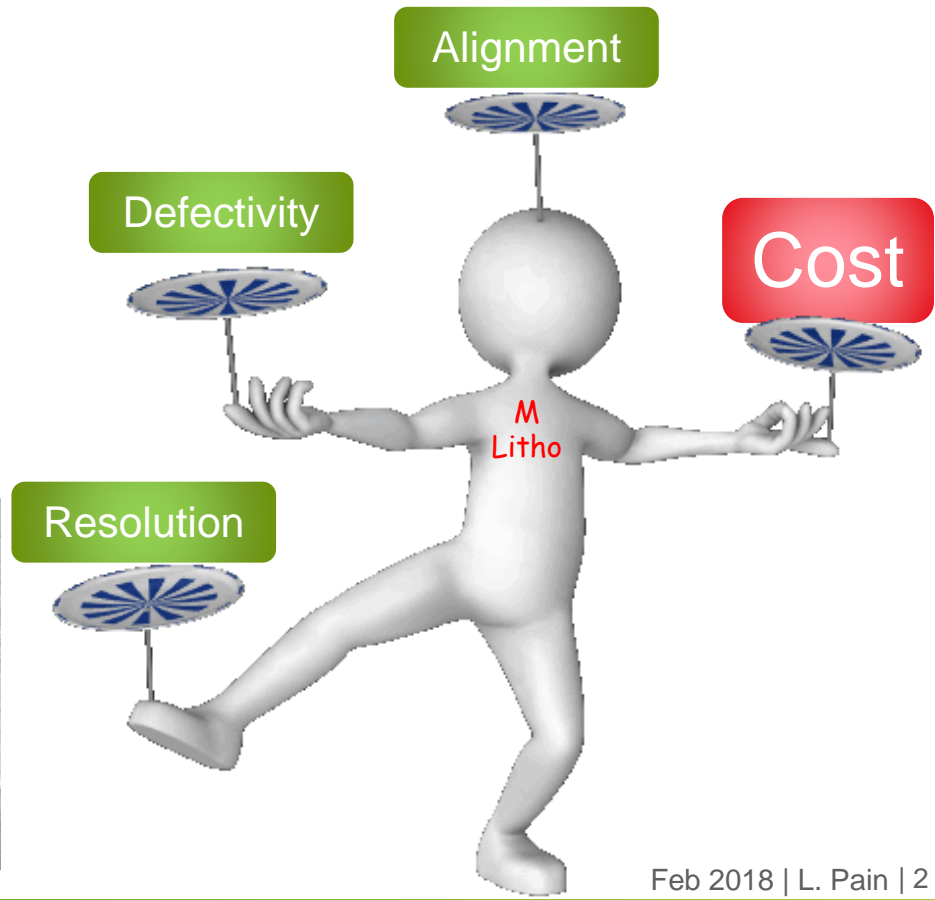
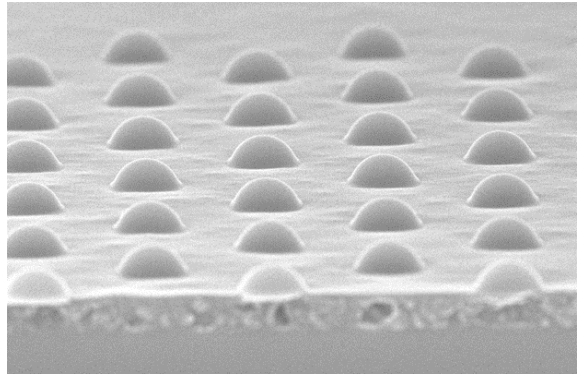
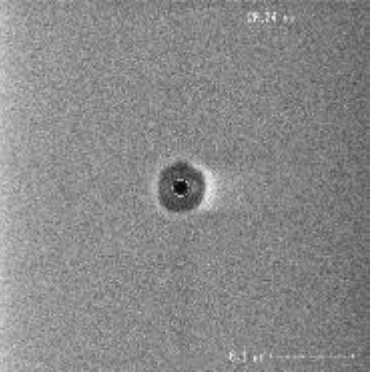
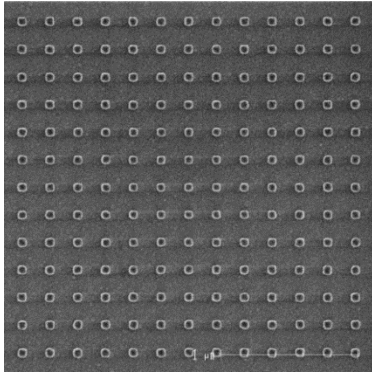
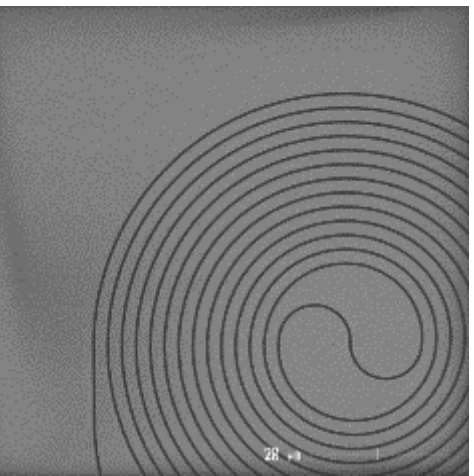
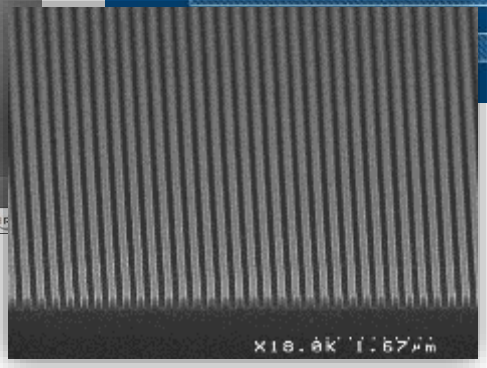
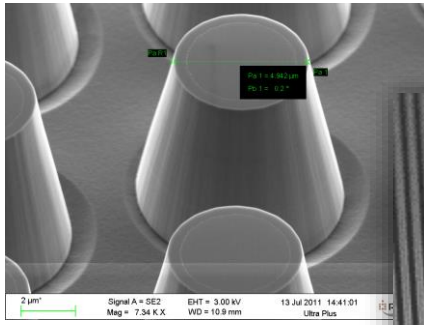
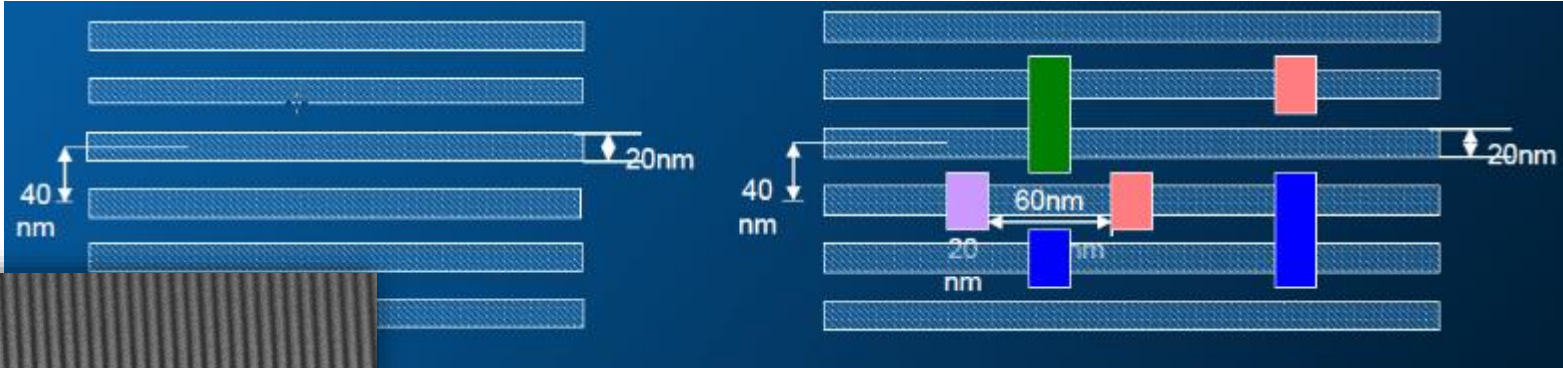


**THE LETI LITHOPOLE  
MARCH 1<sup>ST</sup> 2018**

Feb 2018 | L. Pain

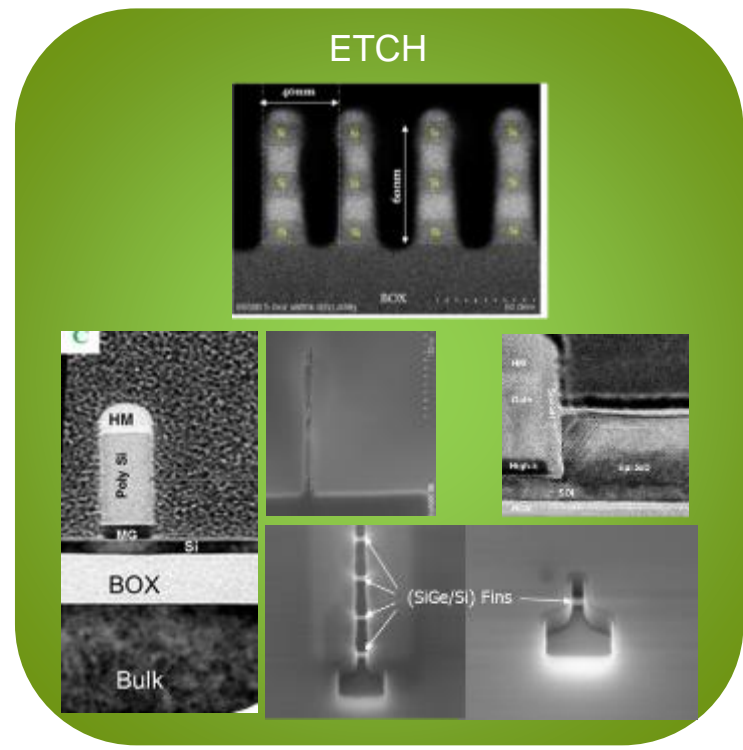
# LITHOGRAPHY/PATTERNING CHALLENGES





# LETI PATTERNING PILOT LINE ENVIRONMENT

- Offer to our partners a relevant access to industrial patterning solution
  - Support advanced CMOS/memory programs
  - Ability to address alternative applications (photonics, large surface...)
  - Provide the most attractive solution relative to CoO output
- Ability to address long term roadmap for device demonstration



# METRO-DEF ENVIRONMENT EVOLUTION

## Top view CD-SEM

VeritySEM 4i



- Sub-10nm 3D CD-SEM
- high-aspect-ratio imaging, tilted electron beam

HITACHI  
Inspire the Next

HCG4000



- 32nm node dedicated CD-SEM
- + Design Gauge for OPC

## Overlay



Archer 600

- Optical overlay metrology for advanced patterning processes at the 1Xnm design nodes (sub-10nm)

## Patterned wafer defect inspection & review

- defect capture on 2Xnm/1Xnm memory and logic devices
- scanner defectivity monitoring (PCM)
- Litho PW centering
- defect capture on 3D or transparent substrate
- Film frame (?)

Target: 3 tools  
Optical inspection + SEM review

2019

## Scanner baseline

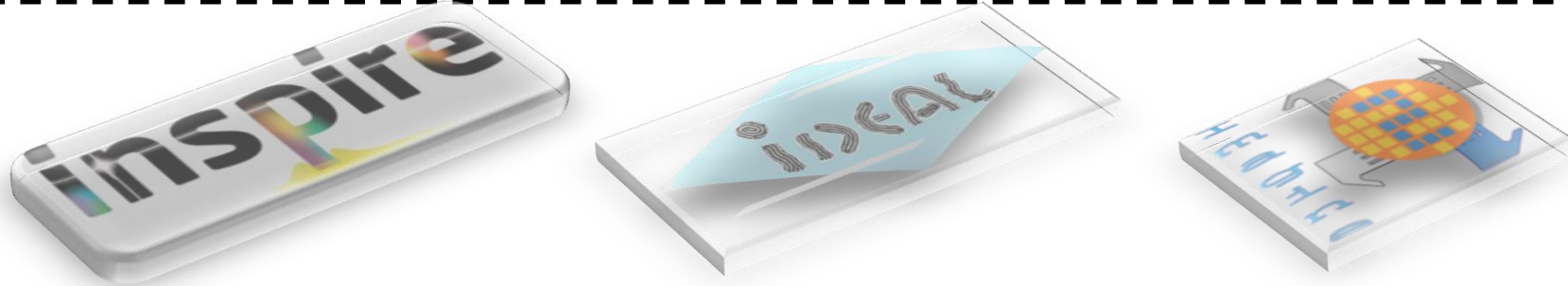


Yieldstar YS375

- Scanner monitoring (Focus baseline & Overlay baseline)
- on-product overlay and focus using diffraction based overlay (uDBO) and diffraction based focus (DBF) techniques

Private Partner R&D program

Prototyping & Foundry Service



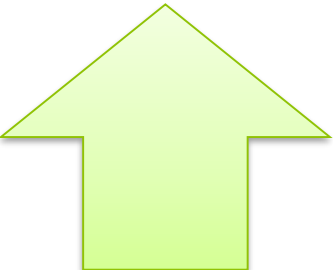
Public assessment Program

# ESTABLISH A STRONG PARTNERSHIP & ECOSYSTEM

**Prototyping & Service**  
 Wafer prototyping with guaranteed cycle time  
 Master pilot line access

- Customized R&D program**
- Dedicated integration blocks
  - Specific materials qualification
  - LETI platform access (litho platforms – metrology & defectivity)
  - Dedicated SW solution deployment

**ECOSYSTEM**



**SPECIFIC R&D ACTIVITY  
 PROTOTYPING & SERVICE**

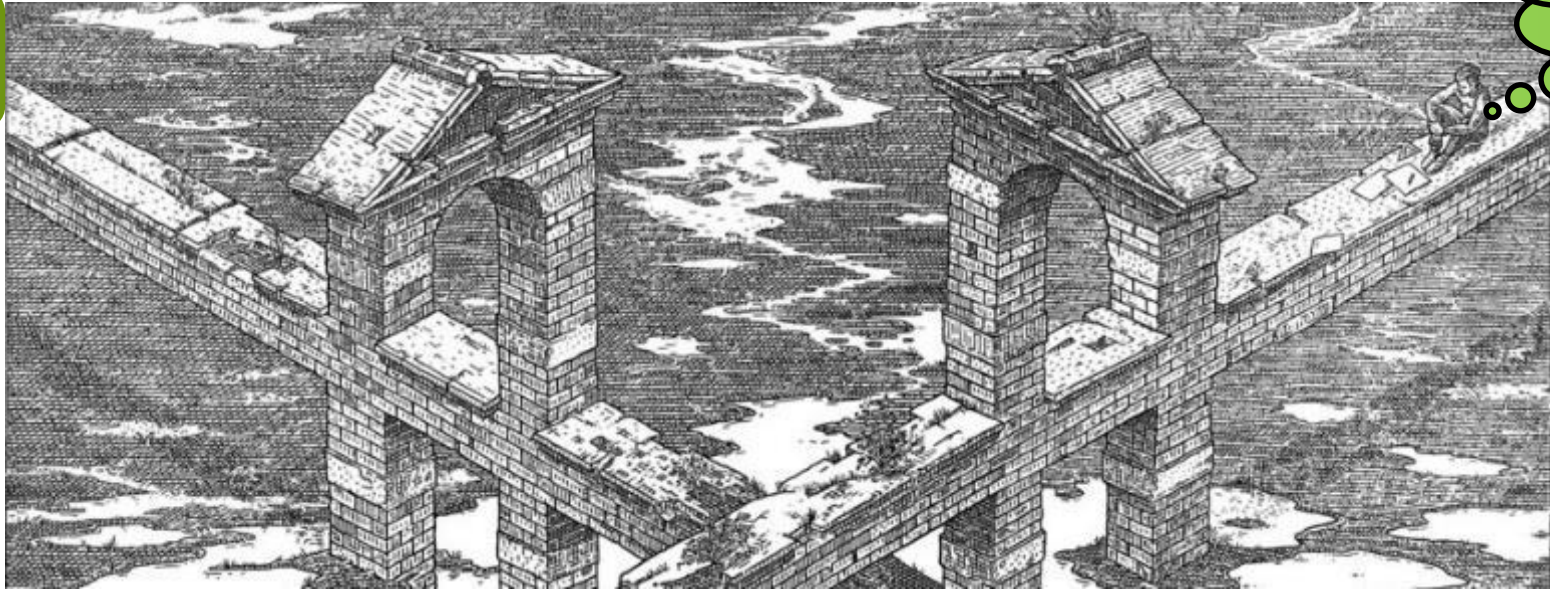
**END USERS**

**YOU**



# THE OPPORTUNITY OF LETI ENVIRONMENT

R&D  
Pilot line



Application ?

# LETI PILOT LINE ACCESS & OPPORTUNITIES

**TOOL ASSESSMENT**

**METROLOGY/DEF**

**PROCESS/MASTER**

**INTEGRATION DEMO**

**LETI PILOT LINE**

*Surfacing*

*Advanced Materials*

*Patterning*

**WAFER SHUTTLE WITH PARTNER**

**Technology learning**

**Wafer processing**

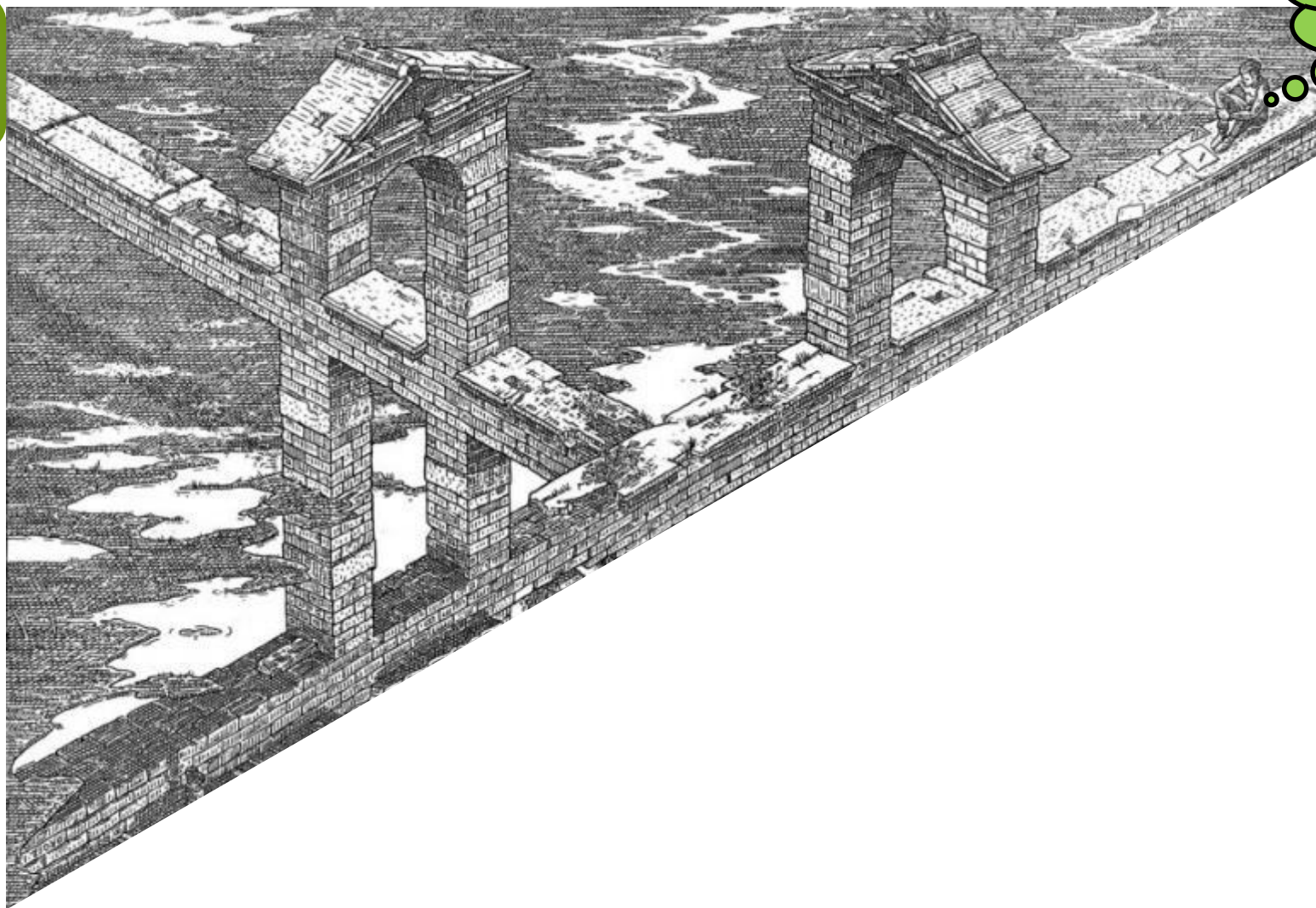
**Pre-serie support**



# THE OPPORTUNITY OF LETI ENVIRONMENT

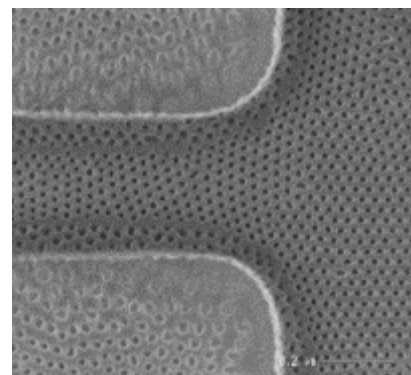
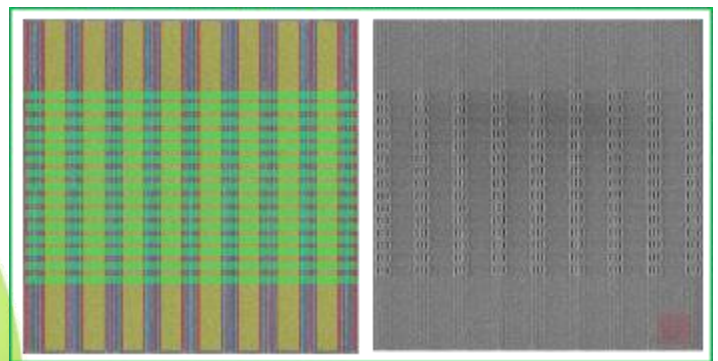
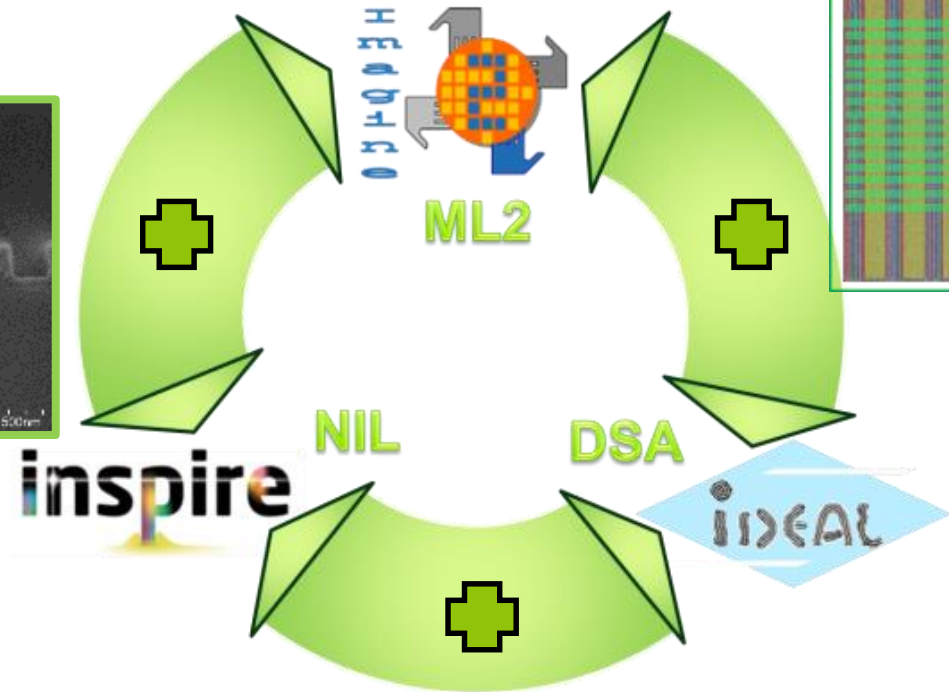
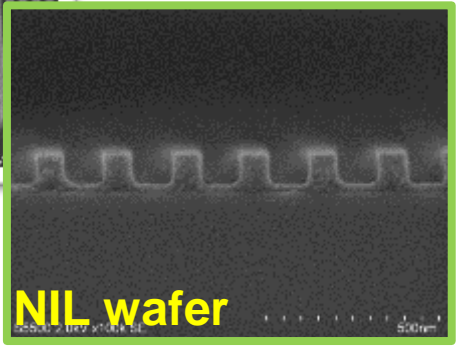
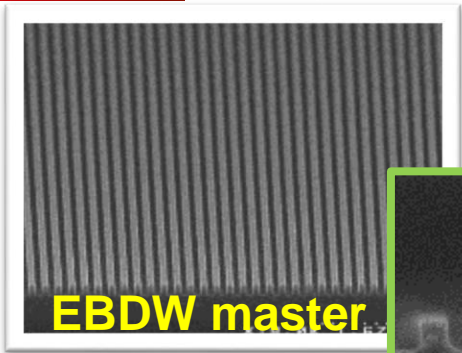
R&D  
Pilot line

Litho  
alternatives



Application ?

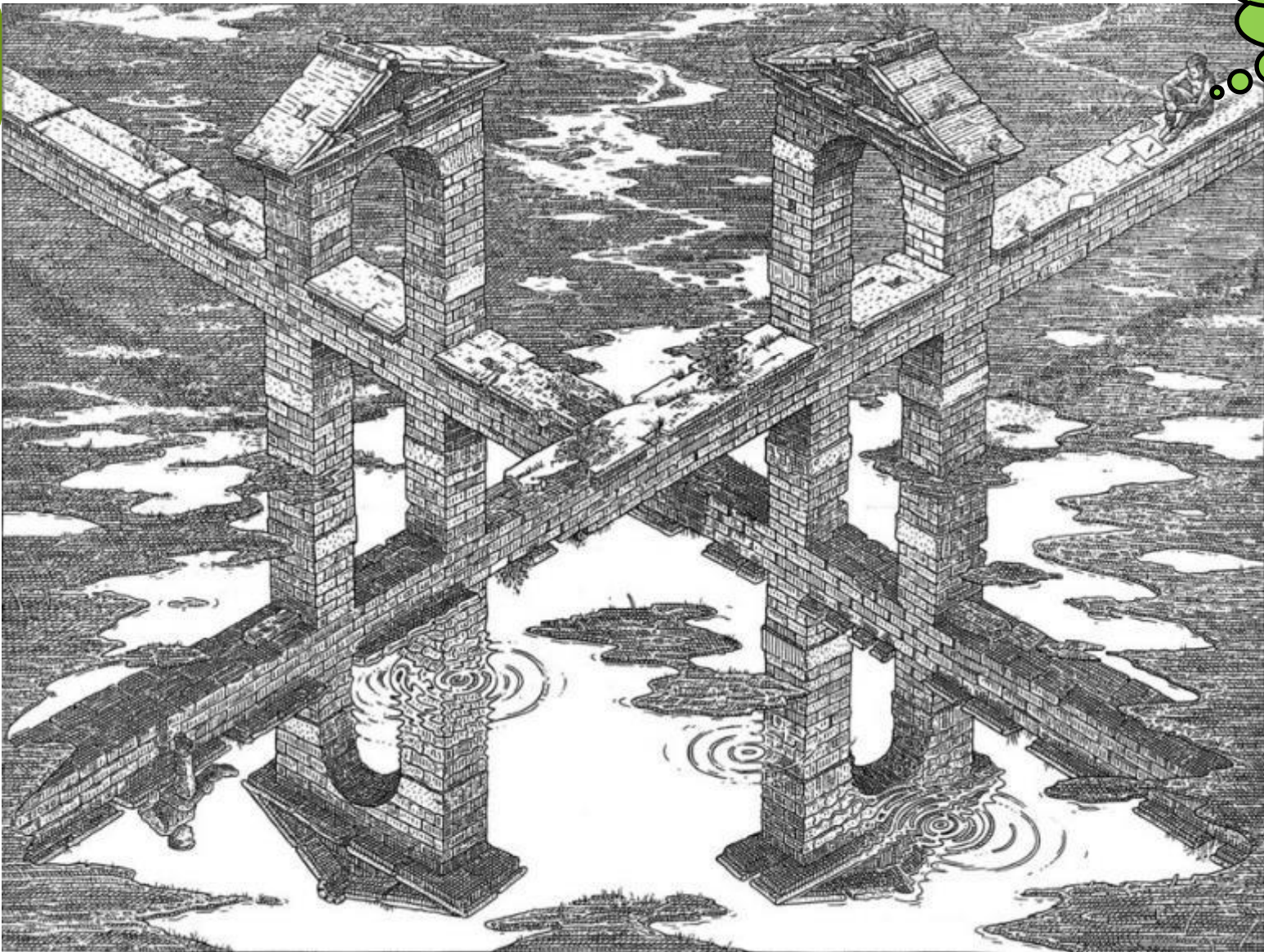
# TECHNOLOGY CROSS FERTILIZATION





# THE OPPORTUNITY OF LETI ENVIRONMENT

R&D  
Pilot line



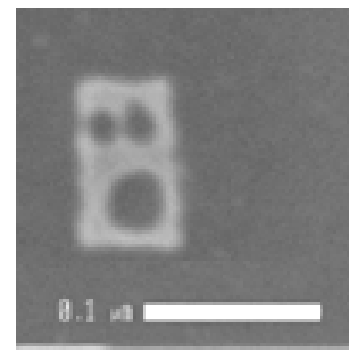
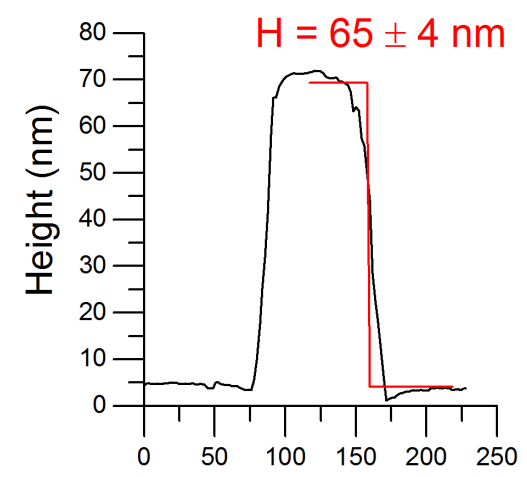
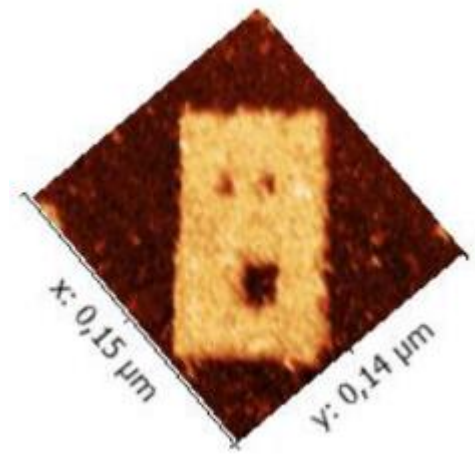
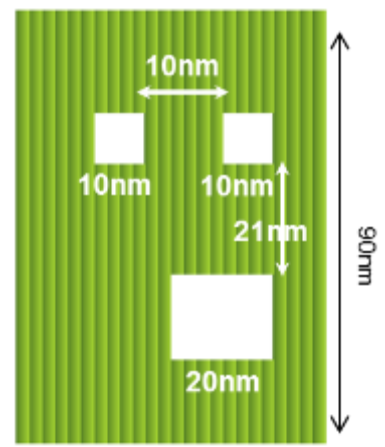
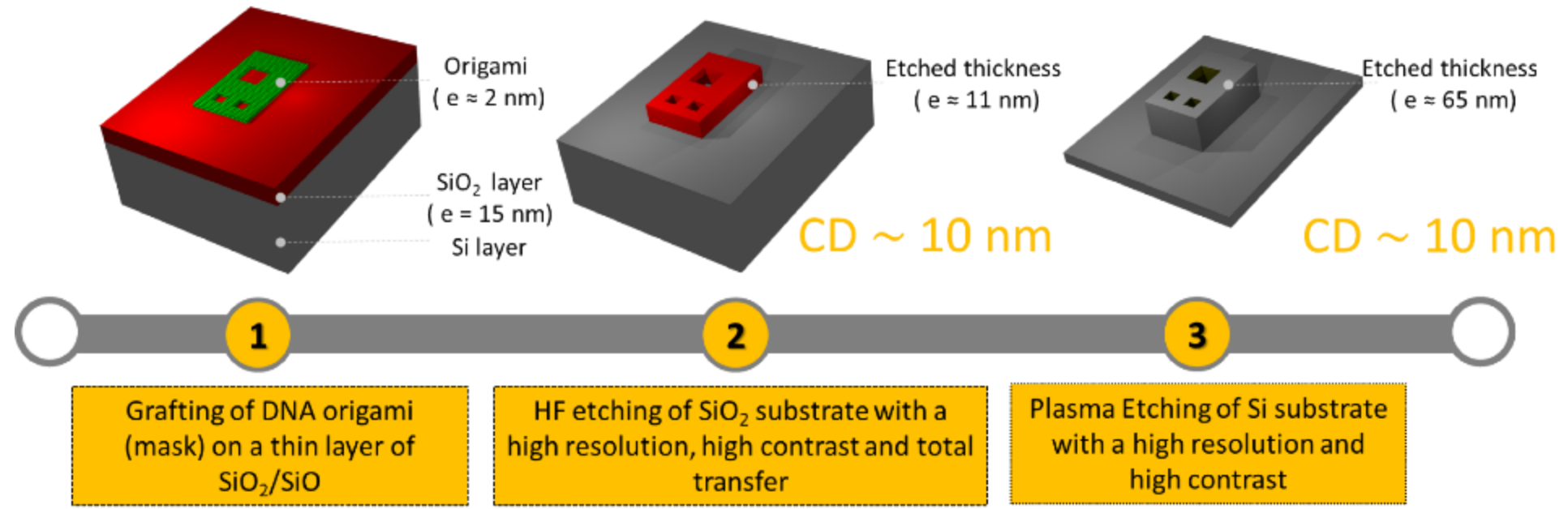
Application ?

Litho  
alternatives

Innovative  
patterning

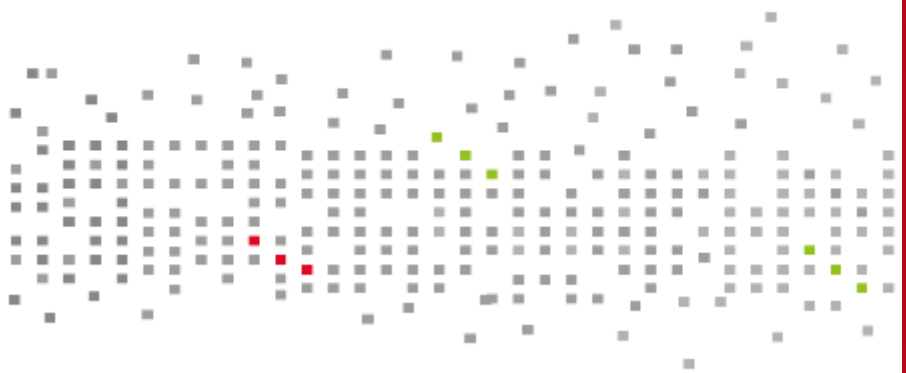


# DNA ORIGAMI MASK FOR sub-10 nm LITHOGRAPHY



CD-SEM image

R.Tiron et al, to be published

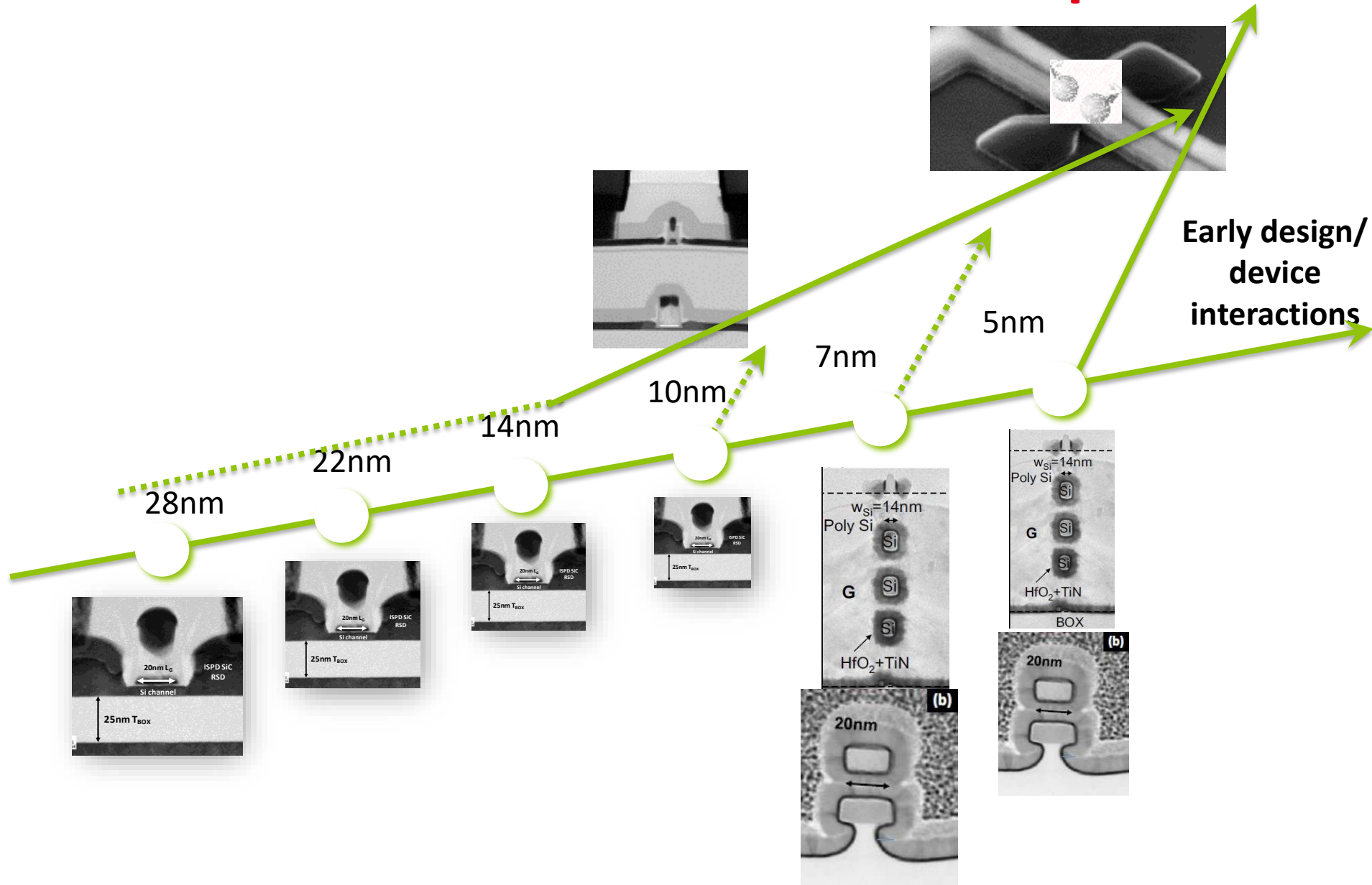


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Commissariat à l'énergie atomique et aux énergies alternatives  
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[www.leti-cea.com](http://www.leti-cea.com)



# Leti advanced devices roadmap



Early system/  
device  
interactions

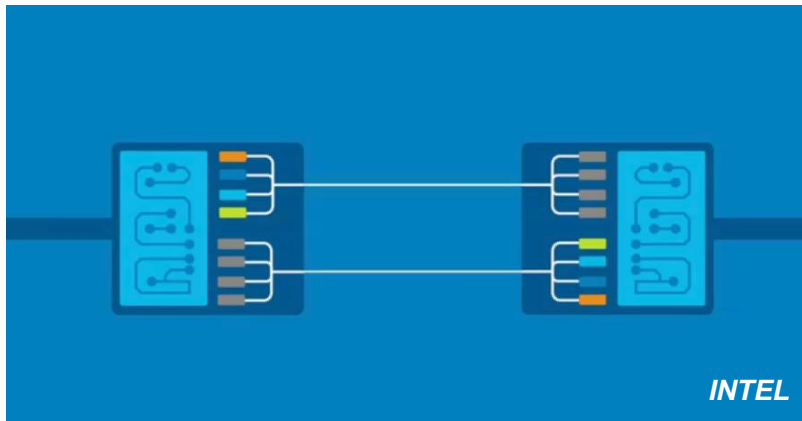
Early design/  
device  
interactions

Early material/  
device  
interactions

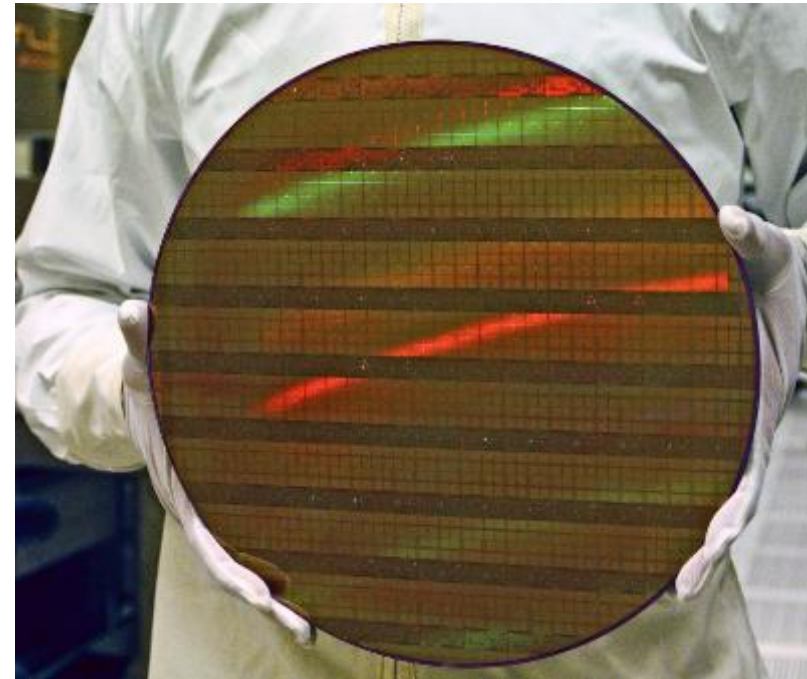


# OPTRONICS & PHOTONICS

Silicon photonics aims at integrating in the silicon microelectronic CMOS technology the optical emitter and receiver modules initially based on other technologies (InP, InGaAs, LNbO3, SiO2, ...)



*Optical communication*



*12" Si wafer*



# (MAPPER-ARKEMA-EVG)-LETI SOLUTION: (IMAGINE-IDEAL-INSPIRE) PROGRAM



# THE MAIN IMAGINE-IDEAL-INSPIRE PROGRAM OBJECTIVES





# THE LETI ECOSYSTEM FOR IMAGINE-IDEAL-INSPIRE PROGRAM



# THE MAIN ACHIEVEMENTS



# THE MAIN ACHIEVEMENTS





# THE MAIN ACHIEVEMENTS

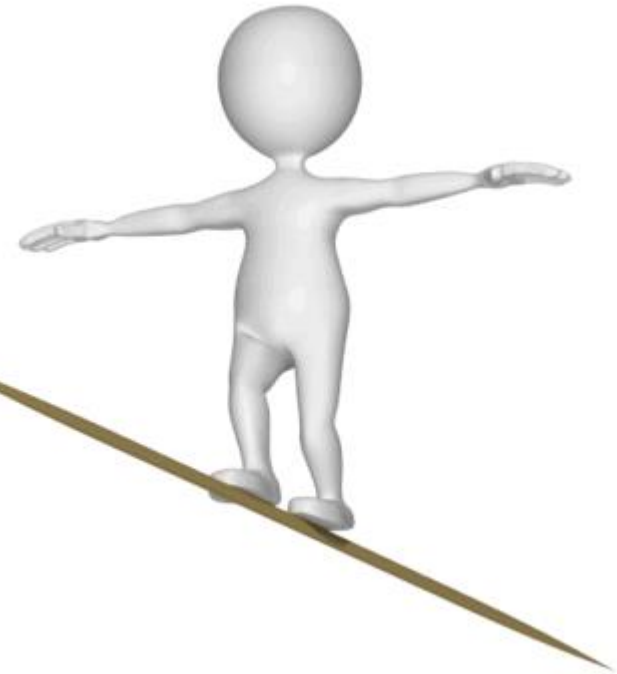


# THE MAIN ACHIEVEMENTS

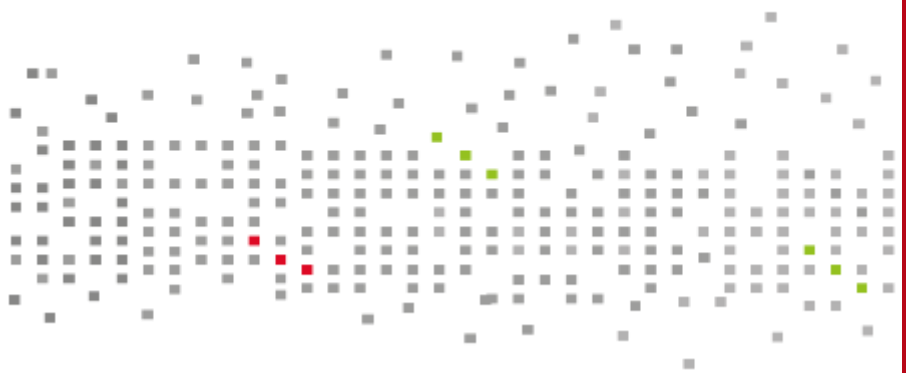


# THE 2018 ROADMAP

# THE NEXT STEPS FOR FURTHER ASSESSMENT AND VALIDATION







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