

Population density

Italian perspective



ENAC Research & Development New Technologies

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- Starting point
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Starting point | Intrinsic Ground risk

SORA 2.5 → Quantitative population density evaluation

Intrinsic Ground Risk Class determination

You need to make the correct choice of row in the matrix

?

Intrinsic UAS Ground Risk Class						
Max UA characteristics dimension		1 m	3 m	8 m	20 m	40 m
Max cruise speed		25 m/s	35 m/s	75 m/s	150 m/s	200 m/s
Maximum iGRC population density (ppl/km ²)	Controlled ground area	1	2	3	4	5
	< 25	3	4	5	6	7
	< 250	4	5	6	7	8
	< 2,500	5	6	7	8	9
	< 25,000	6	7	8	9	10
	< 250,000	7	8	9	10	11
	> 250,000	7	9	Category C Operations (Not part of SORA)		

Table 2 – Intrinsic Ground Risk Class (GRC) Determination

Challenge | Intrinsic Ground risk

SORA 2.5

Target:

choosing the adequate row in the matrix

Challenge:

availability of a reliable and updated population density data

We need to predict quantitative data

Intrinsic UAS Ground Risk Class						
Max UA characteristics dimension		1 m	3 m	8 m	20 m	40 m
Max cruise speed		25 m/s	35 m/s	75 m/s	150 m/s	200 m/s
Maximum iGRC population density (ppl/km ²)	Controlled ground area	1	2	3	4	5
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Table 2 – Intrinsic Ground Risk Class (GRC) Determination

Sources of data

Static source:

- Data related to population density which is representative of only a specific time in the day
- Census data represent local data where population is registered (e.g. may be reliable only during night)
- Census data (ppl/km²) updates do not occur frequently (typically every 10 years) and are expensive
(e.g. Research and Statistical Institutes)

Dynamic source:

- Present value of population density based on data detected in real-time
- Availability of such data should be desirable but sources are difficult to identified, and mostly expensive
(e.g. Telecom data, mobile phones , social networks, ecc.)
- Privacy rights may be investigated

Italian Project DT4IAS

Project DT4IAS (Digital Twin for Innovative air Services)

Cross Tech Hub managed by ENAC and Department for Digital Transformation of the Presidency of the Council of Ministers

Scope

The project aims to support various entities (e.g. start-ups, operators, authorities) in assessing the feasibility of UAS operations and managing decision making process and associated risks.

The DT4IAS (Digital Twin for Innovative Air Service) project is based on the "Digital Twin" concept.

Goals

- development a proof of concept using a 'digital twin' of geographical key elements (including: airspace volume, infrastructures, stakeholder, etc.) with increasing degrees of complexity (congested and non congested)
- application of digital technologies to support risk assessment and decision making processes associated with the construction of new services
- using correlation data tools (Machine and Deep learning/AI) aimed to processing static and real time data
- Coordination with the Italian "Cyber Italy" project in the context of the implementation of IRIDE (Earth observation satellite constellation)

Italian Project DT4IAS

Digital Twin concept refers to a digital representation of a physical object, process or complex system.

The platform will allow the feasibility evaluation for the operation to be assessed making available:

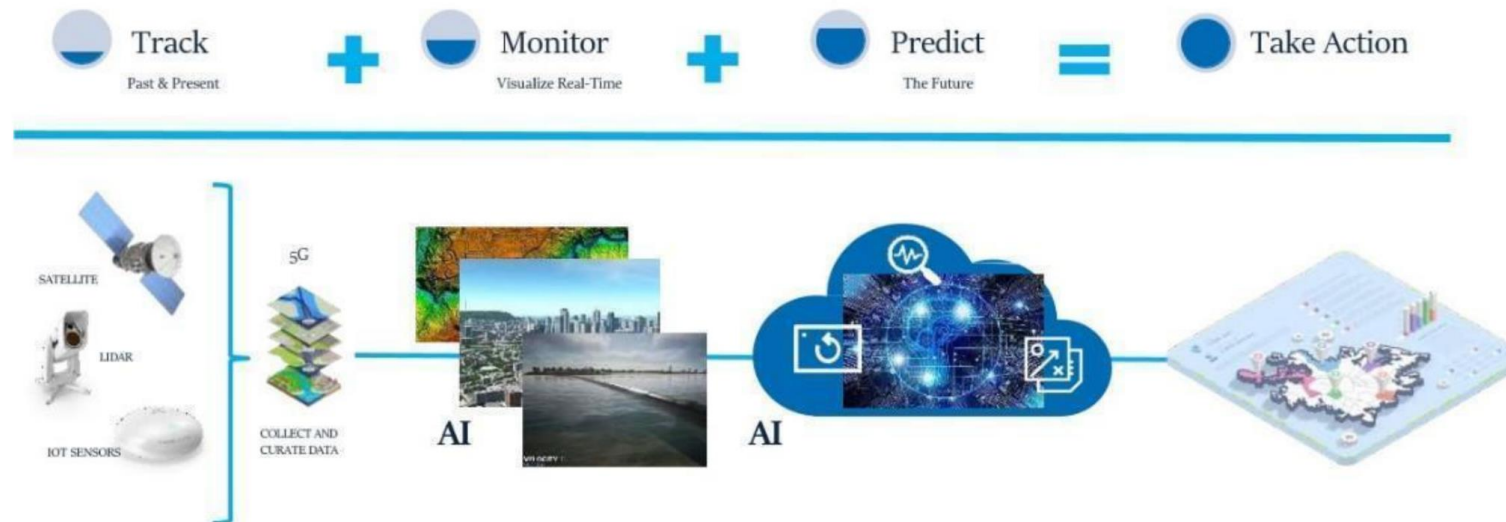
- the preliminary risk associated with the characteristics of a scenario
- other elements that contribute/affect feasibility



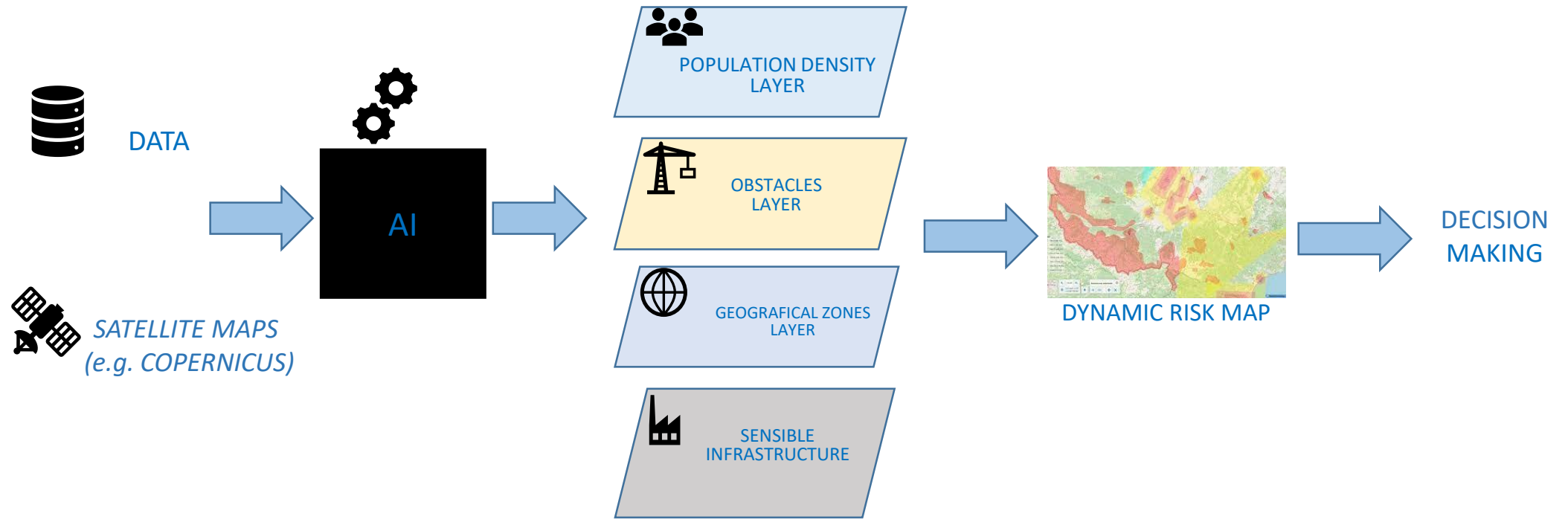
Italian Project DT4IAS

The solution will consist of a georeferenced system that integrates different data sources to evaluate the feasibility of UAS operations.

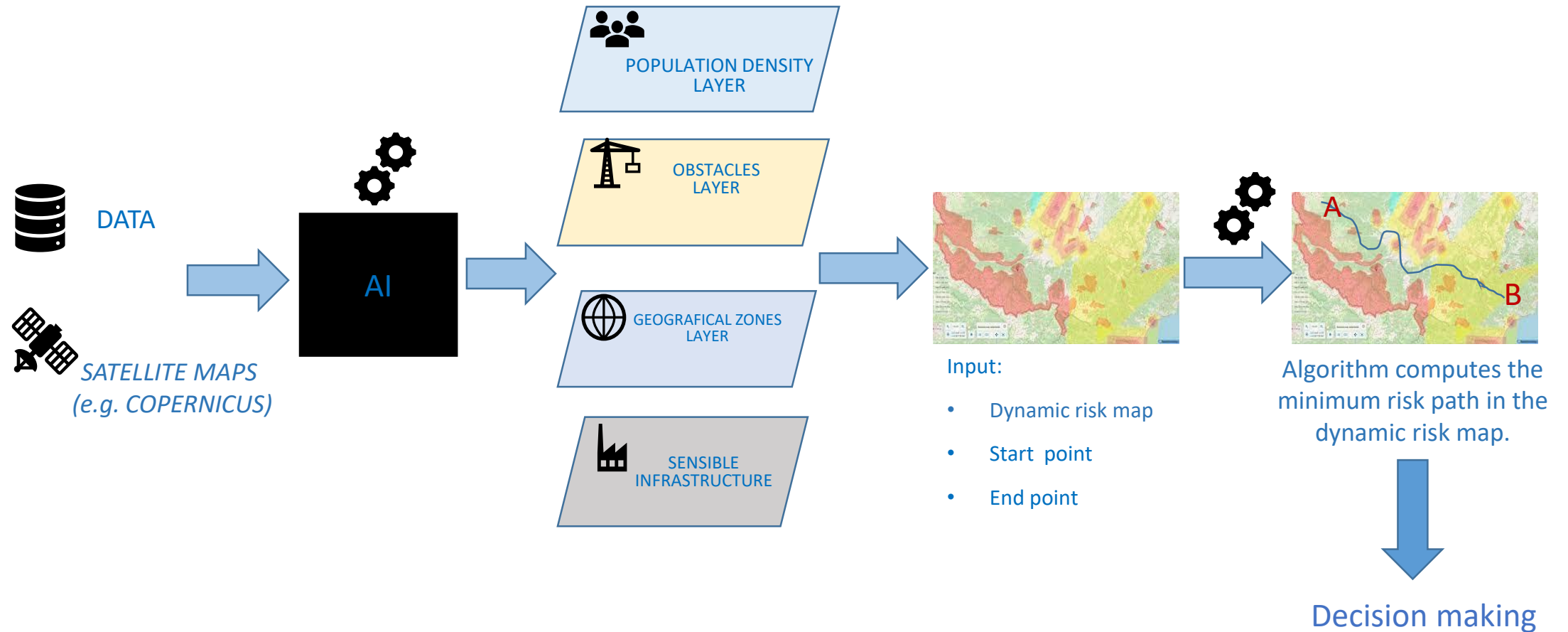
It will provide population density, geographical details, infrastructure, points of interest, regulatory constraints, involved stakeholders and operational restrictions to be displayed in an intuitive and interactive way to support the Decision Making process



Italian Project DT4IAS | Example



Italian Project DT4IAS | Example - improvement



THANK YOU FOR YOUR ATTENTION

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