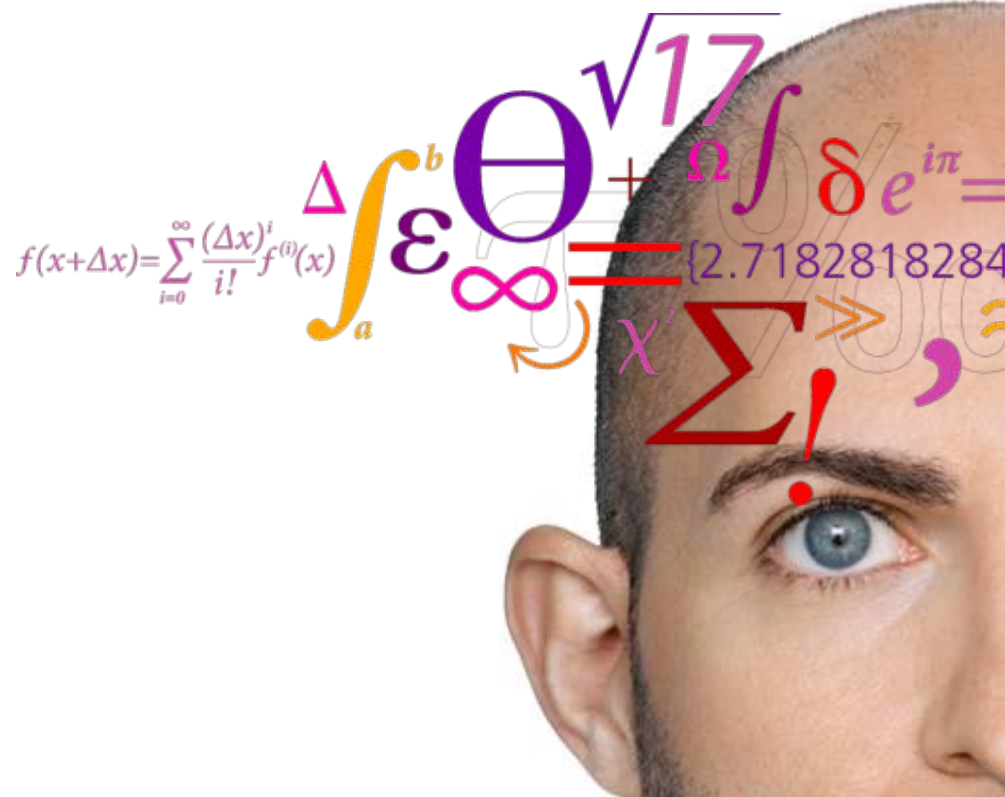


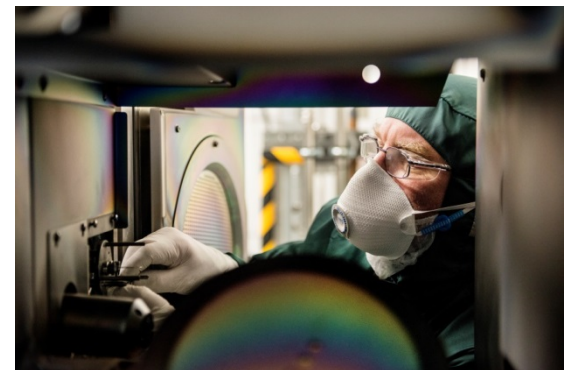
Technology Forum 2 2014

June 10th 2014



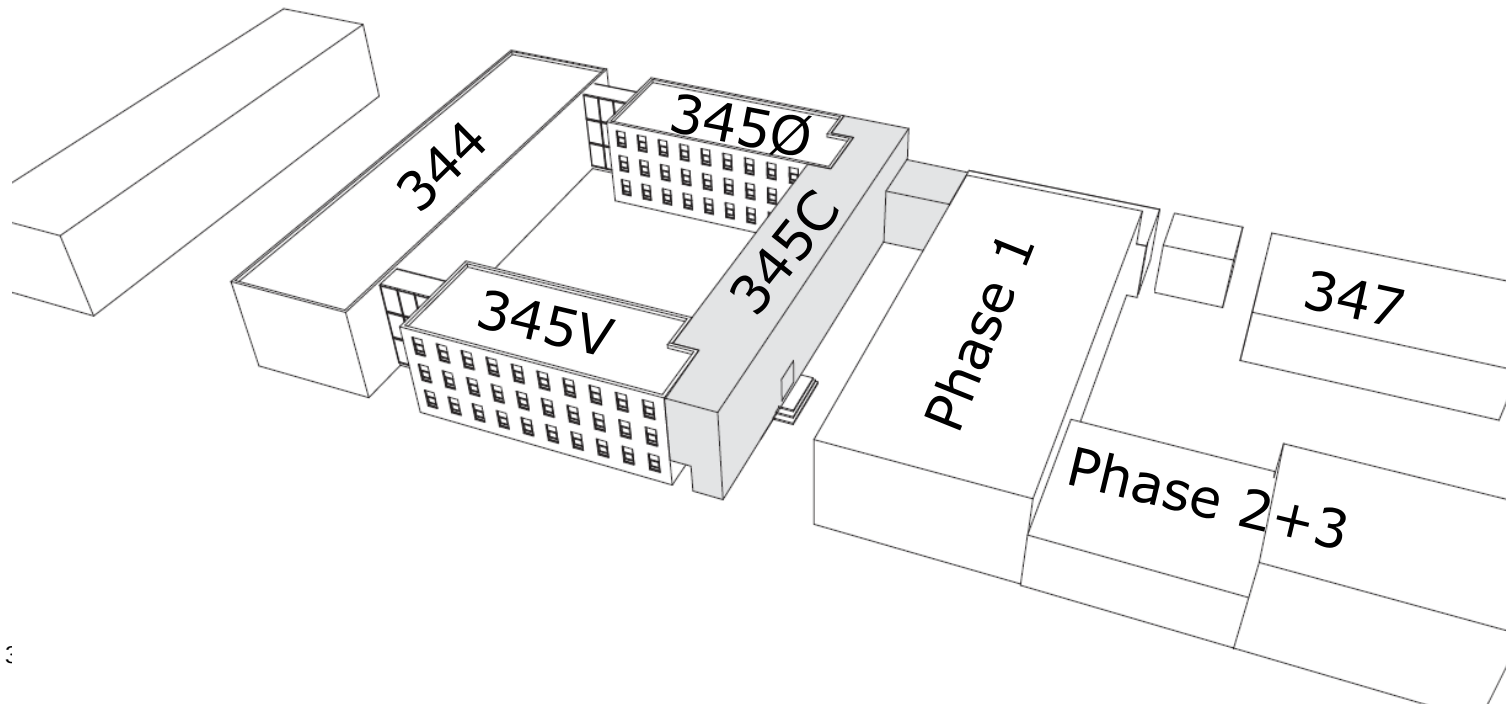
tech forum

**Intensify dialog especially
on a strategic level
between Danchip/Cen
and Danchip/Cen users**



Construction work

- New building: 345C
- Construction start: 28 July 2014
- Pilars will be drilled – not hammered
- However: Noise, dust and vibrations should be expected.
 - Noise: No direct influence
 - Dust: risk of clogging of inlet filters
 - Vibrations: Sensitive equipment might not perform to spec.



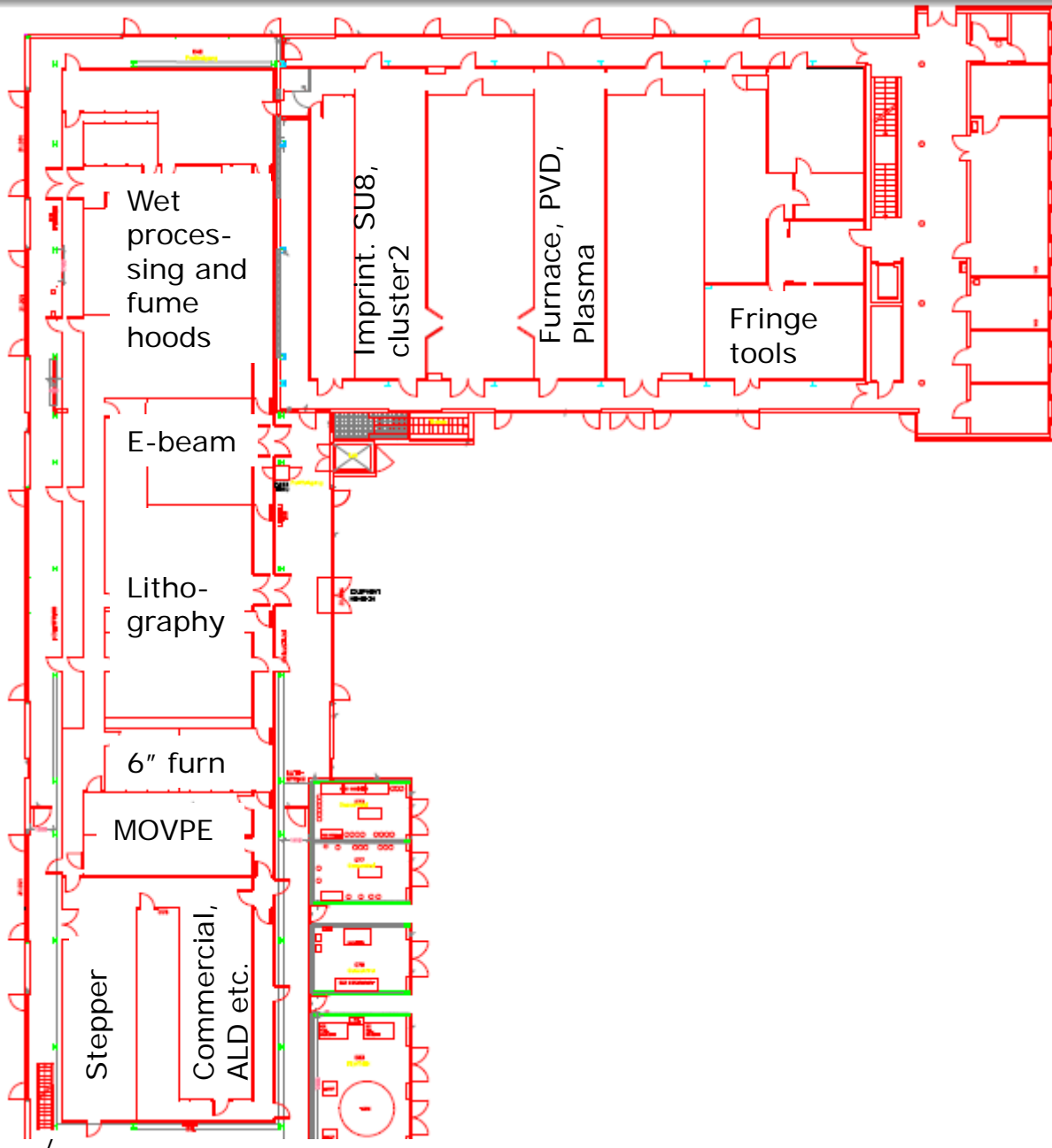
Overview over construction works

- **B346, new humidifier** Cleanroom closed 2 days. Date unknown.
- **B345C (nanotech)** construction work
 - 28. July – 08. August 2014: Demolition of old entrance (Med risk)
 - 11. August – 22. August 2014: Excavation of foundation (Med risk)
 - 20. August – 02. September 2014: Drilling and casting (Med risk)
 - 01. September – 26. September: Casting of foundation (Low risk)
 - 22. September 2014 – 31. July 2015: Other construction (Low risk)
- **B340 (Photonics)** construction work
 - 1. July 2014 - 29. August 2014: Demolition of old wall. (Low risk)
 - 2. January 2014 – 12. February 2015: Construction of “pælevæg”. (Low risk)
- **B331 (Agora)** construction work START JUNE
 - Ramming of plates (Low risk)
- **B346, Ballroom reconstruction**
 - Autumn. Awaiting purchase of fume hoods and wet benches.
 - Wet benches may be inaccessible.

REARRANGED CLEANROOM

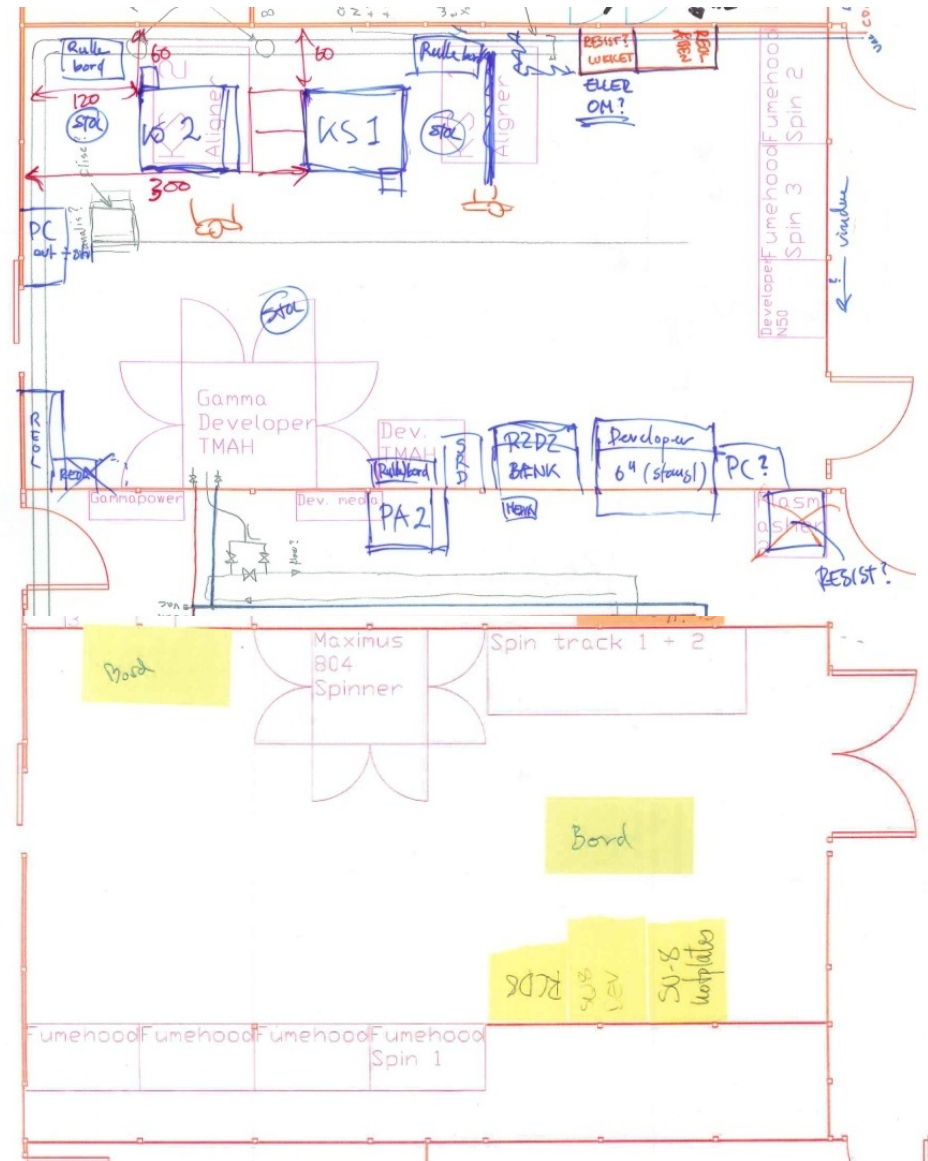
Changed boundary conditions

- New e-beam writer installed in new room
- General use of the cleanroom has changed
- Before: 100 mm
- Now: 100 mm, 150 mm, 2" and other formats
- A more flexible approach needed
- A design centered around research activities or process flows is unflexible
- A design centered around process types is more long-term secure
- Now is a good time to rearrange some of the equipment



New Litho Rooms

- E-3 (Old e-beam room)
 - 2 pcs KS aligners
 - New automatic TMAH developer
 - 2 pcs R2D2 (1 TMAH & 1 e-beam)
 - Tank development (6" developer)
 - Fume hoods for e-beam spin+dev.
- E-5 (previous CR13)
 - Spinners SSE + SVG
 - Fume hoods
- C-1 (old Cleanroom 3 in Phase 1)
 - 6" EVG Aligner (no robot)
 - Manual polymer spinning
 - Fume hoods
 - NIL

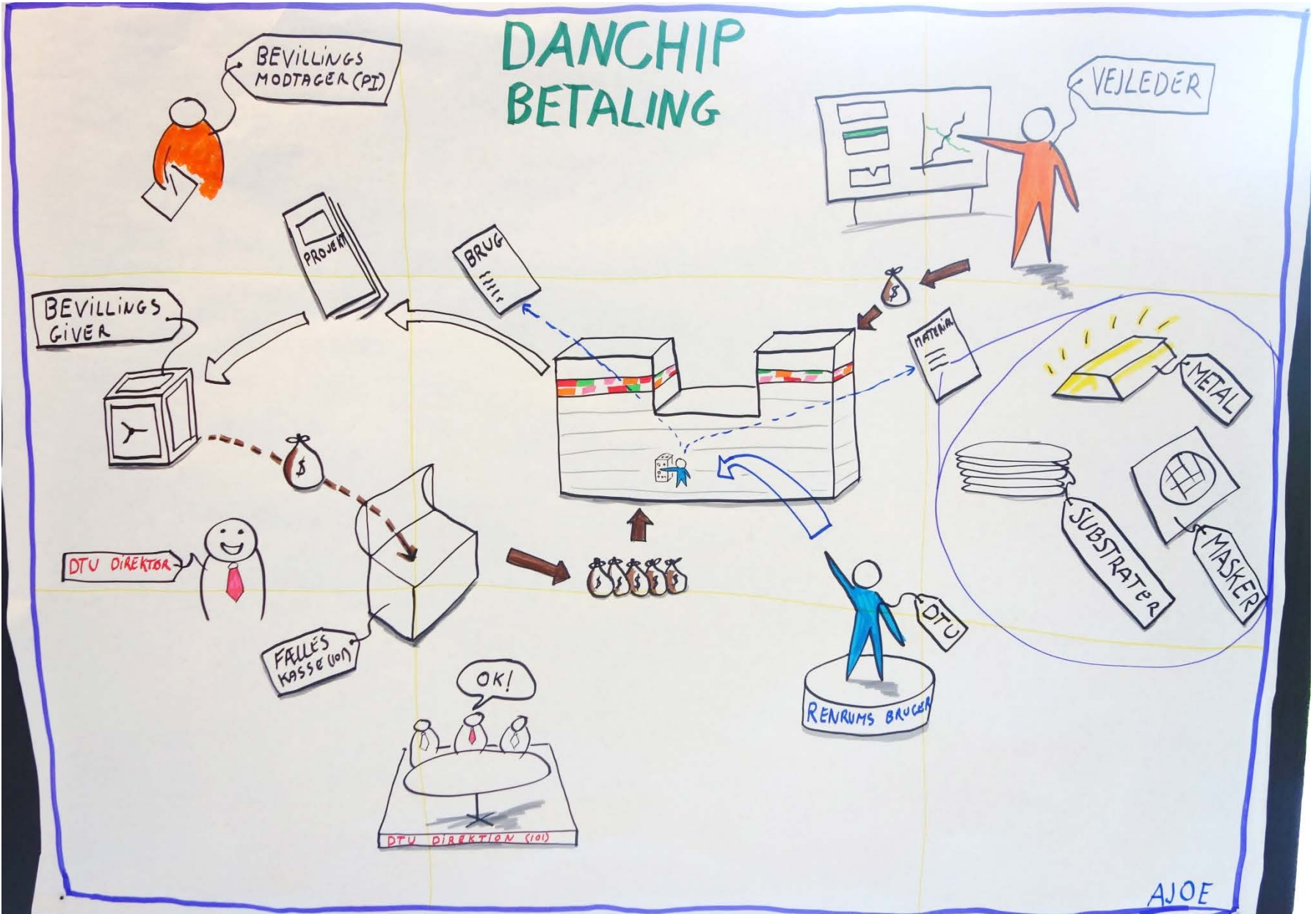


Magnificent 13 Fume Hoods

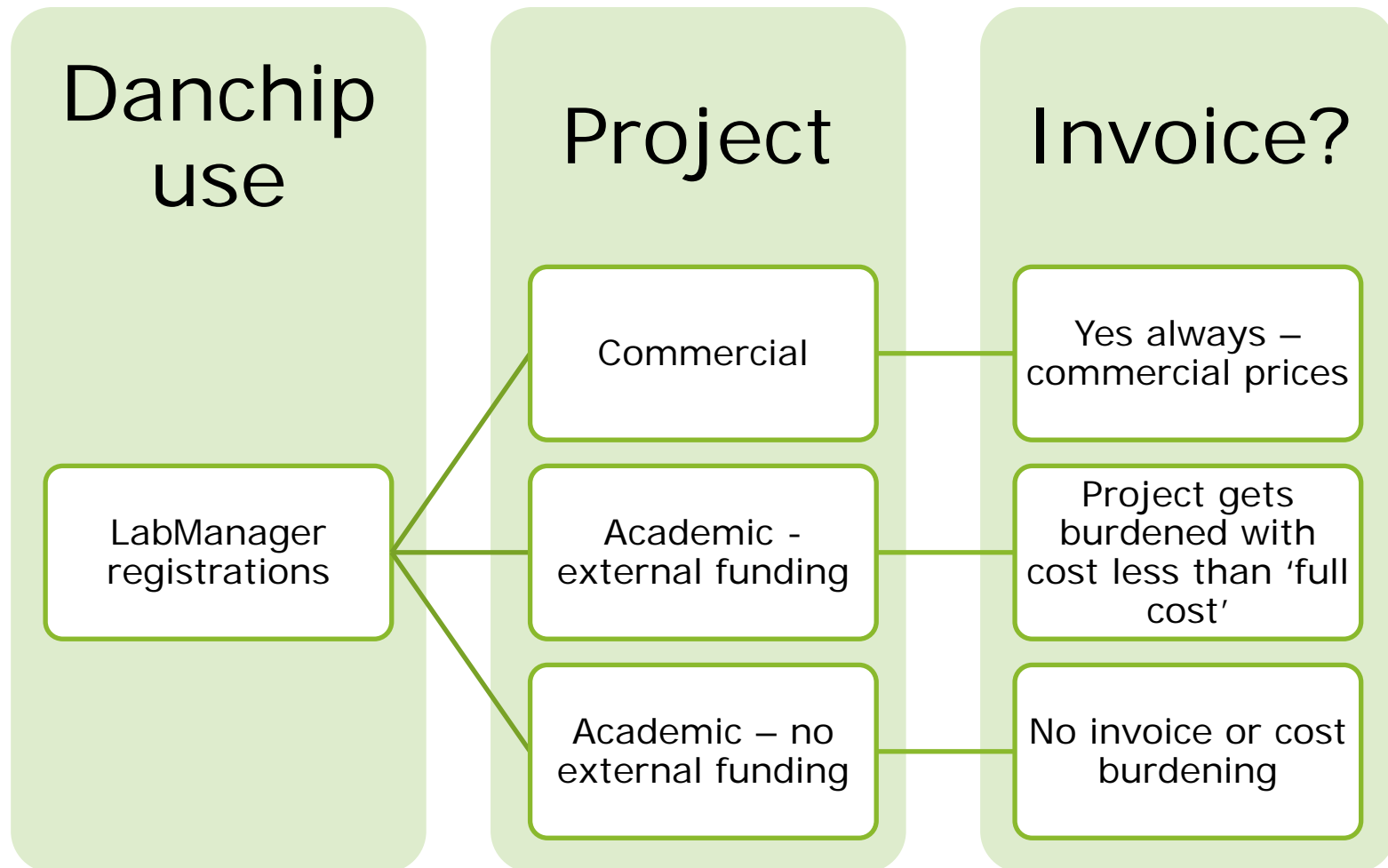
- Identification of needs
 - Simple fume hood with sink only?
 - Fume hood with sink, DIW and N2 guns?
 - Fume hood with sink, chemical bath, bubble rinse, DIW and N2 guns?
(I.e. chemical wet bench with fume hood top)
- Energy saving mandatory (automated sash or similar)
- Obtain price indications for different types at different vendors
- Tender most probably needed

Payment model – Overall DTU

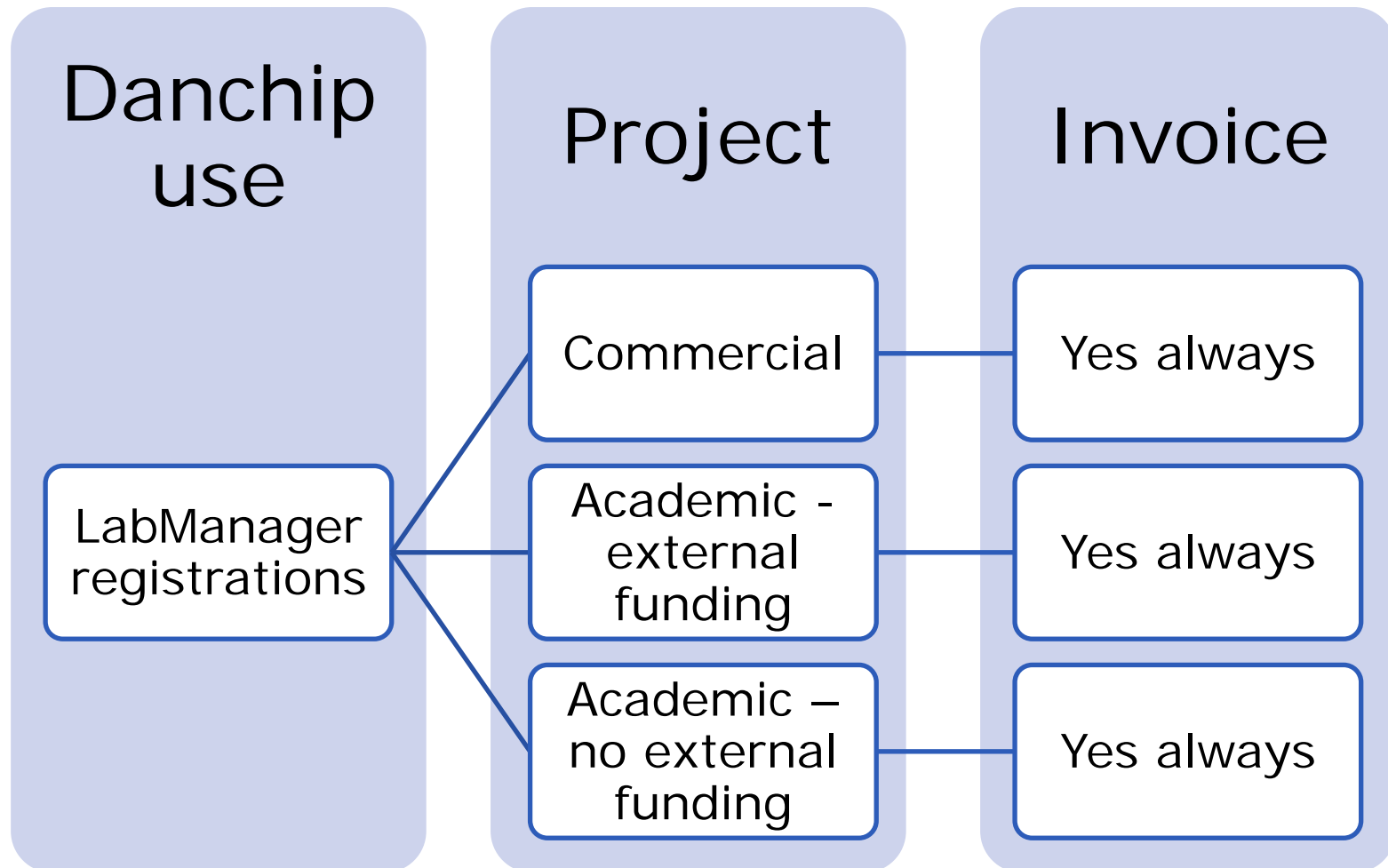
DANCHIP BETALING



Payment model – non-material usage

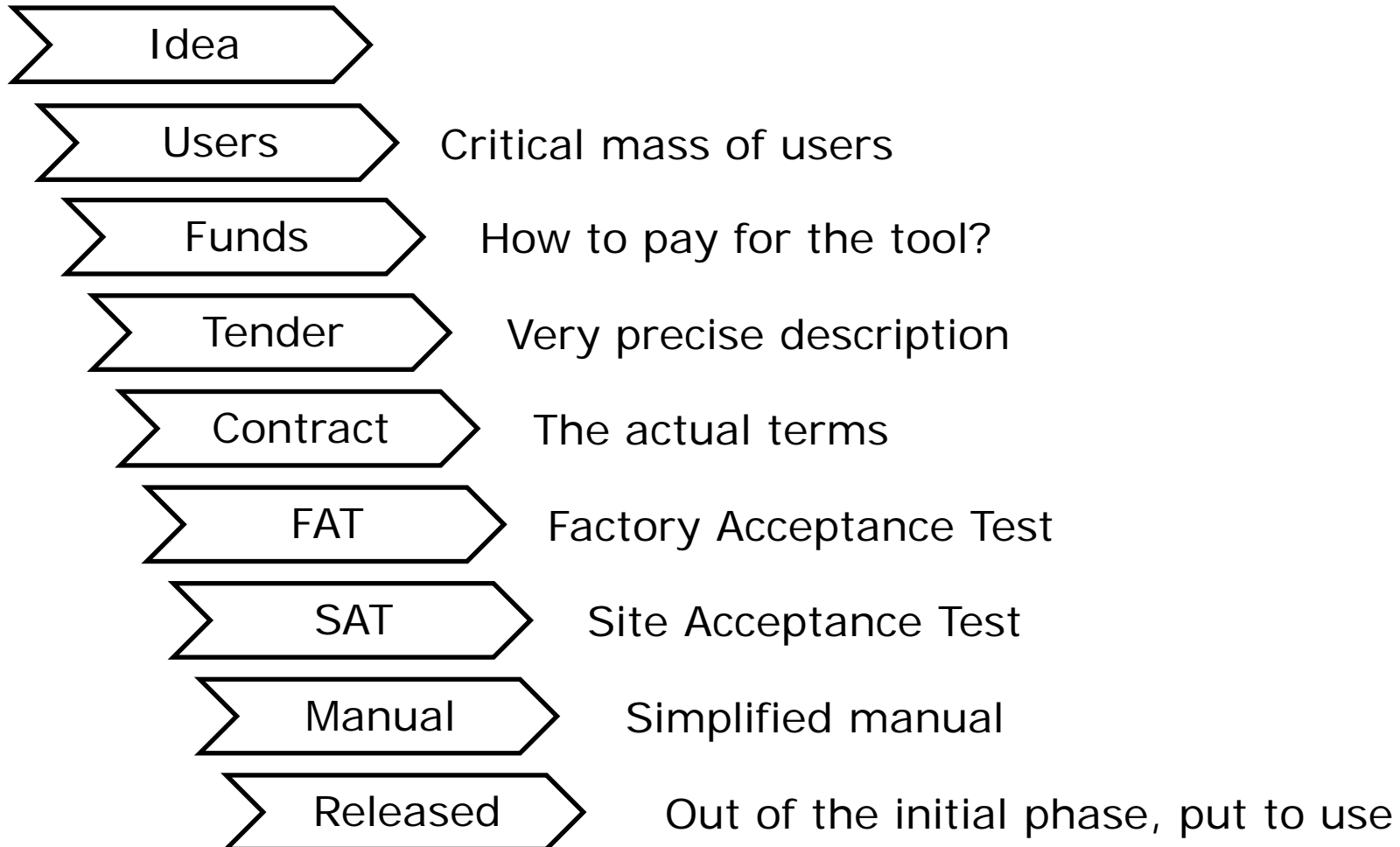


Payment model – Material usage





Situation indicator



Atomic Layer Deposition – Picosun R-200

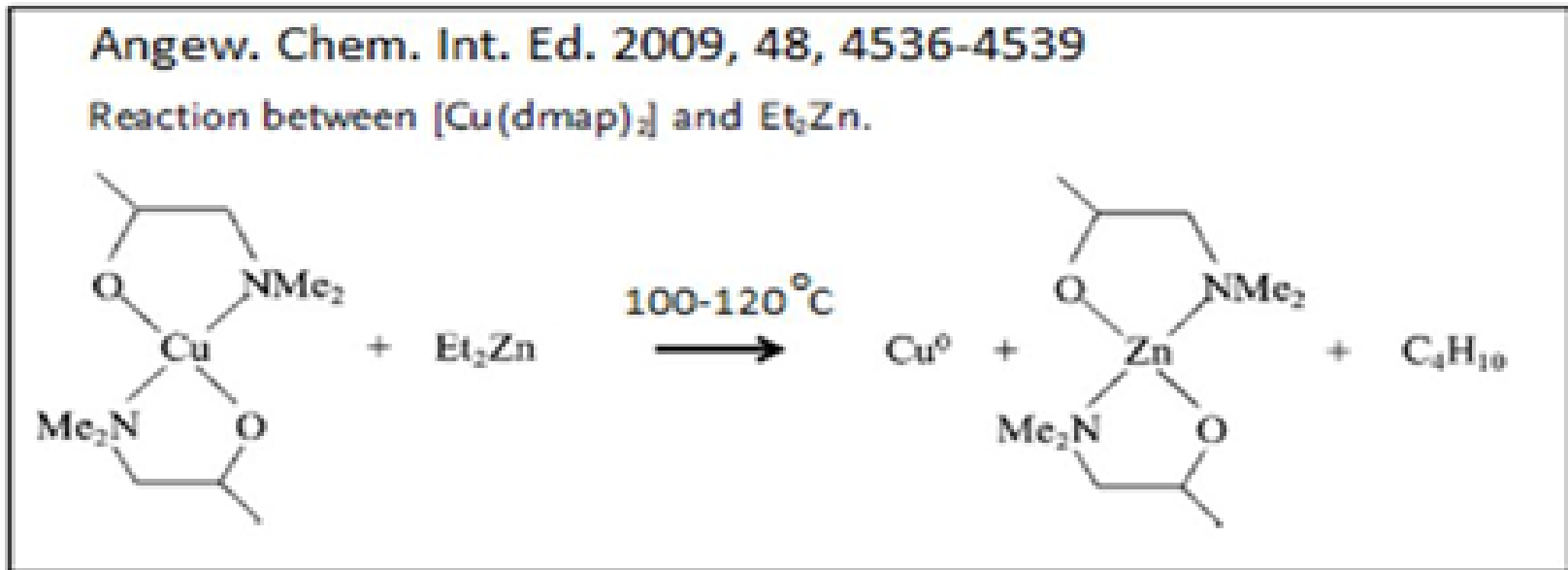
- Tool installed/accepted in February
- Key features:
 - Highly flexible Thermal ALD system
 - Plasma source optional
 - Stacked substrates (pieces – 8" wafers)
 - Initial processes: Al_2O_3 , TiO_2 , (Cu, Zn), (Pt)
 - User processes with assistance – to be released very soon (finalize gas detectors)

PhD project with focus on process development initiated November 2013 (Danchip/Fotonik)



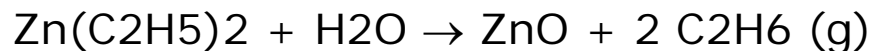
Low-temperature ALD of Copper

Pre-cursors: Copper Dimethylamino-2-propoxide [Cu(dmap)₂]
& Diethylzinc [Et₂Zn]



Side-effect: ALD deposition of ZnO:

Pre-cursors: Diethylzinc [Et₂Zn] & Water



Furnace with reducing atmosphere

PEO-604 (ATV)

- Multi-purpose process furnace with vacuum capability
- Capacity: 50 x 200 mm wafers
- Process temp: 1100 C, rate < 100 C/min
- Multi-purpose: Easy swap of quartz glass
- Reducing atmosphere: H_2 / N_2

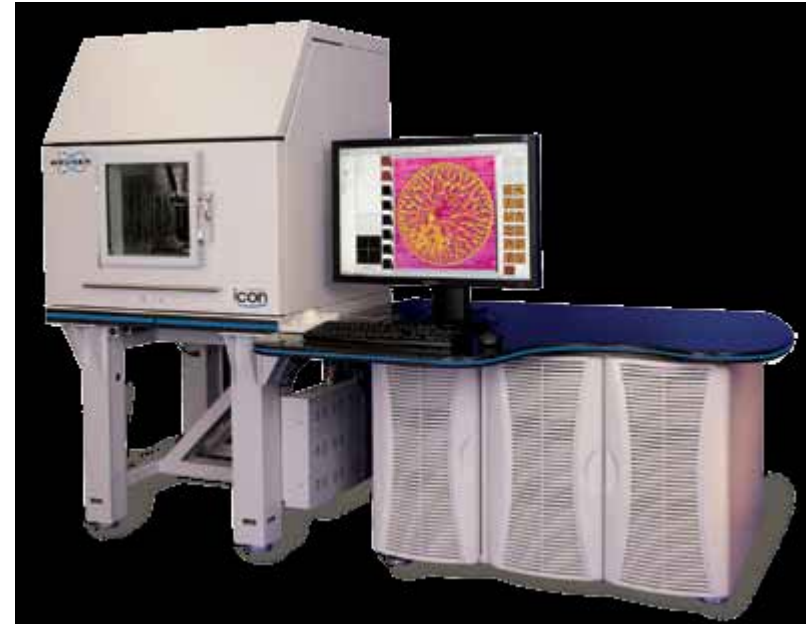
Contract done – delivery November 2014



AFM – replacement of present NanoMan

Candidate: Dimension Icon/FastScan

- Upgrade from Dimension 3100 platform
- Trade-in with present NanoMan system – significant discount
- Compare with **Park NX20** (at DFM)
- Pursue new functionalities
(FastScan, Kelvin probe force microscopy (surface potential))





Parylene deposition tool?

- Parylene is often used in high-end products as a moisture barrier
- Has seen some use in various MEMS devices
- The Nanoprobes group of Nanotech has shown interest
- There will be a presentation by Para Tech on June 18th at 14:30-15:30 in the seminarroom 347



ParaTech LabTop 3000 system

Minority Carrier Lifetime Scanner

- Expected to be used as workhorse to indicate furnace cleanliness
- Can be used to measure devices relying on minority carrier lifetime (Solar cells, backside photodiodes)
- Visit to Freiberg Instruments to test tool on June 11th



Micro Vickers Hardness tester

- Innovatest 412A is being investigated
- Analogue microscope
- Automatic, loading/dwell/unloading
- Test forces 0.01kgf/0.098N to 1kgf/9.8N
- Meets or exceeds, ISO, ASTM, JIS (Nadcap) standards
- Rafael from Nanotech will pay 30 kkr





Electron Beam Lithography add-on (SEM-LEO)

Raith ELPHY Quantum system

- PCI bus technology
- 6 MHz pattern generator (vector scan)
- 16-bit D/A converters
- "Cheapish" supplement to JEOL-9500
- Easy access – no "tough" requirements to sample quality
- No automatic beam blanking
- Installation complete, tool accepted
- First trials undergoing (Nanotech)
- System offered "as is"
- Danchip will not develop standard processes
- Users are encouraged to use Process2Share
- A simple manual will be issued



Spinner rinser dryer

- Rinser dryer for general use :
 - 6" and 8" rotors
 - Presently installed in stepper room
- Rinser dryer for RCA cleaning:
 - 4" and 6" station
 - In cleanroom
 - Not yet installed at RCA bench



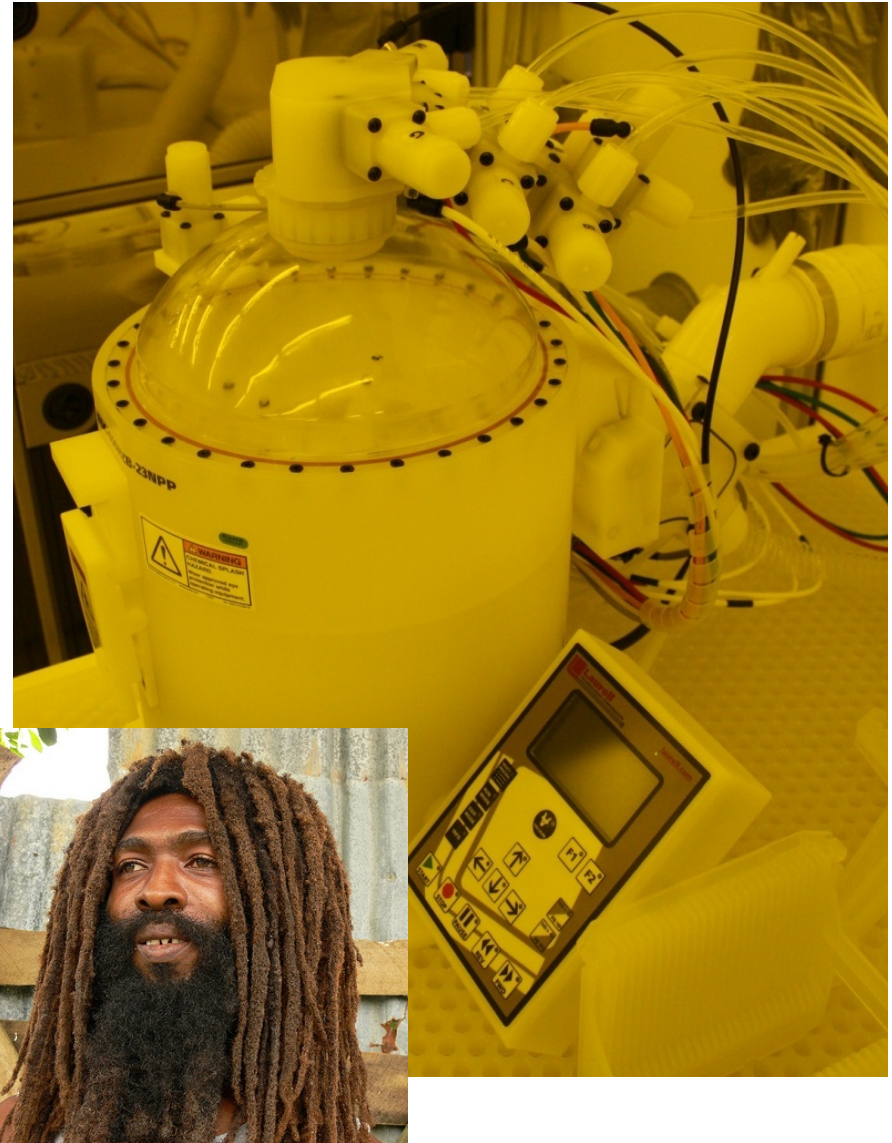
New N2 purifier

- Present N2 purifier is 20 years+
- No spare parts
- No service
- Upgrade model identified



Laurell – e-beam single wafer developer - alias "Rasta R2D2"

- 4" and 6" w/o size change
- Lines for
 - N50
 - MIBK (later)
 - IPA
 - DIW
 - N2 blow dry
- Drain diverter
- Will be built into bench in E-3
- Expected ready 2014Q3



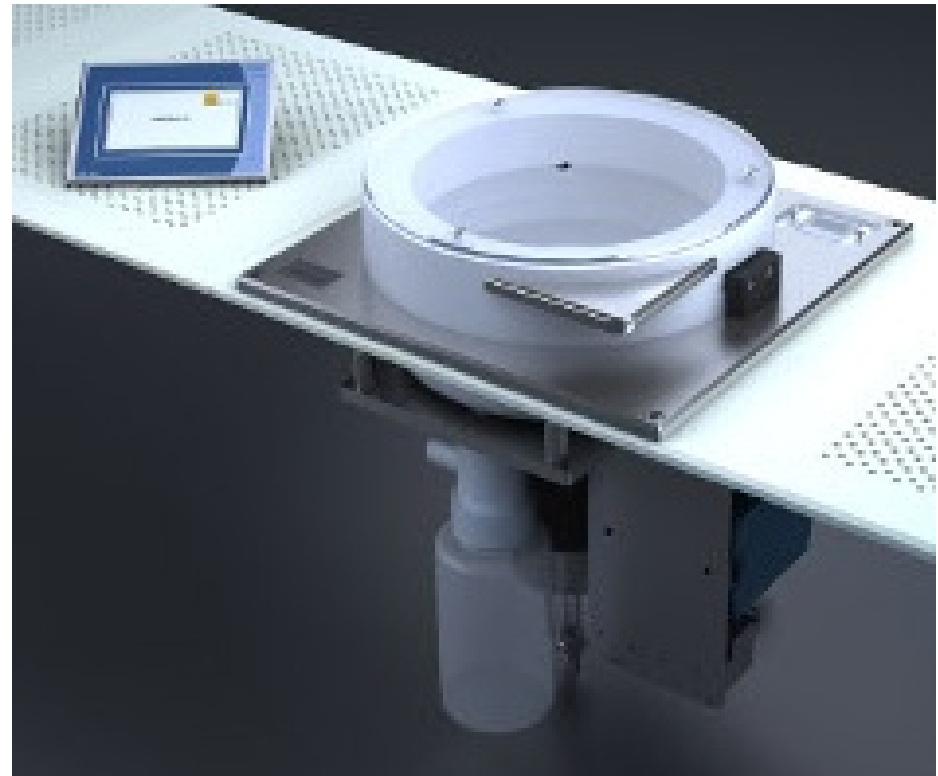
New Karl Süss AI-6 Aligner

- New aligner ordered at Süss
- Very similar to old KS aligner
- Familiar maintenance
- Common spare parts
- Tools can backup each other
- To be installed in new litho room
- Delivered 6th June 2014
(D-Day + 70 years)
- Expected ready 2014Q3



New III-V spinner

- LabSpin 6 from Süss
- Has replaced old Süss RC8
- Simple and robust
- No Gyrset available
- No inserts
- Dedicated bowls
- Ready since March 2014
- Feedback needed
- Should we buy more?



New Hot Plate

- Old HPs and ovens have limited precision
- Manual baking time is imprecise
- Post spin baking affects exposure and development
- Aluminium foil can lower temp by 20° C!
- Süss HP8 can run programs (pins up-down, and proximity bake)
- Being installed in C-1 (old yellow room)
- Expected ready 2014Q3
- Feedback needed
- Should we buy more?



KS Spinner Replacement

- Old KS spinner performing poorly
- Costs many service hours
- Still need for
 - Vacuum less chucks
 - Gyrset
- Best candidate for a replacement: RCD8
- Media arm needed?



Plasma Asher

- Replacement for /addition to Asher 1
- O2 and N2
- Identification of suitable tool in progress



New HMDS Oven

- Will supplement the IMTEC Star 2000.
- Same chemistry (HMDS)
- Can HMDS prime cassettes of wafers and masks





Direct UV Writer

- Exposes resist with a laser beam
- Alignment to existing pattern
- Exotic processes possible: Gray scale litho
- NOT intended as mask writing tool!
- Danchip will not provide standard processes
- What are the needs?
- Danchip will form user interest group to identify needs
- Input most welcome

