An unified in-field measurement and alignment software for experiments and accelerators at CERN large scale metrology section.

IWAA 2016 (03-07 Oct.) - Grenoble - France

P. SAINVITU, CERN – Geneva – Switzerland

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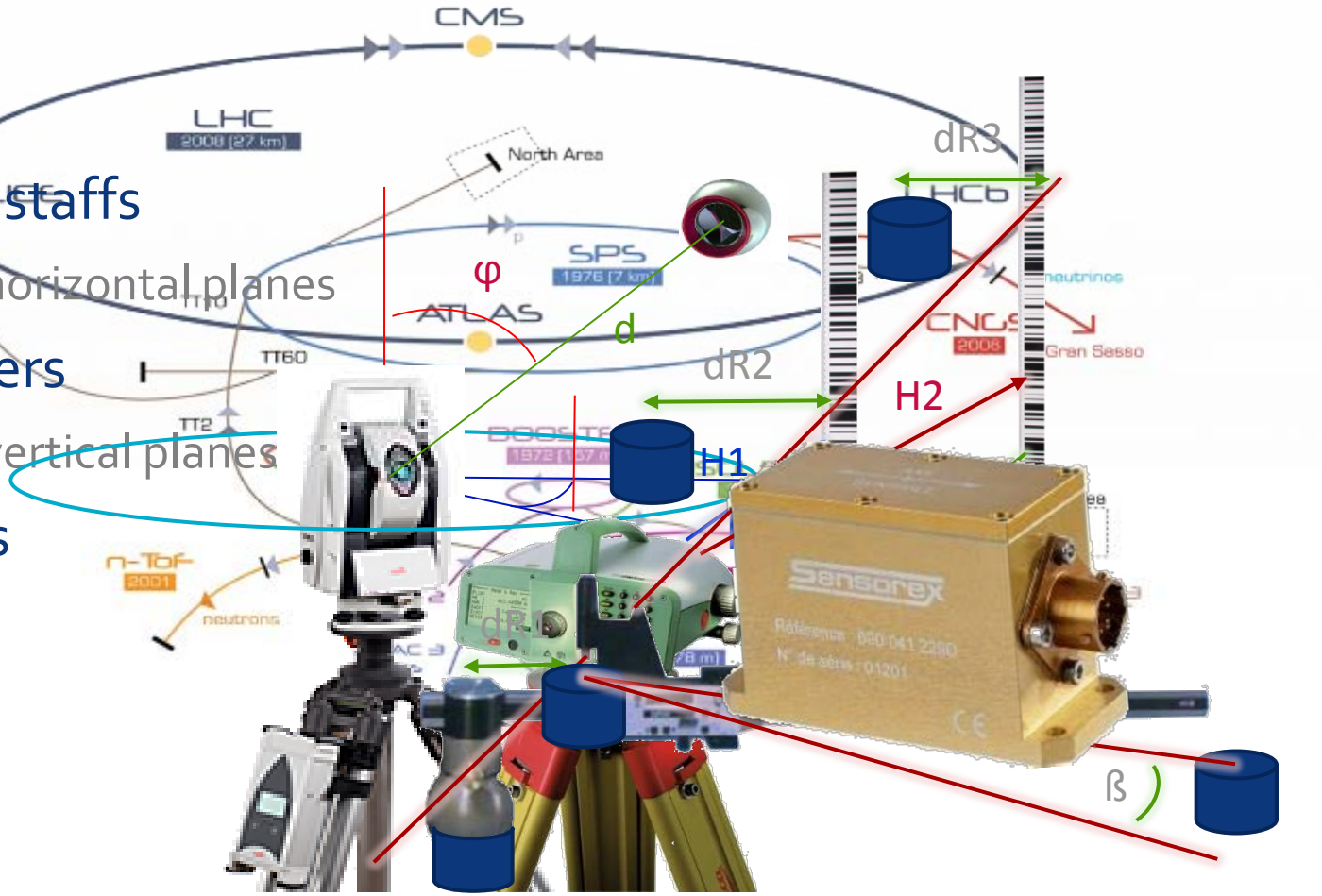
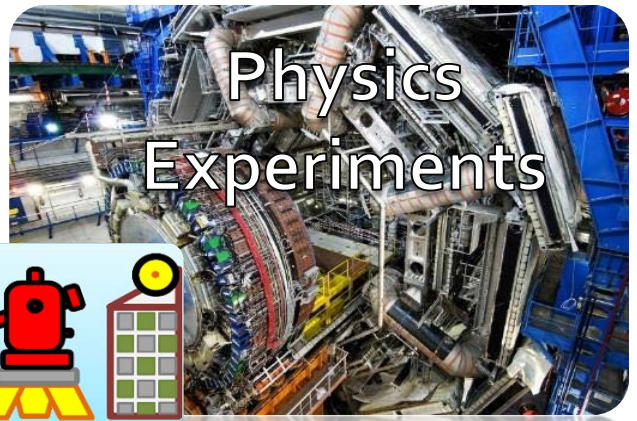
CERN complex alignment - geodesic measurements

- Theodolites, tachometers, trackers and reflectors
  - Angles
  - Distances
- Levels and staffs
  - Offsets to horizontal planes
- Ecartometers
  - Offsets to vertical planes
- Tilt sensors
  - Inclinations



In-field acquisitions - Divergences & similarities

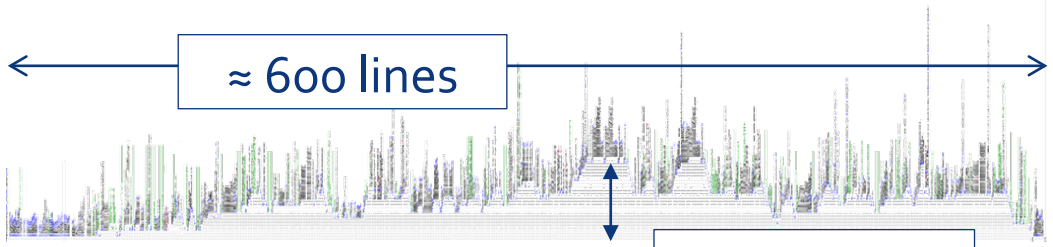


SFB Survey Field Book

Measurement:	Repetitive	Diversify
Tolerances:	Well-defined	Variable
Sequence:	Controlled	Non-existent
Main user:	Industrial Support	CERN STAFF
Coord. System:	Global	Local
Most processing:	Postpone	Immediate
Business model:	Elements, points, networks, geodetic measurements,…	
Instrument:	Communication librairies	
Calculation:	Survey Software dependencies	

Main drawbacks

- From 90's, in VB6 and VBA
- GUI are French only
- Not "touch screen" friendly
- Maintenance
  - New instruments + computing libraries replacement
    >>> double implementation
  - Performed by several surveyors
    >>> duplicate parts + Procedural and OO programming



The challenge

- Unify survey data acquisition tools;
- Facilitate the maintenance;
- Open doors to more up to date interfaces.

The
Survey
Unified
Notebook for
Alignment and
Measurement
Interventions

Rewriting of a single application that fulfil all the constraints

Constraints

Use cases - **Multi-user mode** - Dependencies

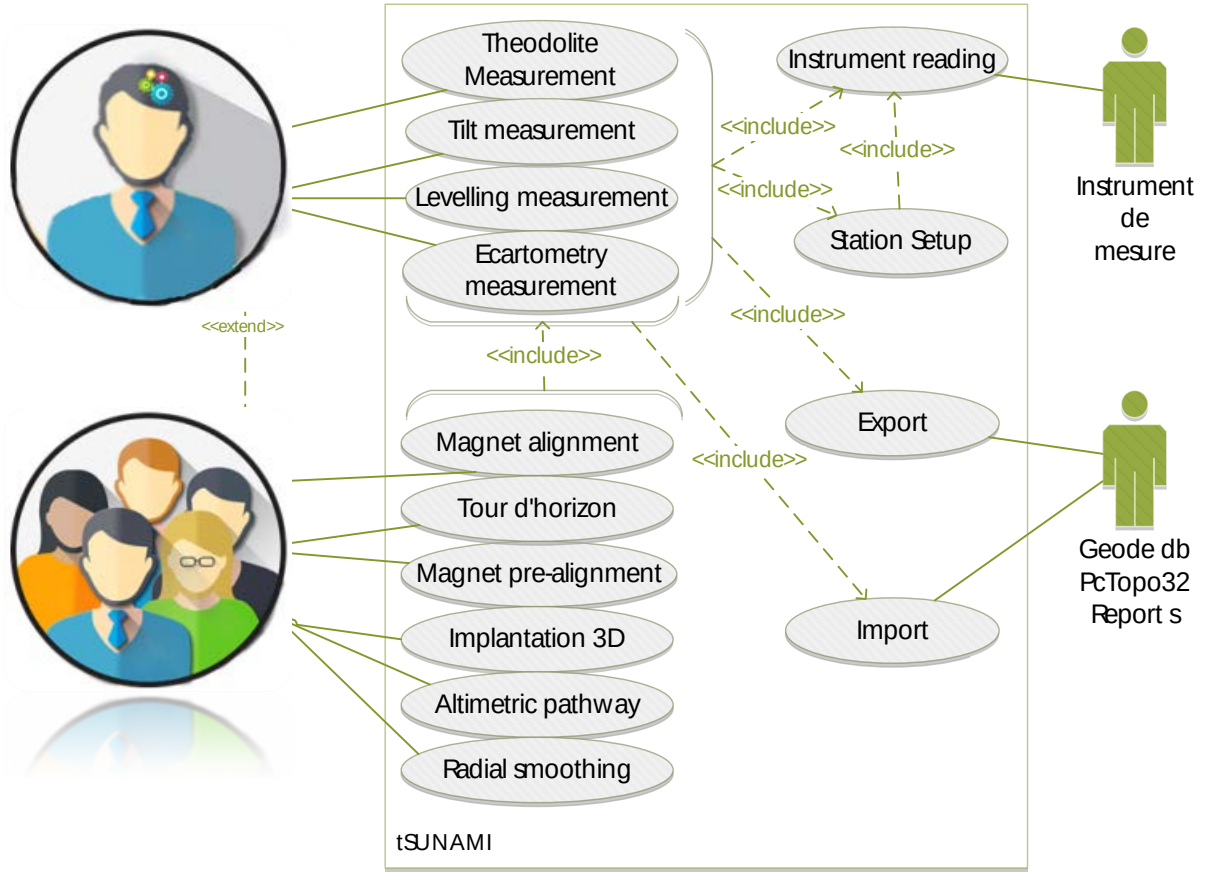
Coordinate systems - Environment of use - Data Views

Advanced user

Flexibility

Guided user

Controlled step by step procedures



Constraints

Use cases - Multi-user mode - **Dependencies**

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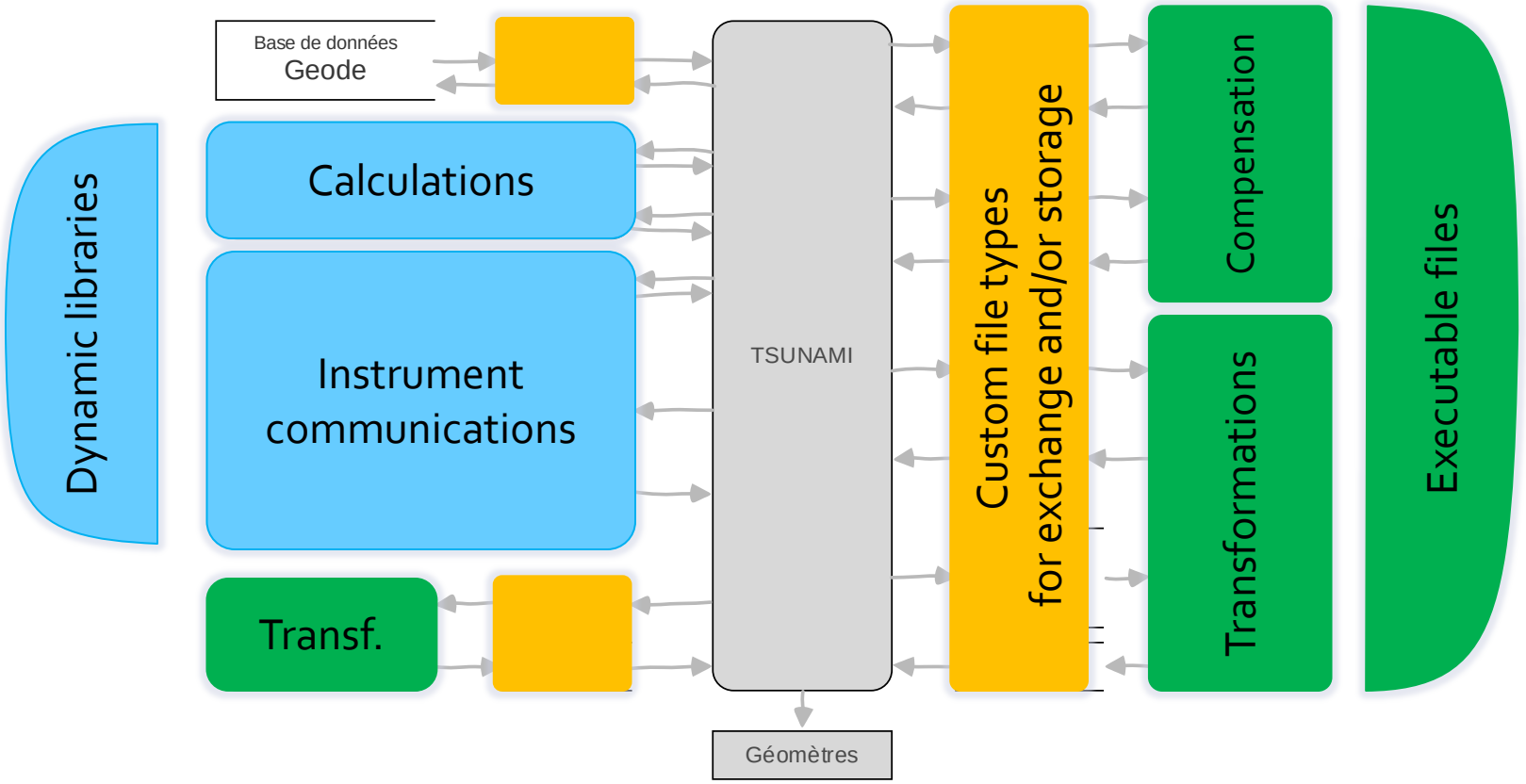

Constraints

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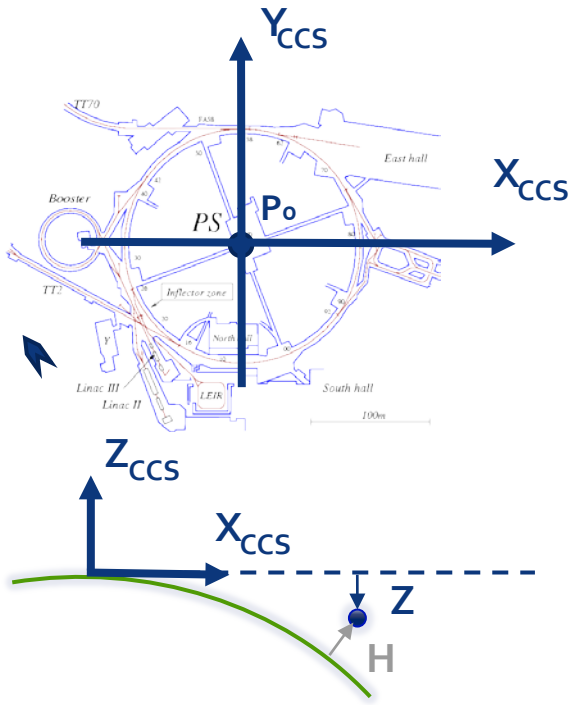
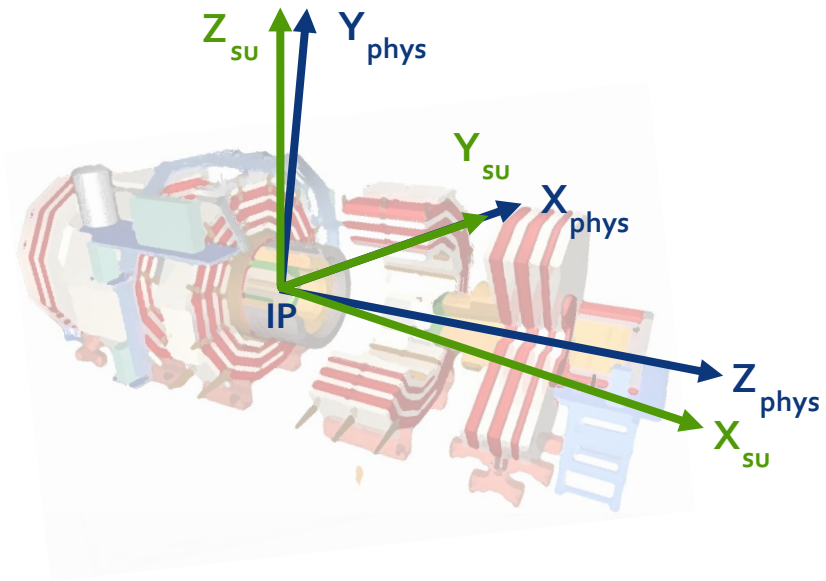
Accelerators



CERN CS : XYZ / XYH

Physics experiments



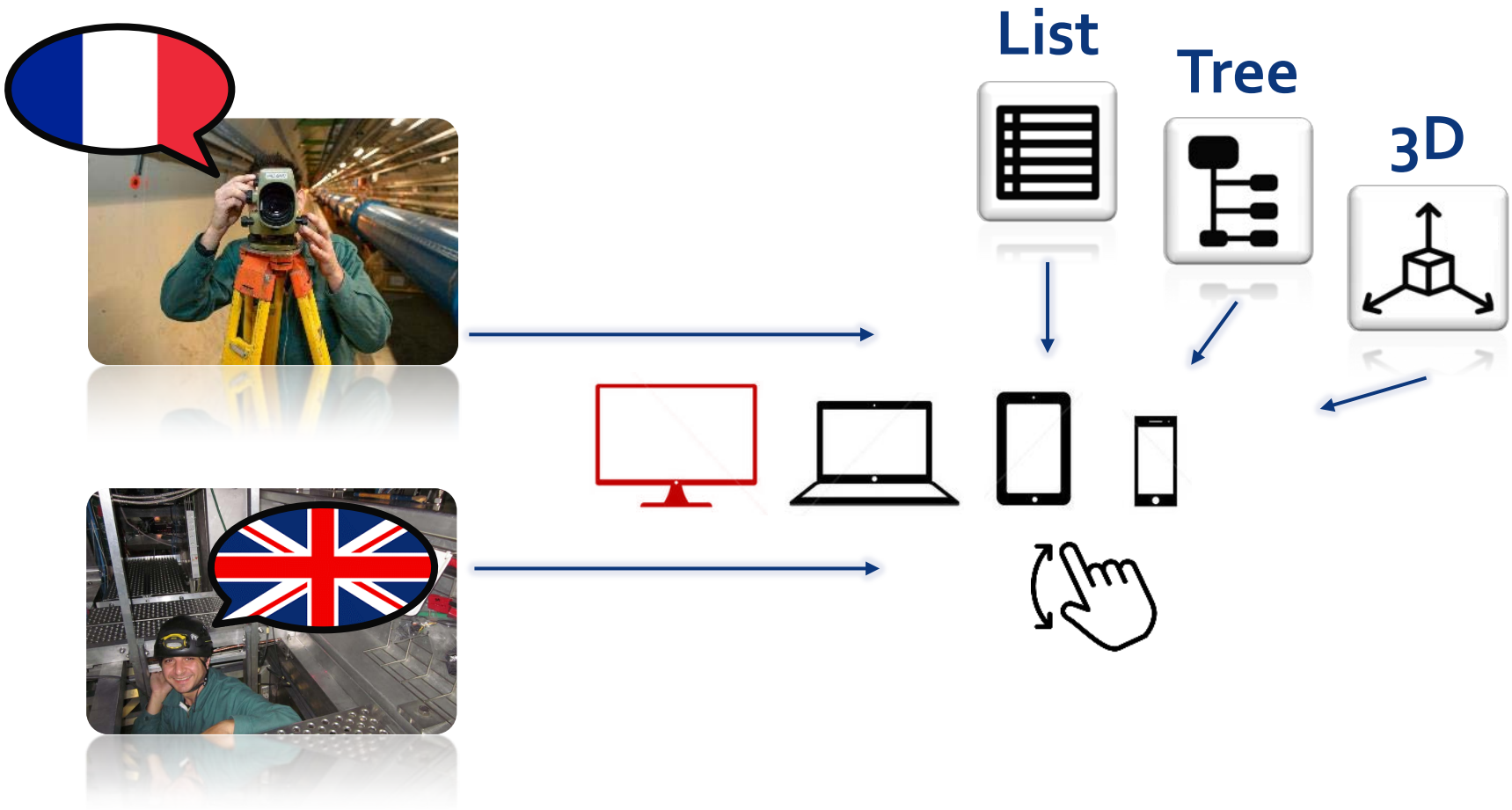
Physicist CS

Survey CS

Constraints

Use cases - Multi-user mode - Dependencies

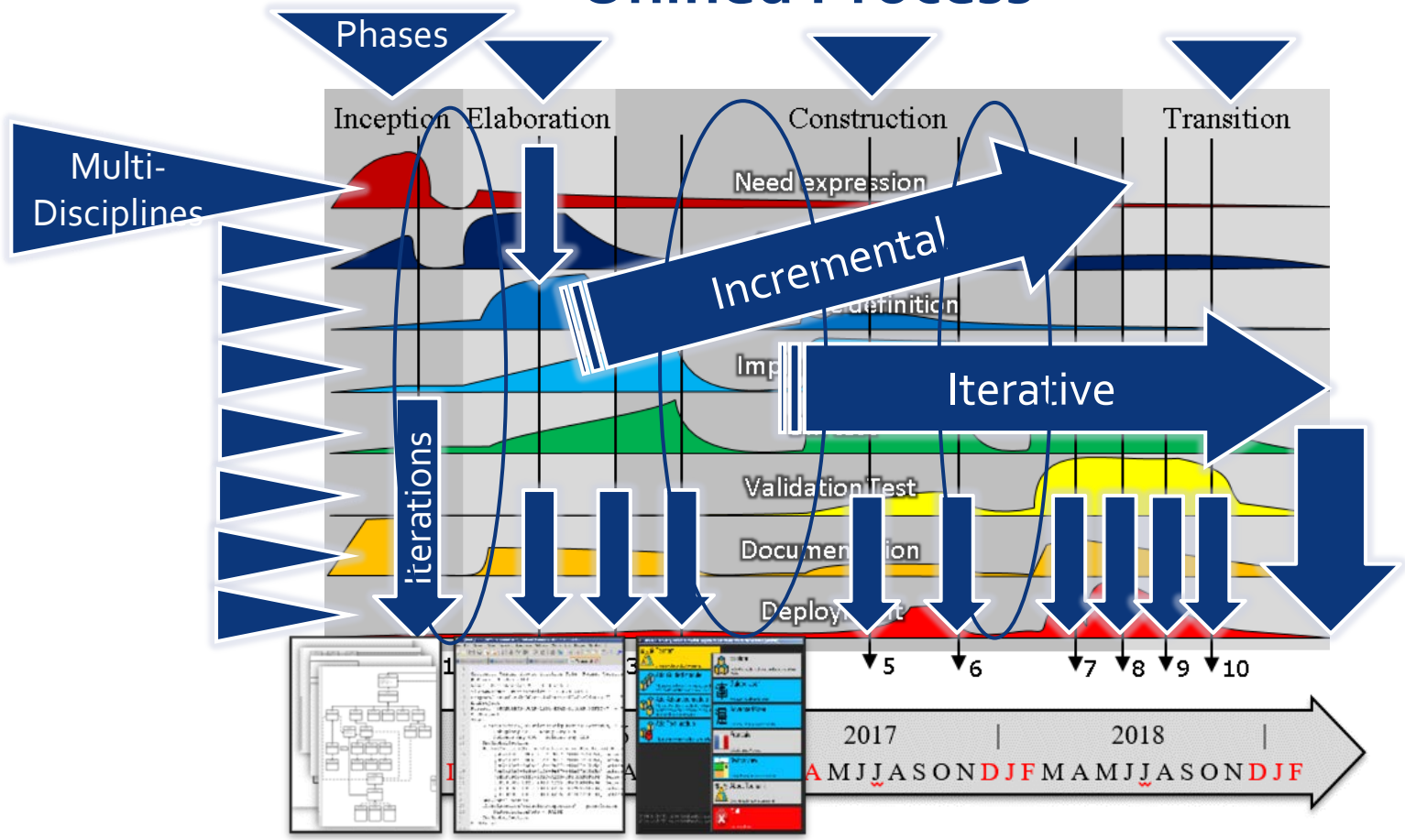
Coordinate systems - **Environment of use - Data Views**



Method

Development process - Platform & language - Workflow - Architecture

Unified Process



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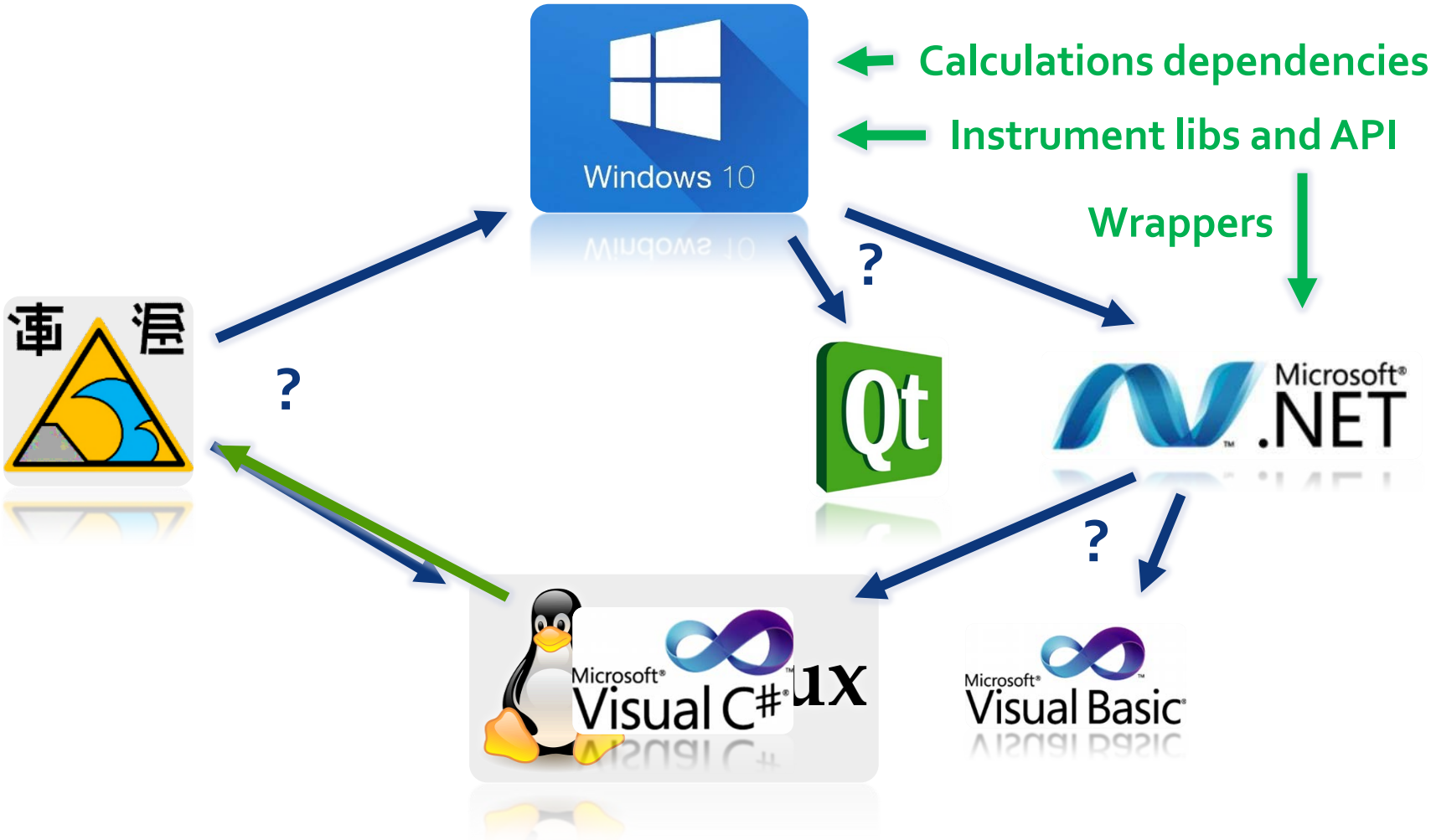

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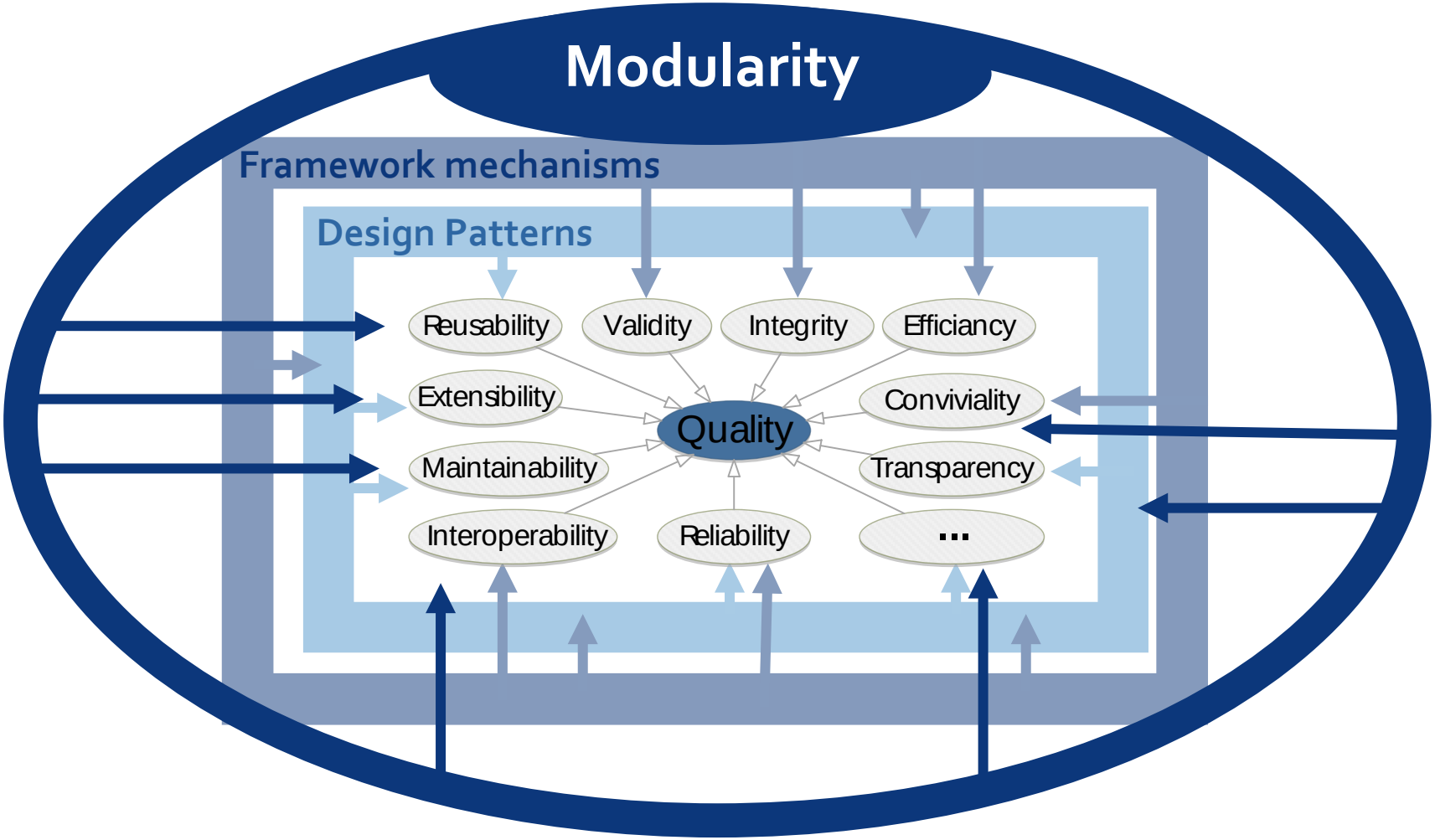

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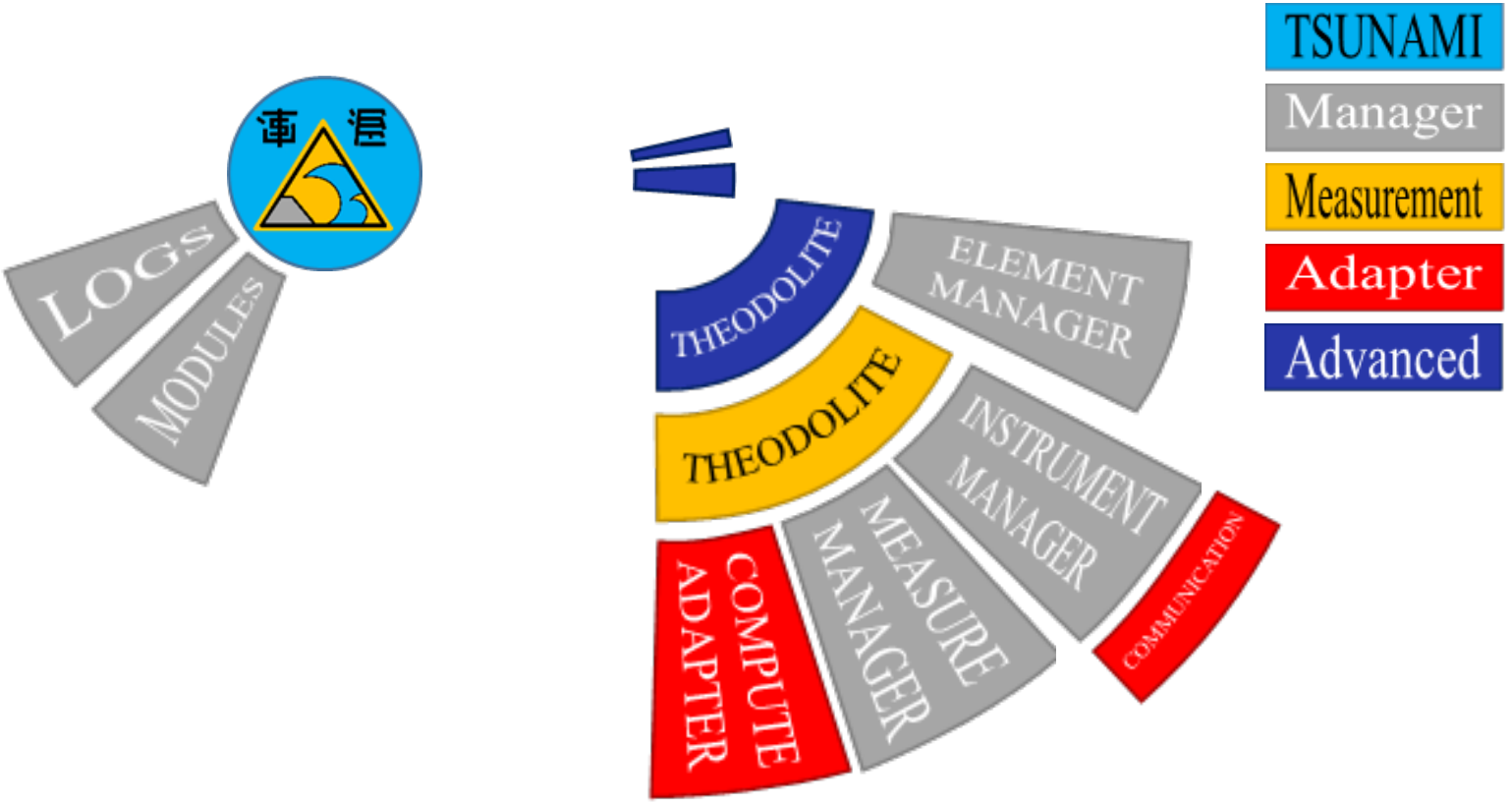

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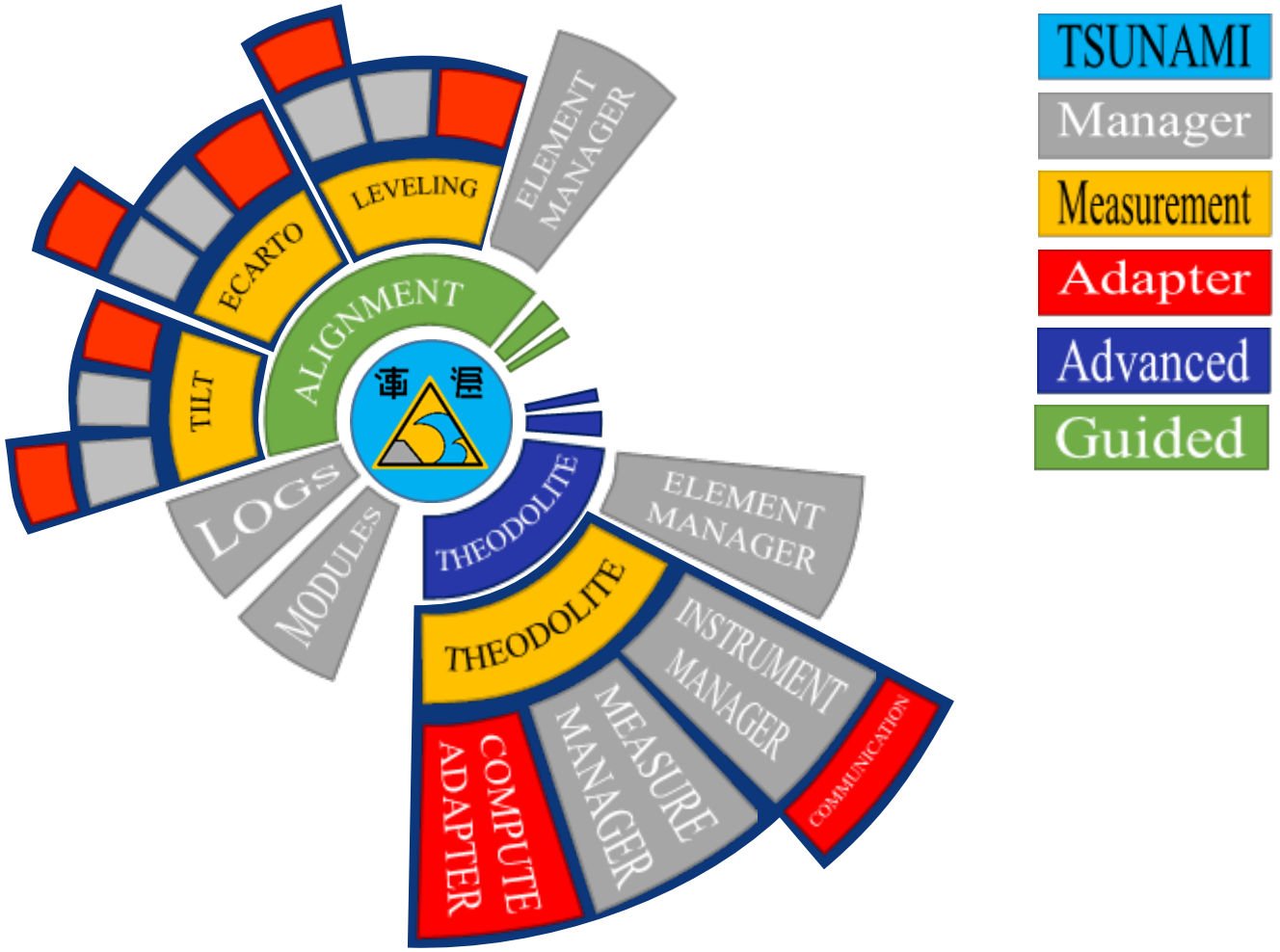

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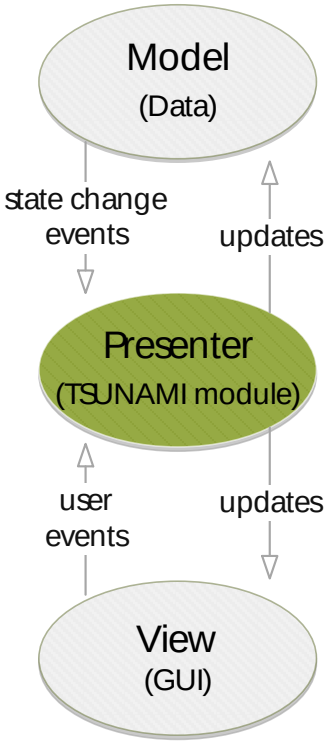
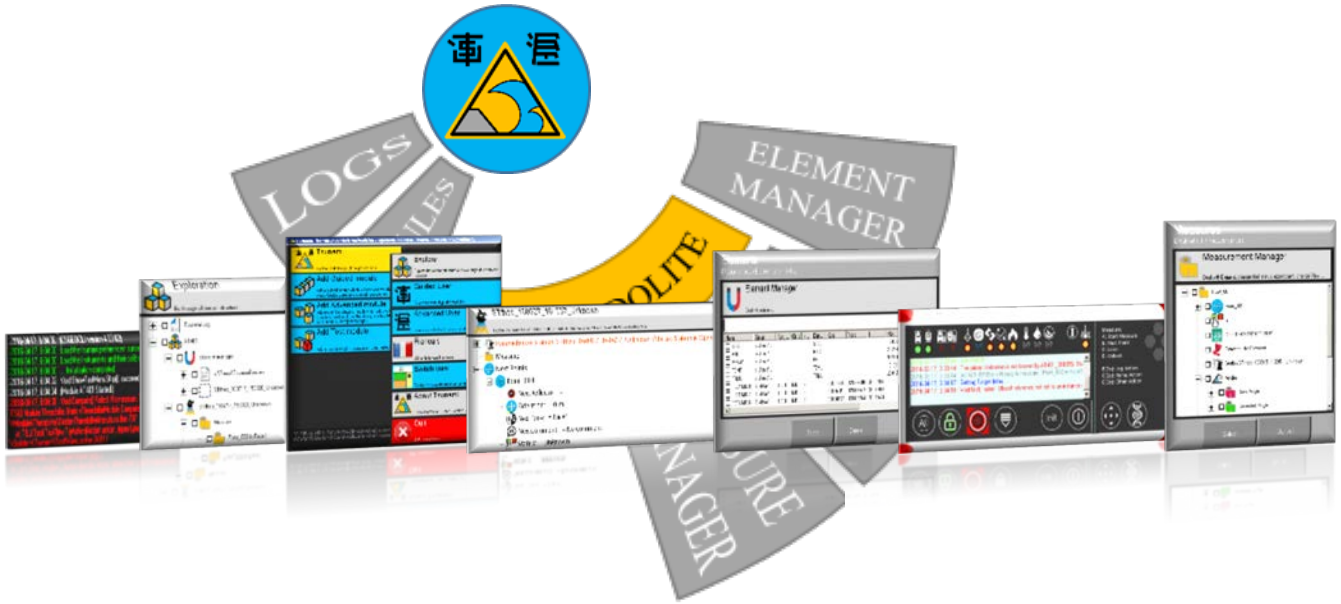




Status of the development

First iterations

- Design Artefacts
- Prototype
  - *Managers & dependencies;*
  - *Ecartometry, levelling & Theodolite.*

Next iterations

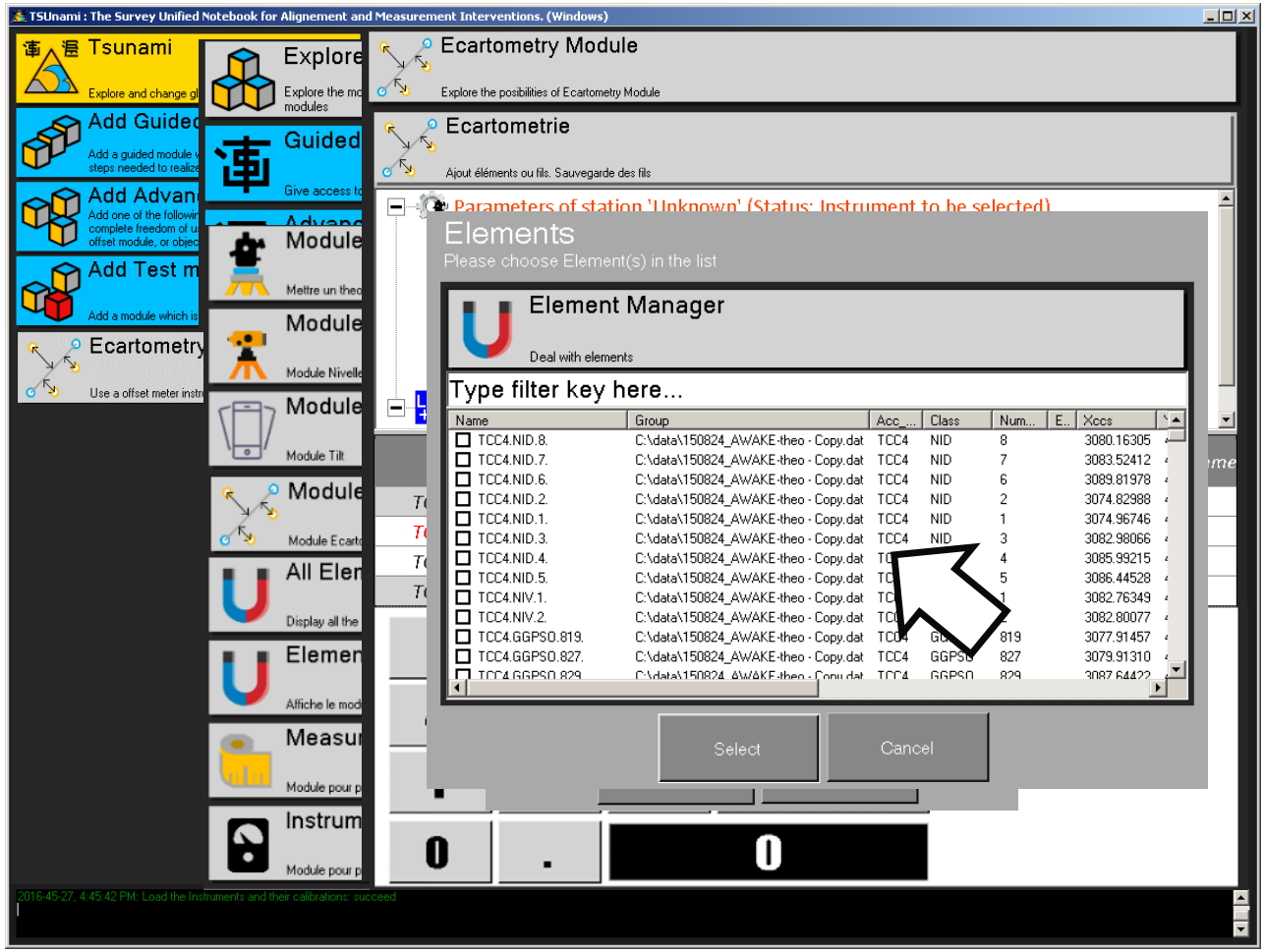
- Architectural choices + implementation:
  - *Tilt measurement;*
  - *Guided modules.*

Summary & Outlook

2 data acquisition software >> TSUNAMI (2 user modes)

- **Development in progress…**
  - Global architecture delivered >> Satisfy constraints + ensure quality
  - Most core functionalities implemented
- **Full-scale tests (next year)**
  - CERN survey team >> feedback >> Corrections and adjustments
- **First version >> next long shutdown**
- **Architecture + documentation** >> ease the maintenance
- **Achieved modularity** >> stimulate extensions
  >> reuse of code in future projects.

Thank you for your attention.



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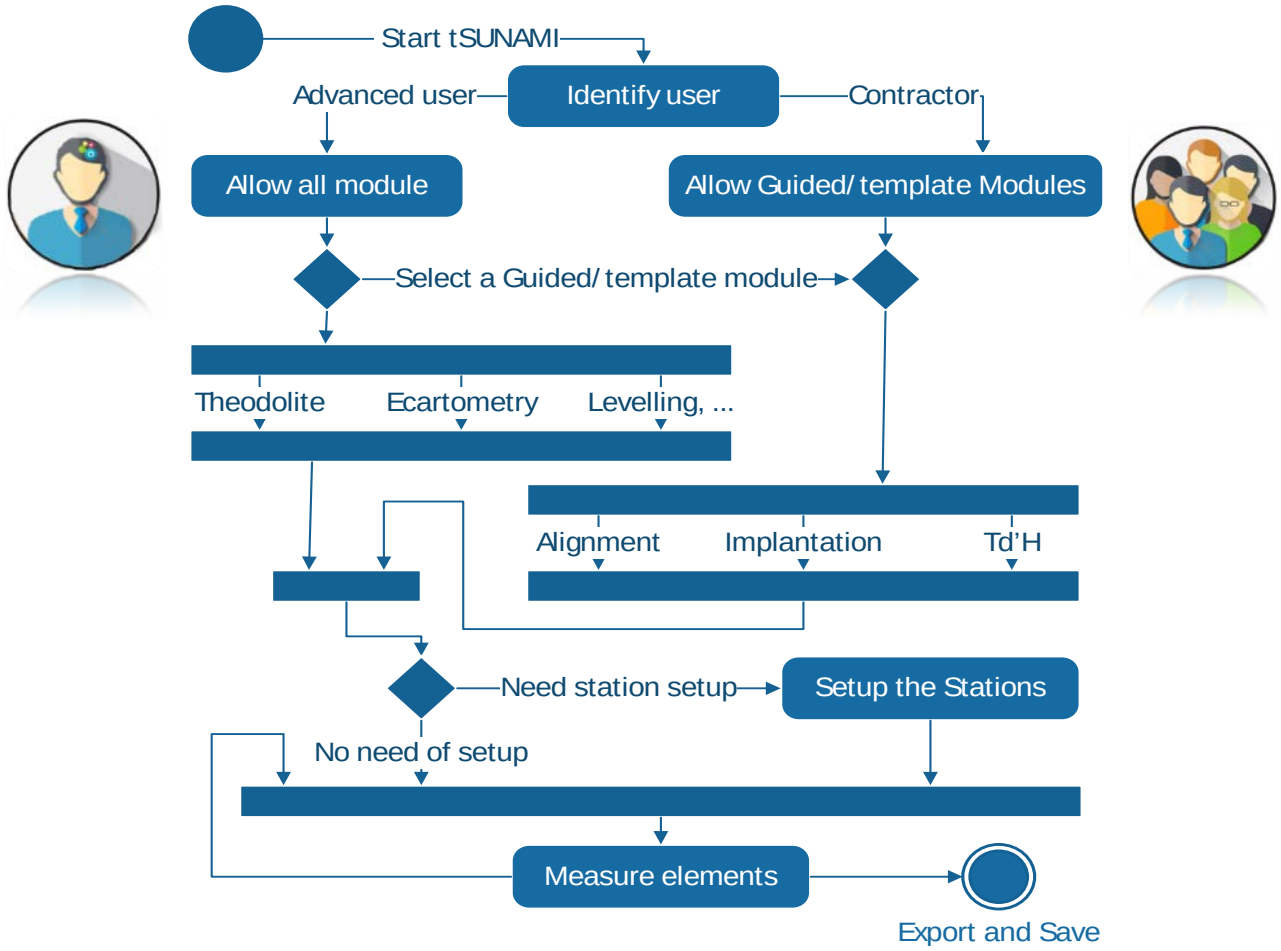

TSU-NAMI