

**DTU DANCHIP**

**DTU Cen**

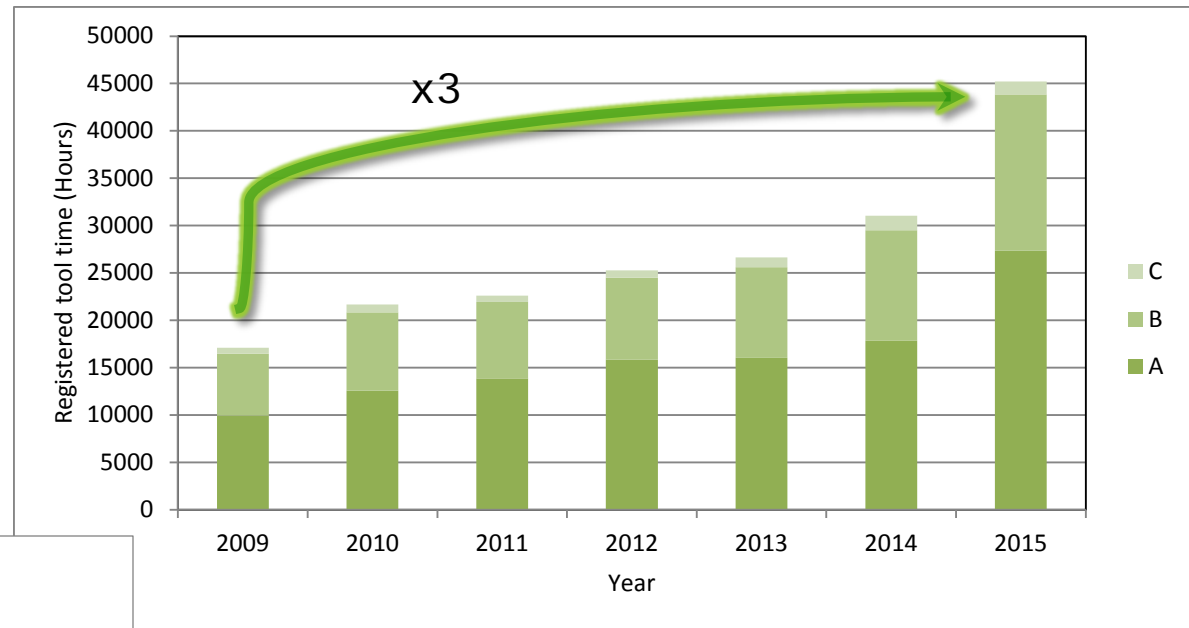
**Tech Forum 2/16**

← 346-347 DANCHIP



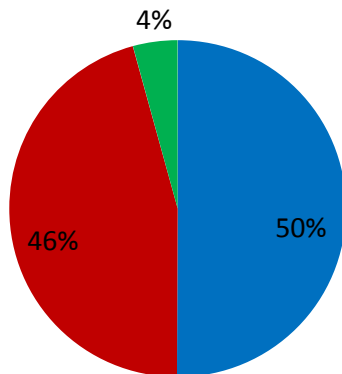
# Facts and figures

## Machine usage Danchip



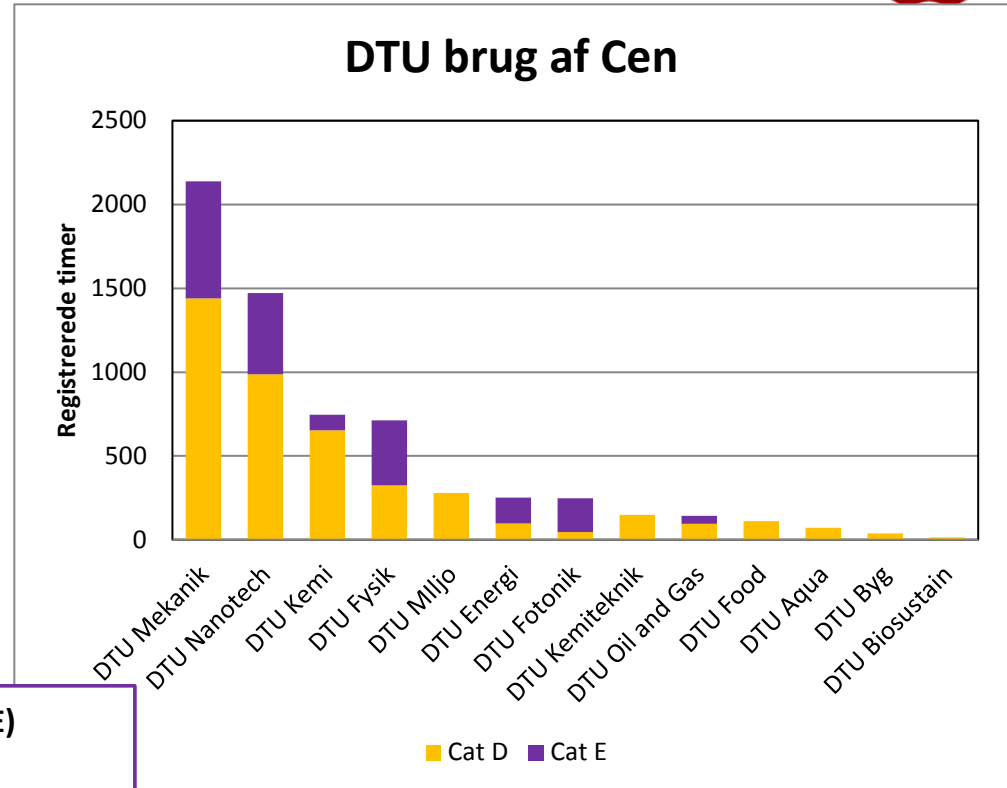
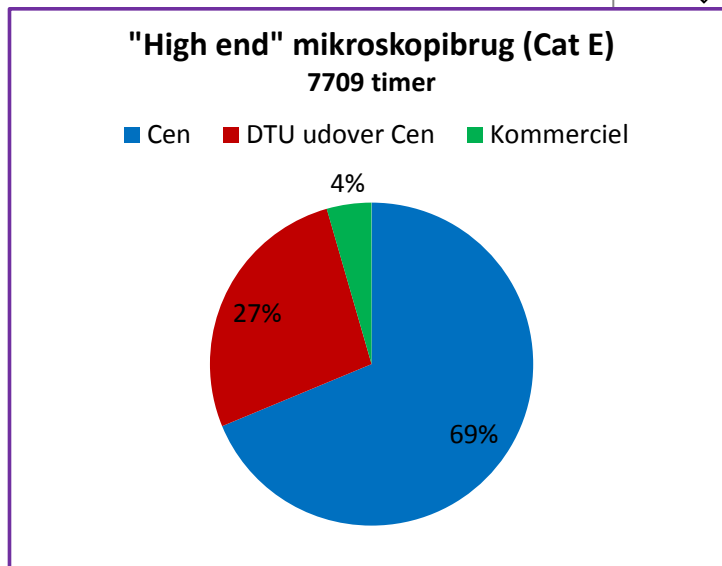
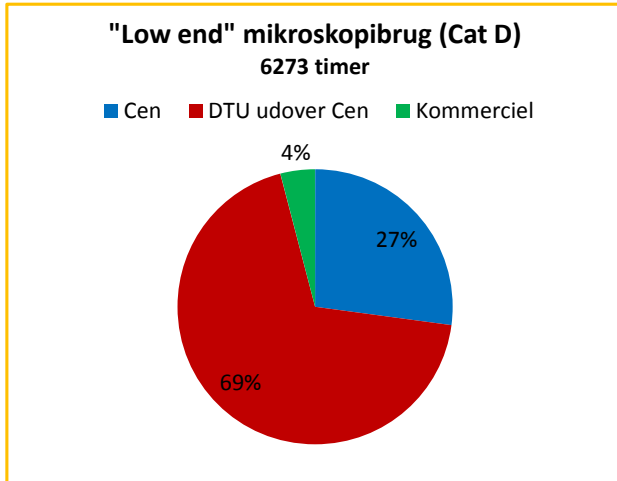
### Total mikroskopibrug (Cat D+E) 13981 timer

■ Cen ■ DTU udover Cen ■ Kommerciel



- 500 registered users
- 70 total staff, 15 research staff, 7 PhD stud.
- 77 peer reviewed publications (2015) with DCH/CEN staff directly involved (authored/co-authored); 6 publications in Nature Publishing Group
- Used by 15 departments and 4 Centers of Excellence (Grundforskningscentre)
- 20 companies

# Facts and figures



# It is getting crowded.....

Increase throughput ---- increase efficiency

A lot has changed over the last years (equipment, resists, safety)

There are plenty of new technologies available (ALD, DUV, etc)

Get a Danchip co-supervisor

Get your processes flows checked and updated

Sign students on **before** they start !

It is much more efficient **for all** to update the process flow and plan training according to an updated flow instead asking for single tool training.

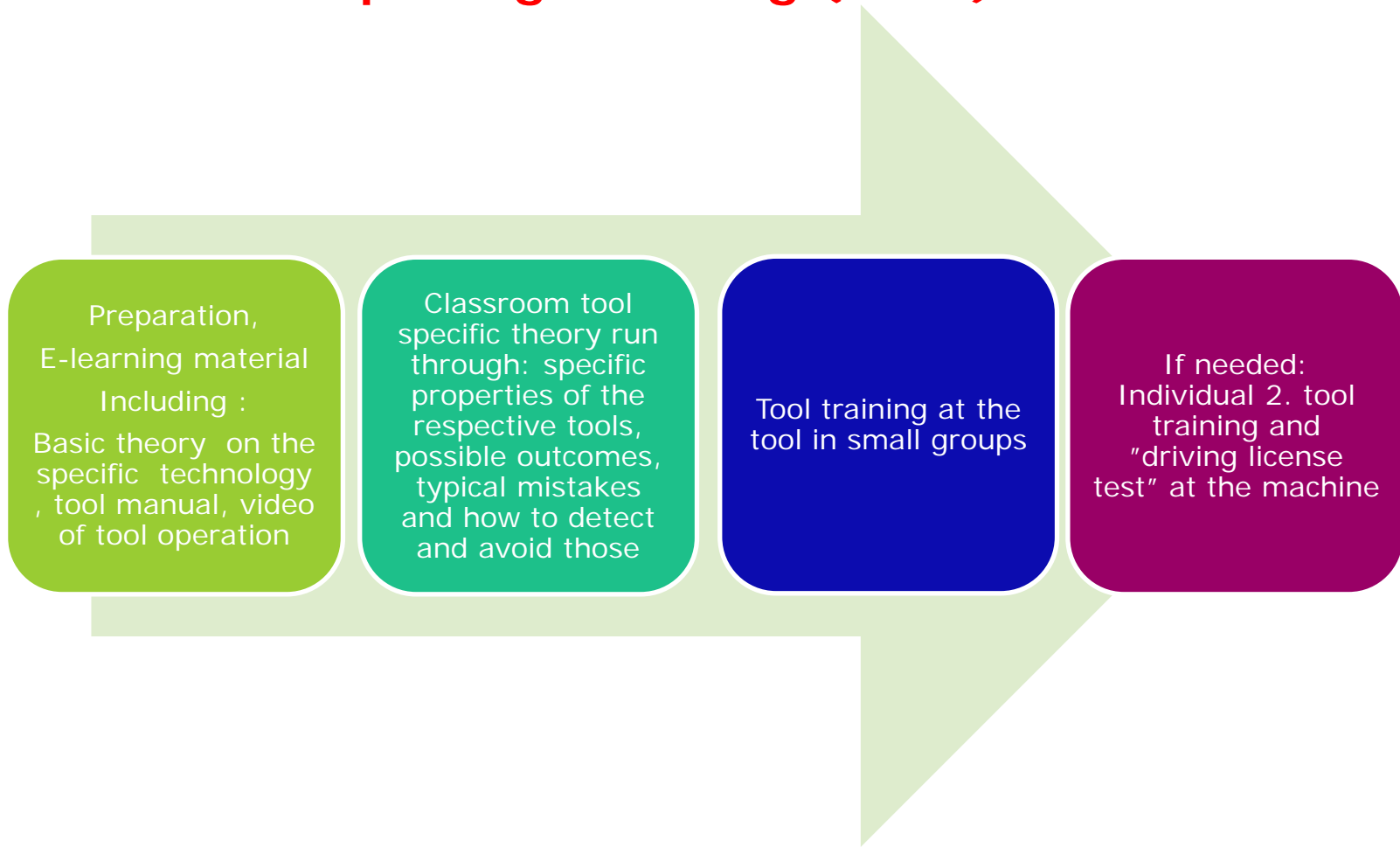
Prepare to process during fringe hours.

# A more thorough introduction to cleanroom processing

Training engineers - not operators

Prevent downtime and accidents through understanding and insight

## **scheduled tool package training (STPT)**



# scheduled tool package training (STPT)



Status:

Lithography TPT in place v0.9 (3h theoretical, 2 (1) practical training session(s), monthly  
aim for: more electronic material, 1h theoretical, 1 practical training session, bi-weekly

SEM training

from 1/8 : 2h theory 2h practical training at SEM basement 346

Mask design TPT

from 1/9: 6-8 participants, distributed course over 2 weeks, ~4h classroom in total

Intro TPT

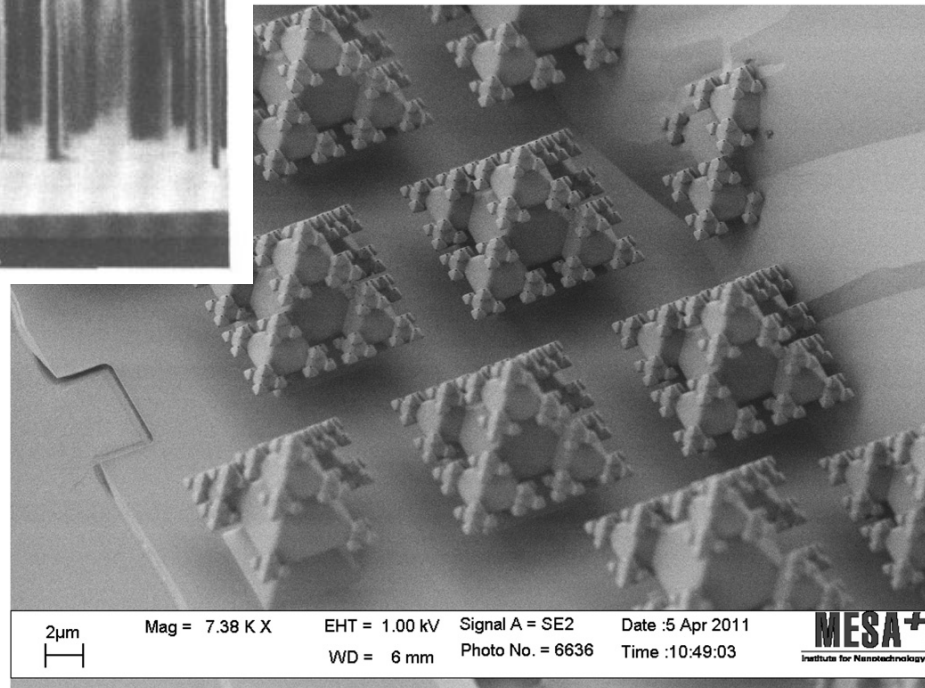
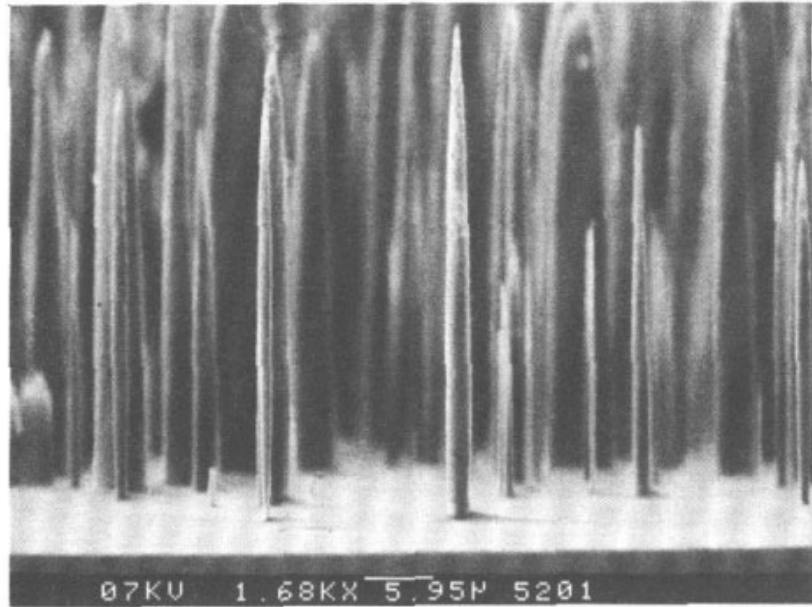
from 1/9: safety, labmanager/labadvisor, cross-contam., process flow

Soon: Wet Chemistry TPT, Thin Film TPT, Etch TPT



# Professor in Silicon nanofabrication

Henri Jansen starting nov 2016



# Soft matter electron microscopy

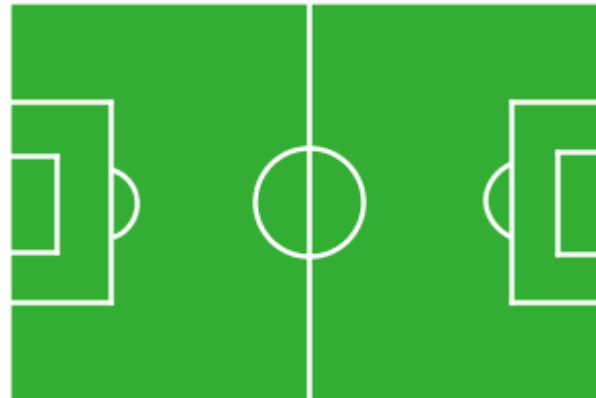
find a professor



## Strategic frame

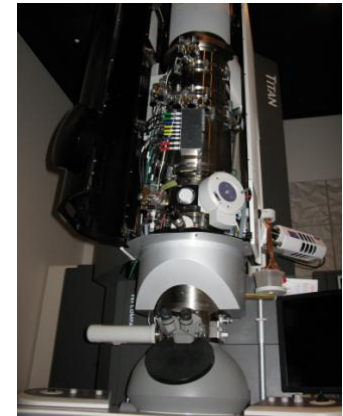
useful for the "wet" sciences

characterization  
not just imaging



make use of the  
existing toolpark  
with few but significant  
additions

try to exploit synergies with  
possibilities at Danchip  
(e.g. MEMS microfluidic sampleholder etc.)





# Materials

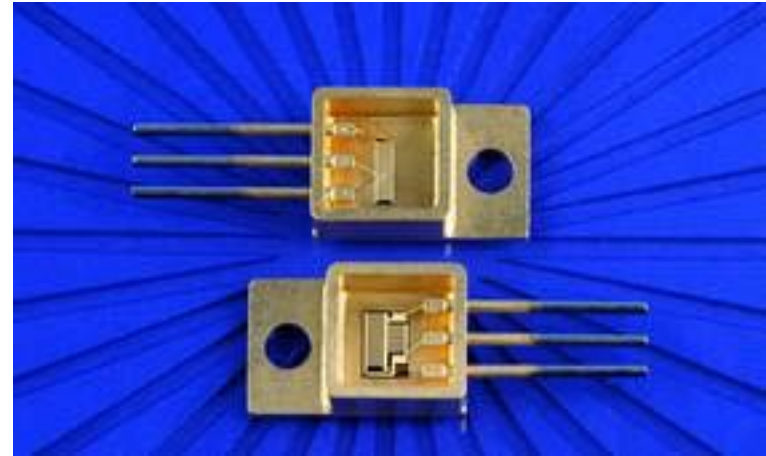


We have to choose our challenges carefully:



Paramount criteria: Generating Critical Mass

= high potential and most useful for as many departments as possible



# Materials



Case: Diamond

Fysik, Fotonik, Nanotech, Elektro .....

Quantum computing

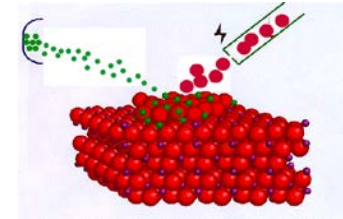
Quantum cryptography

Integrated optics,

Ultra high Q optical resonators

High power transistors

Biocompatible microsystems



We try to save up for the initial investment

Feedback from funding agency: No guaranteed results within the project period.

# **NEW TOOLS / DECOMMISSIONING - FLJE**

# X-Ray Diffractometer

- Background:
  - Complementary in-line material analysis (crystalline/ poly/nano-crystalline)
  - Co-funding (Danchip/Fotonik)
- Material properties:
  - crystal orientation
  - grain size
  - electron density
  - film thickness



# Table-top Thermal Evaporation

## - resistive heated boat (simple system)

- Background:
  - Heavy load on Wordentec
  - Improve flexibility/costs
- Simple (cheap) system:
  - low budget (ca. 30 kEuro)
  - table-top
  - single stage
  - 1-2 boats (resistive heated)



## Pegasus 2

- Background:
  - Bottleneck situation on Pegasus
  - Plans for intensive research in silicon etching (a.o. nanoetch)
- Actively pursusing 2nd hand system





# plasma/thermal ALD from Picosun

## Motivation

- High utilization, bottleneck tendency
- No in-house back-up
- Limited capacity for new precursors

## Key features

- Highly flexible ALD system, thermal & plasma-ALD
- Stacked substrates (pieces – 8" wafers)
- "Work horse" as well as new capabilities
- New chemistries, e.g. for metals and metal nitrides
- Low temperature processes



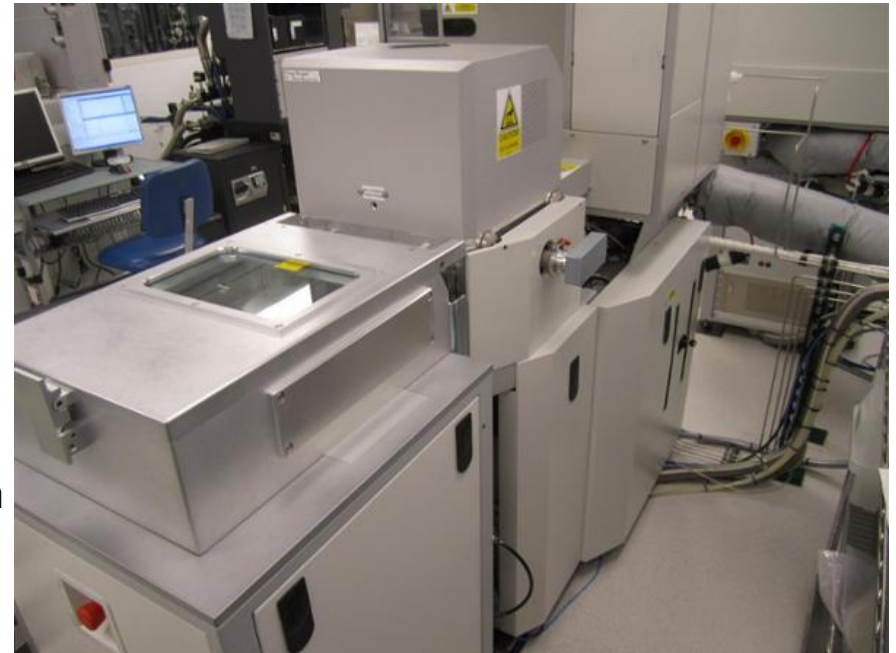
**Under installation – acceptance planned for end of August**

## PECVD-4 – replacement of PECVD-1/2

- SiO / SiN / SiON / BPSG / (~~Ge-doped~~)
- Including stress-tuning capability
- Refurbished SPTS system (2011)

Installation almost done

- still missing Honeywell (ATMI) integration
- initial functional tests



# **NEW TOOLS - LESJO**

# New bonder tool

- Pre-align in KS MA-6 aligner, then bond in KS bonder
- Demo at Süss highly successful – both on 4" and dies.
- Will be placed in E-4, next to KS aligners.
- Delivery in April 2016
- Expected operational Q3 2016



# New imprint tool

- CNI from NILT replaces NIL on the EVG 520



# Tools leaving the cleanroom

- SSE Maximus. (replaced by Süss Gamma)
- EVG NIL 520 & aligner 510.
  - Too unstable and very costly to repair.
  - Bond function replaced by Süss bonder
  - Imprint function replaced by CNI NIL
  - Aligned imprint will not be possible in the future
- III-V aligner (replaced by MA6-2)
- Old wet benches in Ballroom (replaced by new benches and fume hoods)
- Wet benches in C-1 (old yellow room)
  - Replaced by new wet benches in Ballroom
  - Will stay until new benches are ready
- SIMS (no replacement – we are looking at finding external services)
  - Will go when it can no longer be repaired
- Noble Furnace/old Resist Pyrolysis Furnace (replaced by ATV)
- PECVD-2 (replaced by PECVD-4)
- Prism coupler
- Cryofox
  - too unstable / too expensive (running costs)
  - will go in August

