



UNIVERSITÀ
DI TRENTO

Dipartimento di
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Autonomous Software Agents Assignment A1

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National vaccine distribution

High level description of the scenario

There is a central point (red circle) in a state (e.g., Italy) that receives all the vaccine boxes, and from there the vaccine boxes shall be distributed to one designated central location (violet circle), one for each region.

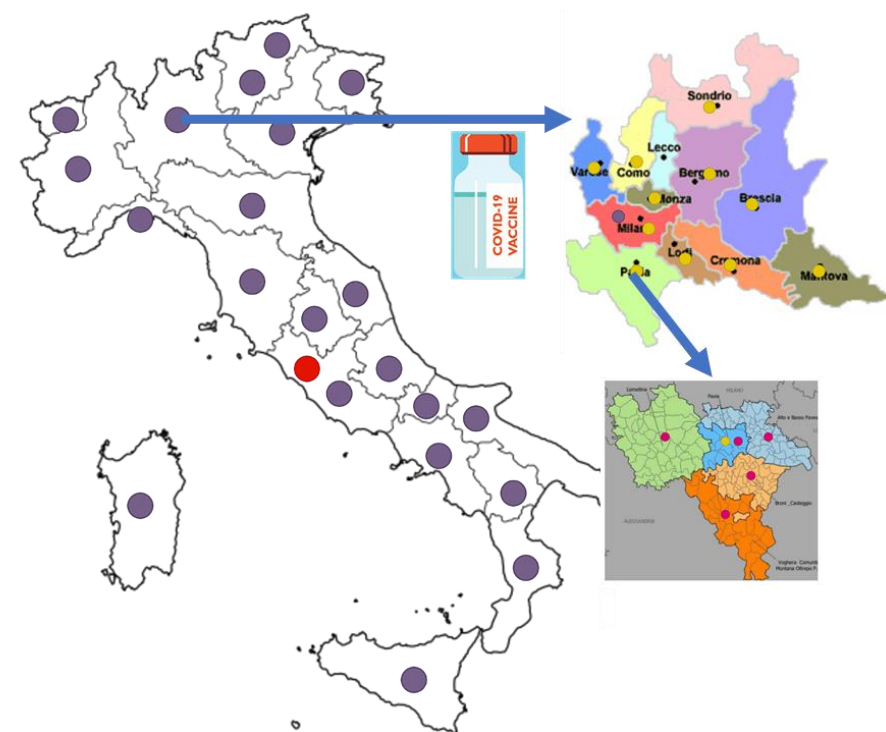
Once the vaccine boxes reach the designated central locations in a region, such vaccine boxes shall be distributed to the different provinces (yellow circles) of the region.

From the designated location in each province the vaccines shall be distributed to the different health districts (purple circles) within the same region.

Transportation of vaccine boxes is performed with different transport agents (planes, trucks, and drones).

Problem:

- Initially all the vaccine boxes are in the central location of the state.
- The goal is that there is at least one vaccine box in each health district.



National vaccine distribution

Constraints

vaccine box = n. districts

we have to decide where to put planes, trucks, drones

We have a fixed number R of regions ($R \geq 15$).

For each region we have at least P different provinces ($P \geq 6$).

Not all the regions and province have an airport.

For each province we assume there are at most D health districts ($D \geq 3$).

Movement of vaccines among locations is performed with different kind of vehicles (planes, trucks, drones).

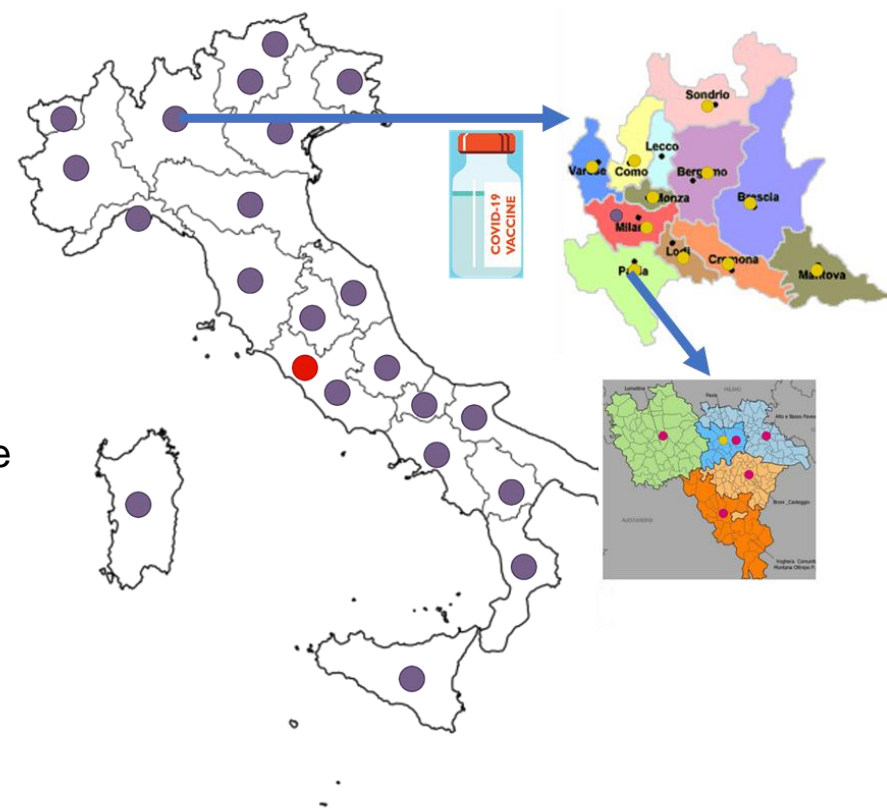
Each agent can load and unload in a transport agent (plane, truck, drone) a vaccine box at a time.

Drones can only be used to transport vaccine boxes from the province central designated location to the health districts of the province.

Trucks and planes can be used in all the other cases, trucks shall be used to reach locations with no airport.

All the movement agents (planes, trucks, drones) have limited capacity for vaccine boxes ($C \geq 1$). **load and unload just one vaccine box at the time**

There are a limited number of planes ($NP \geq 2$) and trucks ($NT \geq 10$) at national level. Similarly, the drones in each region are limited ($ND \geq 1$).





National vaccine distribution

Deliverables and submission rules

Prepare a unique ZIP archive, named "<surname>_<name>_<badge#>_pddl.zip", containing the following files:

1. The PDDL domain file
2. Two PDDL problem files
 - a. First file reflecting the choices described in the PDF document
 - b. Second file reflecting a simplified version of the previous problem
3. Two TXT files (in case resources are not enough to generate 3.a, then only 3.b, and a witness of the failure for 3.a)
 - a. a plan generated for the full problem (2.a)
 - b. a plan generated for the simplified problem (2.b)
4. A PDF document describing the choices of your solution
5. Bonus: As an additional bonus, you may encode the same problem in MA-PDDL considering the planes, trucks, and drones as agents (see for instance the taxi and wireless examples presented during the laboratory sessions)

simplified problem (lower bound numbers as starter, in case not able to solve lower the requirements)

Note: Please check that the PDDL files are syntactically correct.

Submission form:

<https://forms.gle/xDtiVBxAsjkzGsSR8>



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Deadlines and submission rules

(28/04) Presentation scenario + Assignment PDDL (A1)

(11/05) Deadline for submitting A1

(19/05) Assignment Unity Prolog (A2)

(09/06) Deadline for submitting A2

(11/06) Notification of results (no oral presentation for the exam)

All students must register in ESSE3 before submitting A2 (9/06)

(02/07 – 10/09) Second and third exam round

For those who have not passed the exam earlier

- A1 and A2 must all be submitted at least a week before the 2nd and 3rd exam date

Submission form:

<https://forms.gle/xDtiVBxAsjkzGsSR8>

All questions shall be sent to:

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