



**Project**

**Fab@Hospital**

**Flagship Project**

**La Fabbrica del Futuro**

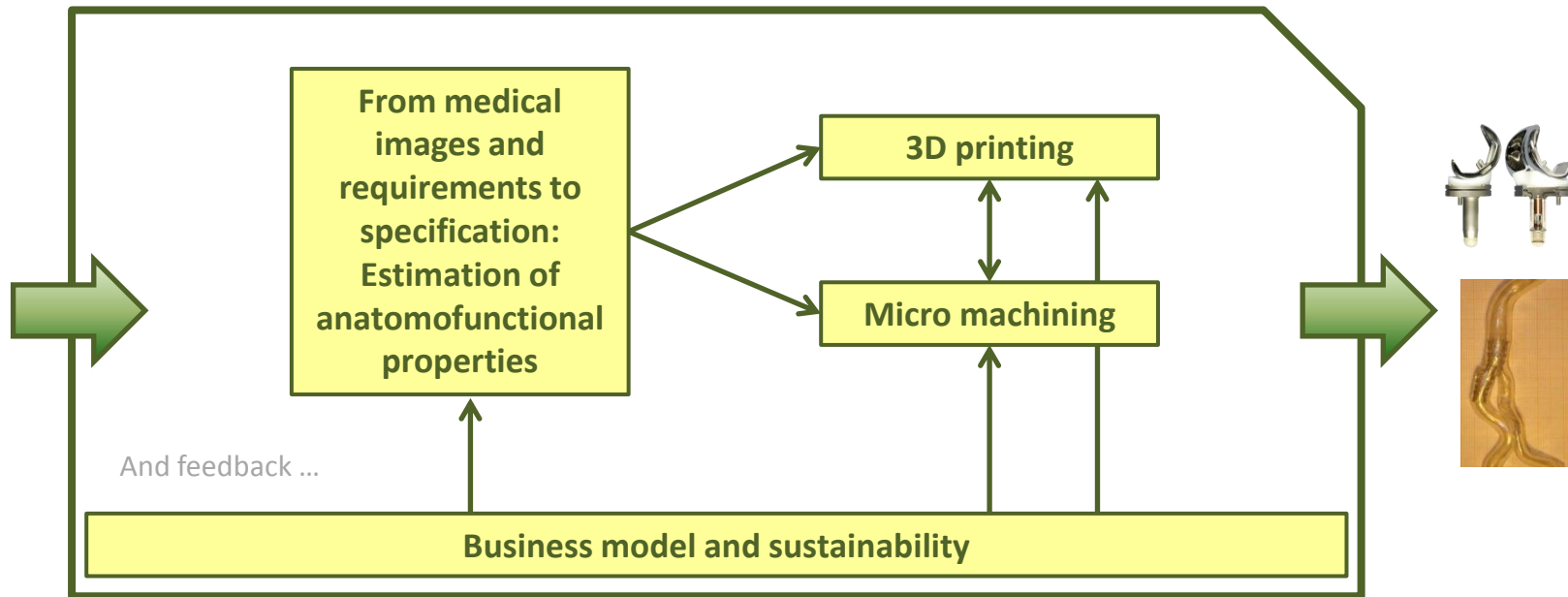
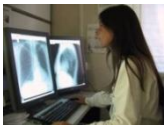
**Subproject S2**

**Kick off meeting**

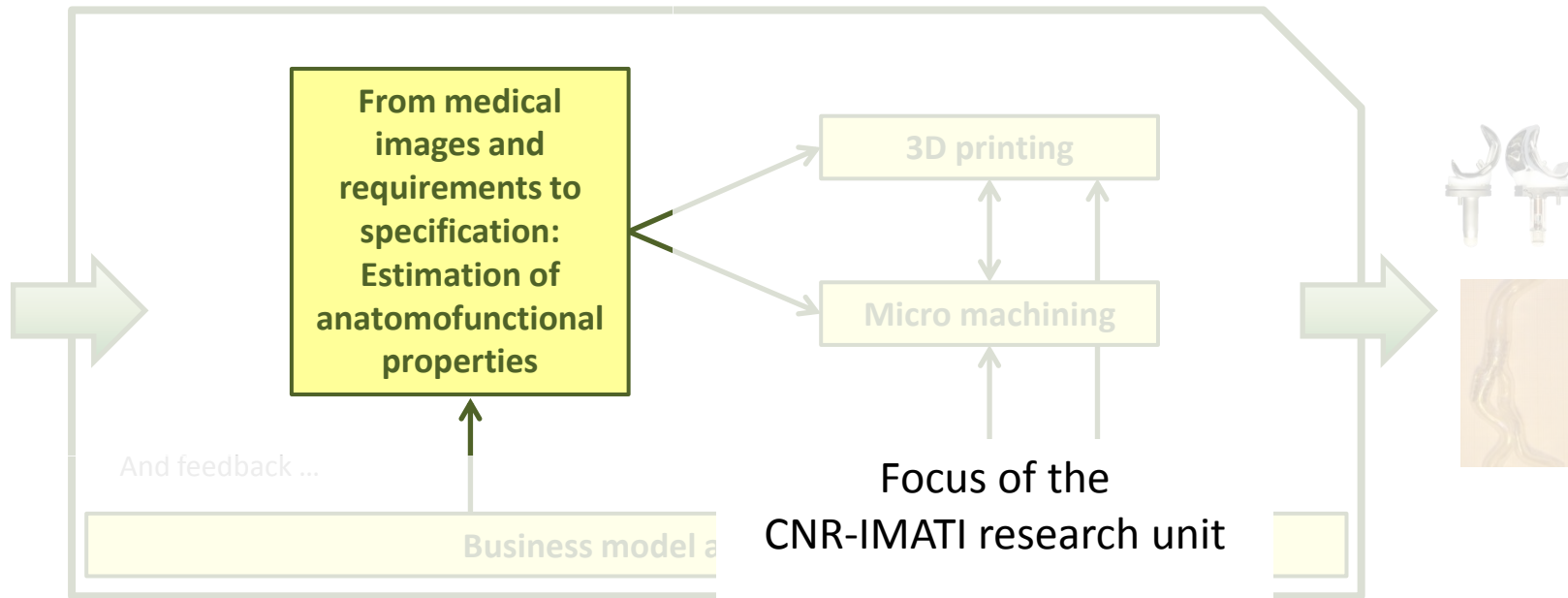
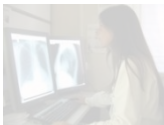
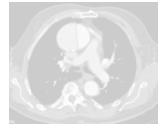
**Milan, February 20, 2014**

# ACTIVITIES OF CNR-IMATI RESEARCH UNIT

# Inside the Factory



# Inside the Factory



WP 2

# CNR-IMATI activities

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- ① From medical 4D images to geometry generation and stochastic estimation of mechanical properties (i.e., the specifications for the productive processes):
  - **First results in a clinical case**
  - **Extend the approach to other cases within the Project**
  
- ② How to include stochasticity of information in the structural and fluid-dynamic simulation:
  - **New activity to be started within the Project**

# Activity 1

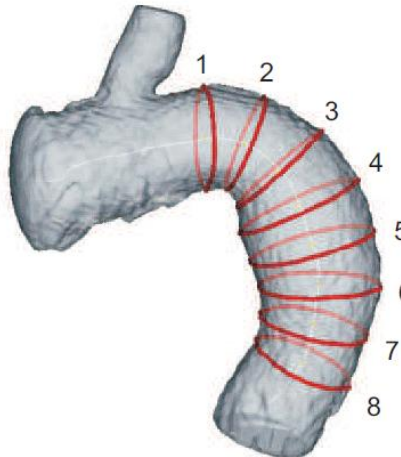
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**Example**: determination of aortic stiffness from 4D MRI images.

Acquisition of MRI  
images over the  
cardiac cycle



Geometry  
definition



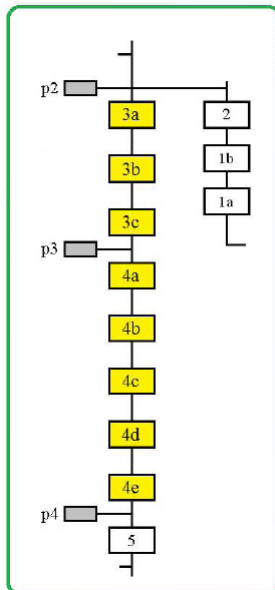
Choice of some  
trasversal section

Measurement of  
arterial radii at  
each section for  
each acquired  
image

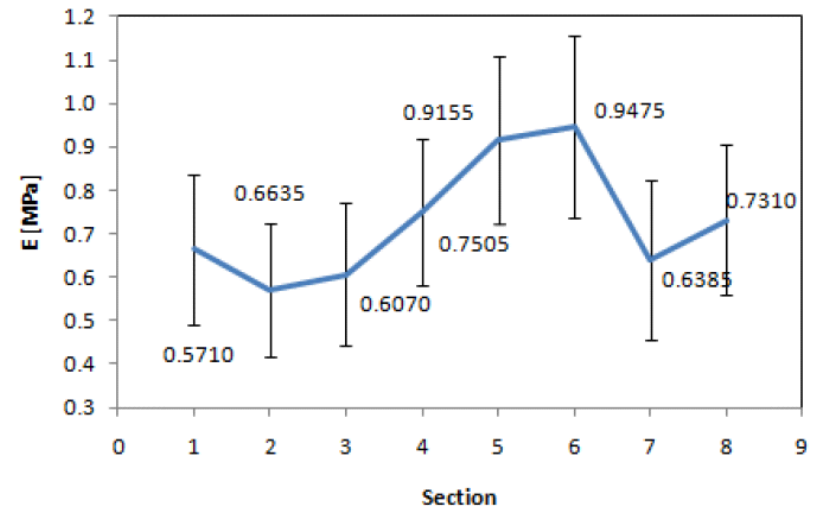
# Activity 1

**Example:** determination of aortic stiffness from 4D MRI images.

Pressure generation by means of a lumped parameter model

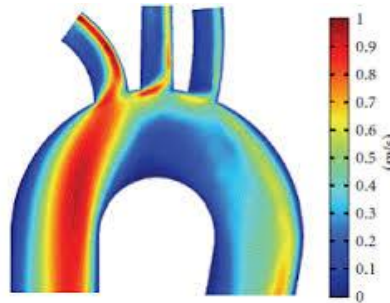


Bayesian estimation of aortic stiffness at each section



# Activity 2

Deterministic  
parameters



One simulation &  
one solution

Stochastic  
parameters

Modify the structure of the  
simulation (not efficient  
solution)

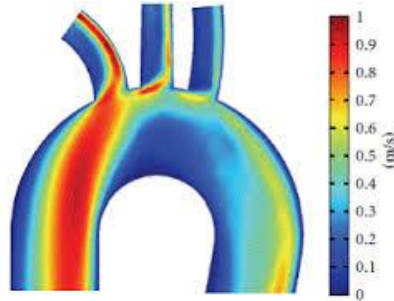
Scenario generation and  
repetition of simulations



# Activity 2

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$10^{\text{big}}$  scenarios



$10^{\text{big}}$  simulations

**Stochastic methodologies to reduce the number of simulations  
while keeping the robustness of the stochastic solution**

In line with the Project:  
allows analysis in few time  
and requires cheaper computational facilities

# Personnel

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## PERMANENT STAFF

- Ettore Lanzarone
- Raffaele Argiento

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[raffaele@mi.imati.cnr.it](mailto:raffaele@mi.imati.cnr.it)

## TEMPORARY STAFF

- One training contract (*borsa di studio*) for a position devoted to the mathematical and stochastic modelling activities
- One training contract (*borsa di studio*) for a position devoted to the laboratory activities of CNR-IMATI (supporting all partners)

## ADMINISTRATIVE SUPPORT

- Gabriella Bonfanti

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# Personnel

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Ettore Lanzarone

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