



Operations research

2nd lecture

Prof. L. Palagi



OR course at a glance

- ❖ You can find all info on the web site
<http://www.dis.uniroma1.it/~palagi>
[didattica](#)
aa-2017-18
operations research
- ❖ Join the Google Group “OR_ICI_2017”
- ❖ Calendar of the lectures on the web site

FRIDAY 29 September

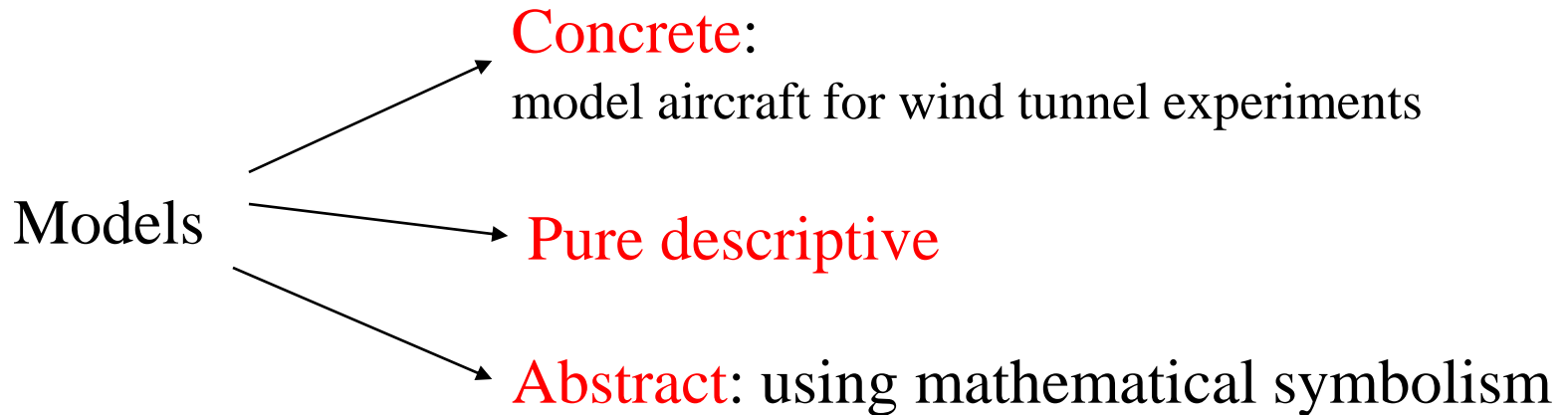
NO LECTURE

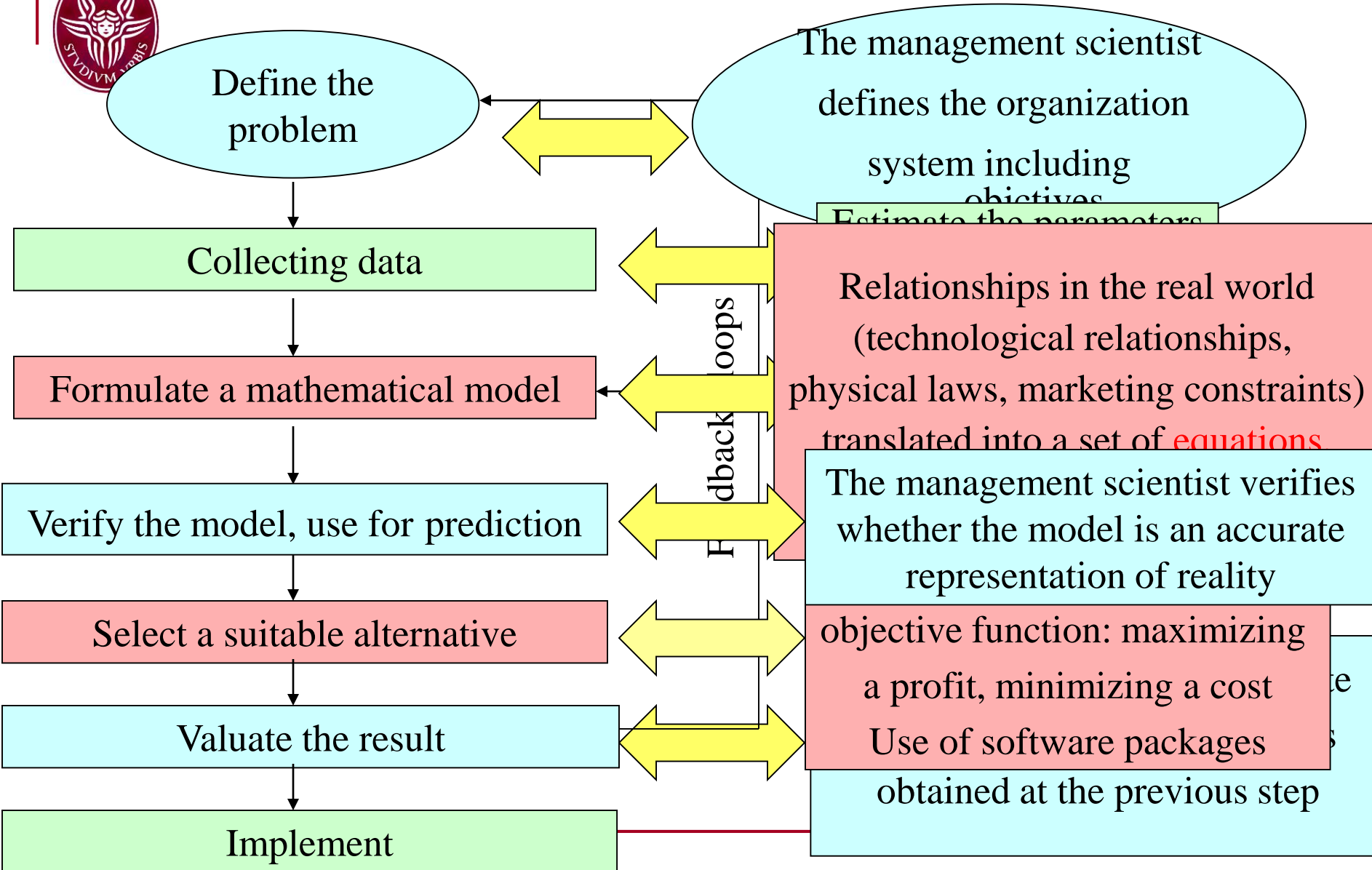


The concept of a model

Many applications of science make use of **models**

The term '**model**' is usually used for a structure which has been built purposely to exhibit features and characteristics of some real object.







Mathematical model: representation of a real problem in terms of mathematical expressions.

benefit

- It reveals not apparent relationships, makes mathematical analysis possible
- Simulation of scenarios (*what happens if ...*)
- Use of mathematical solution procedure

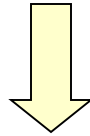
drawback

- Lack of precision of data
- Impossibility of quantifying some data (social value)



Optimization models plays a fundamental role in **mathematical programming**

mathematical programming



“planning”

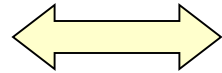
Different from
computer programming

Optimization model

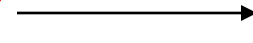
Involve *maximize* something
or *minimize* something, choosing
among different alternatives



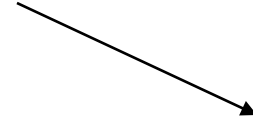
Set of possible
alternatives



Feasible solutions x stays
in a set F

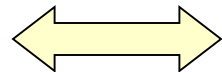


finite



infinite

One
optimization
criterion



$f: F \rightarrow \mathbb{R}$ **objective** function

$$\min_{x \in F} f(x)$$

or

$$\max_{x \in F} f(x)$$



An easy example

Definition of the
problem

Which is the **shortest path** to go **from**
place **A** to place **B** ?

Feasible solutions

$F = \{ \mathbf{x} = \text{all possible paths from A to B} \}$

Objective function

Minimize the length f of the path