

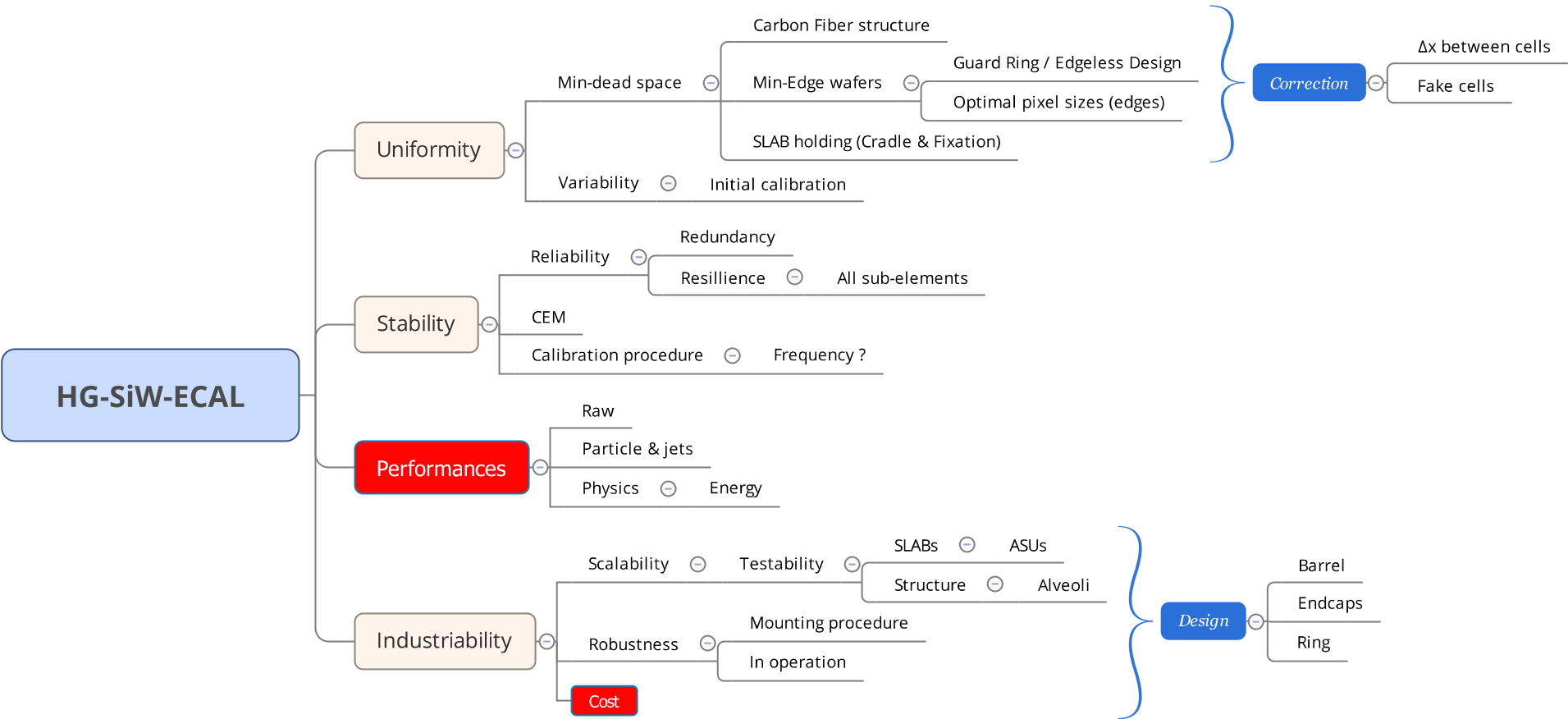
# ILD and R&D program

*Vincent Boudry*

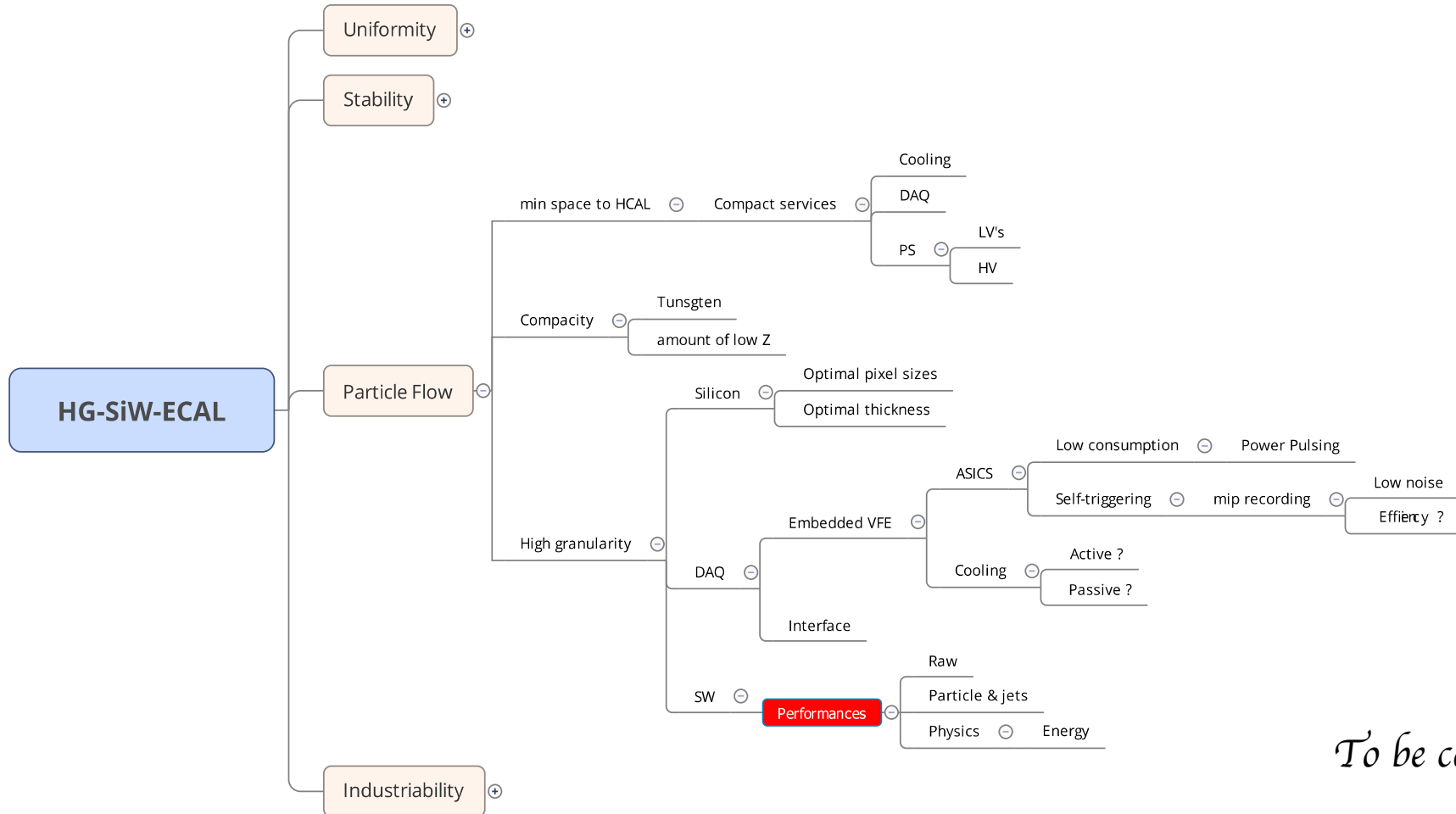
École polytechnique, Palaiseau

***SiW-ECAL day***  
***LAL, Orsay, 21/03/2016***

# Silicon-ECAL: a complex project



# PFA (HG) SiW-ECAL is even more complex



*To be completed...*

# Critical / most relevant R&D in ILD ?

On going inventory...

(i.e. don't feel offended if your favorite analysis/study is still missing)

## Simulation

- Physics analysis

## Thermo-Mechanical

- Structure & Cooling

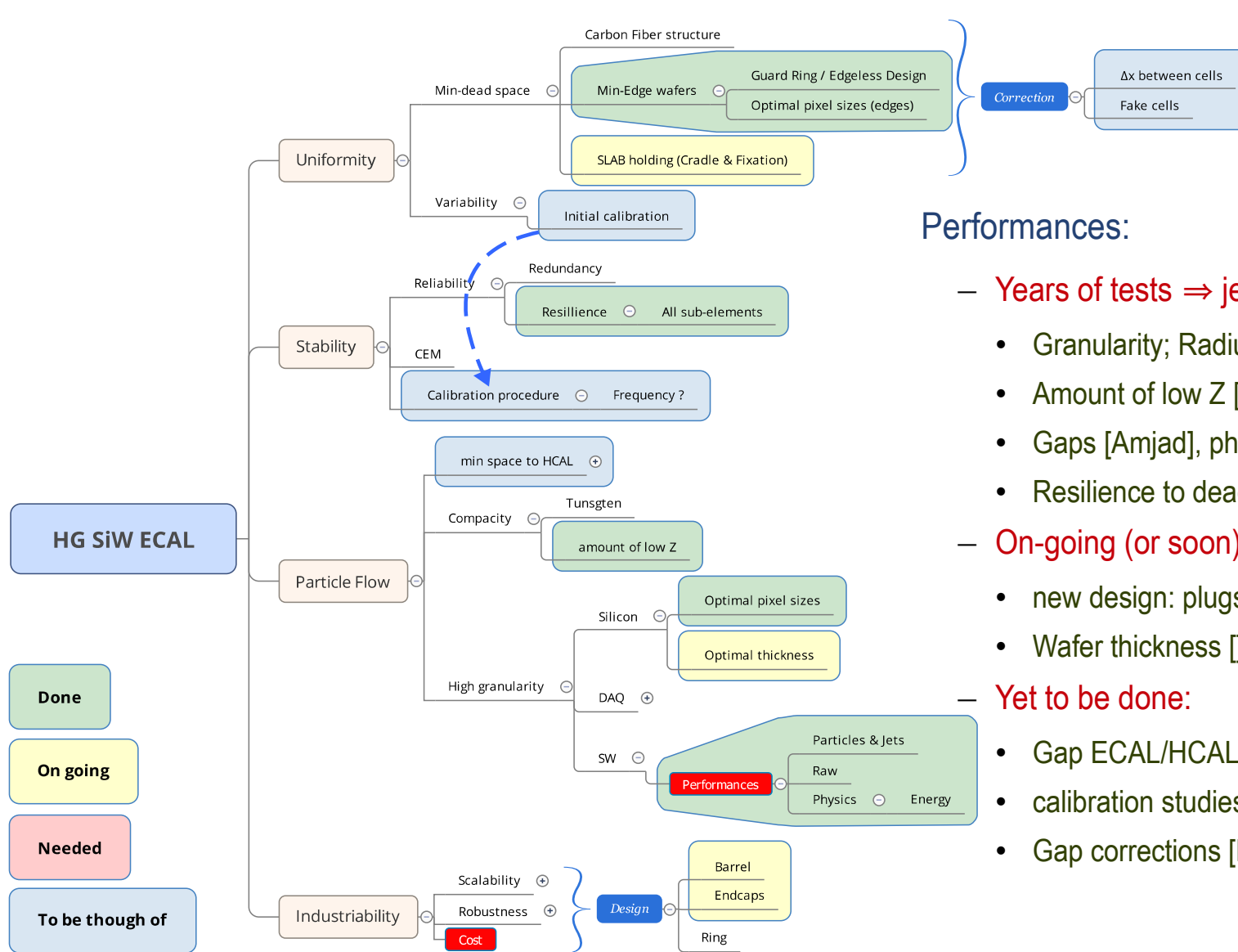
## Electronics

- VFE (ASIC) → DAQ

## Instrumentation

- beam tests, sensor studies

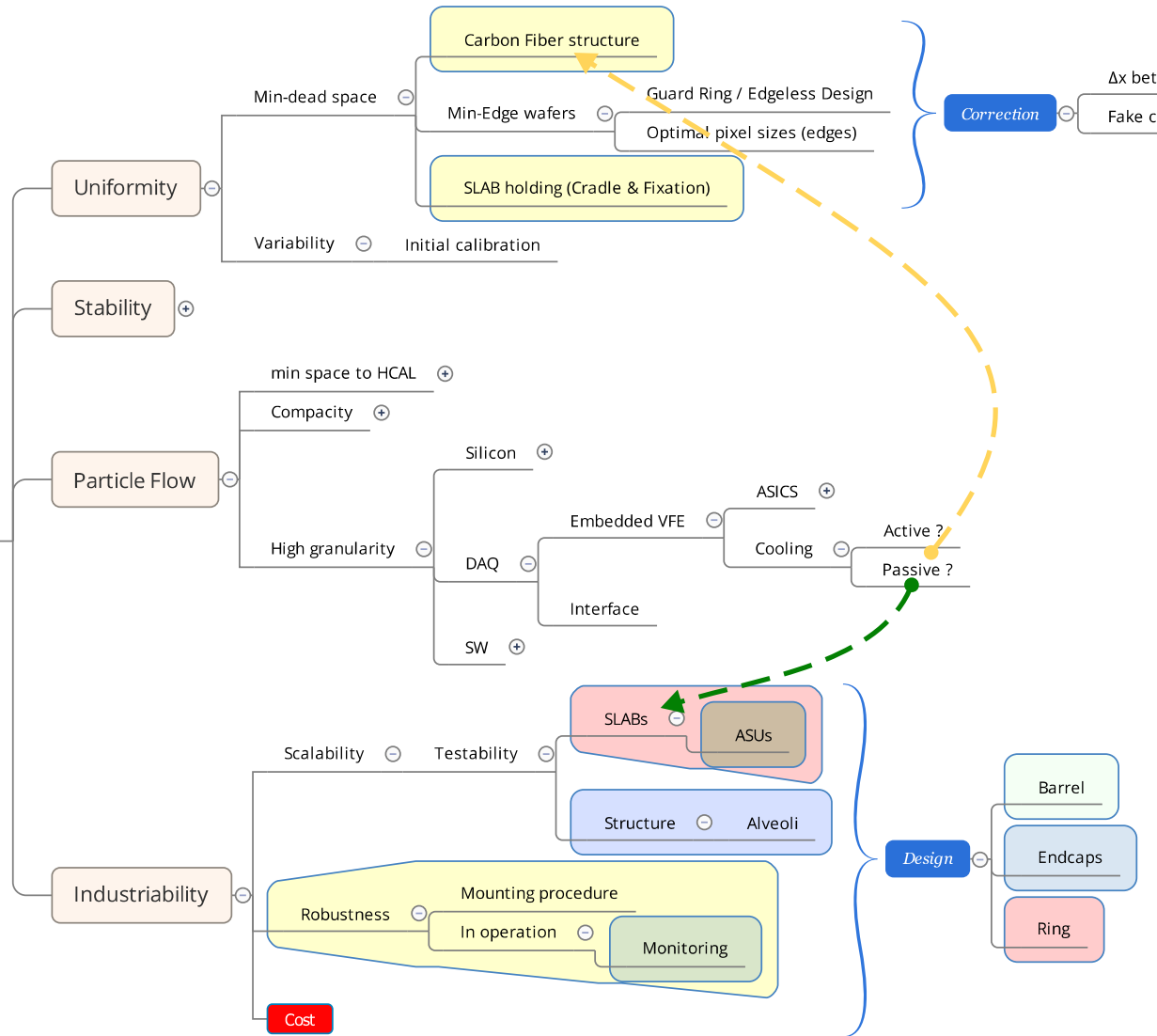
# Simulations



## Performances:

- Years of tests  $\Rightarrow$  jets, tau's (lepton-ID), single parts
  - Granularity; Radius; Nb of Layers [Thompson, Hieu, ...]
  - Amount of low Z [Amjad]
  - Gaps [Amjad], physics prototype (BT)
  - Resilience to dead elements [Daniel]
- On-going (or soon)
  - new design: plugs [Daniel]
  - Wafer thickness []
- Yet to be done:
  - Gap ECAL/HCAL
  - calibration studies [?]
  - Gap corrections [Done by Daniel in Digi...?]

# Thermo-Mechanics



## ASU

- Metrology: ✓
- Gluing: ✓ [LPNHE] {AIDA-2020}

## SLABs

- Cradle and Fixations (on-going) {AIDA-2020}
  - long SLAB mechanical prototype
  - long SLAB H with W

## CFR Structures

- Large prototypes available
  - Metrology [Anduze et al.]
  - in-situ metrology (FBG) {P2IO ?}
  - Thermal tests [Denis]
- stress tests to be done ⇒ simulation feeding

## Design

- Barrel > Endcaps >> Ring
  - TBD: Margins & Movements

## Cooling

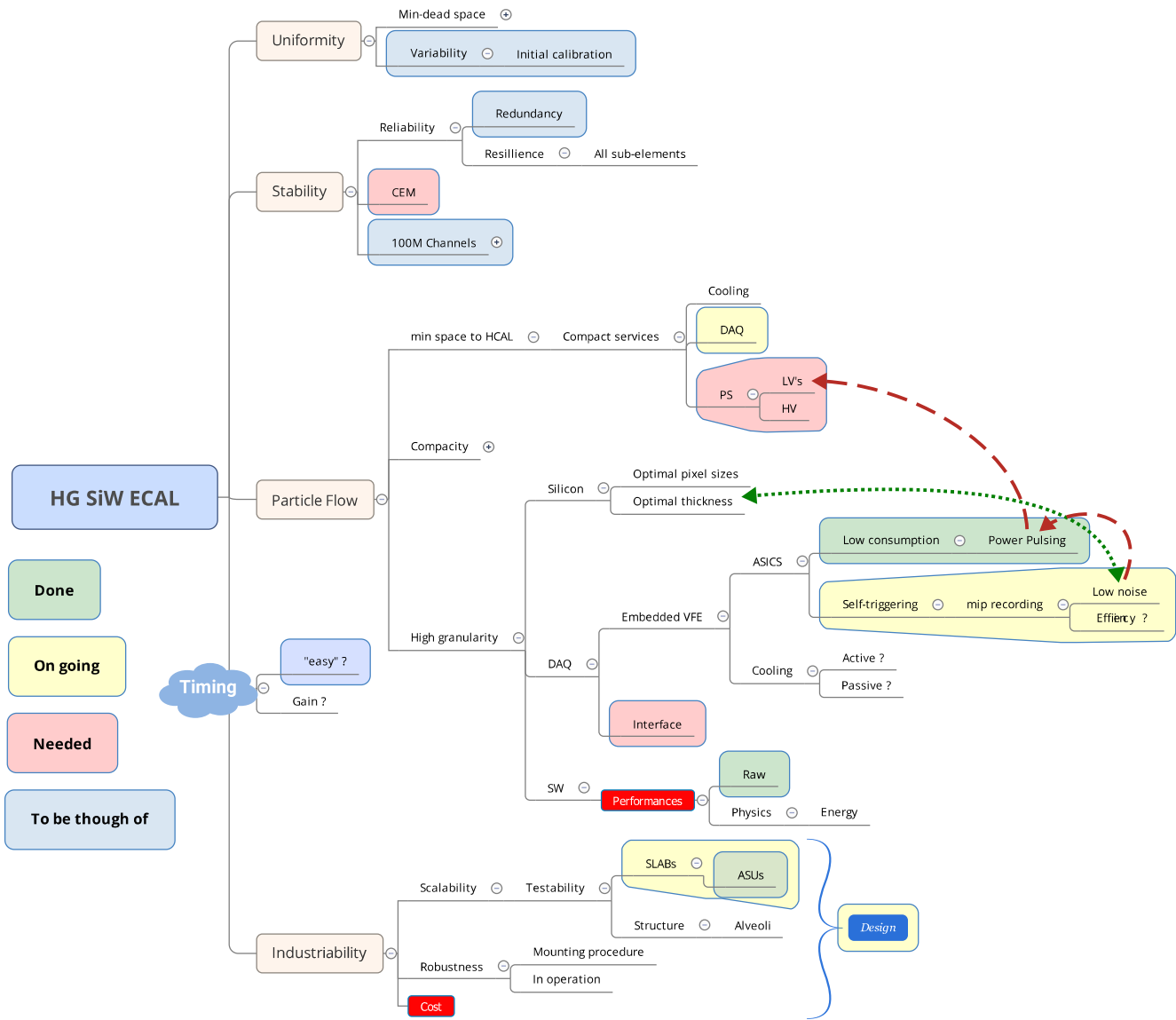
- Prototype available [Denis] {AIDA-2020}
- "Full" Thermal simulation ?

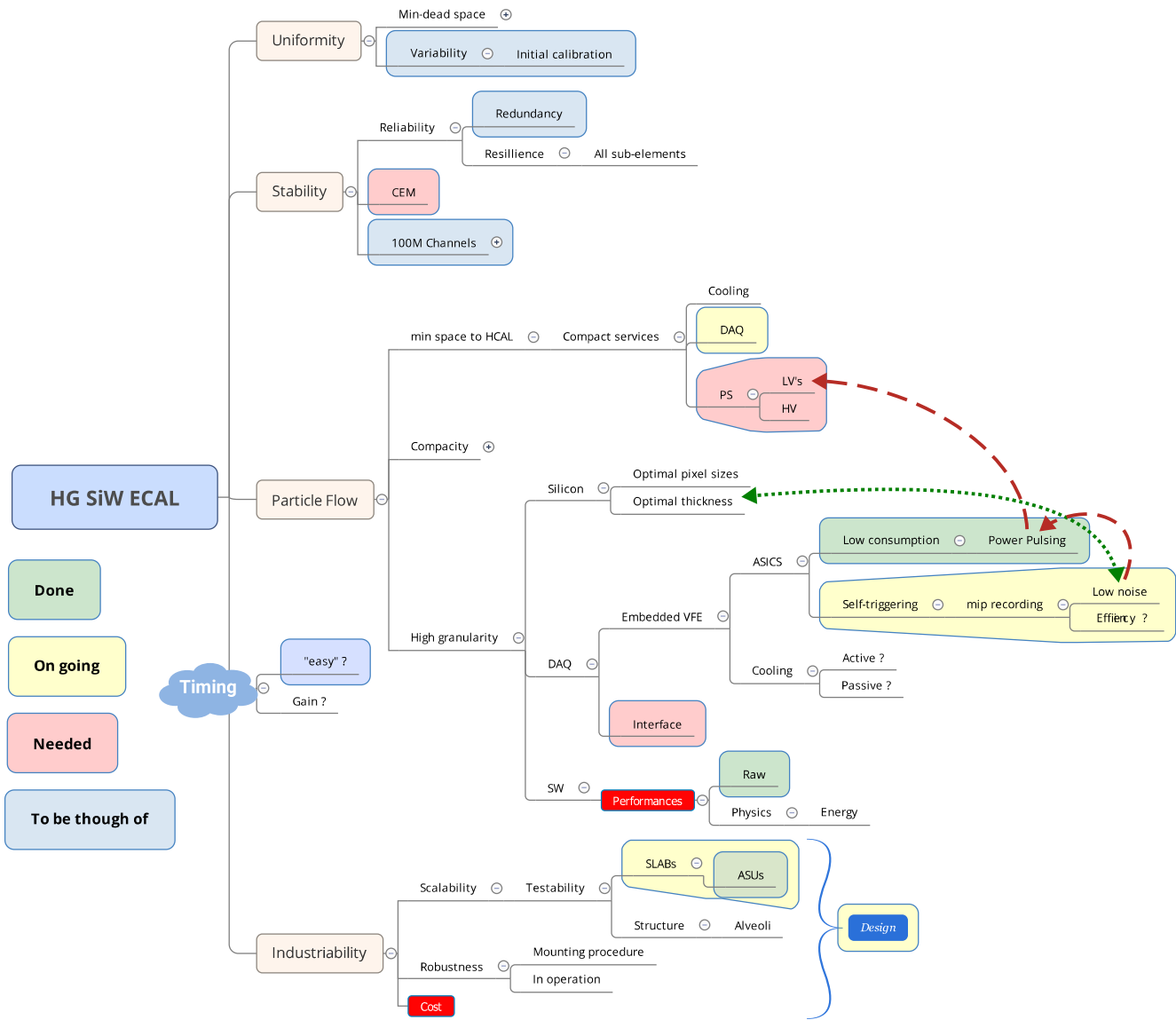
## VFE: SK2(a)with

- Many tests of SK2
  - COB/BGA/QFP, in sockets, on FEV8/11, in SLAB in beams, ... [Stéphane, Rémi, Jérôme, Thibault, Vladik, Taikan, ...]
  - Continuous, in PP mode
  - Direct readout (probe), with DAQ
    - still gaps in description
- SK2a on-going [Artur, Shridha] ~ OK

## ASU:

- design ~OK BT2015 [Vladik]
- COB tests [Roman, SKKU] {P2IO}:





## SLABs

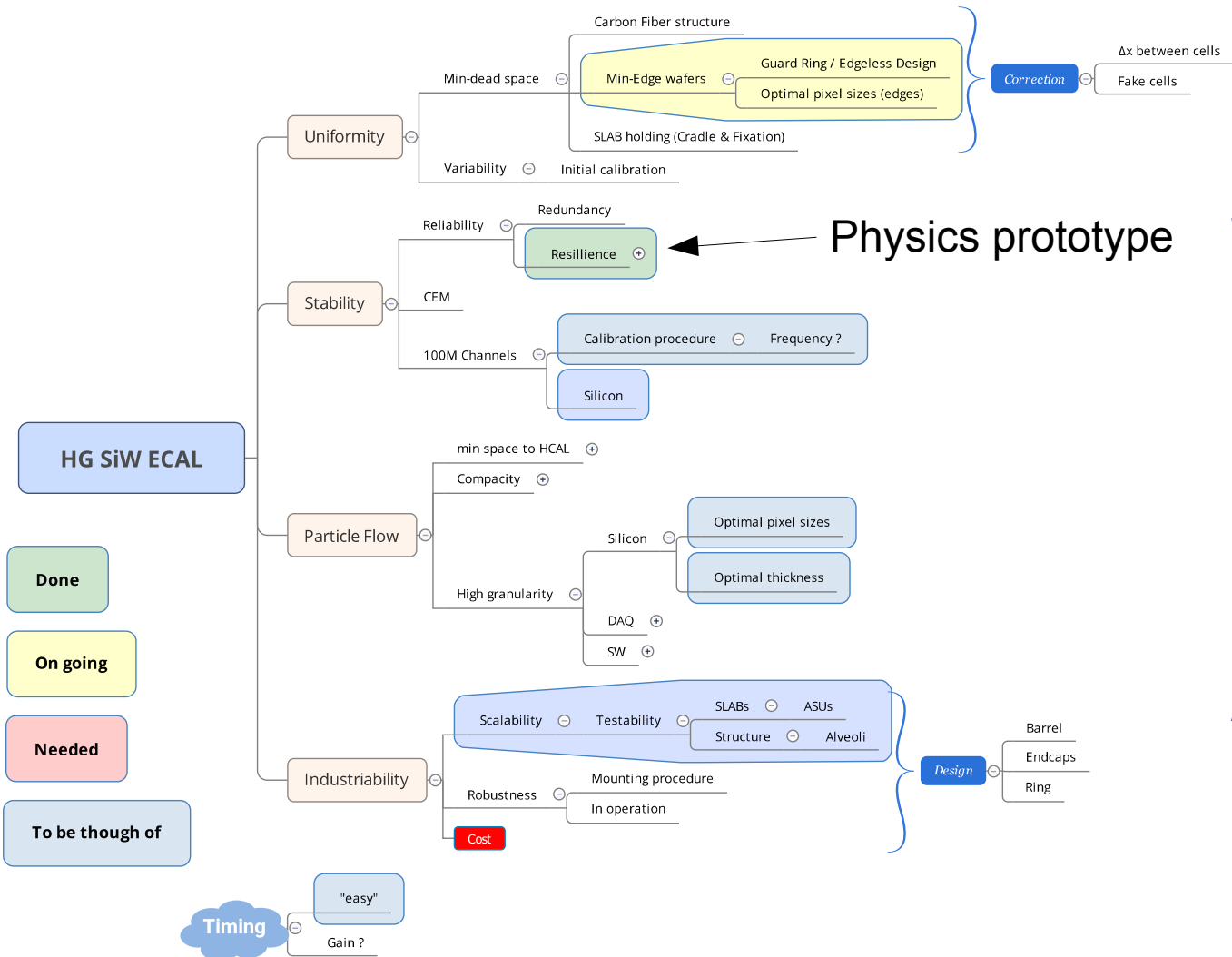
- Noise [BT June 2016]
  - ⇒ services ? better decoupling ?
  - SK2A short SLABs {AIDA-202, P2IO}
- Long SLAB 10 ASU on bench {P2IO}
- Industrialisation
  - step 0: Quality {AIDA-2020}, Assembly {P2IO}
  - step 1: Re-evaluate solution with industrial partner

## Services:

- DAQ (redundancy, rates)
- Power Supplies, Interface {P2IO}
- CEM design



# Instrumentation



- Done
- On going
- Needed
- To be thought of

## Wafers

- Characterisation [Jacques] {AIDA-2020}
- Irradiation [Daniel, Lacour]
- Guard Ring solutions
  - Laser tests [Rémi, Vladik, Taikan]
- Dead space:
  - ⇒ beam tests μ's [TBD], physics proto
  - ⇒ pencil beams (a la PHIL)
- Wafer size: 8"
  - waiting for LFoundry (paid)...

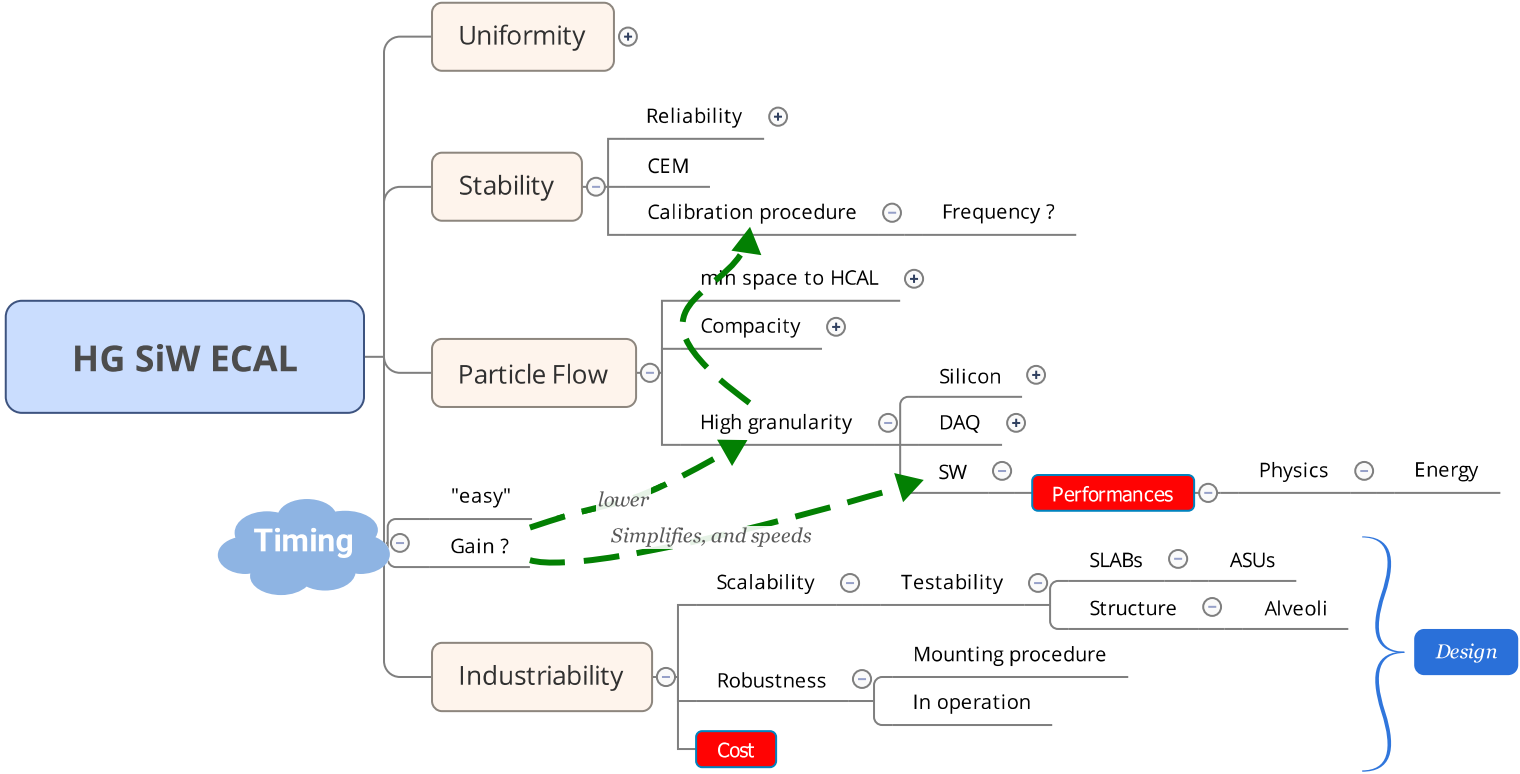
## ASU

- testing → bench @ LPNHE & LAL
- Timing testing: SK2a ASU

## Beam test analyses

- Photon direction
- HE showers in tech. prototype

# What would bring Timing ?



# Conclusions

## Probably missed some items

- **To be completed!**
  - ⇒ structured list of task and studies for possible new comers

## Which priorities for 2017 ?

### CALICE

- **Short SLAB and Prototype: noise / running modes**
  - SK2 / SK2a
  - improved PS, ASUs ?
- **Long SLAB: assess**
  - Assess electronics
  - Mechanics feasibility

## ILD

- **New models**
  - Finalisation of simulation models
    - Dimensions
    - Validate models
  - Review of analyses
    - Get organised by tasks...  
⇒ responsibilities ?
- **Constraints from services ?**
  - ⇒ interfaces
  - PS scheme
  - DAQ Scheme
  - ...