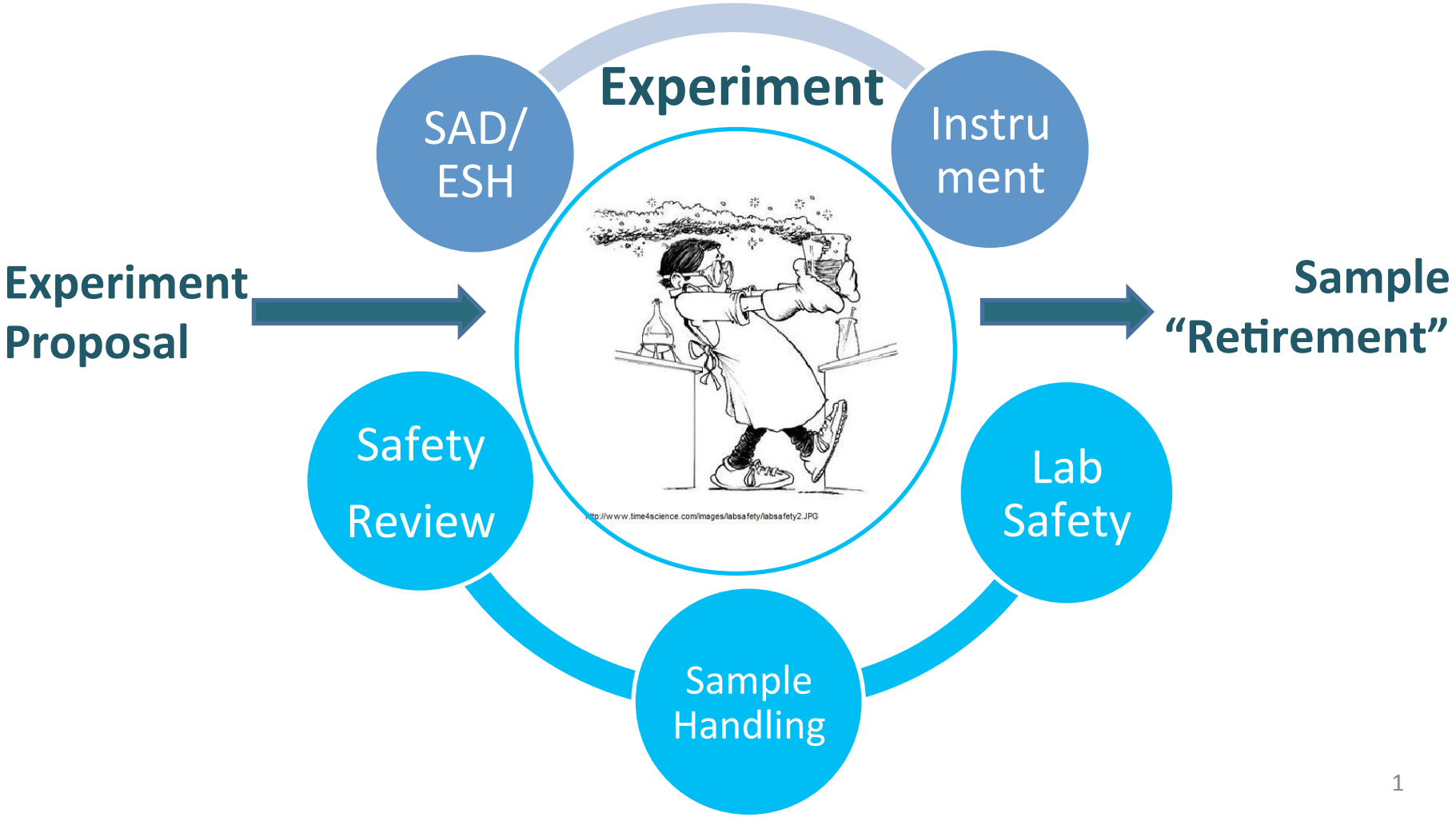
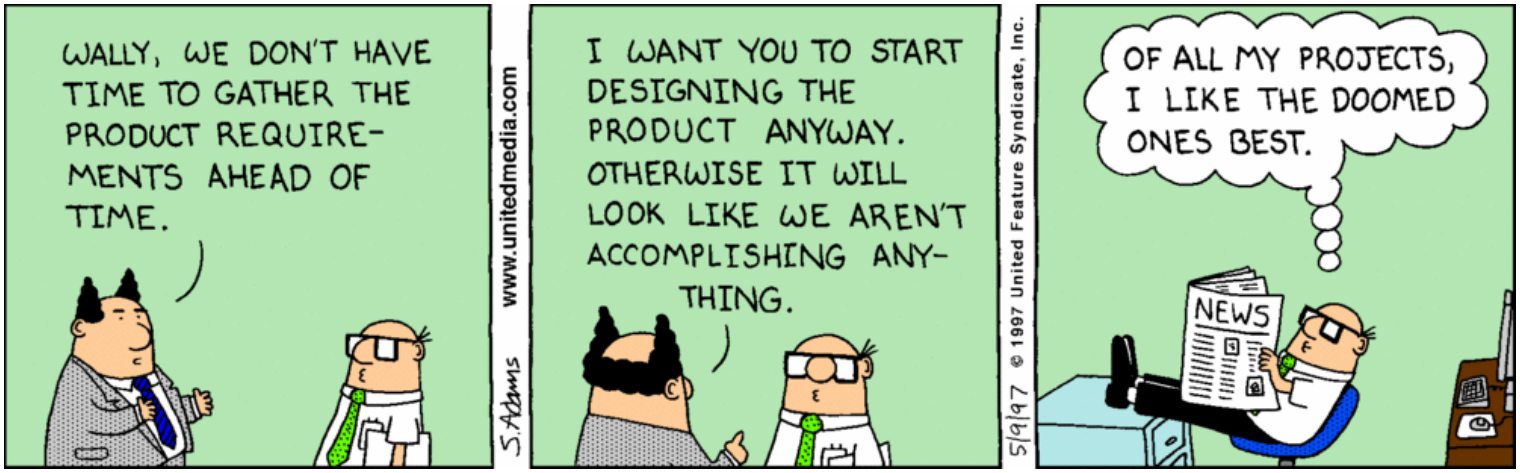
Safety and Sample Handling at ESS

Stay Safe ➡ **Develop rules, determine controls** ⬅ Do Science



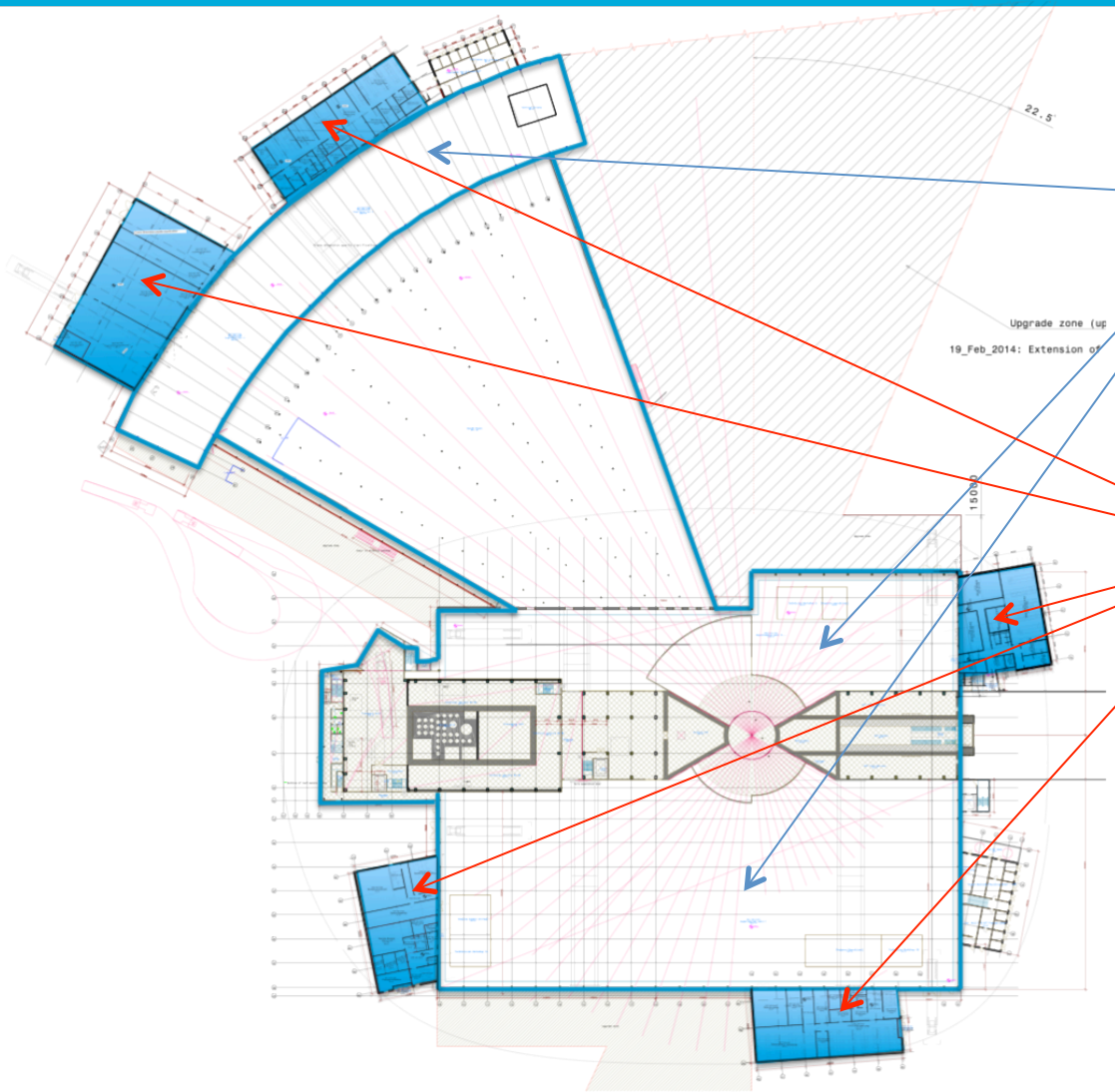
ESS Safety and Sample Workflow for Instruments – Reference Document for WBS 13.6.X.7.1

- reference document for Safety and Sample Workflow
  - Radiological Zoning
  - Sample Management (procedures, requirements, infrastructure)
  - General Safety



What does it mean for the instrument teams?

Experimental halls and laboratories

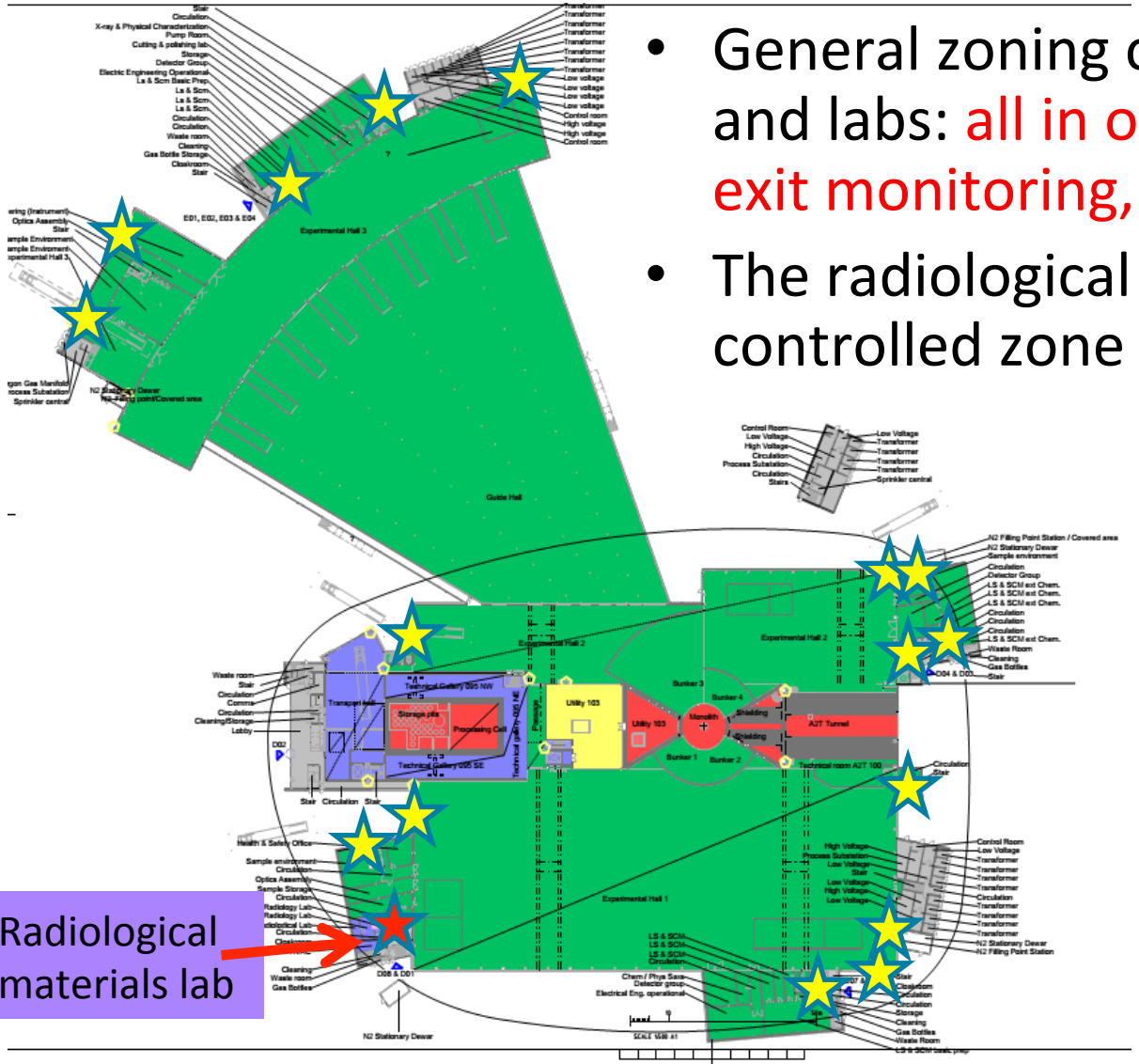


- Experimental hall:
- instruments
- small work areas
- workshops

Laboratory space
- Chem/bio labs
- Rad mat. labs
- workshops

at least 200 entries by 50 different people into the experimental hall / day

Zoning of experimental halls and laboratories



- General zoning of experimental hall and labs: all in one zone (supervised), exit monitoring, controlled access
- The radiological materials lab will be a controlled zone

Entrances to supervised areas.

Entrance to controlled areas.

Monitoring at Exits.

Radiological Zoning based on ESS-0033188

- all in one zone (supervised) is possible because:

- Sample Management Procedure

-"Flexible zoning" , e.g. in exp. cave

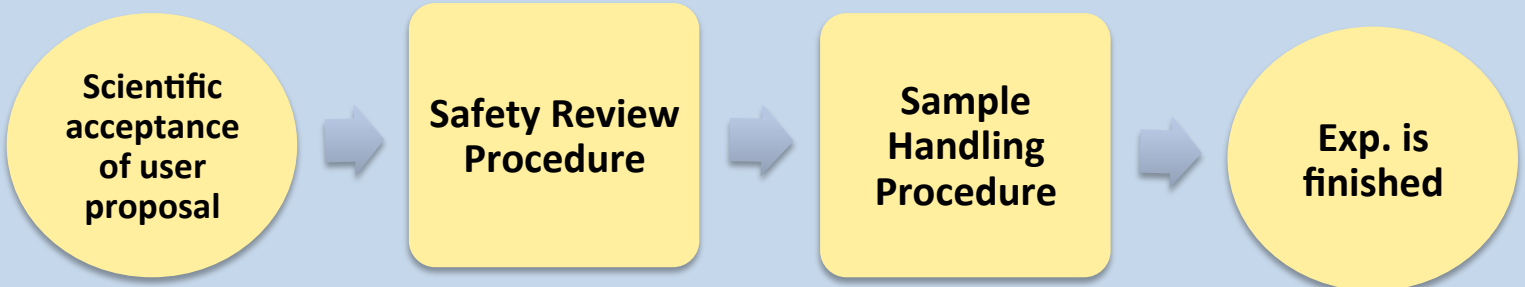
- engineering/ administrative controls (infrastructure on instruments)

<u>Near future:</u>

zoning document for science implementing ESS zoning in detail

Sample Management

SAMPLE MANAGEMENT, REVIEWED PROCEDURES (ESS-0024109, 0024107, 0024112):
DESCRIBE SAFETY PROCEDURES CONNECTED TO HANDLING OF SAMPLES AND SAMPLE ENVIRONMENT EQUIPMENT (SAD, ESH, SE)



- Safety Review: (1) **hazards** connected to sample/sample environment equipment (2) administrative and engineering **controls**

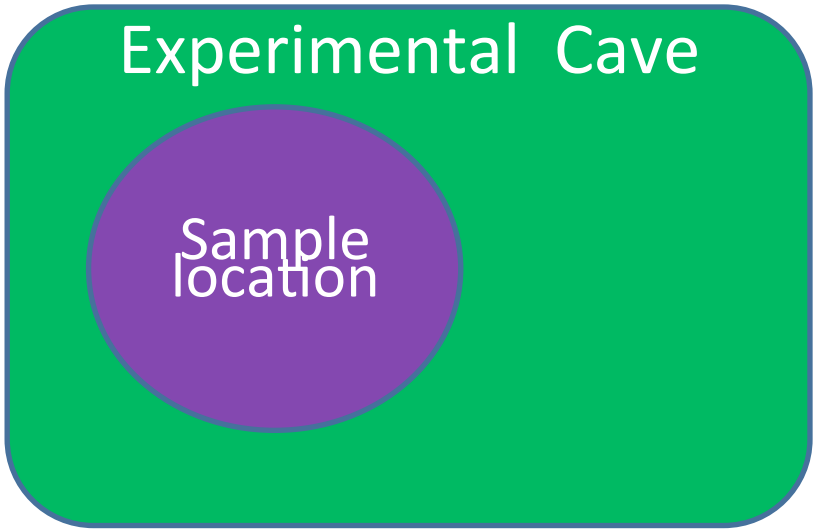
➔ no unauthorized samples leave ESS / samples get shipped lawfully

➔ NOT included : general hazard analysis for the instrument itself

- Sample Handling: how to (1) **handle/move samples** in the experimental area (instrument, workshops, labs), (2) **store samples**, (3) **remove samples** from exp. Area

➔ No contamination in supervised area

Zoning of experimental cave during normal operation



- While shutter is closed: Instrument caves are supervised zone (green zone) =>radiation only - no contamination!
- Samples are at the **sample location**: a flexible controlled area – contamination allowed!

The area considered **sample location** will be defined during safety review of the respective experiment - for non-hazardous samples it might simply be the sample container.

- Sample location can be:
  - sample can
  - cryostat
  - ventilated "tent"
  - ….
  - Instrument cave

Infrastructure for instruments

SUPPLIED

- access to a vacuum exhaust line to main stack for 1m^3 sample volume (activated gas, secondary containment,…)
- access to a non-rad fume hood ventilation system

NEEDED

- requirement: approved sample cabinet for storage
- requirement: instrument specific lab/sample handling space on instruments

General safety

- **SAD is involved in general safety connected to experimental work in labs and on instruments:**
  - √ **Laser safety (procedure in review)**
  - √ **Oxygen deficiency ODH (procedure in review)**
  - √ **Chemical safety (first procedures in operation, started)**
  - – **Compressed gases, high pressure, electric,…**

- **SAD will ensure the instrument teams are informed, will assist with general and instrument specific safety documentation,…), will work with ESH on training plans**

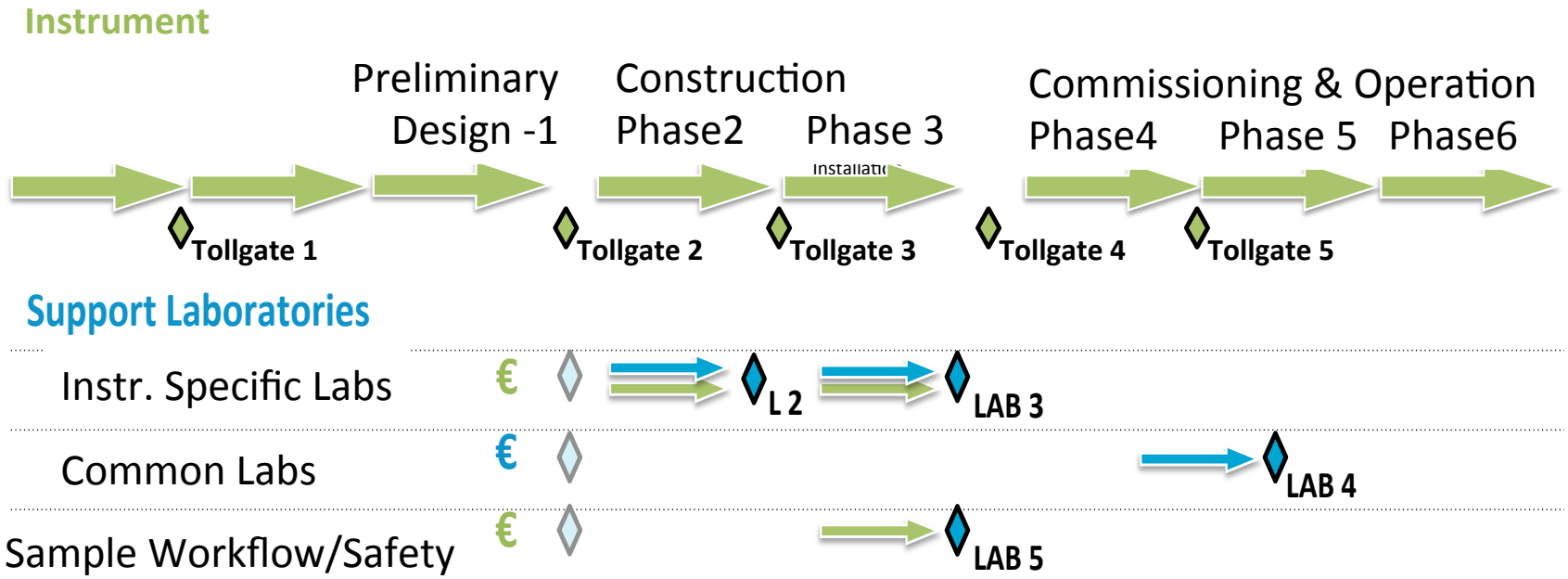
Collaborating for a fully integrated instrument

“We collaborate. I’m an expert, but not an authority, and Dr. Gelpas is an authority, but not an expert.

- the instrument and the SAD team:
  - establish requirements and a timeline
  - identify instrument specific labs/workspaces
  - identify needs for common laboratories
- Instrument team (with help from SAD):
  - ESS sample workflow and safety procedures
  - provide required infrastructure to follow procedures
  - plan for standard equipment as it pertains to laboratory access/needs

Most requirements are procedural; very little budget allotment is required.

Timeline



Instrument specific Labs:

- LAB2: review , requirements, access points
- LAB3: ready, integrated sample workflow (for all areas)

Common Labs:

- LAB4: general user labs entering hot commissioning ready