Machine Learning in Emergency Response

Marco Codastefano

WFP Machine Learning and Artificial Intelligence

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Who we are

The Technology Emergency Preparedness & Response Branch is responsible for coordinating and managing WFP's Information Technology response to emergencies.

WFP Drones

As part of its strategy to leverage technology to end hunger by 2030, WFP has been developing the use of unmanned aircraft systems (UAS) in humanitarian action since 2017.

Supported by the Belgium Government, WFP has developed the UAS coordination model and is implementing a training package – **Let's MAP / Let's FLY / Let's COORDINATE** building local capacity of staff, partners and the humanitarian community.

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UAS Project

Why machine learning in emergency response?

Transforming post disaster damage assessments

Impact

Data Collection

Data Processing & Analysis

Response

Within 72hrs of a disaster

Transforming post disaster damage assessments

Impact

Data Collection

Data Processing & Analysis

Response
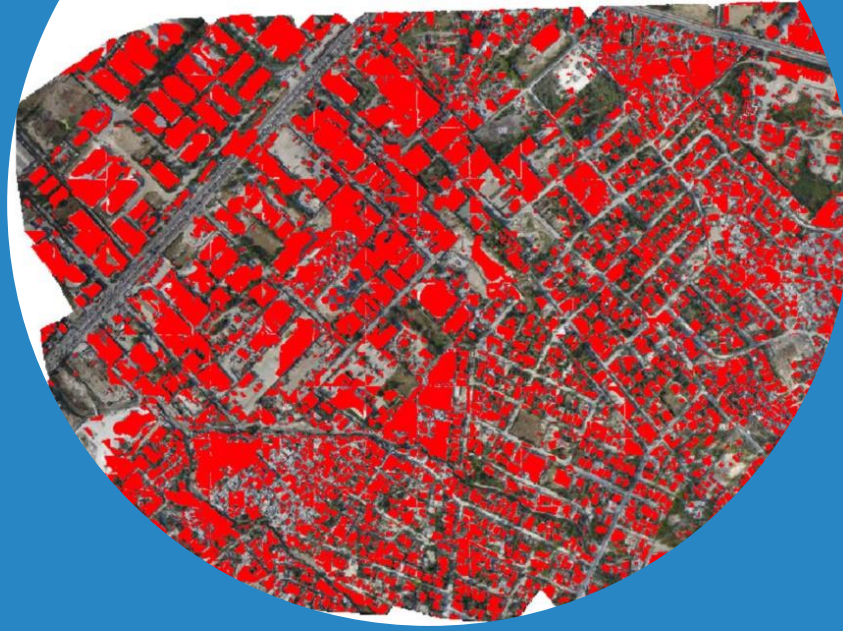
Within 72hrs of a disaster

The Challenge

- **Super computers and data availability are key drivers behind Machine learning**

- **Access to both is the biggest challenge in emergencies**

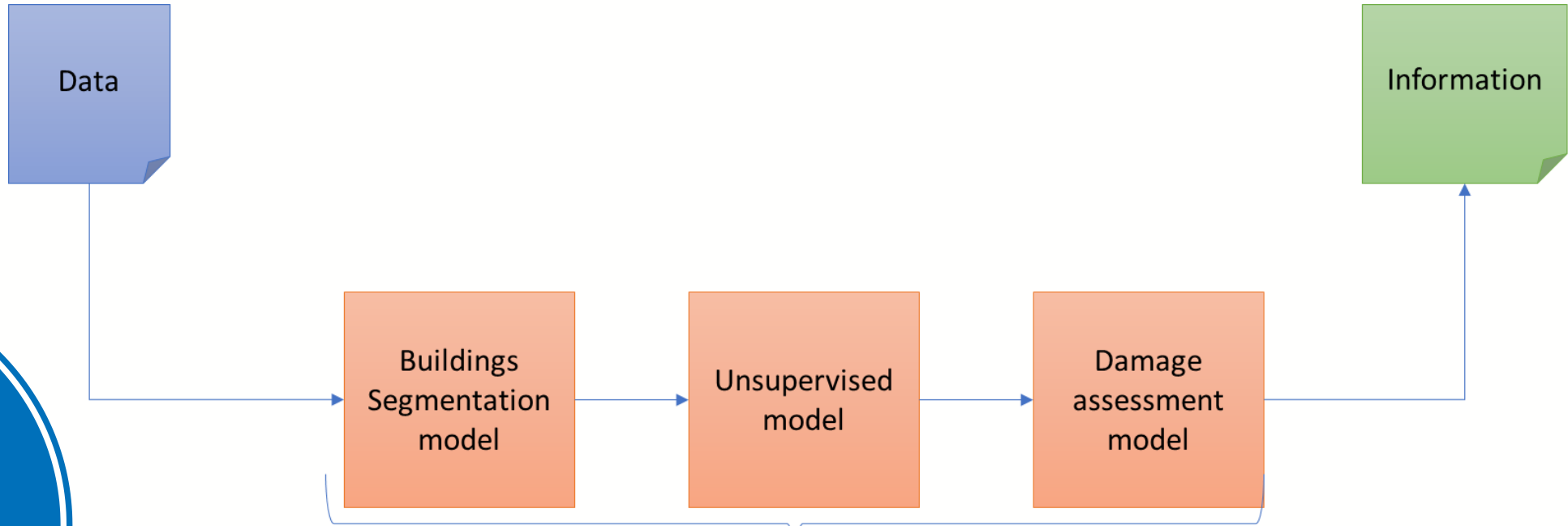# DEEP: Digital Engine for Emergency Photo-analysis

What is DEEP?

DEEP is an application designed to automate the learning analysis and processing of high resolution images and ultimately, help speed up our response time during emergencies.
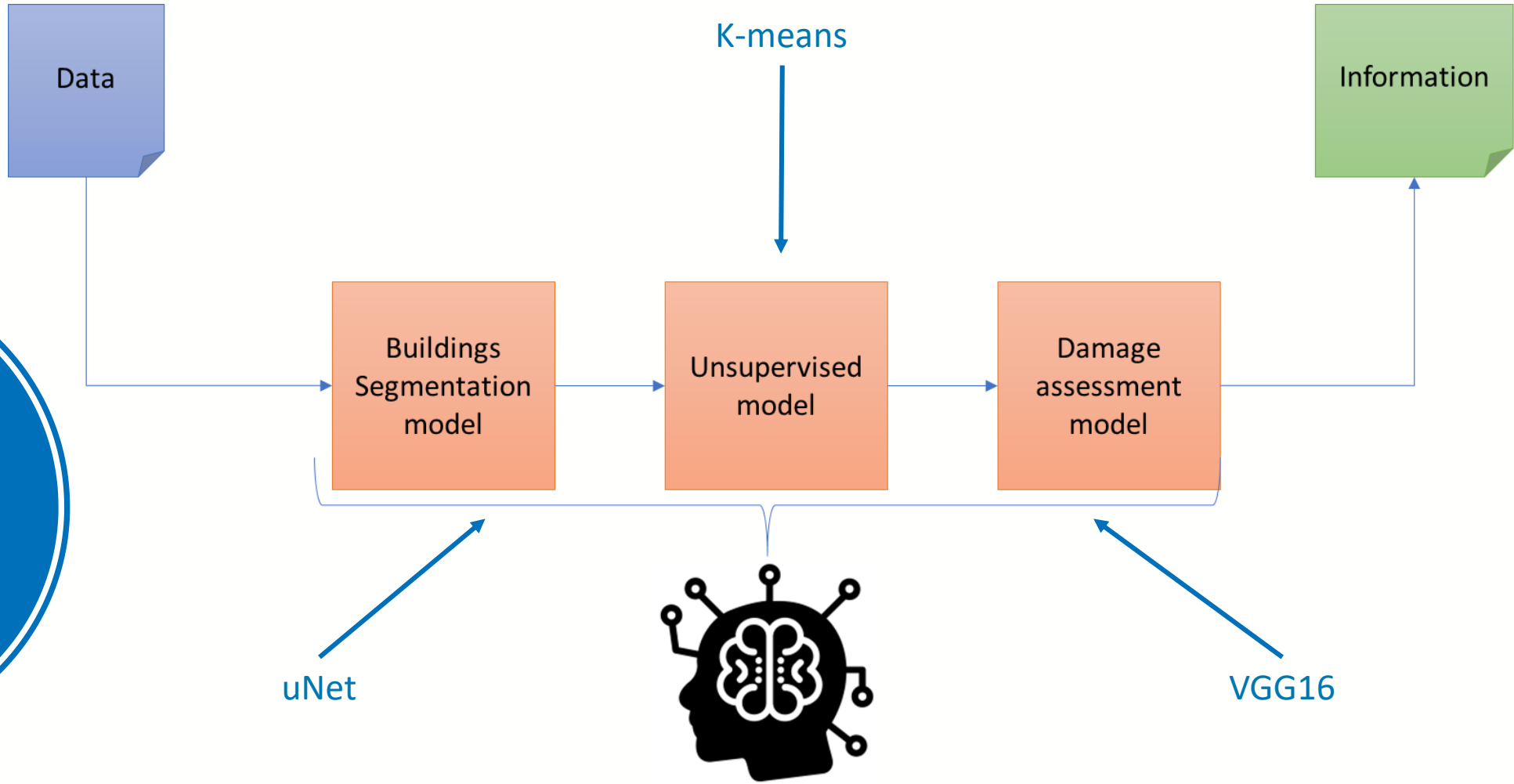
DEEP is built on these characteristics:

1. Ready for emergencies

2. Easy to use

3. Fully modular

Damage Assessment

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Task: Detect every building in the map to understand people density distribution and estimate m2 of damaged buildings in the area.

The damage assessment analysis is usually done at a later stage of the emergency response process and can take weeks.

With DEEP

we make the analysis in the first 72hrs of a disaster, providing key information to support decision-making and resource allocations.

10 minutes (per drone flight) to get a damage assessment (with 15% error)

Without DEEP

Days to weeks to manually conduct the image analysis and produce key information.

DEEP

The output is compatible with any GIS analytics/visualization tool incl. Google Earth Enterprise, QGIS, ARCGIS - and it runs on commercial available hardware.

This demo is built around building detection but this application can programmed to detect any item with the right data i.e. standing water, roads, bridges.

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The Mozambique response

Capacity building June 2019

10 Participants from INGC and Universidade Eduardo Mondlane

10 Trainings days
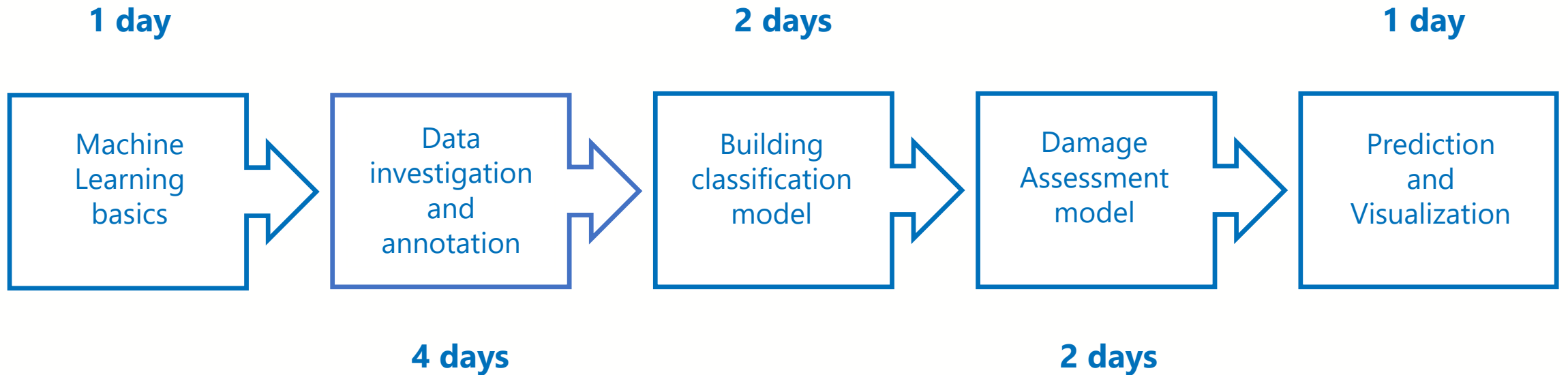
1 TB drone images from Kenneth and Idai

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World Food Programme

SAVING LIVES CHANGING LIVES

INGC
Instituto Nacional de Gestao de Calamidades

Workshop Workflow

1 day　　　　　　　　　　　　　　　**2 days**　　　　　　　　　　　　　　　**1 day**

Machine Learning basics　→　Data investigation and annotation　→　Building classification model　→　Damage Assessment model　→　Prediction and Visualization

4 days　　　　　　　　　　　　　　　**2 days**

Lessons learned

1. Machine learning applications need to be rooted in emergency response contexts, including challenges related to connectivity and computing power.

2. Complementing drone data gathering with machine learning analysis capacity, like DEEP, is essential to improve the information value chain and decision-making in disaster response

3. Preparedness is key: Without appropriate collaboration with the local government and institutions before an emergency, machine learning is of little concrete value.

4. Building local capacity has enormous value in terms of response speed and information sharing.

Thank you!

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