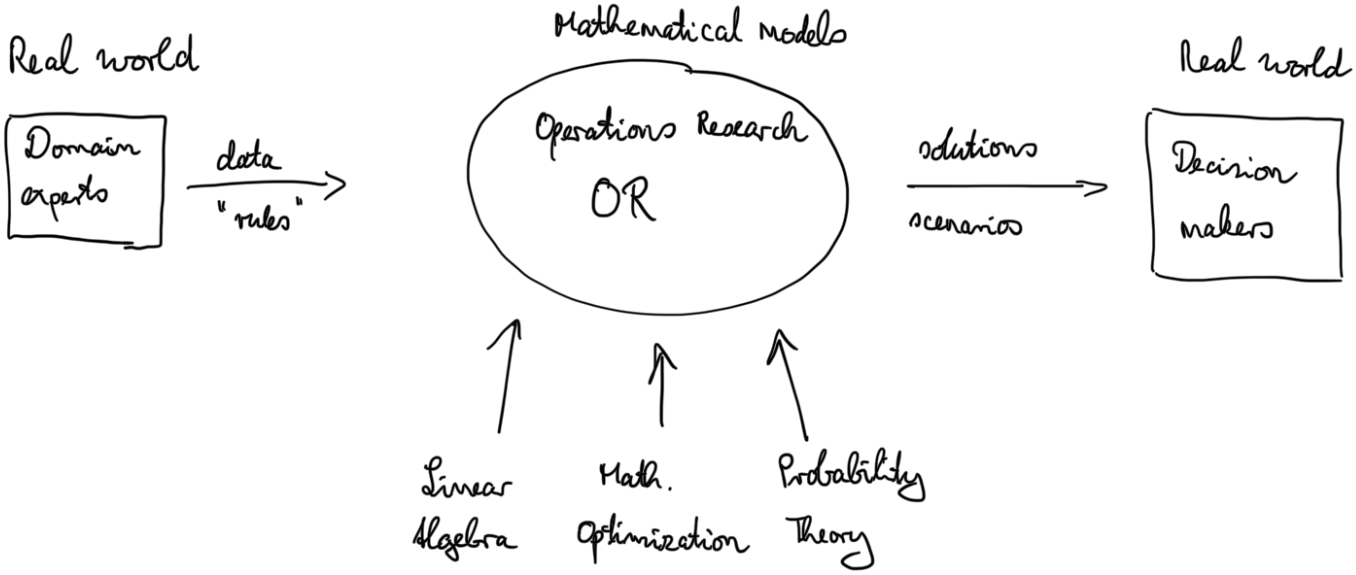


Key steps:

1. Definition of the problem
2. Aquiring data
3. Mathematical model
4. Solving the model
5. Testing, sensitivity analysis
6. Deriving recommendations and/or implementation as decision support system.

Typical models:

- Linear programs ("linear optimization problem") ($\frac{1}{2}$ of this course)
- Nonlinear programs (continuous optimization problems)
- Dynamic programs (lin. or nonl., can be solved in stages)
- Decision theory (involves probability)
- Inventory theory
- queueing theory

WYNDOR Glass Co. (Prototypical example)

- 3 plants
  - Plant 1: Aluminum frames
  - Plant 2: wood frames
  - Plant 3: Final assembly, glass
- 2 Products:
  - Prod. 1: glass door with aluminum frame
  - Prod. 2: wooden window

Marketing says they'll sell all that can be produced.

Task: How many units of product 1+2 should be made to maximize profit subject to the available capacities.

Data:

	Required prod. time per batch [h]		Production time available [h]
	Product 1	Product 2	
Plant 1	1	0	4
Plant 2	0	2	12
Plant 3	3	2	18
Profit per batch	$3 000	$5000	

Decision variables:

x_1: # of batches of prod. 1

x_2: # of batches " " 2

Objective function (here profit):

$$z = 3x_1 + 5x_2 \quad [\text{in k\$}] \quad \text{to be maximized}$$

Constraints:

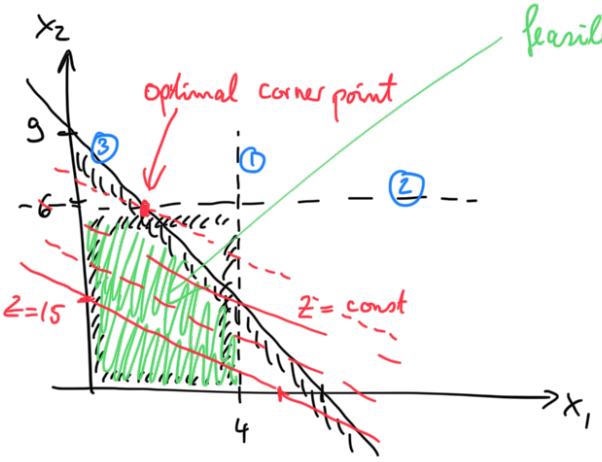
$x_1, x_2 \geq 0$

$x_1 \leq 4$ ①

②

$2x_2 \leq 12$ ②

$3x_1 + 2x_2 \leq 18$ ③



$15 = 3x_1 + 5x_2$

At optimal corner point: $2x_2 = 12 \Rightarrow x_2 = 6$

$3x_1 + 2x_2 = 18 \Rightarrow 3x_1 + 12 = 18 \Rightarrow x_1 = 2$

⇒ Should produce 2 batches of Prod 1 and 6 batches of prod. 2

to find the optimal profit

$Z = 3 \cdot 2 + 5 \cdot 6 = 36$ [R$]