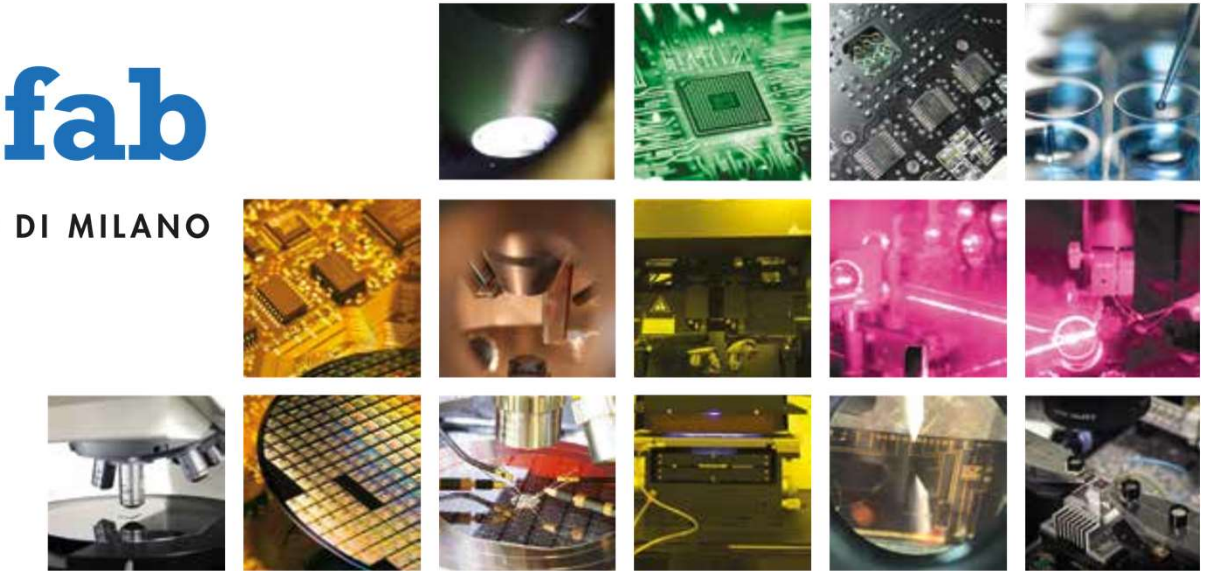
polifab

POLITECNICO DI MILANO



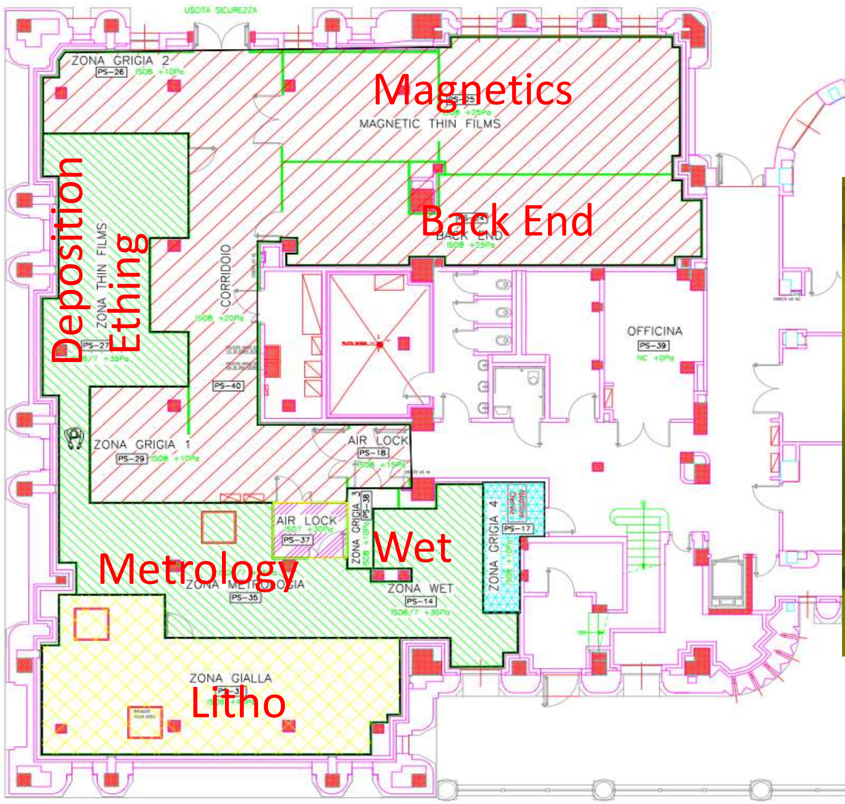
Polifab – a Micro-nano fabrication facility @ PoliMI

A. L. Lacaita

Facts

400 m^2 clean-room with 6’’ industrial grade equipment

Mission: enabling innovative concepts in nanoelectronics, photonics, MEMs, microfluidics, biosensors



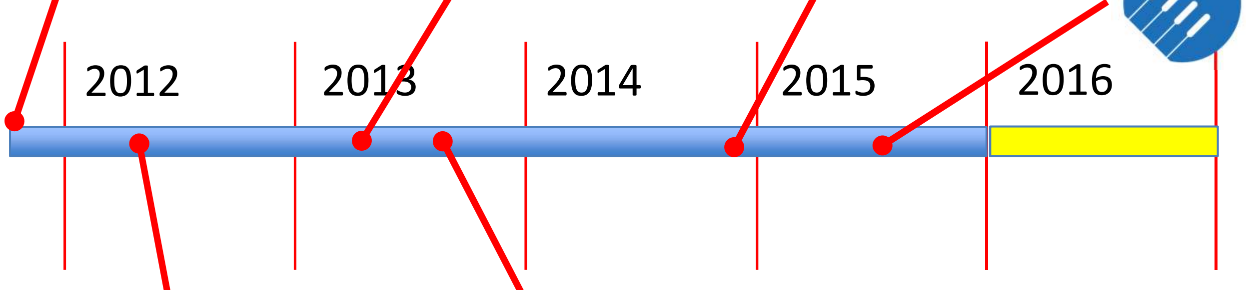
polifab
POLITECNICO DI MILANO

Via Colombo, 81 MILANO

Outline

- From the first proposal to cleanroom opening
- Cleanroom structure and equipment
- Research projects
- Governance and access options

Timeline 2016



Proposal

cleanroom
project released

Dec. 5, 2014

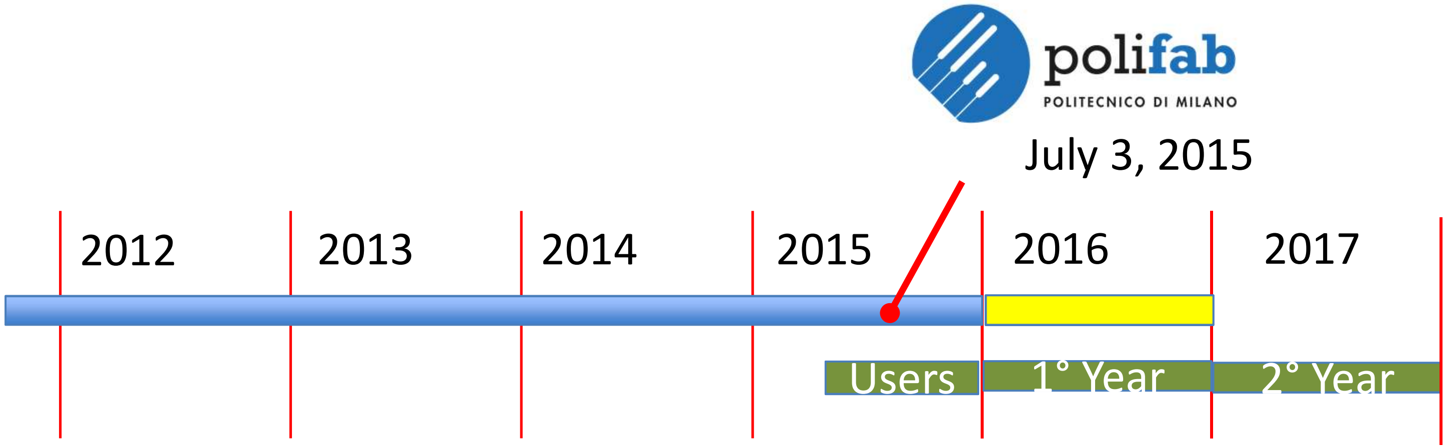
polifab
POLITECNICO DI MILANO

July 3, 2015

Equipment transfer to PoliMI
Budget allocation to build the
cleanroom

cleanroom fabrication and rump-up

Timeline 2016



polifab

POLITECNICO DI MILANO

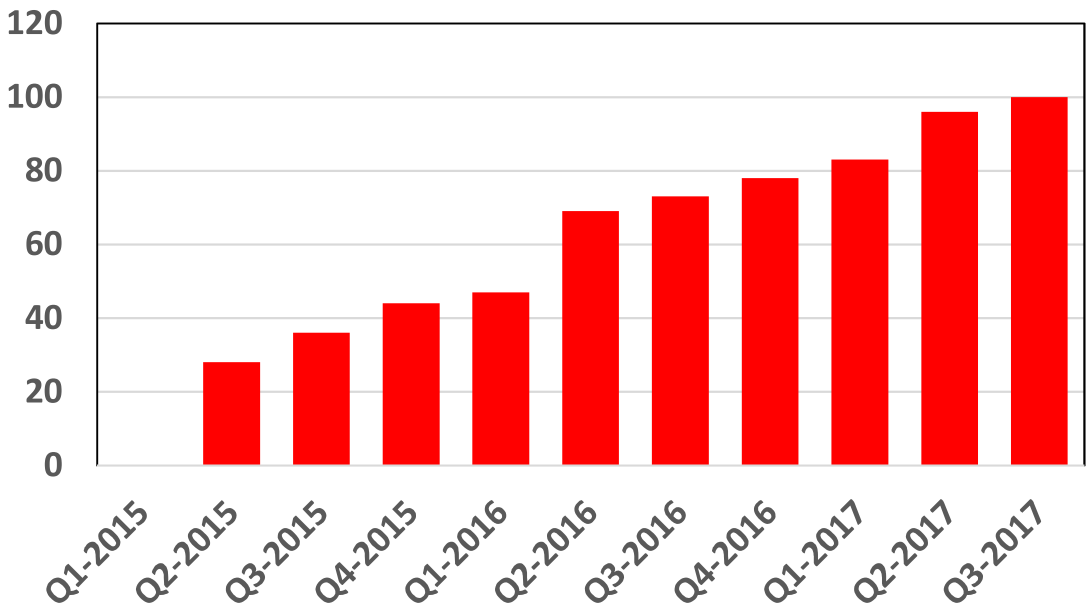
July 3, 2015

2012 2013 2014 2015 2016 2017

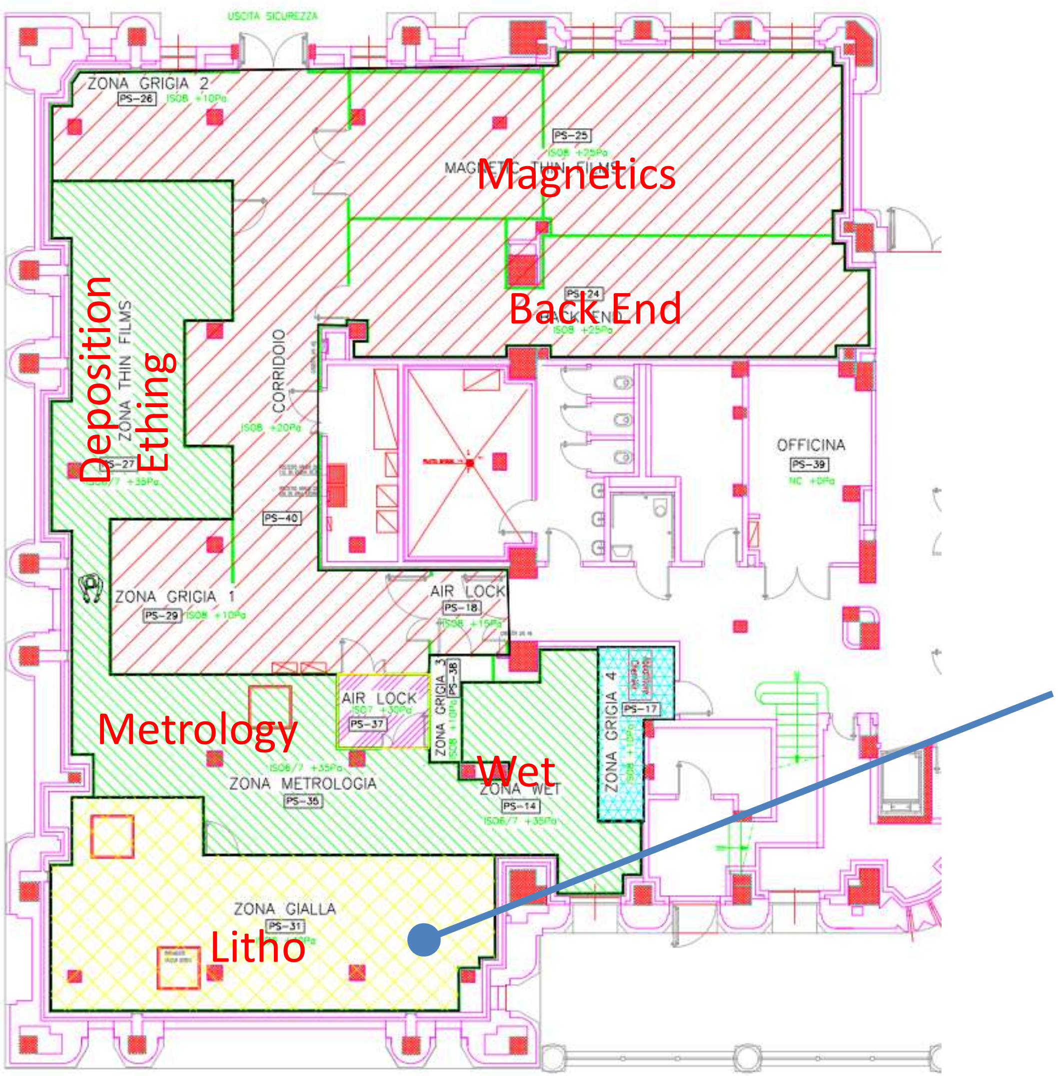
Users

1° Year

2° Year



Photolitho and EBL



Photolito and EBL

Mask aligner

Laser writer

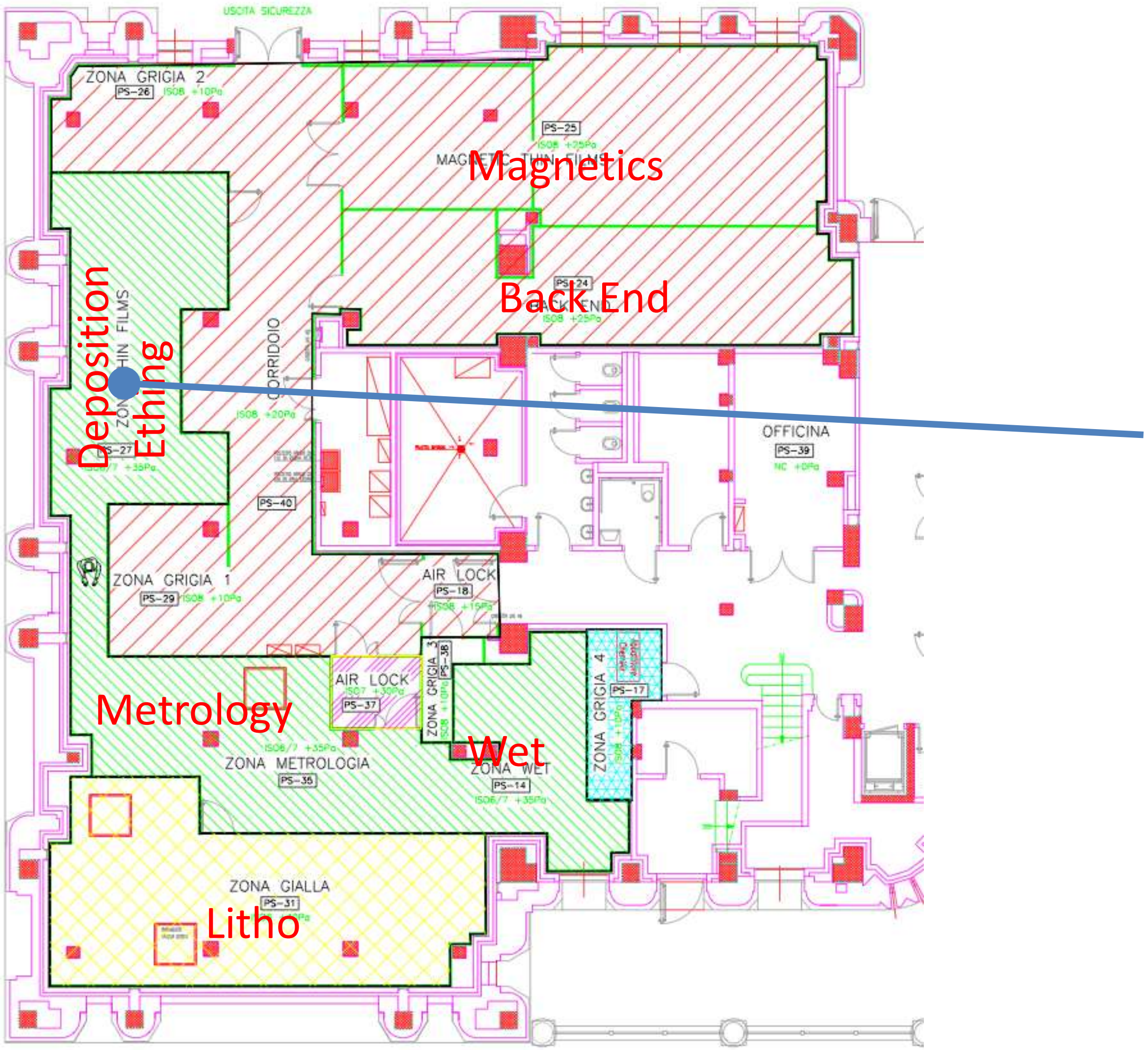
SEM - EBL writer

Spin coater

Ovens, hot plates

Benches for resist development

Deposition and etching



Thin films deposition

Magnetron Sputtering (RF and DC)

E-beam evaporator

PECVD

Rinse & dryer

Dry etching

Ion Beam Etching

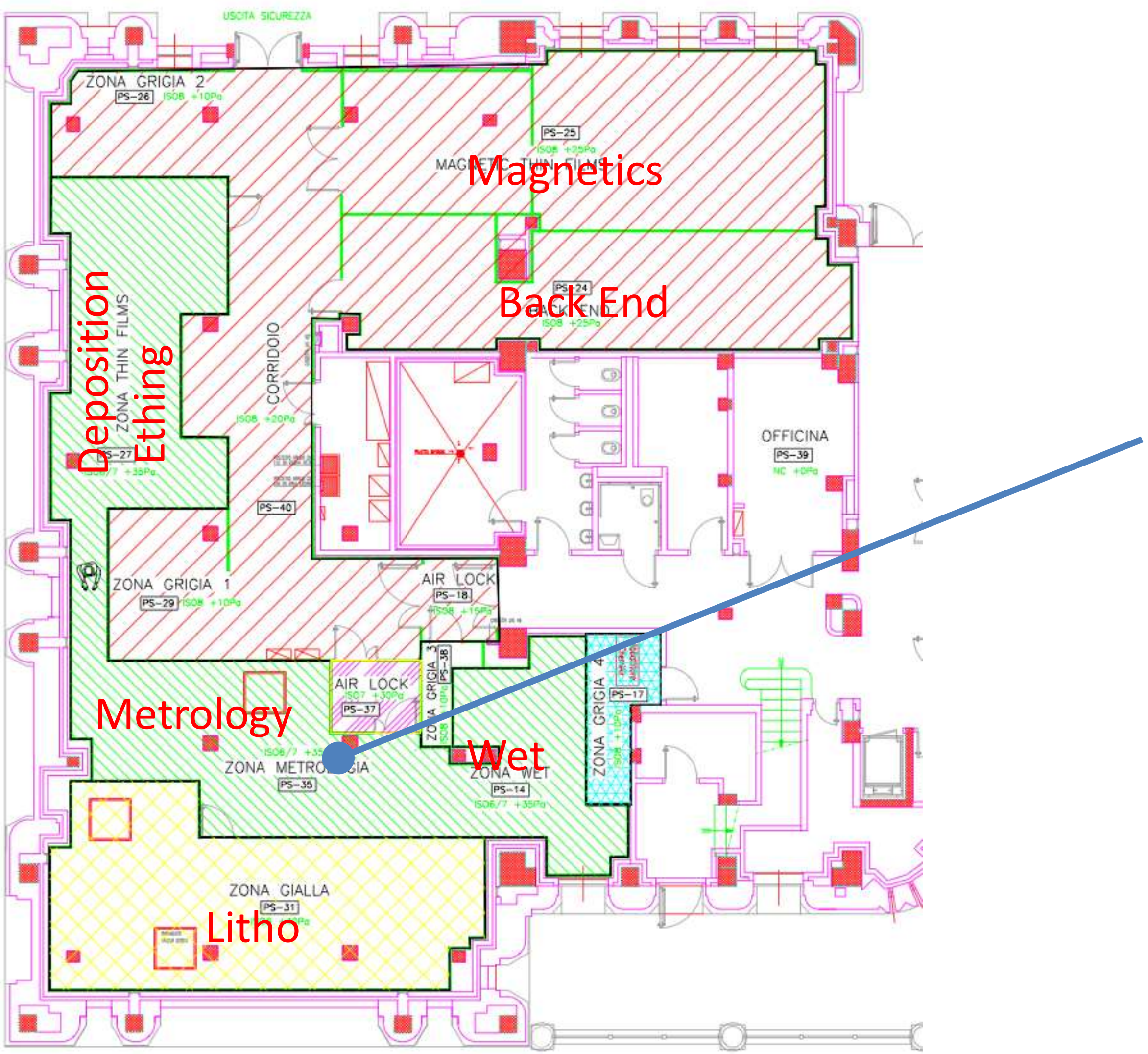
Reactive Ion Etching

Plasma cleaning

Wet process

Electroplating

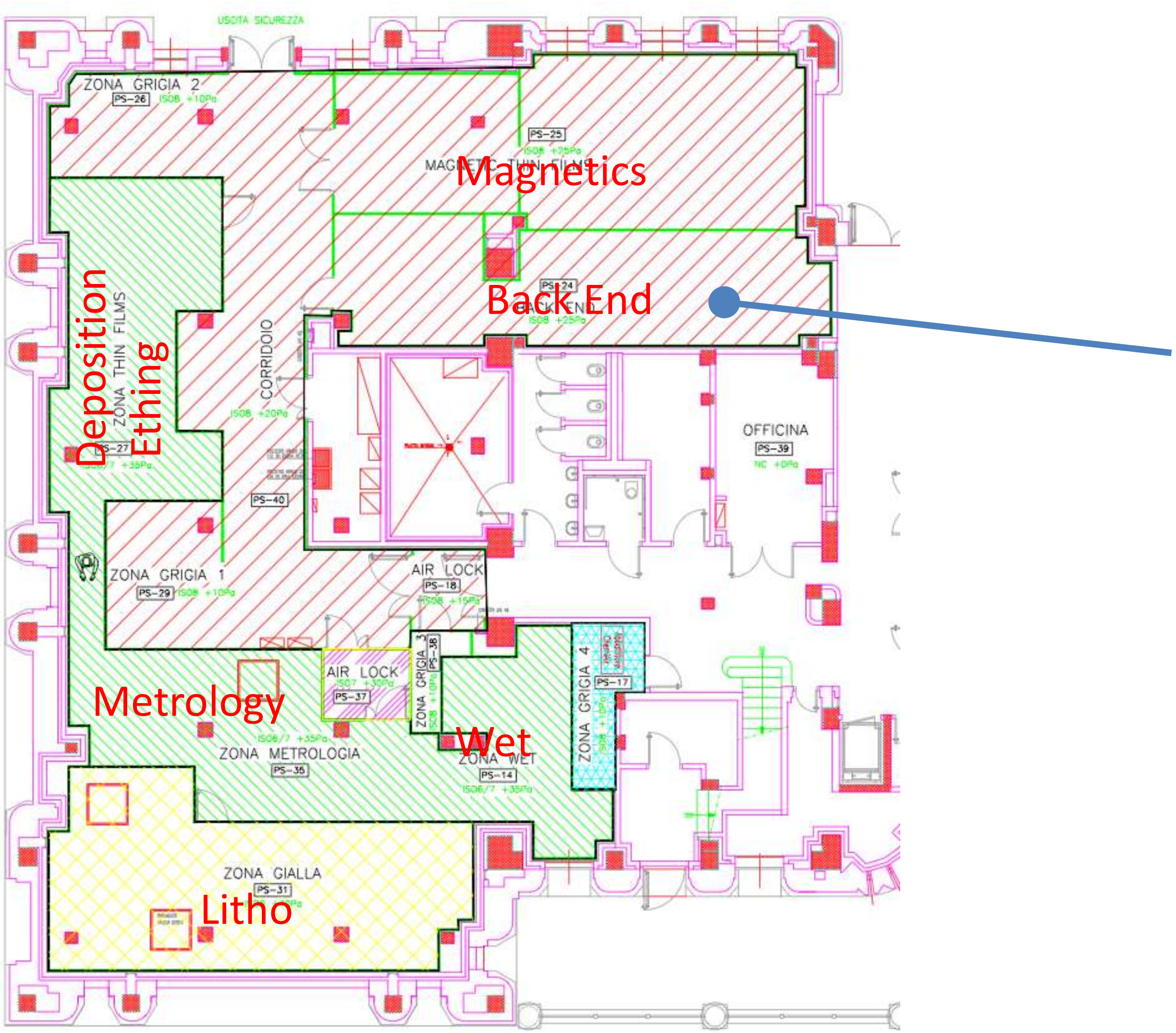
Wet processes and metrology



Wet processes
Chemical etching
(organics and inorganics)
Lift-off

Metrology
Spectroscopical
ellipsometry
Profilometer
AFM
Metricon
Electrical resistivity

Annealing and back-end



Annealing

Furnaces (900°C)

RTPA

Back-end

Dicing saw

Wire bonding

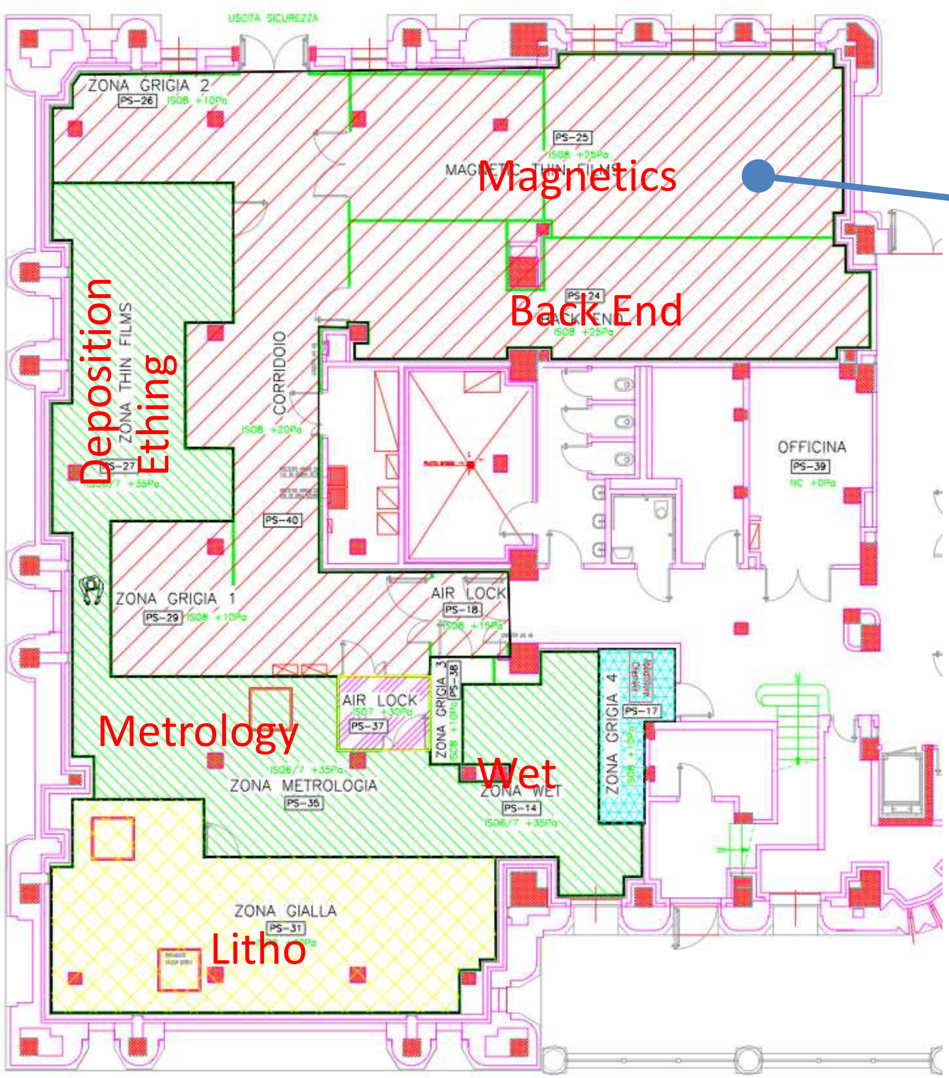
Lapping

Wafer mounting

PDMS

Microfluidic facility

Magnetics



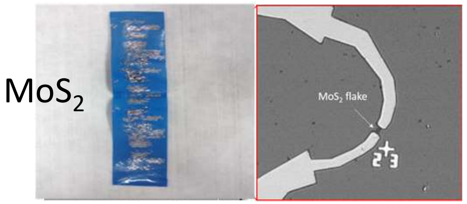
Magnetics

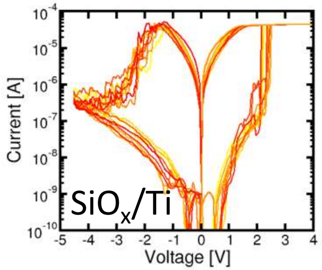
MBE cluster

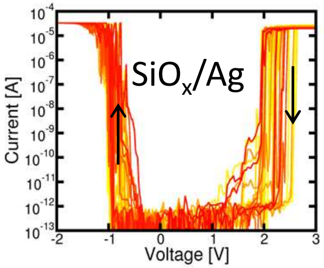
Sputtering

Micro-nanoelectronics

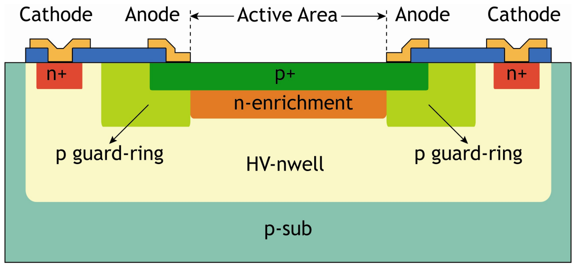
Development of ReRAMs, selectors, prototypes of 2D transistors

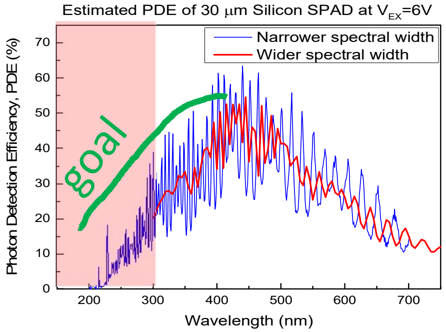




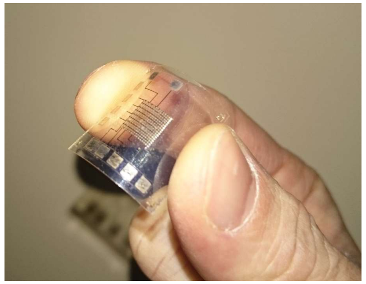


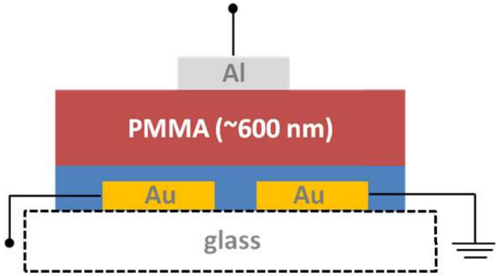
Post-processing of SPADs for enhanced IR detection efficiency

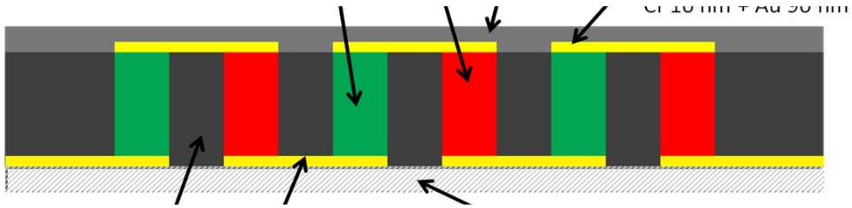




Micro contacts for OLED and OTEG

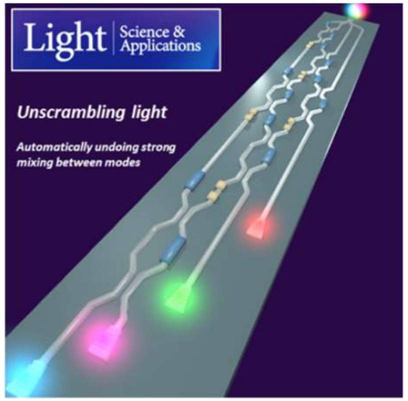




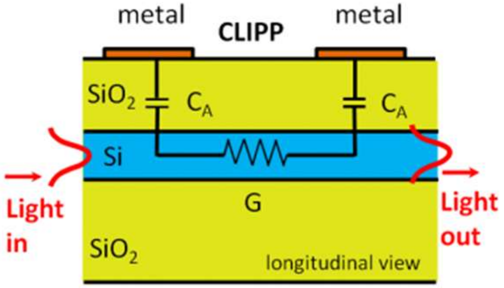


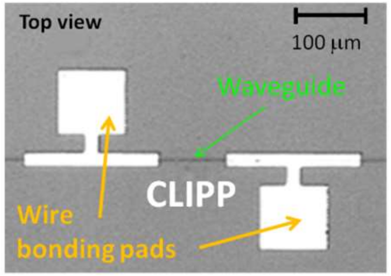
Photonics

Photonic components

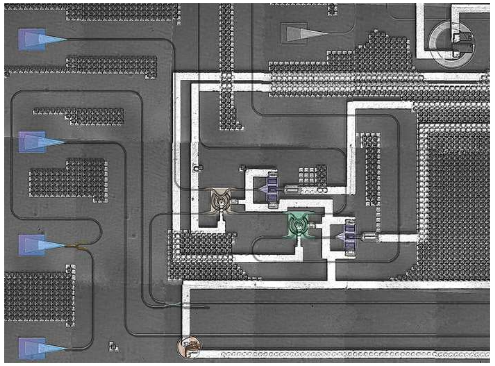


Photonic sensors





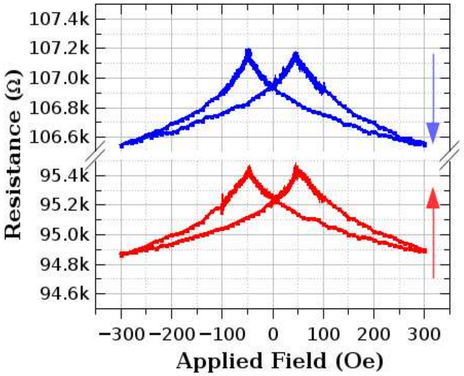
Photonic circuits for quantum photonics

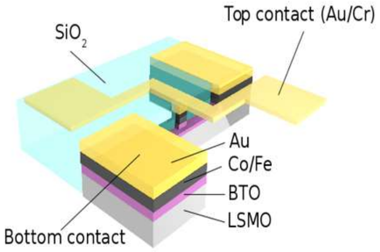


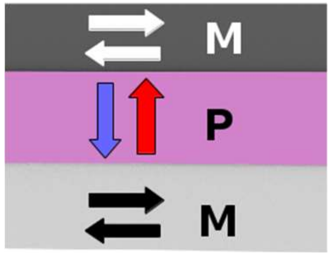
Fabrication equipment
PE-CVD
RIE
Optical/Electronic Lithography
Laser writer
Characterization Equipment
Ellissometry
Metricon
Profilometer
SEM

Nano-Magnetics

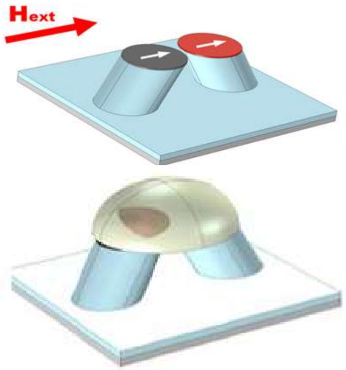
Multiferroic Tunneling junctions for information storage

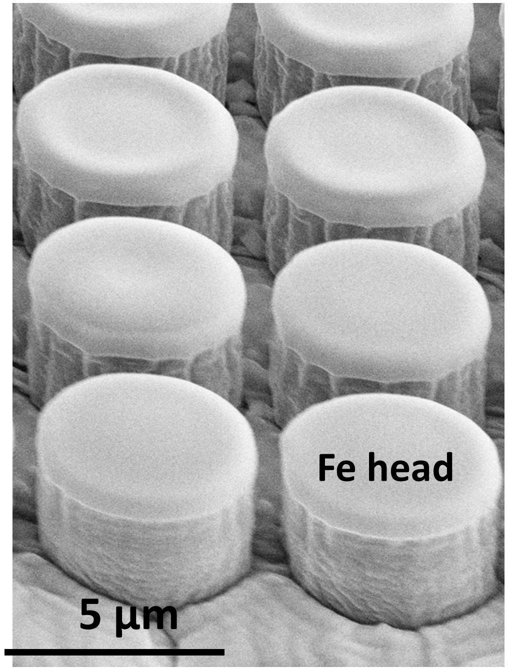




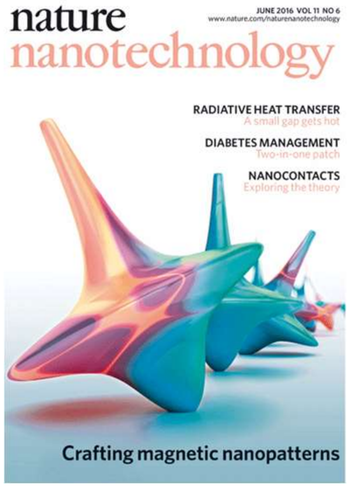


Magnetically actuated devices





PDMS pillar


nature nanotechnology

JUNE 2016 VOL 11 NO 6
www.nature.com/naturenanotechnology

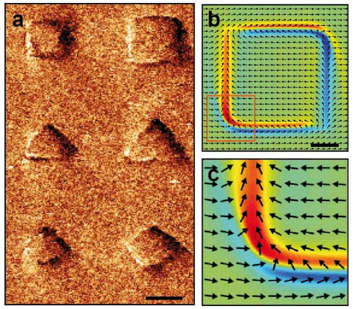
RADIATIVE HEAT TRANSFER
A small gap gets hot

DIABETES MANAGEMENT
Two-in-one patch

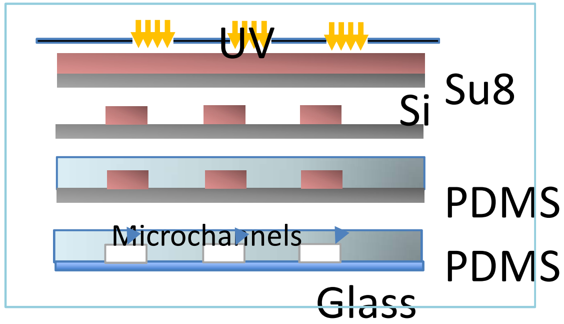
NANOCONTACTS
Exploring the theory

Crafting magnetic nanopatterns

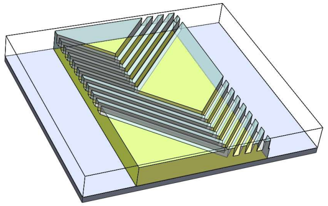
Nanopatterning techniques



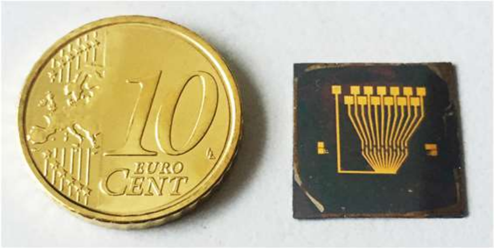
Microfluidics

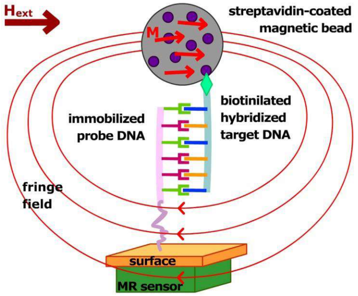


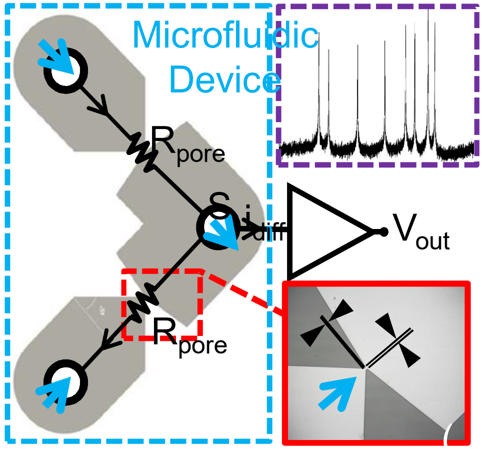
Microfluidic devices for rare cell detection



Magnetic biosensors



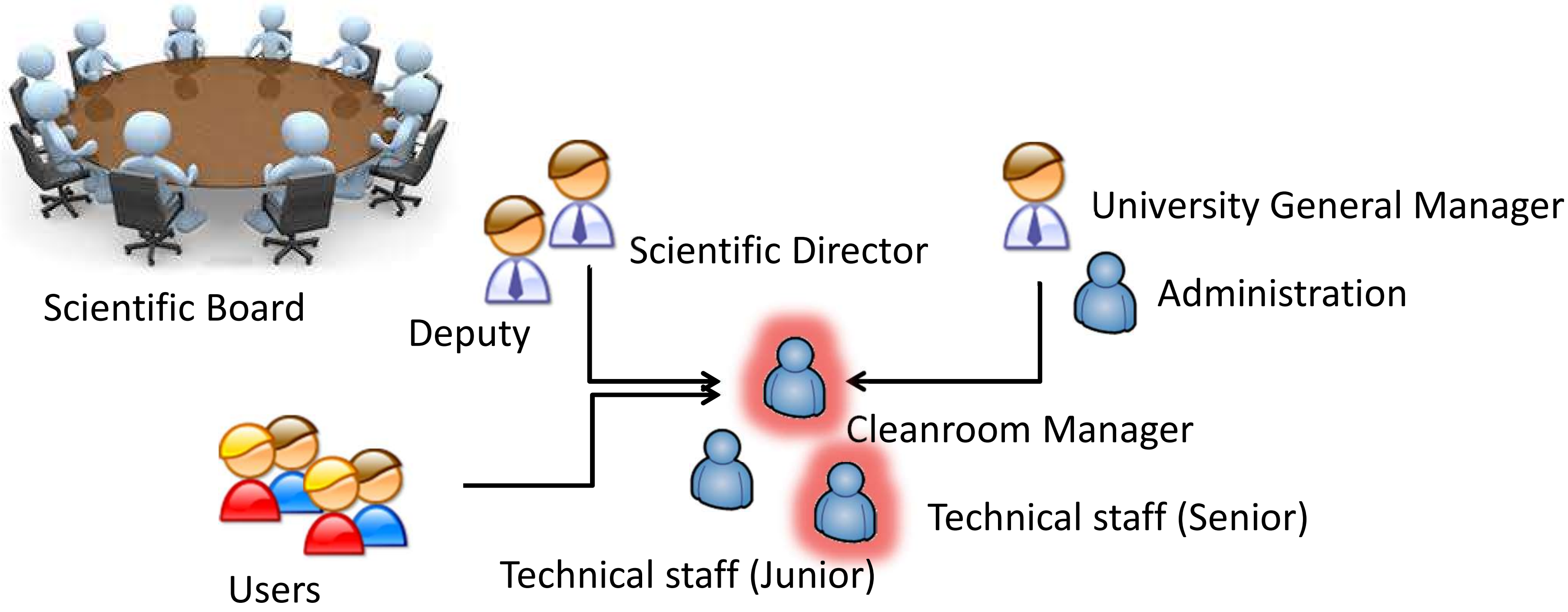




Pharmaceutics

Counting antibody aggregates

Governance



Scientific Board

Scientific Director

Deputy

University General Manager

Administration

Cleanroom Manager

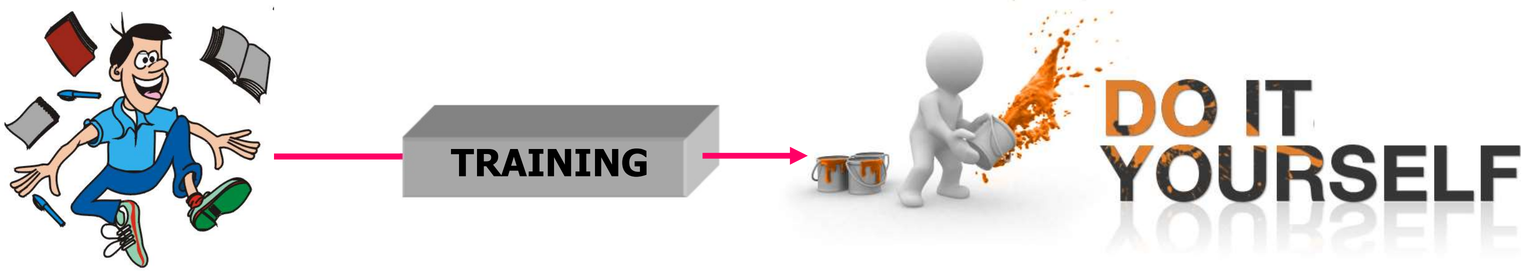
Users

Technical staff (Senior)

Technical staff (Junior)

Access options

1. «hands-on» - direct access to the cleanroom after safety qualification.



TRAINING

2. «service» - processing made by PoliFab personnel