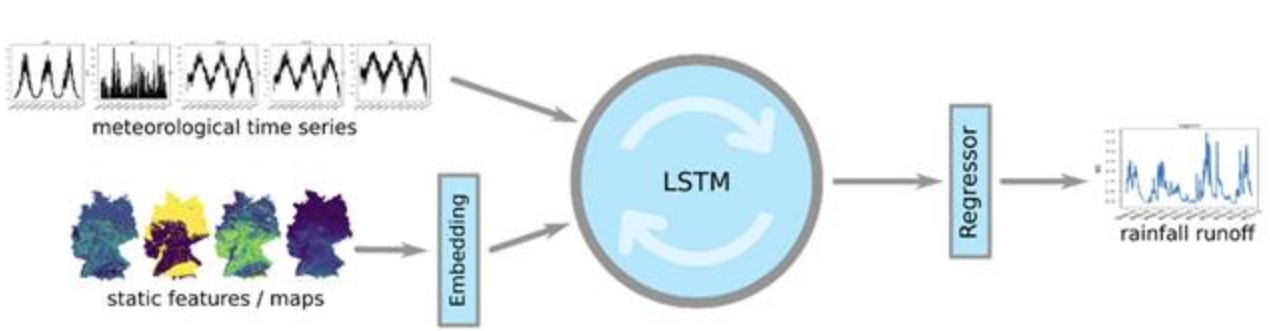

Image based on the work of Vischer et al. (2025)

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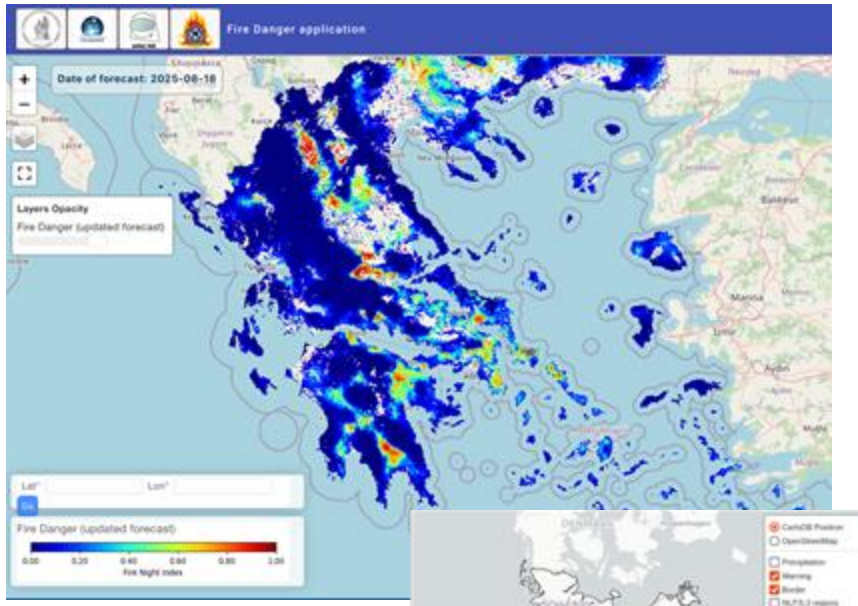
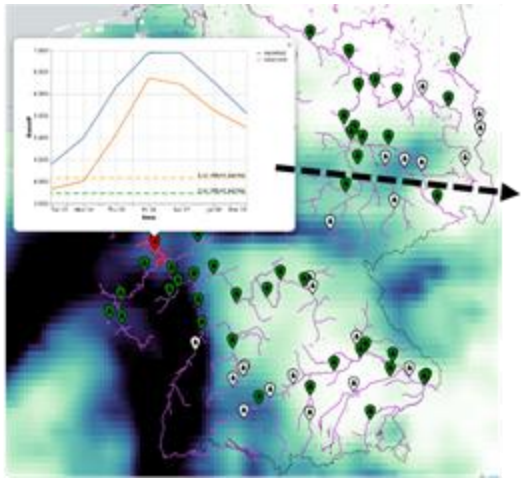
Deployment

Integration in processes & applications

User uses the system



Screenshot from [Orion Watch]



The user can select a specific location and obtain detailed information about:

- hydrological status.
- Potential risks of flooding

Rainoff model [Vischer et al. (2025)]