

Update on CTA+ (and CTAO) - Opportunities and challenges -

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CHERENKOV TELESCOPE ARRAY PLUS (CTA+)

Missione 4 (Istruzione e Ricerca) – Componente 2 (Dalla Ricerca all'Impresa)

Investimento 3.1 (Infrastrutture di Ricerca)

IR0000012, CUP: C53C22000430006

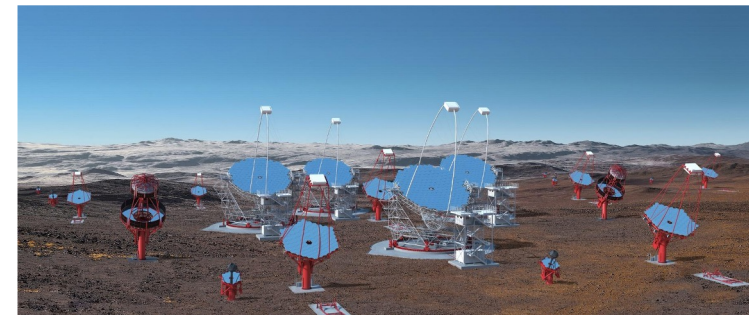
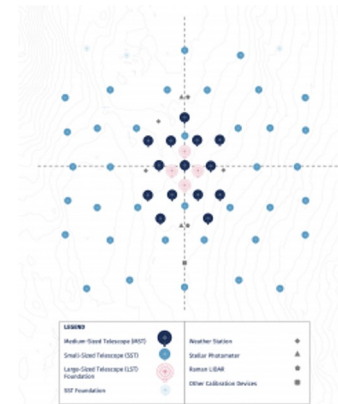
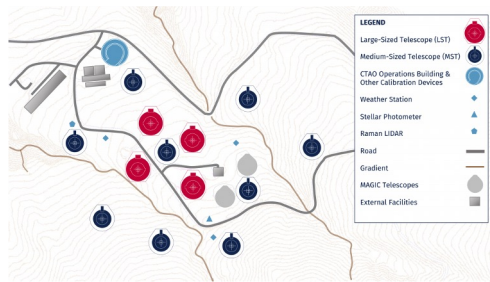


Outline

- Brief Update on CTAO
- Update on CTA+
- Opportunities & Challenges
- CTA+ SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats)

The CTAO Project:

- Money Matrix in May 2021 defined the project: CTA-N, CTA-S, HQs
- Italy contributes 60 M€ (out of ~310 M€), second only to DE (~80 M€)
- Layout baselined (Phase A):
 - CTAO-N (La Palma): 4 LSTs + 9 MSTs (NB: ASTRI MA in Tenerife with 9 "SSTs-like)
 - CTAO-S (Chile, Paranal): 14 MSTs + 37 SSTs

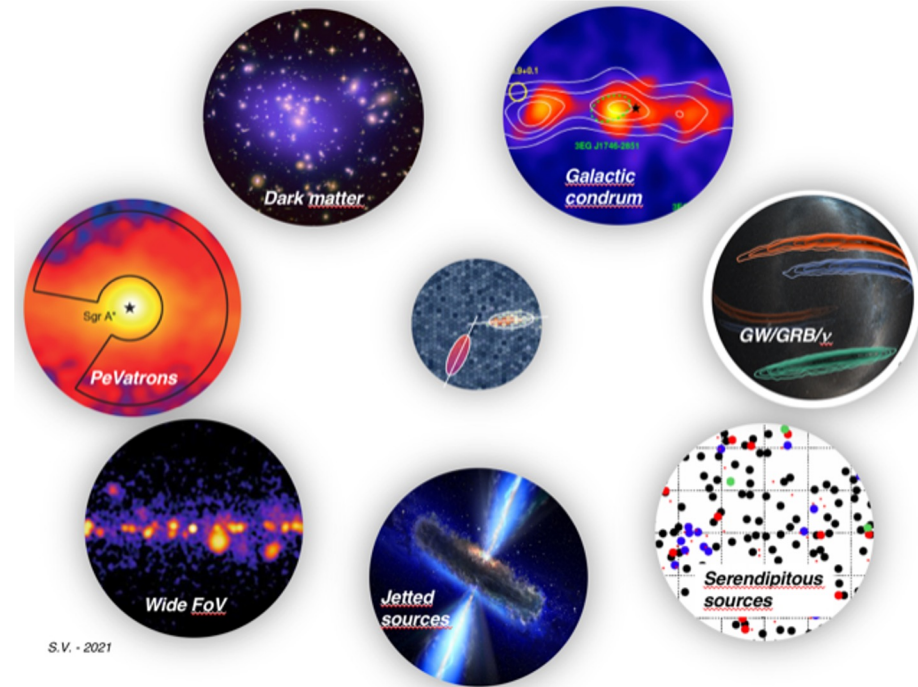
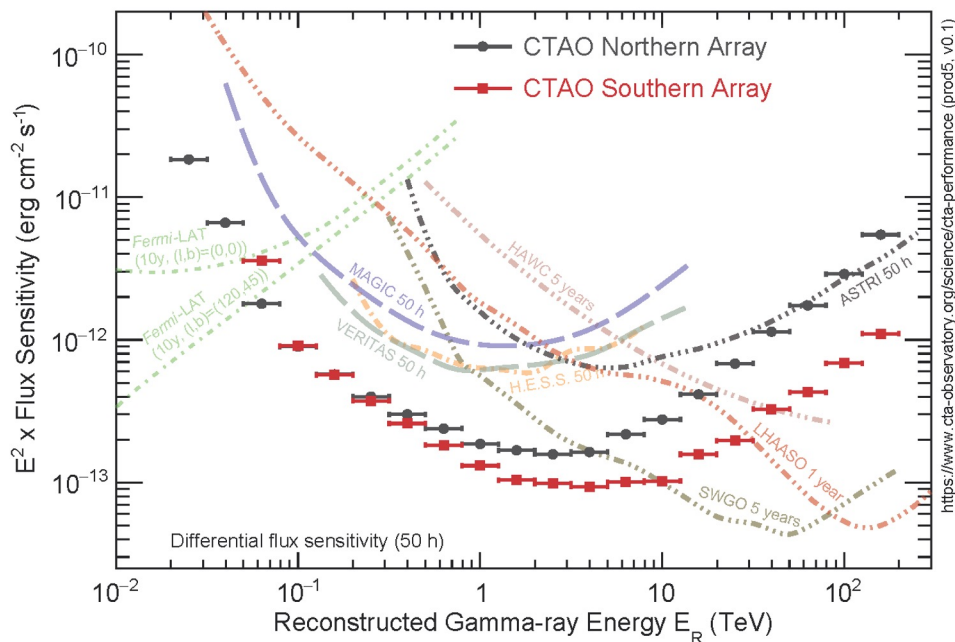




The CTAO Project:

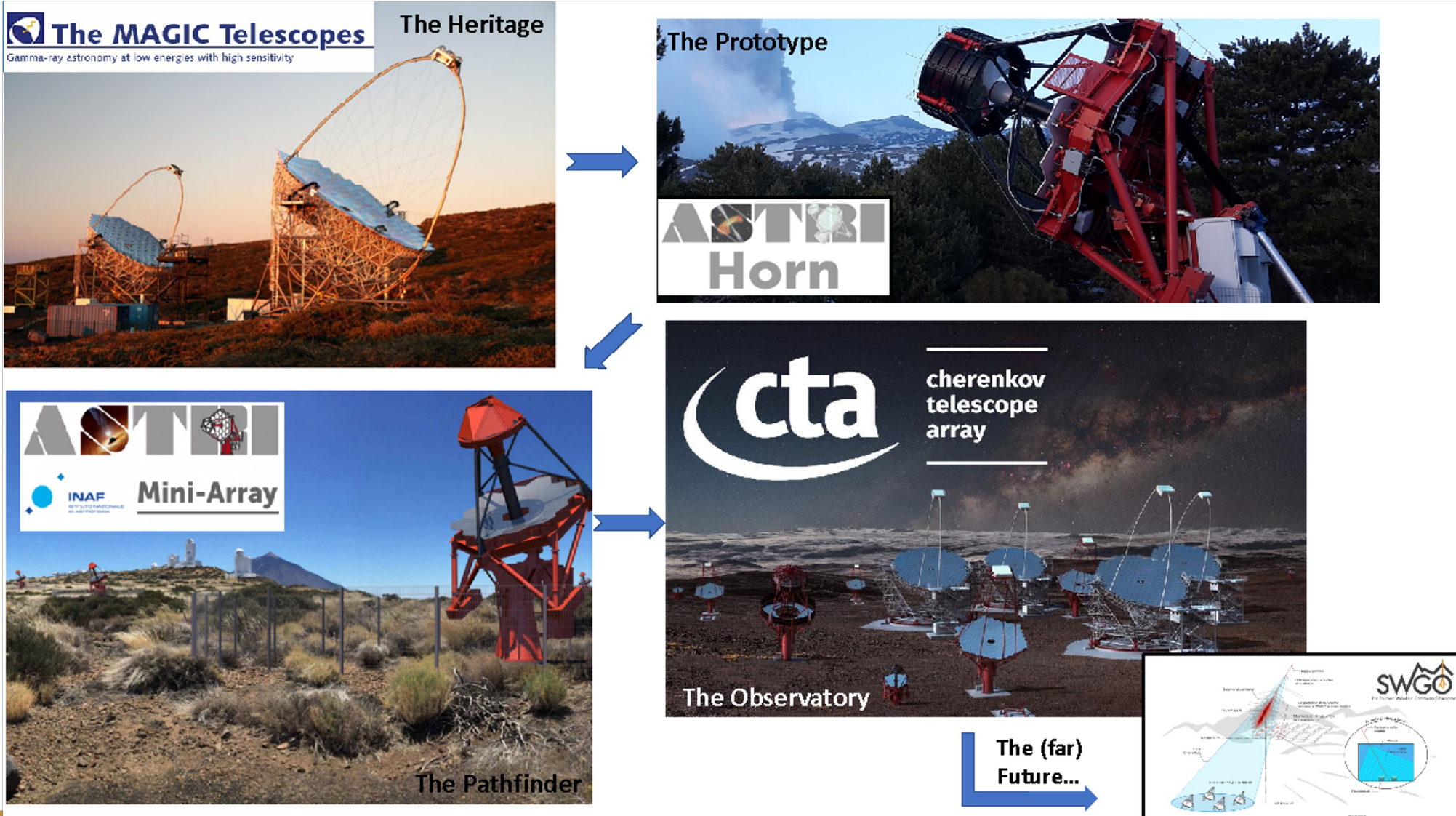
- Programmatics: Long-term framework: **Transition** from gGmbH to ERIC (from pre-construction to construction) was **“interrupted”** in July by the EC legal services. Intense negotiations to solve issue, may need revision into «IGO-equiv». TBC in few months. Some potential impacts on long-term commitments (to be clarified).
- The project: **Despite the above uncertainties, the project is moving forward, with: North: LST-1 already working, LST-2 to 4 within 2024, MST-N1-9 within '26-'27 (NB: ASTRI1-9 within '24); South: tender for the SSTs is out, tenders for 2 LSTs (mounts, mirrors and cameras) are almost out, MST-S1-14 Pathfinder on-going...**

The CTAO Project/Observatory: The first (open) Observatory in the TeV energy range



Will revolutionise the TeV science and community,
and expect the unexpected!

INAF "roadmap": From MAGIC (Heritage), to ASTRI-Horn (Prototype), to ASTRI-MA (pathfinder), to the CTAO (Observatory), plus CTA+!



The CTA+ ~~Project~~ Program:

- PNRR Proposal approved in Spring '22: **71.5M€ to months** (KO in 01/01/2023) 🤖🤖
- Main contribution is to enhance CTAO-S, opening transient science in CTAO South i.e.:
 - a) CTAO-S baseline + **2 LSTs** (major effort) 💪 (*PI: Anton...*)
 - b) CTAO-S baseline + **5 SSTs** (*PI: Tagliaferri*)
 - c) + **Multi- ν follow-up enhancements**:
 - i. VST polarimeter (*PI: Schipani*)
 - ii. TNG fast photometer (*eSIFAP, PI: Ambrosino*)
 - iii. Fast vlbi radio (*PI: Giroletti*)
 - iv. Stellar Intensity Interferometry (*for ASTRI; PI: Zampieri*)
 - d) + R&D new detectors for Cherenkov telescopes or complementary (e.g. SWGO)
 - e) + **science & outreach** in Italy and HQs (Resp.: Zanin)



Science Opportunities after CTA+:

- ✓ CTAO: Italy already among major contributors (second only to DE), providing the 37 (+5) SSTs and host of the HQs → **among main players with important access to KSPs time** (KSPs=GPS, EGS, Gal. Center, etc.)
- ✓ **With CTA+**, Italy (& INAF) becomes **the** major contributor of CTAO
- ✓ CTA+: LSTs mean 10s-100s GeV i.e. allow the **“gamma-ray transients” window**. Access already granted for the North (LST Science Team soon to be defined), in 2-3 years also for CTAO-S. Also multi-ni facilities will open new windows for follow-ups.
- ✓ CTA+ Science program started already **9 PhD courses + about 15 TDs (6 of which scientific) + support to school, conference, and travels**
- ✓ **NB:** ASTRI MA is synergic, and pathfinder, to CTAO and CTA+ contributions!

Programmatic opportunities

- **At CTAO level:**
 - **Synergies** (tech and science) with **ASTRI-MA**, and **MAGIC**
 - **CTAO HQs @ Bo**, INAF-OAS premises
 - ERIC framework (tbc) would guaranty long-term support for operations from MUR
- **At PNRR/CTA+ level:**
 - LSTs, SSTs+, and multi-ni **open new window in South site**, strengthen position/leadership of INAF researchers
- **At INAF-level:**
 - Opportunity to hire new expert personnel, focus mainly on **procurement & production** (key for future dev. of INAF)
 - Strong opportunity to organize management (standardise: procurement, hiring, accounting, budget)

Criticalities

- **At CTAO level:**
 - gGmbH to ERIC transition interrupted
 - Impact on long-term comitments, including loss of VAT-exemption (for IKCs)
 - Impact on start of tender for South-site Infrastructures
- **At PNRR/CTA+ level:**
 - Uncertainties on PNRR program duration
 - Extremely tight schedule
- **At INAF-level:**
 - Administrative strong burden @ MM and structures involved
 - Programmatic (costs, schedule, accounting) risks need to be covered/backed by INAF
 - PNRR Program Office strongly needed!



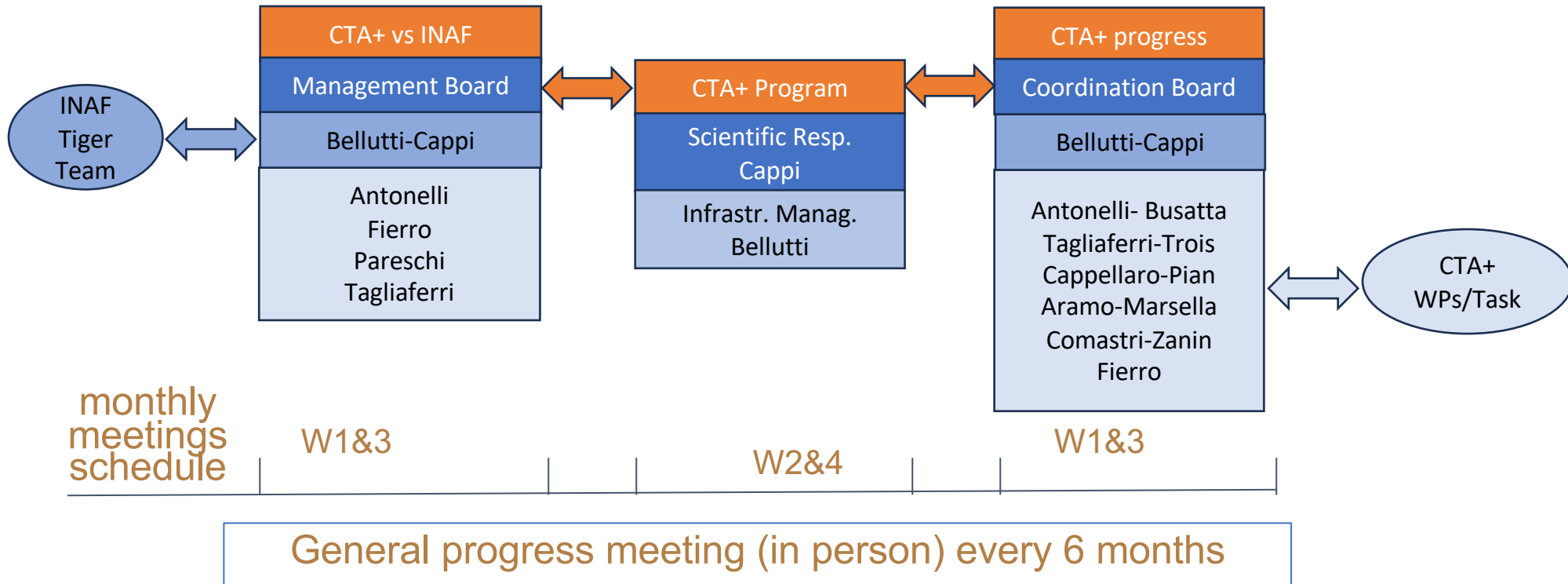
The CTA+ Program WBS

Nodes		Workpackages		Tasks	Nodes		Workpackages		Tasks
1100	Program Office				1400	Optical/radio follow-ups			
		1110	Program Management	1			1410	Coordination Office	1
		1120	Financial Management	1			1420	VST Polarimeter	3
		1130	PA/Safety	1			1430	TNG O/NIR Fast Photometer	1
		1140	Procurement	1			1440	RadioFast VLBI	1
1200	LSTs South						1450	Intensity Interf. for SSTs	2
		1210	Project Office	8	1500	R&D (CTA Tech. Enhancement)			
		1220	Mechanical Structures & Auxiliary	2			1510	Coordination Office	1
		1230	Mirrors and Actuators	2			1520	Water Cherenkov + RPC	5
		1240	Camera and Raw Processing	1			1530	SiPM R&D	6
		1250	Auxiliary & Computing	5	1600	Science			
		1260	AIT/V	5			1610	Science	17
1300	SSTs+						1620	Outreach & Communication	9
		1310	Project Office	8			1630	CTAO HQs	1
		1320	Mechanical Structures	2					
		1330	Mirrors	2					
		1340	s/w	2					
		1350	Cameras	1					
		1360	SYS AIT/V	4					

6 Nodes
27 WPs
93 Tasks
114 Deliverables

CTA+: a diffuse management approach (delegation of activities, not responsibilities)

to involve all the working team (to foster the team spirit) and
to ensure a timely control of the program status



CTA+: Hiring Program Status (INAF)

planned: **33**

hired @June 2023: **9**

hired @Dec 2023: **+9**

new call out @Dec 2023: **15**

N.B:

- ✓ Program/Research Manager: Hired in March '23 (Major EU/MUR Milestone: **successful**)
- ✓ Hiring of 2 Experts for Support to Management (currently Tiger Team Members)
- ✓ Overall strong support to the INAF PNRR Program Office Management structure

Situazione TD al 30 Giugno 2023						
WP-task	Titolo Attività	centro di costo	30 giugno 2023	incorso	da bandire	a budget
INAF						
1100-1	CTA+ Program Management	INAF-HQ	1,0	0,0		1,00
1100-2	CTA+ Financial Management	INAF-HQ	0,0	1,0		1,00
1100-4	CTA+ Auditing&Procurement	INAF-HQ	0,0	1,0		1,00
1100-4	CTA+ supporto rendicontazione	INAF-HQ	0,0	0,0	1,00	1,00
1210-3	LST-South AIT/V - PA/QA/Safety Management	INAF-IAPS	0,0	0,0	1,00	1,00
1260-1	LST-South Management	INAF-IAPS	0,0	0,0	1,00	1,00
1520-2	RPC analysis and simulation	INAF-IAPS	1,0	0,0		1,00
1310-3	SST+ PA/QA/Safety Management	INAF-IASFM	0,0	0,0	0,60	0,60
1440-1	Follow-ups RadioFast VLBI	INAF-IRA	0,0	0,0	1,00	1,00
1230-1	LST-South OPT Subsystem Management	INAF-OAB	0,0	1,0		1,00
1310-4	SST+ Simulation & Analysis	INAF-OAB	0,0	0,0	0,40	0,40
1310-5	SST+ Optical Engineering	INAF-OAB	0,0	0,3		0,30
1330-1	SST+ Opt Subsystem management	INAF-OAB	0,0	0,7		0,70
1340-1	SST+ Software Subsystem Management	INAF-OAB	0,0	0,0	0,50	0,50
1340-2	SST+ Software Subsystem development	INAF-OAB	0,0	0,0	0,50	0,50
1350-1	SST+ Software Subsystem Management	INAF-OAB	0,0	0,5		0,50
1310-2	SST+ System Engineering	INAF-OAC	0,0	0,5		0,50
1420-3	VST Polarimeter: AIV	INAF-OAB	0,0	1,0		1,00
1610-11	Support to CTAO Project Science Management	INAF-OAB	0,4	0,0		0,40
1610-15	Preparing CTAO surveys	INAF-OAB	0,6	0,0		0,60
1420-2	VST Polarimeter: Development	INAF-OACN	0,0	1,0		1,00
1360-1	SST+ AIT/V Management	INAF-OACT	0,0	0,0	1,00	1,00
1450-1	SST Inten. Interf. Instrument	INAF-OAPD	1,0	0,0		1,00
1450-1	SST Inten. Interf. Instrument	INAF-OAPD	0,0	0,0	1,00	1,00
1210-1	LST-South Project Management	INAF-OAR	1,0	0,0		1,00
1210-2	LST-South System Engineering	INAF-OAR	1,0	0,0		1,00
1210-4	LST-South Simulation & Analysis	INAF-OAR	1,0	0,0	0,00	1,00
1210-5	LST-South Optical Engineering	INAF-OAR	0,0	0,0	1,00	1,00
1210-8	LST-South Mechanical & Thermal Engineering	INAF-OAR	0,0	0,0	1,00	1,00
1220-1	LST-South M&S Subsystem Management	INAF-OAR	0,0	0,0	1,00	1,00
1250-1	Auxiliary Subsystem Mng & Int	INAF-OAR	0,0	0,0	1,00	1,00
1250-1	Auxiliary Subsystem/calibration camera box	INAF-OAR	0,0	1,0		1,00
1260-5	Verification Manager	INAF-OAR	0,0	0,0	1,00	1,00
1210-7	LST-South Software Engineering	INAF-OAS	0,0	0,0	1,00	1,00
1250-4	LST Software Development	INAF-OAS	0,0	0,0	1,00	1,00
1410-1	Coordination Office: Science & Management	INAF-OAS	1,0	0,0		1,00
1610-10	Support to CTAO Project Science Management	INAF-OAS	0,4	0,0		0,40
1610-14	Preparing CTAO surveys	INAF-OAS	0,6	0,0		0,60
1620-3	Multimedia material	INAF-OAS	0,0	1,0		1,00
Totals			9	9	15	33,00

Hired
Hiring in progress
planned (2024)

Pierluigi Bellutti
13.11.2023
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GMT+01:00

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MASSIMO CAPPI
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CTA+: Investment Program Status (INAF)

N° of procurements larger than 5 k€ (INAF only)

planned: **45** (37 M€ + IVA)

closed: **10** (0.75 M€)

Started before 31/12/23: **27** (35.1 M€) ←

to start/end after 01/01/2024: **8** (1 M€)

SSTs: 3.6 + 15 (out in Oct.)
LSTs mount: 25 (out in Nov.)
Optics SSTs+LSTs: 3.8 (out in Nov.)
Cameras (INFN): 10 (out in June)

Updated analysis (nov. 2023): impacts and solutions from external factors

Threats	Solutions found (NB: All implied significant delays)
The impossibility (in the PNRR) of hiring new administratives to support the program (despite huge budget increase)	INAF own ad-hoc fund to hire 54 administrative persons in 17 structures/institutes
Extreme difficulty to identify RUPs for big tenders	PI should be RUPs, but with legal and economic support (new INAF regulation for «indennizzi»)
The change of «codice degli appalti» (in July 2023!)	Learn/study the new «codice degli appalti»
The change of the call for TD (in July 2023!)	Agreement on transition period (from Pica to InPa)
The limited availability of candidates to be hired (due to large request)	Very intensive scouting
A non friendly reporting portal (not well tested)	External contract for technical support (own local copy of portal)
Specificity of PNRR: Tenders, hiring, accounting	INAF PNRR Program Office established for the standardization of documents and procedures

Updated analysis (nov. 2023): impacts and solutions from internal factors

Weakness	Threats	Solution
<p>Personnel: the lack of activities prioritization (the PNRR time and project complexity strictly require a «total» dedication)</p>	<p>Program: slowed down People: demotivation</p>	<p>Prioritization: CTA+ as first duty People: a clear committment for recognition needed</p>
<p>Context: the history of an institution still based on the concept of «sum» instead of «integrated» operative centers</p>	<p>Processes inefficiencies (blocking conflicts)</p>	<p>Strengthen HQ staff , duties optimizations, e.g. via ad-hoc PNRR Program Office</p>
<p>Program complexity vs deadline Supply chain: international situation ERIC start uncertainty</p>	<p>Time: non extendable deadlines Partial target achievements</p>	<p>Time: negotiate 12 months of extention (at least) Other back-up funds (post pnrr)</p>
	<p>INAF: changes in all the top management</p>	



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Thank you very much for your time and attention



<h1>S</h1> <h2>STRENGTHS</h2>	<h1>W</h1> <h2>WEAKNESSES</h2>	<h1>O</h1> <h2>OPPORTUNITIES</h2>	<h1>T</h1> <h2>THREATS</h2>
<ul style="list-style-type: none">• Things your company does well• Qualities that separate you from your competitors• Internal resources such as skilled, knowledgeable staff• Tangible assets such as intellectual property, capital, proprietary technologies etc.	<ul style="list-style-type: none">• Things your company lacks• Things your competitors do better than you• Resource limitations• Unclear unique selling proposition	<ul style="list-style-type: none">• Underserved markets for specific products• Few competitors in your area• Emerging need for your products or services• Press/media coverage of your company	<ul style="list-style-type: none">• Emerging competitors• Changing regulatory environment• Negative press/media coverage• Changing customer attitudes toward your company <p>WordStream</p>