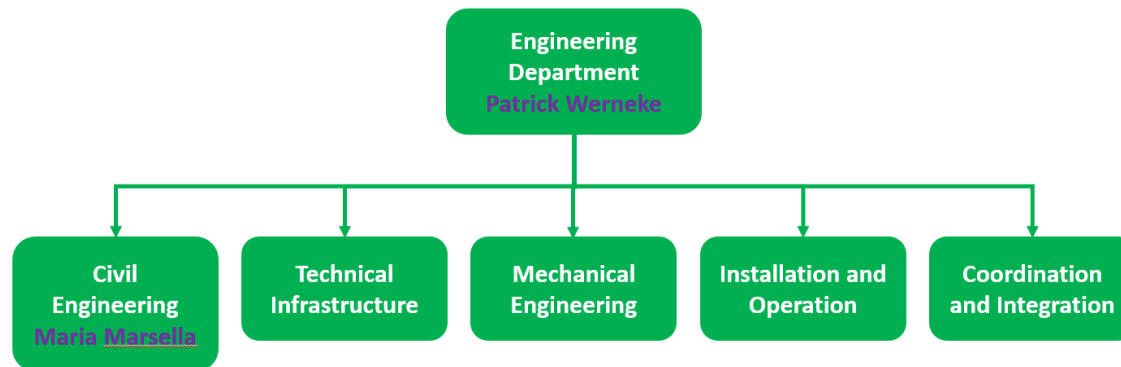


## ETO summary/overview from ET Annual Meeting

## Phase I - CE activity in the Preparatory Phase

- Support and coordinate the CE activity to **design the civil research infrastructure** in the selected construction site(s) and for two configurations in parallel (triangle&L shape)
- set up a detailed **work plan** including deliverables (specifications, design, schedules, budget) to provide to **BGR** (governmental body entrusted to take decisions )
- Coordinate the activity with **local teams** carrying out the **civil engineering preliminary studies**



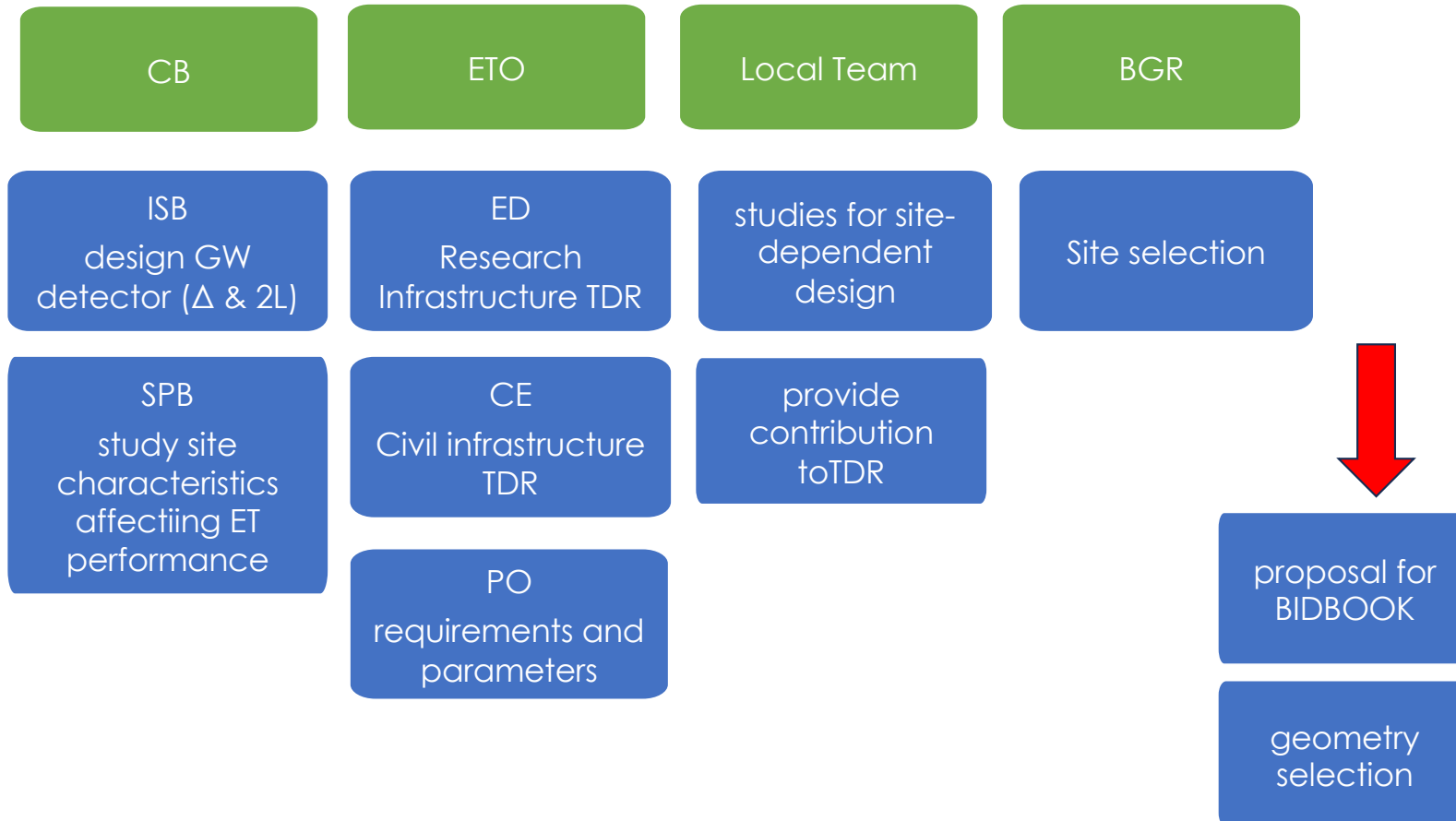
## Which are the technical steps ?

- Identify and collect from ISB and SPB all the **requirements/parameters** relevant to CE design (this is a mutual effort based on the in-progress PBS)
- agree on a **timeline** (<sup>1.</sup>considering the needs for CE implementation levels)
- establish a **collaborative framework** between local teams and SPB to fully integrate site investigations on **noise model** in the **design process to identify** construction solutions

## Agree on a timeline (considering the needs for CE implementation levels)

	Phase 1			Phase 2	Local team		
	Geometry selection	Preliminary TDR	Site selection	Final TDR	Local team site-dependent preliminary design	Local team site-dependent final design	Procurement ..... .....
ESFRI							
INFRADEV							
ETO							
CERN MOU							
Sardinia							
EMR							

## How to coordinate the activity within different bodies ?



## ➔ How to coordinate the activity with local teams ?



### REQUIRED INFO

- **To receive document**, under the terms and conditions defined in the GA, to accomplish the preliminary TDR
- **To ask for a site proposal** including a technical design, a time/cost estimation, risk analysis, socio-economic impact, permitting roadmaps,....
- **To ask for amendments** if something needs to be changed



### REQUIRED TASKS

- **To implement a plan** for responsibilities and coordination of the local teams
- **To submit request** on a set of common documents and reports and the method for quality assessment
- **To display** a collaborative framework between SPB and local teams



### BGR IN Phase 1

- Establish roadmap pillars
- Request and evaluate document/proposals
- Take decision

# How to organize the activity ?

➔ **WP to be started in collaboration with CERN are devoted to:**



## WP0

### cost estimate classification system

- **To identify a common methodology** for attributing the maturity level of the CE design and uncertainty



## WP1

### shared tools/platform for digital modeling

- **To implement a plan** to define design computational methods, multi criteria optimization, adaptable/parametric models, etc.
- **To establish a procedure** to share data interactively with other teams of ETO (shared BIM platform)



## WP2

### requirements from ED-CB

- **To support** analysis and understanding of requirements and constraints from ISB
- **to associate** them to elements of infrastructure
- **To classify** in terms of relevance (mandatory, preferred, ameliorative)
- **To identify** additional interferences



## WP3

### layouts/specifications

- **To deliver** a reference version of a BIM model of the ET layout of caverns, shafts, and tunnels for triangle and 2L obtained following a set of minimal requirements discussed and approved by ISB
- **To share** info with the local teams to implement the site-specific design process
- **To collaborate** to elaborate for potential integrations

## WP0 - cost estimate

- identify a common **methodology**
- attributing the **maturity** level of the CE design and uncertainty

## WP1 - shared tools/platform for digital modeling

- define **design computational methods**, multi criteria optimization, adaptable/parametric models, etc.
- procedure to **share data** interactively with other teams of ETO (shared GIS/BIM platform)



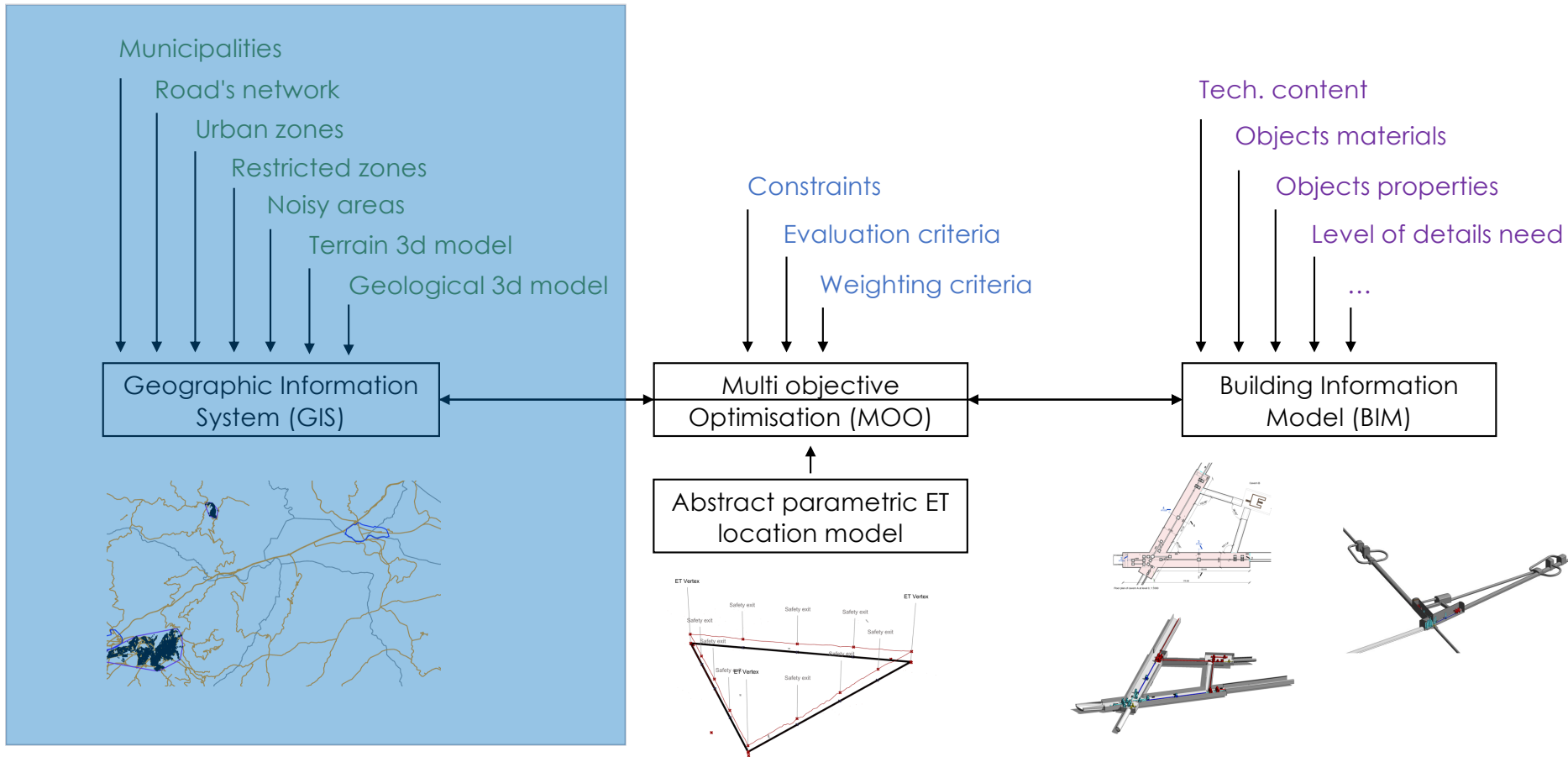
## WP2 - requirements/constraints

- associate to **area/elements** of infrastructure
- classify in terms of **relevance** (mandatory, preferred, ameliorative)
- establish **priority**

## WP3 - layouts/specifications

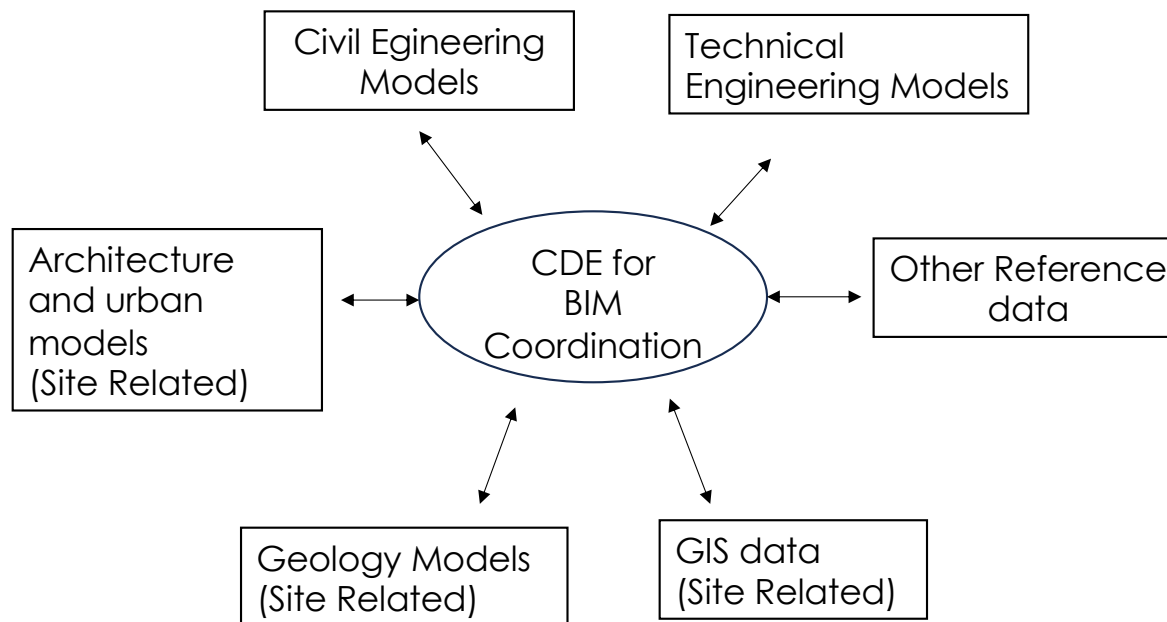
- **deliver** a reference version of a BIM model of the ET layout of caverns, shafts, and tunnels for triangle and 2L obtained following a set of minimal requirements discussed and approved by ISB
- **share** info with the local teams to implement the site- specific design process
- **integrate** changes/alternatives

# Data and tools to support early-stage infrastructure design in collaboration



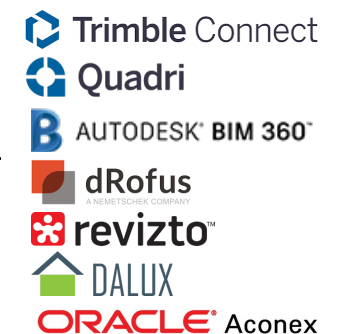
## Common Data Environment (BIM-Server)

Service used by Project Stakeholders to coordinate BIM model and the related reference data.



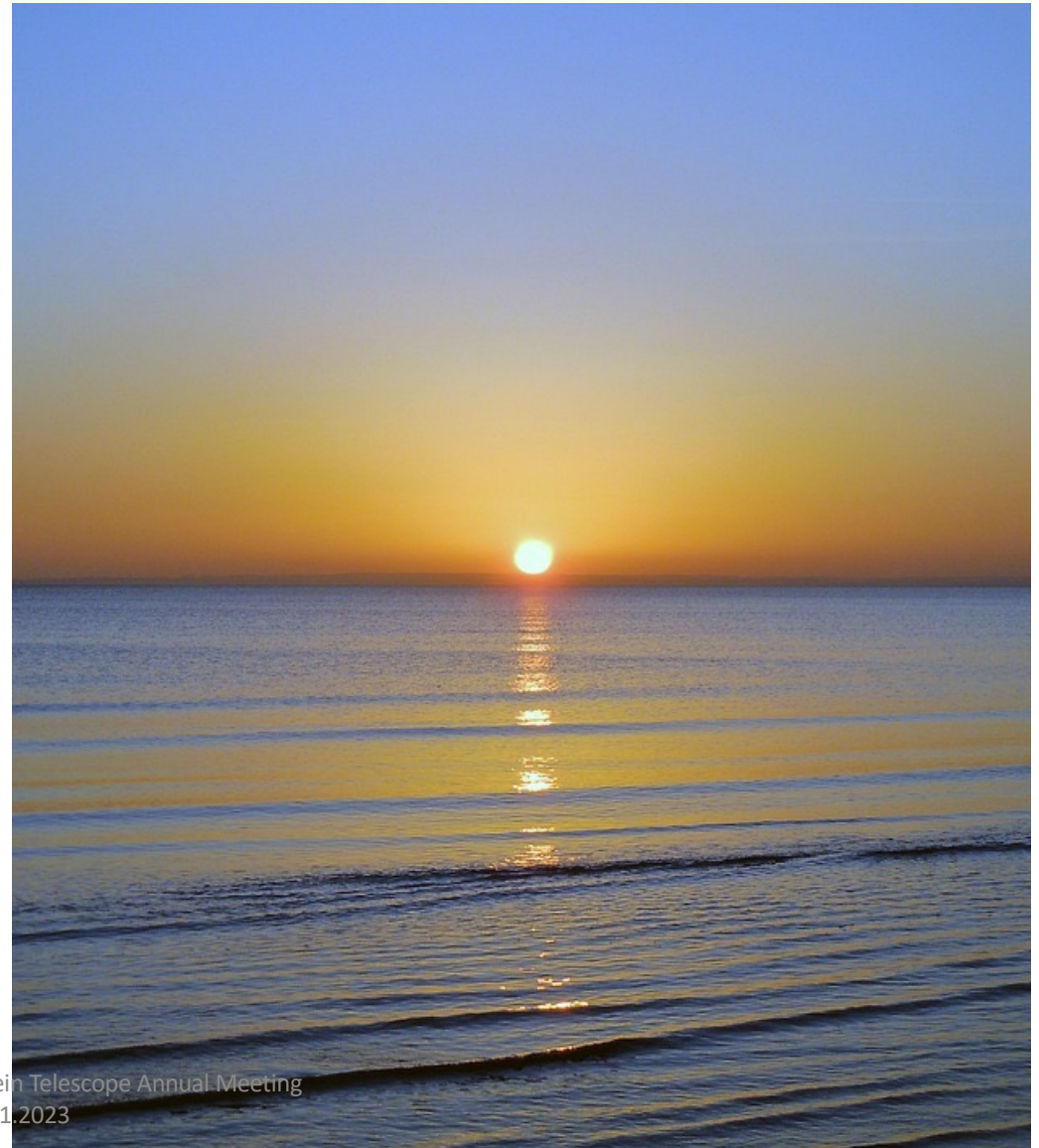
Exmaples:

- [Trimble Connect](#)
- [Trimble Quadri](#)
- [Autodesk BIM 360](#)
- [dRofus](#)
- [revizto](#)
- [DALUX BOX](#)
- [Oracle Aconex](#)



## Inputs form SPB - what, where and how ?

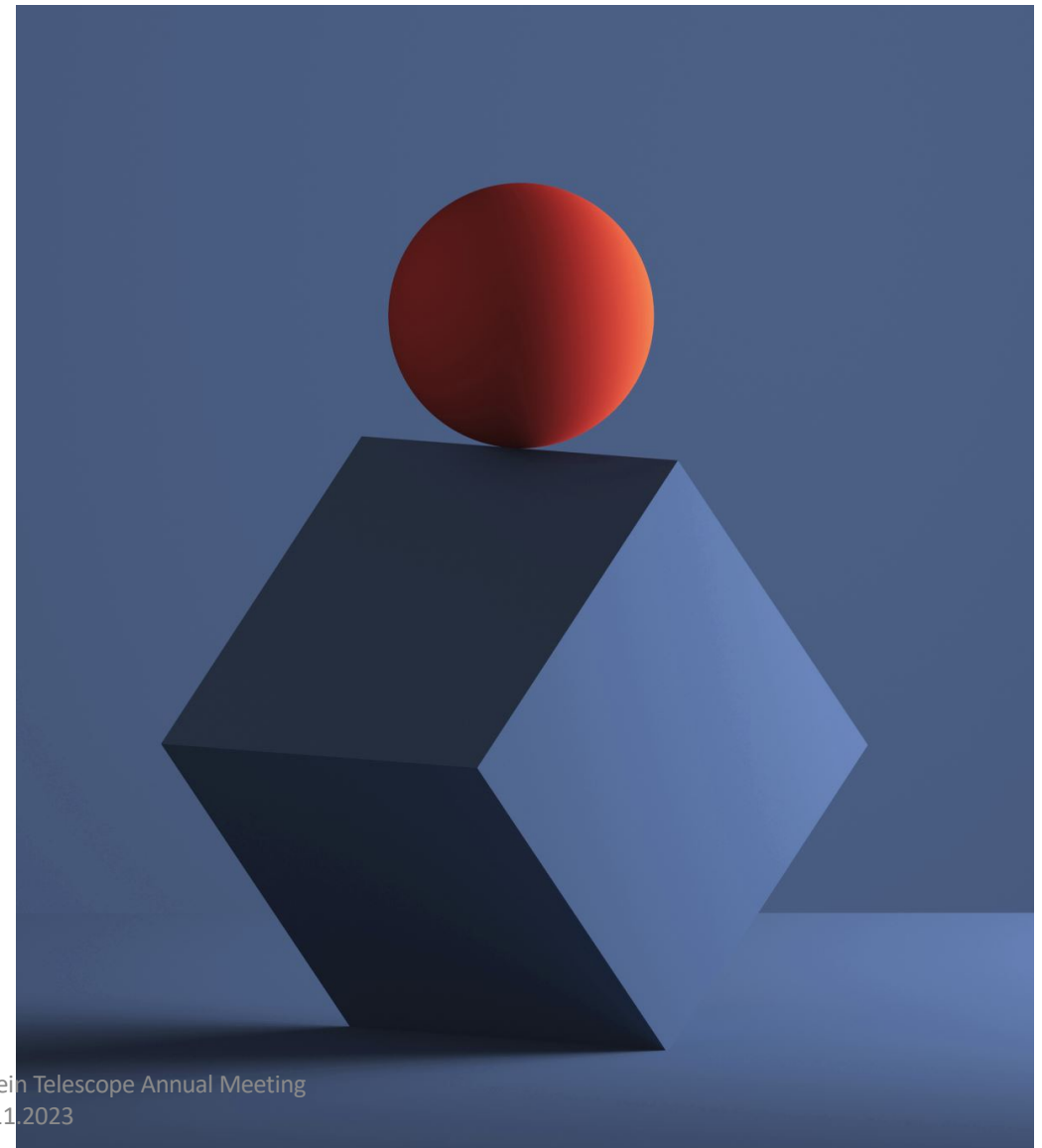
- source/effect
- requirements
- tolerance
- accuracy
- affected area and classification
- source/effect
- relevance
- priority



## How to contribute to the selection of geometry ?

Any geometry can be studied and realized from a civil engineering point of view (eventually optimized or modified to maintain the required performance)

- It is a matter of cost ?
- It is a matter of technical optimization ?
- It is a matter of scientific goals ?
- .....



## harmonize the activity of the local teams

- Assess **responsibilities** and align the activity along the ET roadmap (reference persons)
- Define a set of **common documents and reports** based on same quality parameters and level of detail to be prepared for the preliminary TDR.
- Promote a **collaborative framework** between local teams and SPB that oversee site quality investigations and include specific engineering objectives to support **optimization of construction solutions** (speed of excavation, counteractions for tunnel stability and noise reduction, underground water management, monitoring during operation, .....



# Identify and integrate additional topics

## geology and geophysics

- underground positioning
- Excavation approach
- .....

## structural dynamic modelling

- to assimilated noise models and identify the impacts on different part/element thresholds and define active or passive mitigation actions to be designed and located
- Design of monitoring system (SHM)
- System/material to mitigate mechanical vibrations in soft soils and hard rocks
- .....

## geodesy and gravimetry

- reference network
- local geoid refinement
- alignements, positioning
- .....

.....

