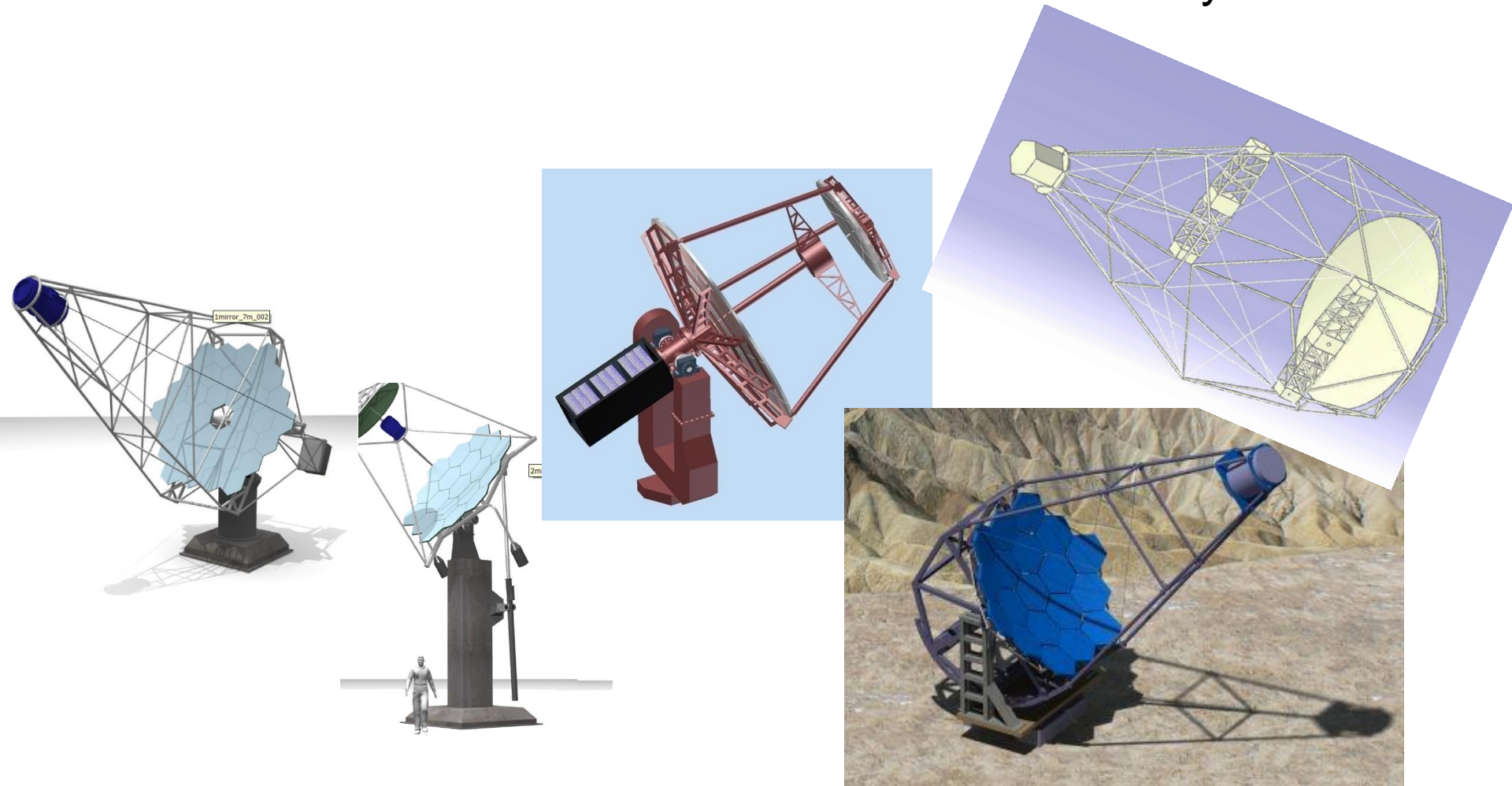


SST-STR activities

Giovanni Pareschi

INAF – Brera Astronomical Observatory



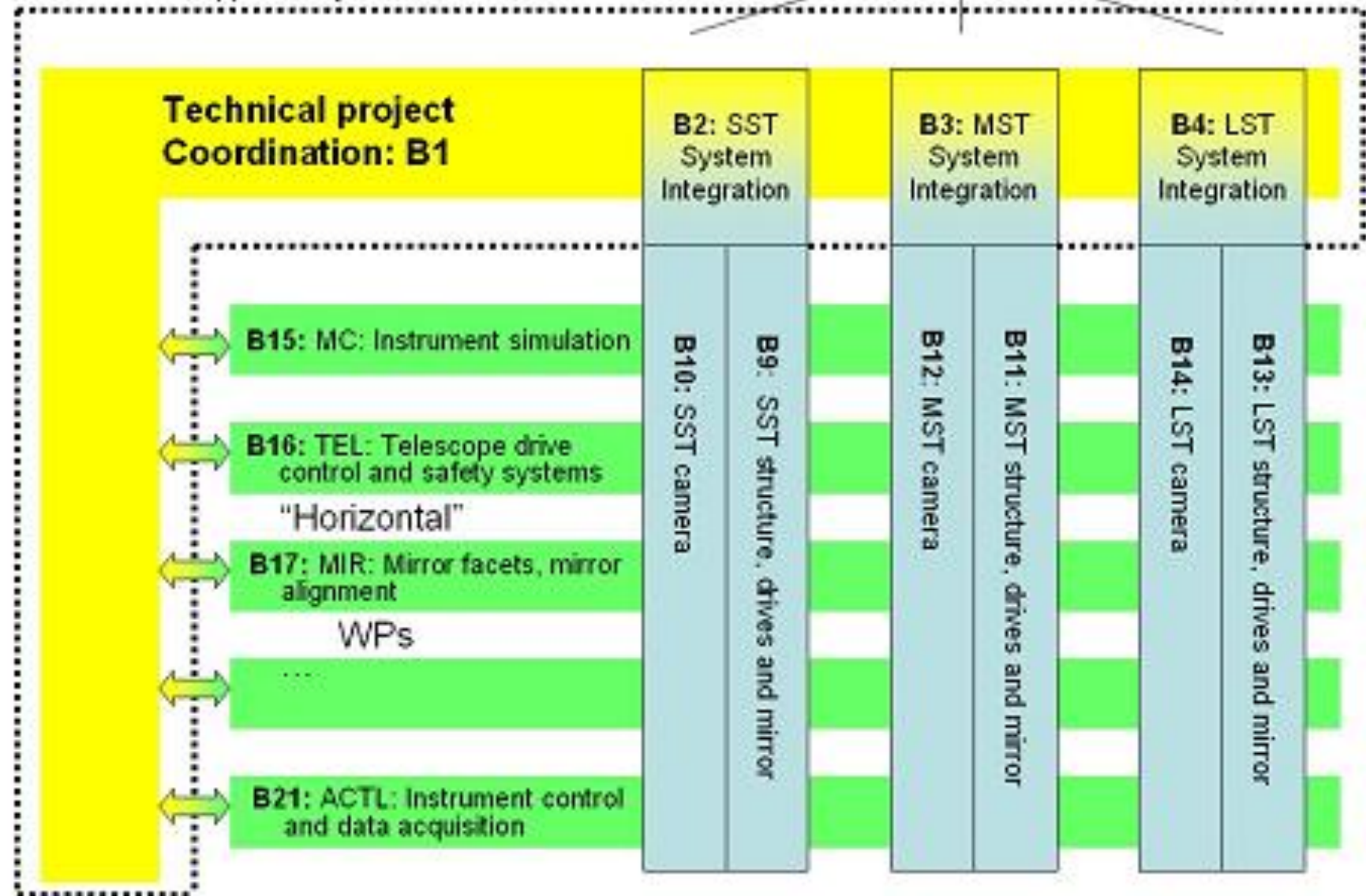
SST-STR WP

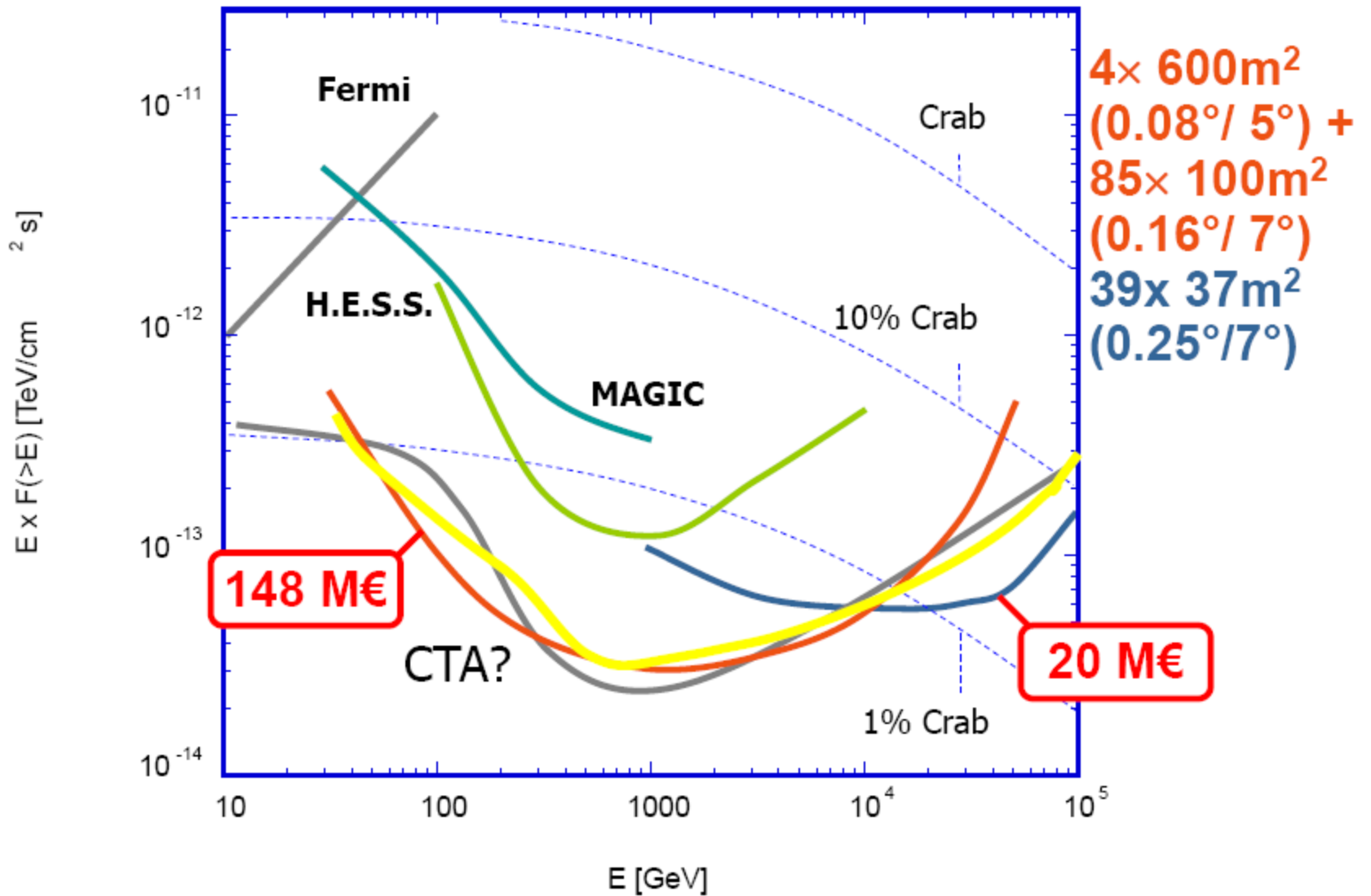
- Activities (together with the SST-CAM) supporting the SST-SYS WP
- SST-STR: “ Work package for which no support is requested” (from the CTA-PP proposal)
- However prototypes and tests to be done!



Supported by CTA-PP

"Vertical" WPs





From J. Hinton presentation

39 Optimisation e.g. 7m solution

For fixed area & array cost



- Need to give ROM (but reliable!) inputs for the simulation group
- Necessity to reduce the number of parameters to simplify the study



Iterate to find consistent solution

Two primary telescope options for the SST:

- **DC** - a single dish of diameter 7 m with Davies-Cotton optics and focal length 10 m; (about 30 units to be produced)
- **SC** - a two mirror system with primary mirror diameter close to 4 m and overall focal length of 2 m. (up to 100 units to be produced)

N.B.: The focal plane instrumentation is adapted to the different plate-scales in the two cases.

Target Price HE Array (“all included”): 25 Meuro

→ For D-C ~ 0.83 MEuro/telescope

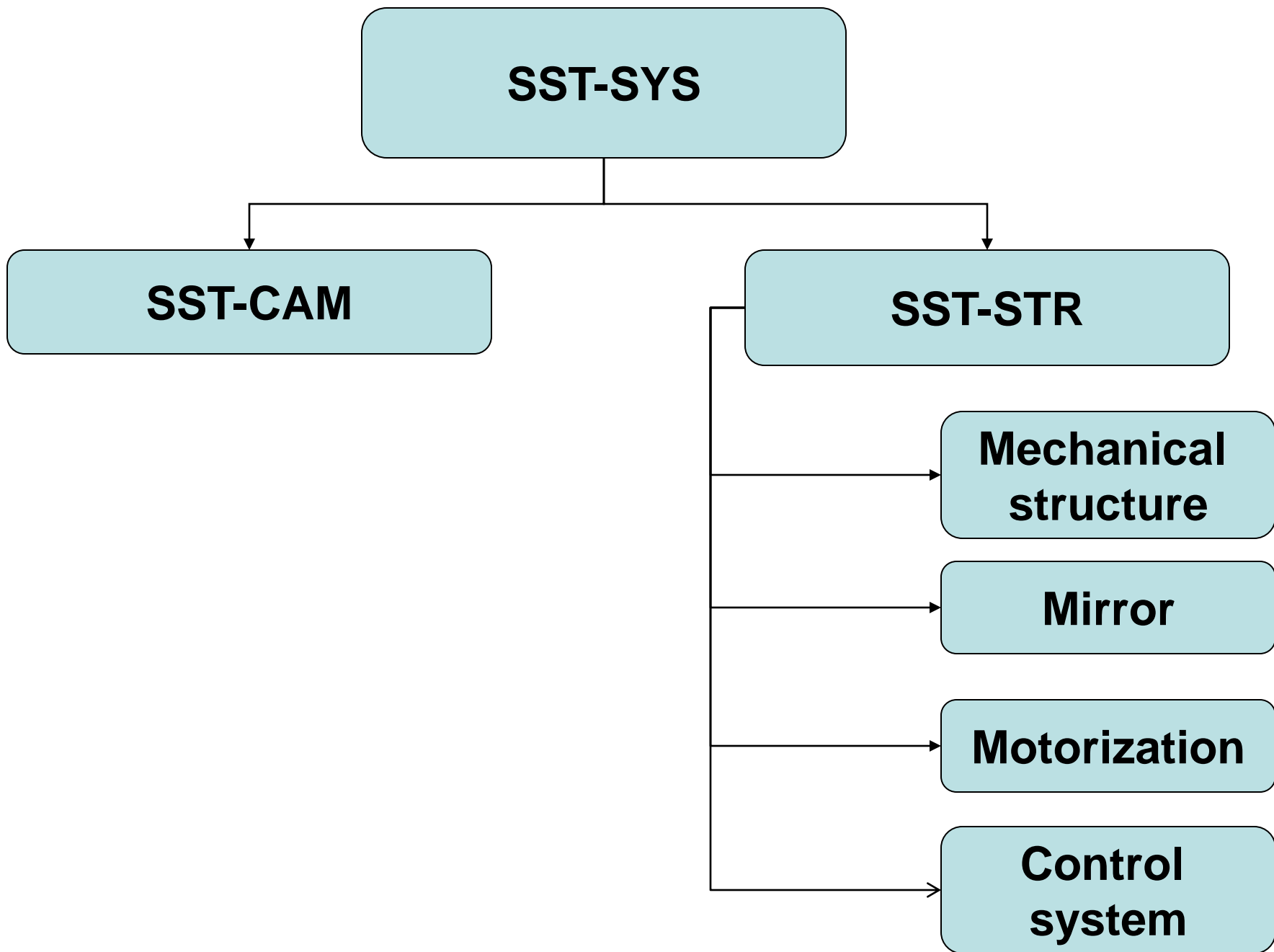
→ For S-C ~ 0.25 MEuro/telescope

SST-STR activities: general tasks (I)

- **Design and prototyping of the SST structure and optics**
- comprehensive study of the structure, mirrors, motorization and control system for the two options (DC and SC)
- → input to SSTR-SYS for the selection of one of the two options (jointly with WPs SST-CAM)
- and WP will be dedicated to the detailed engineering design of the telescope structure and optics for the preferred option.

SST-STR activities: general tasks (II)

- In case of an SC option, additional activity for
 - critical specific components, like the secondary mirror and its fixation.
This WP will deliver detailed implementation plans and the verification of prototypes of critical components and assemblies.
- In case a DC design will be chosen, in addition a prototype structure will be realized.



Deliverables

Del. No.	Deliverable	Deliver Date
B2.1	Baseline design document for the CTA small-size telescope (SST)	12
B2.2	Technical design document for the SST	23
B2.3	Report on component testing, verification and qualification for the SST	30
B2.4	Final design document for the SST	34
B2.5	Implementation plan for SST	34

Financial support to the SST-STR

- 300 KEuro (spread across the 3 FY) are available in the context of the WP8-IRD (industrial development)

N.B.: 60% funded by the European Contract; 40% funded by INAF)

- 100 KEuro: production (by diamond milling or other alternative figuring and polishing technique) of 6 masters/mould for LST, MMS, and SST
- 150 KEuro: pre-production by replication of 50 m² of mirrors and characterization (calibration and environmental tests) of the kind requested for LST, MMS, and SST (prototypes of mirrors for all three types of telescopes should be developed) via cold glass slumping or other similar replication technologies (e.g. Ni electroforming for the secondary mirrors of the SST if the).
- One contract for the design study, after the preliminary designs already done, of SST with an external company (50 KEuro)

Other funds

- Other matching funds will be made available for this activities by INAF (100 k/year)
- Other funds?
- Activities will be performed on “Best effort” basis by all the players in case of lack of dedicated funds

Mirrors

- D- C: → 1200 m² and about 1000/2000 facets to be produced (depending on the segment size)
 - Spherical profile/ hex shape facets usable (simplification of the mold production)
 - Radius much smaller than MST and LST → we are at the limit of the cold slumping possibility
- S-C. → 1200 m² and about 2000-4000 facets to be produced (depending on the segment size)
 - Aspherical design for both primary and secondary mirrors
 - Upgrade of the cold slumping technology needed
 - Probable need of a “petal” like configuration for facets
 - Better trade-off to be investigated for the segmentation issue

Main Players for Structure

- Poland (Institute of Nuclear Physics Polish Academy of Sciences) → D-C system
- Argentina: Univ. Nacional de la Plata (School of Eng.)
→ D-C system
- UK: Univ. of Durham, Liverpool and Leicester → SC system
- Italy: INAF (Brera) → D-C and SC systems

Main Players for the Mirrors

- Brera → mirror system study; development of the optics for both configurations based on glass slumped segments
- CEA → possible contribution for the D-C

The interaction with the WP MIR (not easy so far) should be consolidated for the definition of common aspects:

- metrology and testing
- alignment
- size and configuration of the facets (if possible)

INPUTS (IF ANY) NEEDED ASAP!

Short and mid term actions (I)

- Definition of a **Document of Top Level Requirements and references** for Structure, Mirrors, Motorization and Control of both telescope types (G. Pareschi, R. Canestrari → T. Greenshaw) - draft T0+ 1m; final version T0+2m (Oxford meeting)
 - N.B.: Preliminary size and configurations for mirror facets to be indicated
- Indication of a **reference person** for each group of players working on structures - T0 + 1 week
(proposed names: Greenshaw, Rovero, Canestrari, Ziolkowski)
- For each of the structures under study Preparation of a **Design Document** reporting on the design and analysis (including a preliminary feasibility study and cost evaluation)
(all reference persons – T0 + 4m)

Short and mid term actions (II)

- Delivery of the document on the “Preliminary evaluation of the mirror implementation problematic and proposed test plan” (reference designs for facets desirable)
(R. Canestrari - T0+3 m)
- T0+4: Definition of the Breadboards for the mirrors; starting of the activities
- General review of the preliminary studies; **merging and trade-off** (if possible) of the different design proposed for the DC and SC configurations respectively (in close collaboration with the SST-SYS chair).
(T0 + 5m)

Short and mid term actions (III)

- Start the refining and more detailed study of the two merged solutions (1 for DC and 1 for SC); definition of the sub-tasks for the players; (T0+5m);
- Delivery of the Final studies for the DC and SC structures (T0 + 10m)
- Delivery of the results on of the activitie related to the mirror breadboards (T0 + 10m)
- Trade-off between the two solutions (DC and SC) to be recommended (in close collaboration with SST-SYS and SST-CAM) (T0 + 11m)