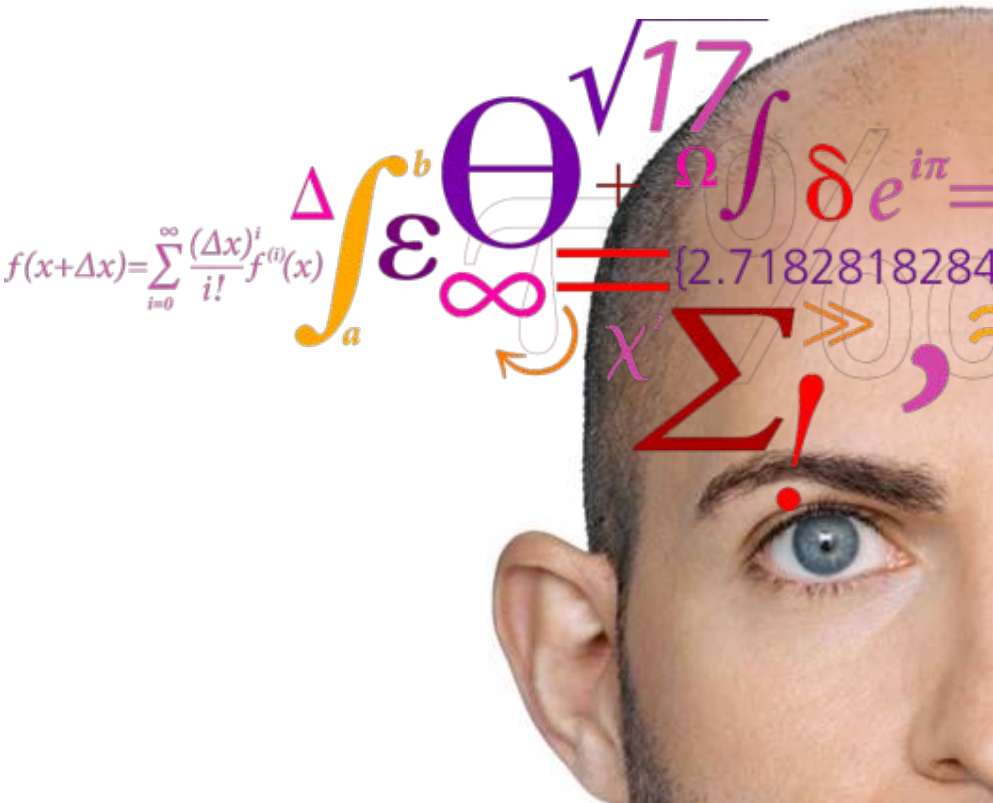
Danchip Techforum 1-2016

”Spring cleaning”



Agenda

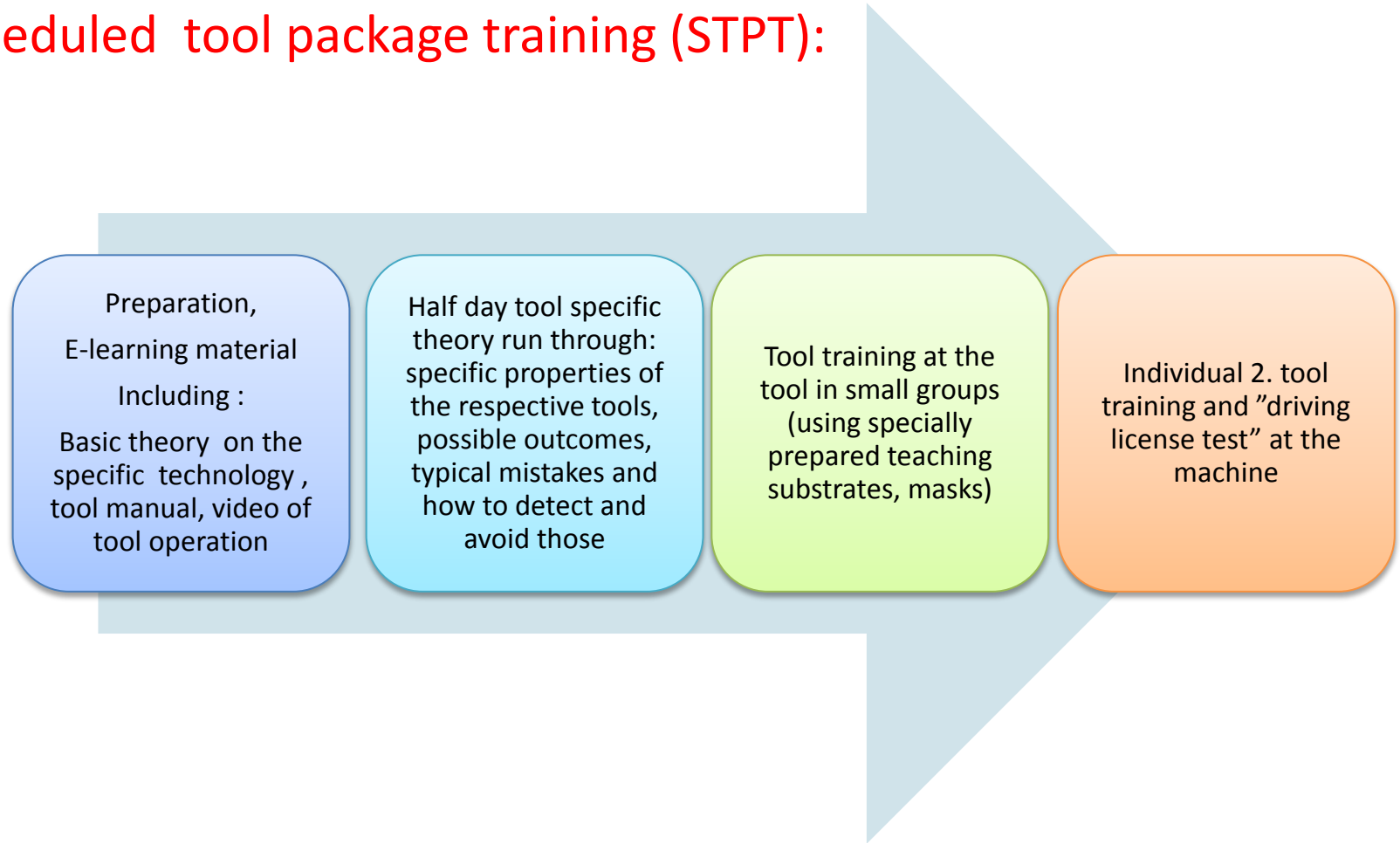
- Package training
- New electron microscopy possibilities
- Decommisioning, reorganizing and new tools

$$\nabla \cdot (\mathbf{cleanroom\ equipment}) = 0$$

Scheduled tool package training

Goal: students are trained with basic theoretical background and experimental methods to a level allowing them to pursue cleanroom processing on the respective tools without permanent supervision.

scheduled tool package training (STPT):



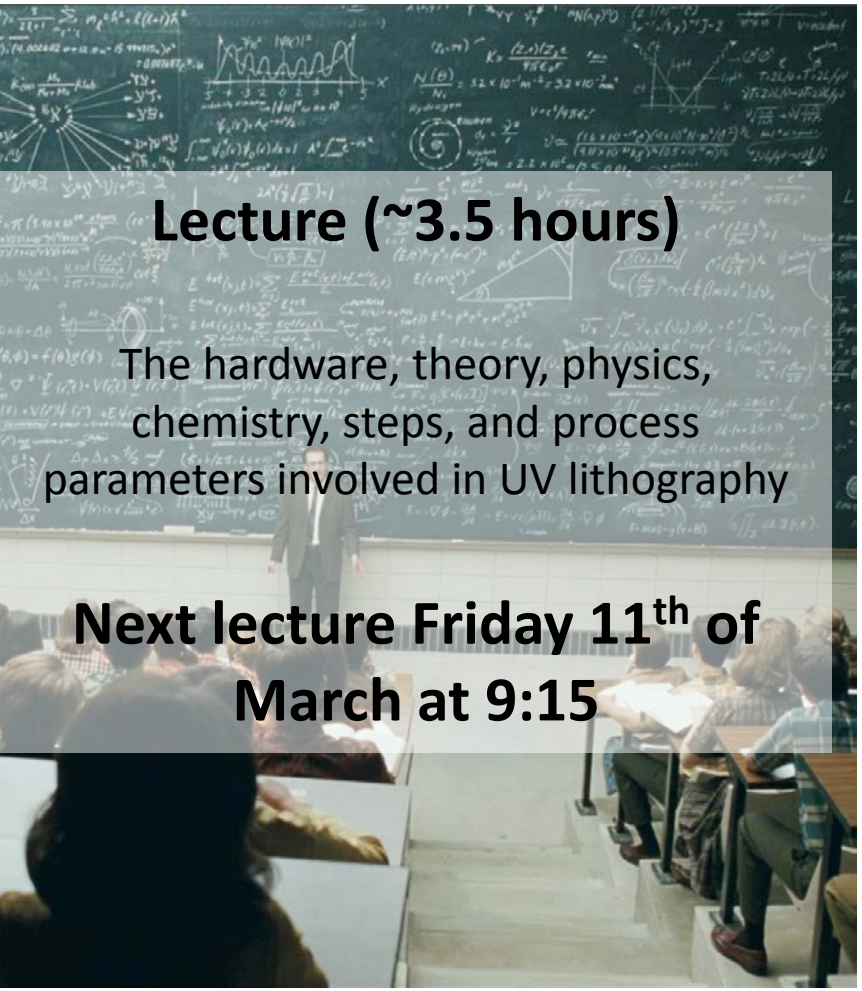
Scheduled packages

Package	Online when?
Transmission electron microscopy (Cen)	Now
Scanning electron microscopy (Cen)	Now
Ultraviolet lithography (Danchip)	Now
Scanning electron microscopy (Danchip)	April
Mask design (Danchip)	September
Wet chemistry (Danchip)	September
Cleanroom introduction 2 days (Danchip) Replaces present safety course	September
Thin film (Danchip)	December
Dry etch (Danchip)	December

Video material is posted to DTU's podcast channel:

http://podcast.llab.dtu.dk/feeds/dtu-danchip/

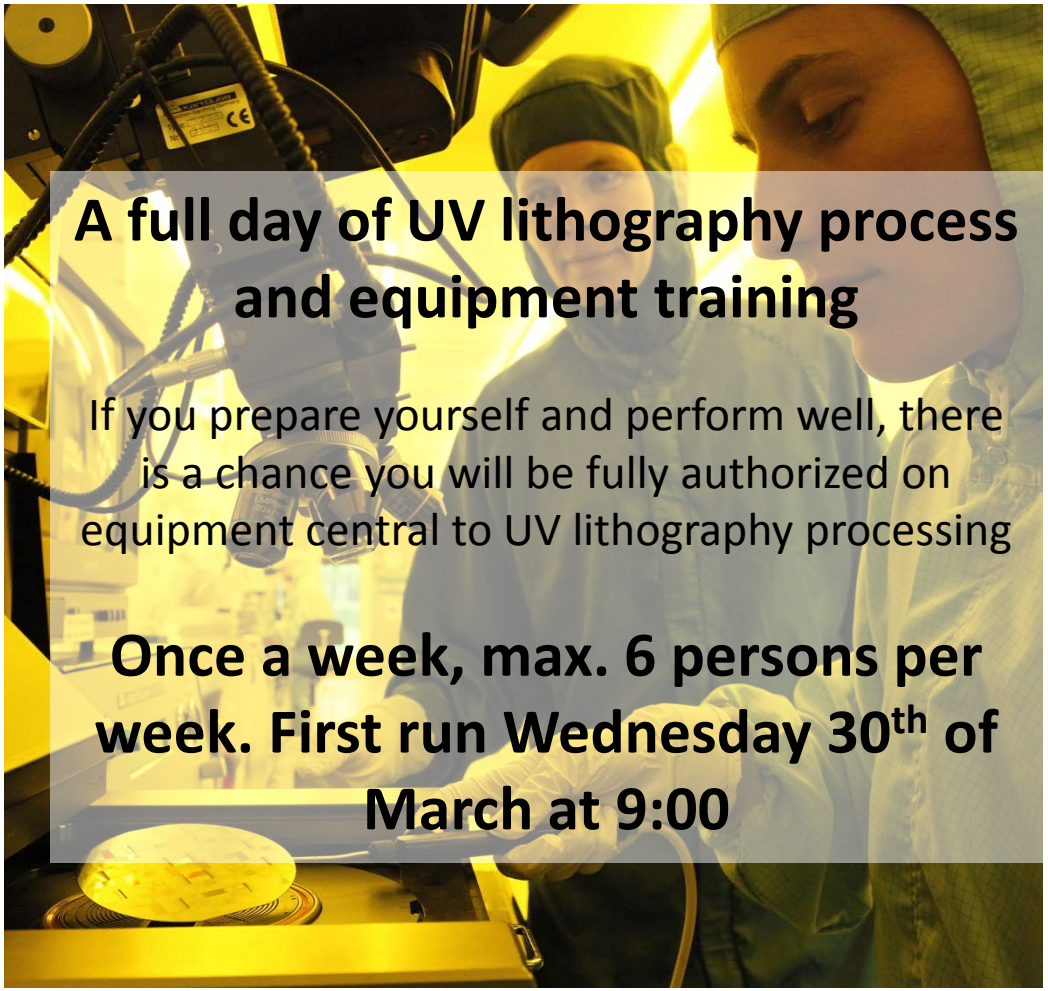
UV Lithography Tool Package Training



Lecture (~3.5 hours)

The hardware, theory, physics, chemistry, steps, and process parameters involved in UV lithography

Next lecture Friday 11th of March at 9:15



A full day of UV lithography process and equipment training

If you prepare yourself and perform well, there is a chance you will be fully authorized on equipment central to UV lithography processing

Once a week, max. 6 persons per week. First run Wednesday 30th of March at 9:00

See LabAdviser: Lithography → Litho Tool Package Training
http://labadviser.danchip.dtu.dk/index.php/Specific_Process_Knowledge/Lithography

Sign up: right here or by sending an email to lithography@danchip.dtu.dk

NEW ELECTRON MICROSCOPY POSSIBILITIES

High speed camera

Planned installation – May 2016

RESOURCES

MODEL 1095

DATASHEET

OneView camera

SPECIFICATIONS

Specification	Benefit
Base system	
4096 x 4096 pixels, 15 µm pixel size	Enable ultra-high-definition (UHD) image resolution in a large sensor for wide field of view
25 frames per second (fps) while operating at full 4k x 4k resolution	Always operate at TV rates at full sensor resolution, no binning required
Real-time drift correction	Automatically remove drift and outliers in real-time across all image capture modes
Scalable dynamic range	Eliminate restrictions associated with a traditional dynamic range specification
GIF compatible	Install above GIF system, without impact to performance or operation
In-situ option	
Stream 4k x 4k resolution images at 25 fps directly to disk in *.dm format	Eliminate workflow bottlenecks when capturing large *in-situ* datasets
Up to 20 s LookBack capability	Never miss the start of a reaction with post-event triggering
	Capture only data that matters to you
>15 min data storage capability	Store several 4k x 4k resolution at 25 fps data sessions on a single computer; expansion capability available

High pressure sample holder

- Looking into possibilities at the moment…

NEW TOOLS - FLJE

New FE-SEM: Zeiss Supra 40VP (Supra-3)

- Background: SEM-LEO (our training tool) is being used for dedicated lithography applications
  - – Raith-ELPHY system
  - - Ice lithography (Anpan/William)

- Detectors: SE-, VPSE-, In-lens, & BSD
  - 6” samples
  - 5-axes eucentric stage:
  - x,y :130 mm; z: 50 mm

- Old Zeiss Supra 40VP (Supra-1):
  - re-located to basement – replaces old SEM-JEOL
  - future training tool
  - high-quality FE-SEM outside CR
  - **dedicated cleanroom / basement (346) related activities**

General SEM situation

- SEM Supra 1 (Old Zeiss):
  - Relocated to the basement in 346
  - Training and ex-situ (CR) inspection
- SEM Supra 2 (Supra 60):
  - General inspection in CR
- SEM Supra 3 (New Supra 40):
  - General inspection in CR
- SEM-Leo: Will be dedicated for Raith lithography including Ice lithography

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

Contract signed – tool arrives 15 April 2016

PECVD-4 – replacement of PECVD-1/2

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

Installation under preparation

- expect installation work to be finalized June 2016

DECOMMISIONING, REORGANIZING AND NEW TOOLS - LESJO

New Süss Gamma Spinner

- Will replace SSE Maximus
- Released yesterday
- Is equipped with
  - AZ5214E
  - MIR
  - nLOF
- Can run 4 and 6 inch without any size change or special recipes
- No user editable processes
- For special processes:
  - Ask Danchip to make recipe
  - Do your own on a manual spinner

New bonder tool

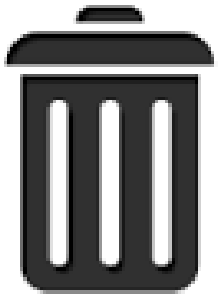
- Pre-align in KS MA-6 aligner, then bond in KS bonder
- Demo at Süss highly successful – both on 4” and dies.
- Will be placed in E-4, next to KS aligners.
- Delivery in April 2016
- Expected operational Q3 2016

New imprint tool

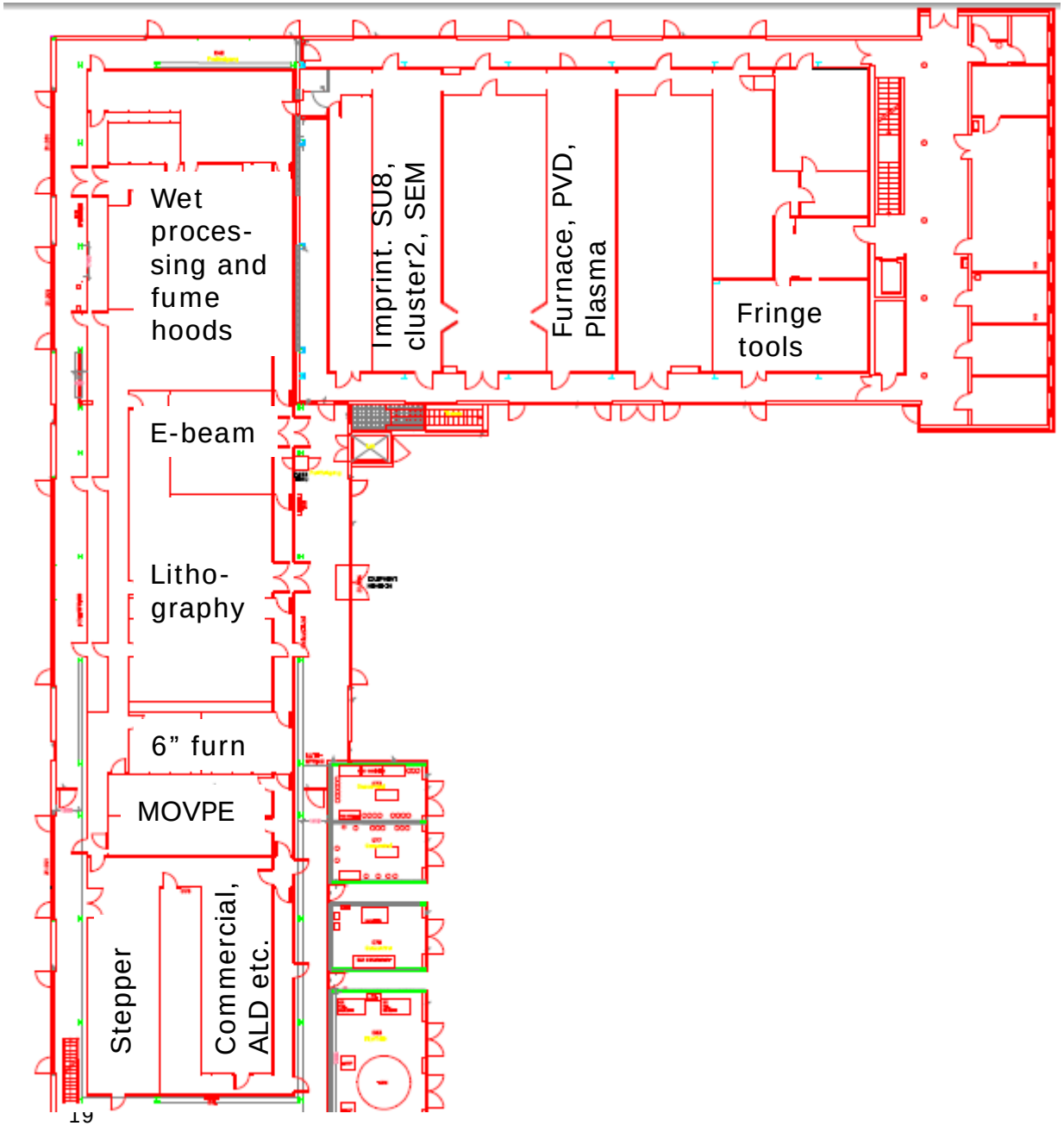
- CNI from NILT replaces NIL on the EVG 520

Tools leaving the cleanroom

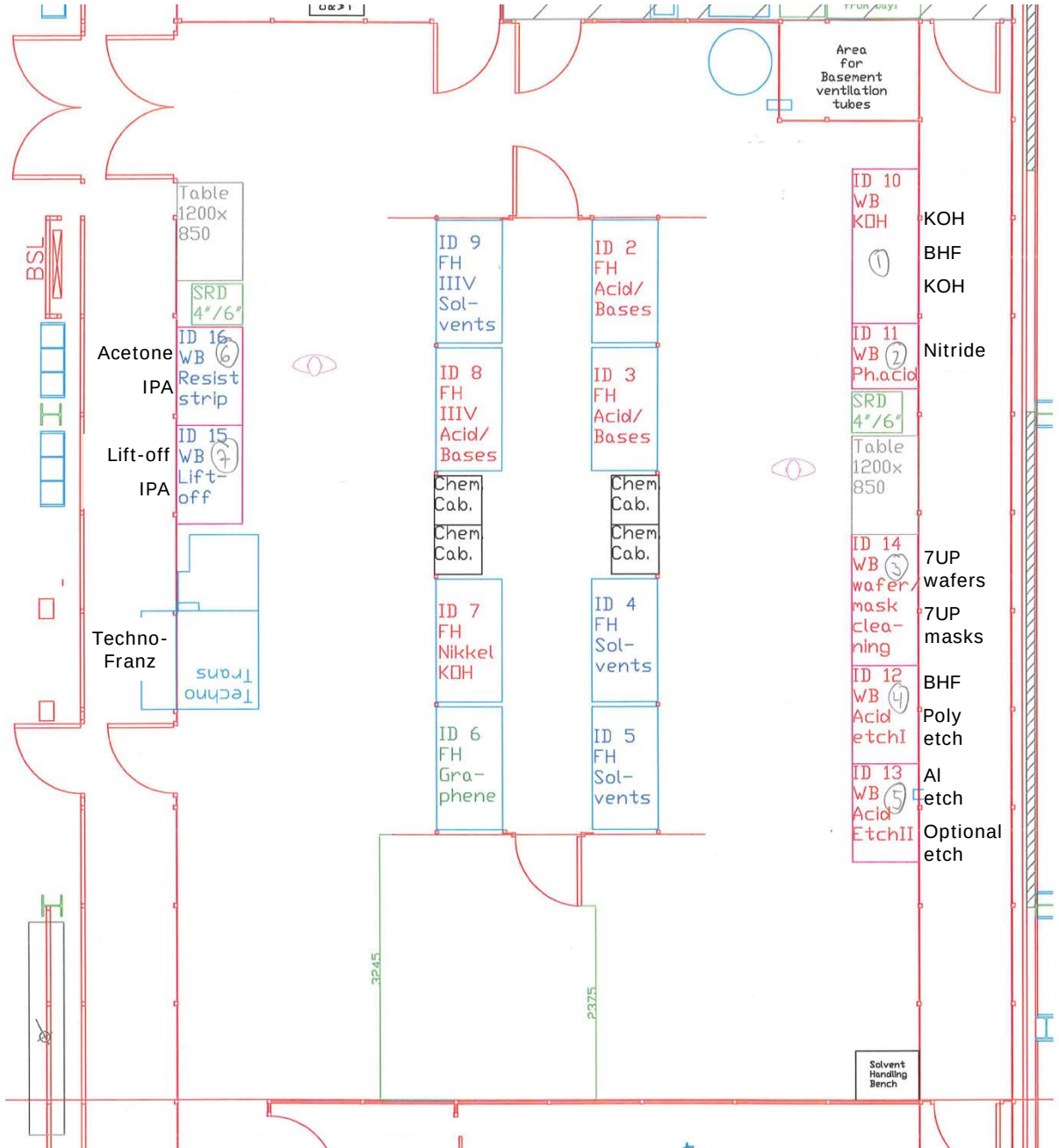
- SSE Maximus. (replaced by Süss Gamma)
- EVG NIL 520 & aligner 510.
  - Too unstable and very costly to repair.
  - Bond function replaced by Süss bonder
  - Imprint function replaced by CNI NIL
  - Aligned imprint will not be possible in the future
- III-V aligner (replaced by MA6-2)
- Old wet benches 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



New cleanroom order



Ballroom with new fume hoods and wet benches



Time schedule for fume hoods and wet benches in Ballroom

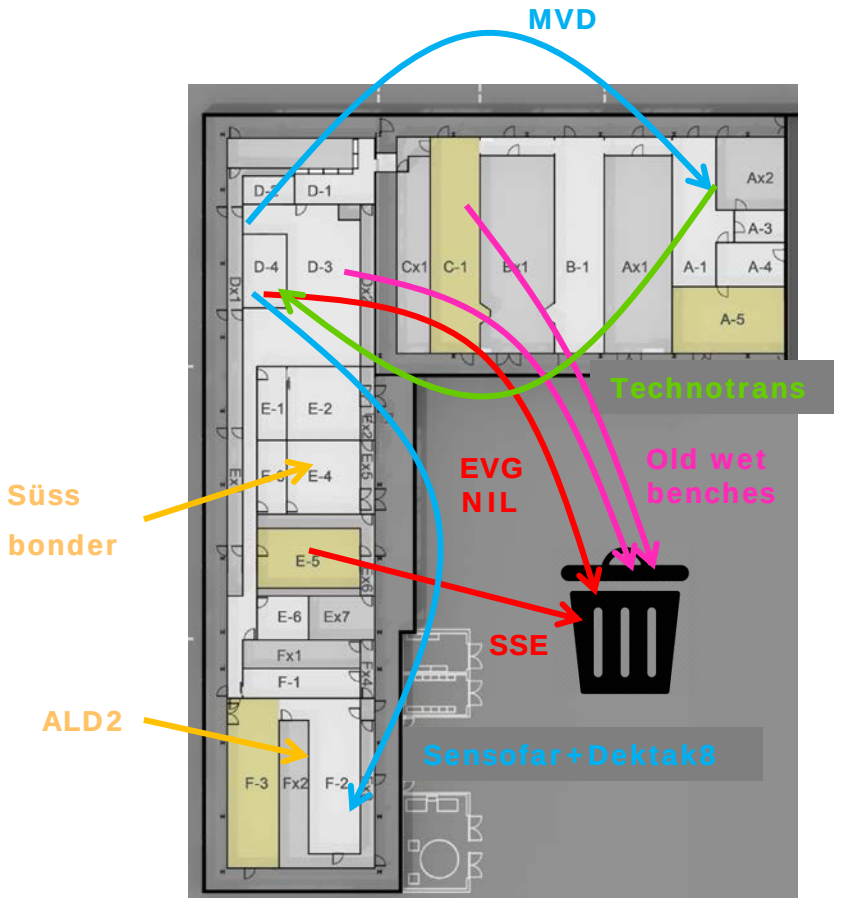
- 8 fume hoods for ballroom
  - Delivery: July 2016
  - Expected release: December 2016

- 7 Wet benches for ballroom
  - Delivery: August – October 2016
  - Expected release: 2017Q1

- 2 spinner wet benches + 1 cleaning fume hood for E-5 (litho)
  - Delivery: January 2017
  - Expected release: 2017Q3

Equipment Tetris – moving stuff around and installing new things – plan per March 2016

Tool	Moves to	Date
AFM	C-1	Week 10
Dektak XT	F-2	Week 10
LEO SEM	F-2	Week 12-13
Dektak 8	F-2	Week 13-14
Sensofar	F-2	Week 13-14
Technotrans	D-4	Week 14-15
Cu plater	D-4	Week 14-15
MVD	A-1	Week 16-17
Süss bonder	E-4	Week 16-18
New fume hoods	D-3	Week 24-35
EVG NIL 520	Trash	Week 38
EVG 510 align	Trash	Week 38
Old wet benches in D-3	Trash	Before week 33
New wet benches	D-3	Week 33-52
Old wet benches in C-1	Trash	Once new benches ready



Wrap up

- Tool packages
- A lot of changes happening in the cleanroom
- High speed camera at Cen

$$\nabla \cdot (\mathbf{cleanroom\ equipment}) = 0$$