2° Forum della Ricerca Sperimentale e Tecnologica

# CDF @INAF-OACN – The Concurrent Design Facility in Naples for the development of astronomical instrumentation

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## Introduction

Astronomical ground-based instrumentation has grown considerably in size, and thus in complexity. A concurrent engineering approach, with all teams of a project working together at the same time, can be an effective answer to these new challenges.

As part of the "STILES – Strengthening the Italian Leadership in ELT and SKA" proposal, a modern Concurrent Design Facility (CDF) will be developed in the Astronomical Observatory of Capodimonte, with the aim of innovating the way the design process is managed in INAF.

In order to do so, two main aspects need to be taken into account: the physical infrastructure and the methodology to be applied to ground-based instrumentation projects.

## Development of the facility

The Concurrent Design Facility in Naples will be born out of a historical building in the premises of the Capodimonte Observatory.

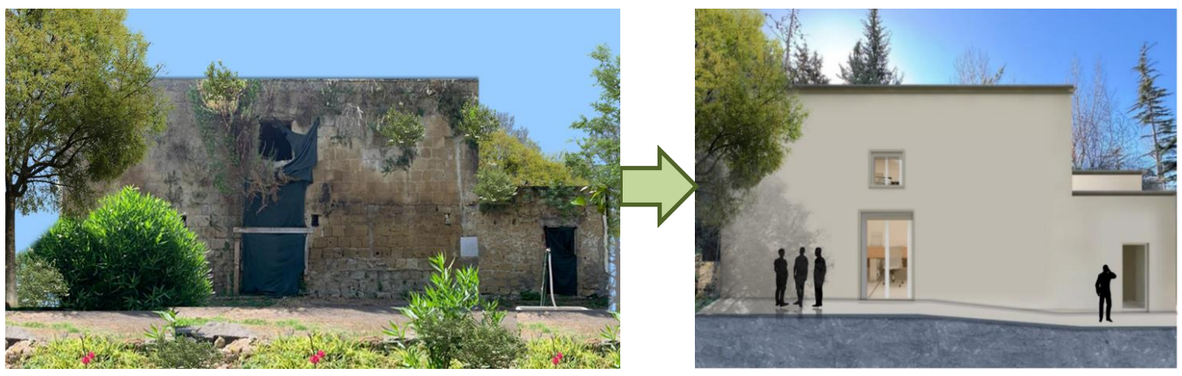

Figure 1. The historical building in Naples (above) and the concept of the CDF (below).

## Logistic constraints

The fact that the historical building cannot be changed in appearance means that the available space is a main driver for the design of the facility. Instead of a single CDF room, it will host two smaller rooms, both equipped with a videoconference system that can put them in communication with each other. Expanding on the modular approach concept, CDFs can be replicated in other Institutes in Italy to create a network of nodes, with the CDF in Naples being the primary node. The network of CDFs answers to the fact that it is not always easy to have all members of a project physically in the same place at the same time.

Figure 2. The two CDF rooms.

## Methodology constraints

A key point is the customization of the concurrent approach, that has already been successfully employed in other fields, to how an astronomical ground-based project works. The transition to concurrent engineering should be as smoothly executed for everyone involved as possible. The established workflow of the people working on specific aspects of the design should not be disrupted. In fact, the software tools used by each team will not be imposed by the facility. The heart of the model and the tracking of the interdependencies between work packages will be the COMET concurrent engineering tool, which will represent the only additional tool to be used by the various teams.

Figure 3. Workplace in one of the CDF rooms. Team members will connect their own laptops to their respective workstation.

Customization of COMET starts from the definition of the different roles and work packages of ground-based instrumentation, continuing with the creation of the quantitative and qualitative parameters that are usually exchanged between said work packages, with the aim to create an INAF library with pre-made models that can be used to first define the structure of a new project. Other tools that are already employed at system level, like Cameo, can model the system and interact with the concurrent engineering tool.

## Conclusions

The concurrent engineering approach can improve many aspects of the design process, in terms of time, costs, and quality of interactions. A laboratory for extended reality applications has also been developed as part of this project, to support the concurrent engineering sessions.

Figure 4. The CDF in virtual reality.

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