INFRA-DEV Horizon Preparatory Phase for ET

M. Martínez

ICREA IFAE BIST

EGO EUROPEAN GRAVITATIONAL OBSERVATORY

ET annual meeting

EGO, 15th Nov 2022

ET EINSTEIN TELESCOPE

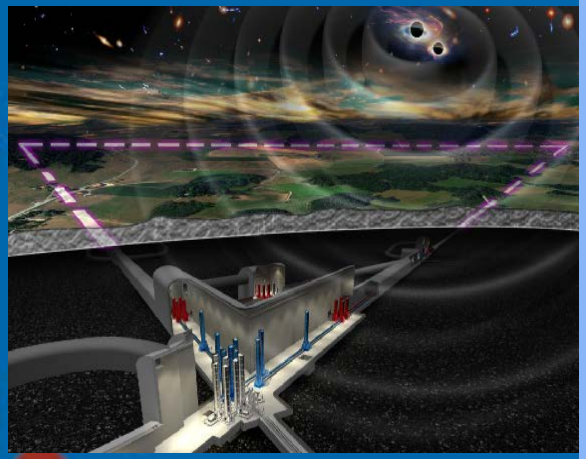
European Strategy Forum on Research Infrastructures

ET on the ESFRI roadmap

ET EINSTEIN TELESCOPE

ESFRI ROADMAP 2021

https://www.et-gw.eu/



Project submitted by:

- **Italy** (Lead Country)
- Netherlands
- Belgium
- Spain
- Poland

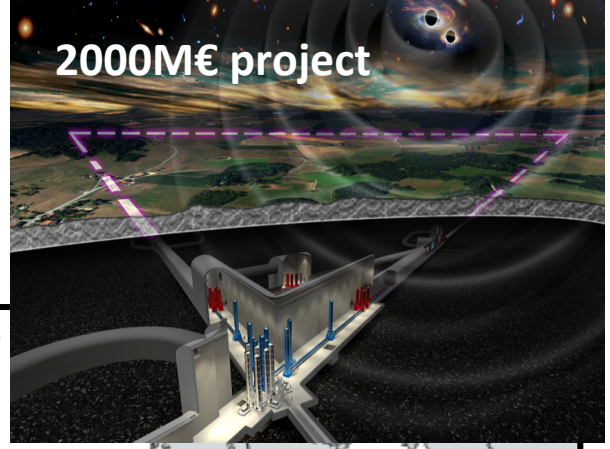
30/06/2021:

ET is on the ESFRI roadmap!

ET Consortium

- ET CA signed by 41 institutions
- INFN and Nikhef are the coordinators of the consortium
- Funding expected in the next months by the governments in the frontline
- EU funding for the Preparatory Phase in 2022

Einstein Telescope as ESFRI



European Commission | Funding & tender opportunities
Single Electronic Data Interchange Area (SEDIA)

SEARCH FUNDING & TENDERS | HOW TO PARTICIPATE | PROJECTS & R

Preparatory phase of new ESFRI research infra

Goals for ET Preparatory Phase

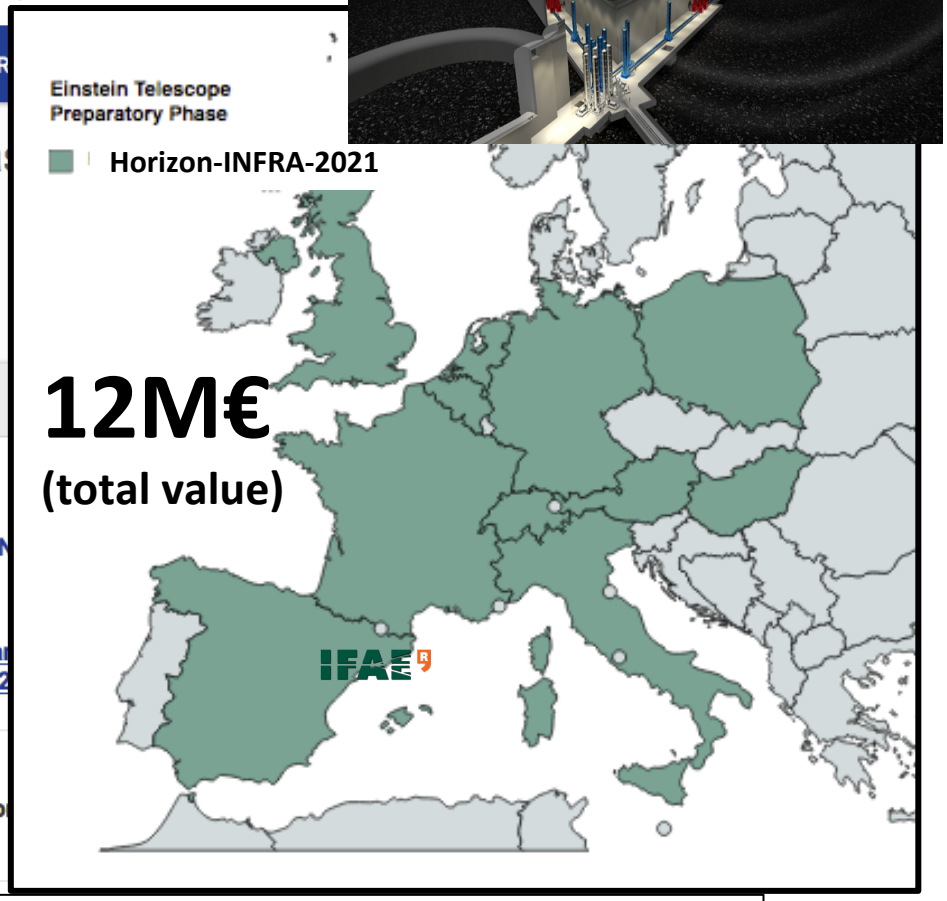
- Governance
- Financial architecture/plan/framework
- ET legal entity
- Final ET design and cost evaluation
- Site or sites selection
- Construction funding
- User services
- Computing model
- Sustainability

3.45M€
(approved)

Topic related FAQ

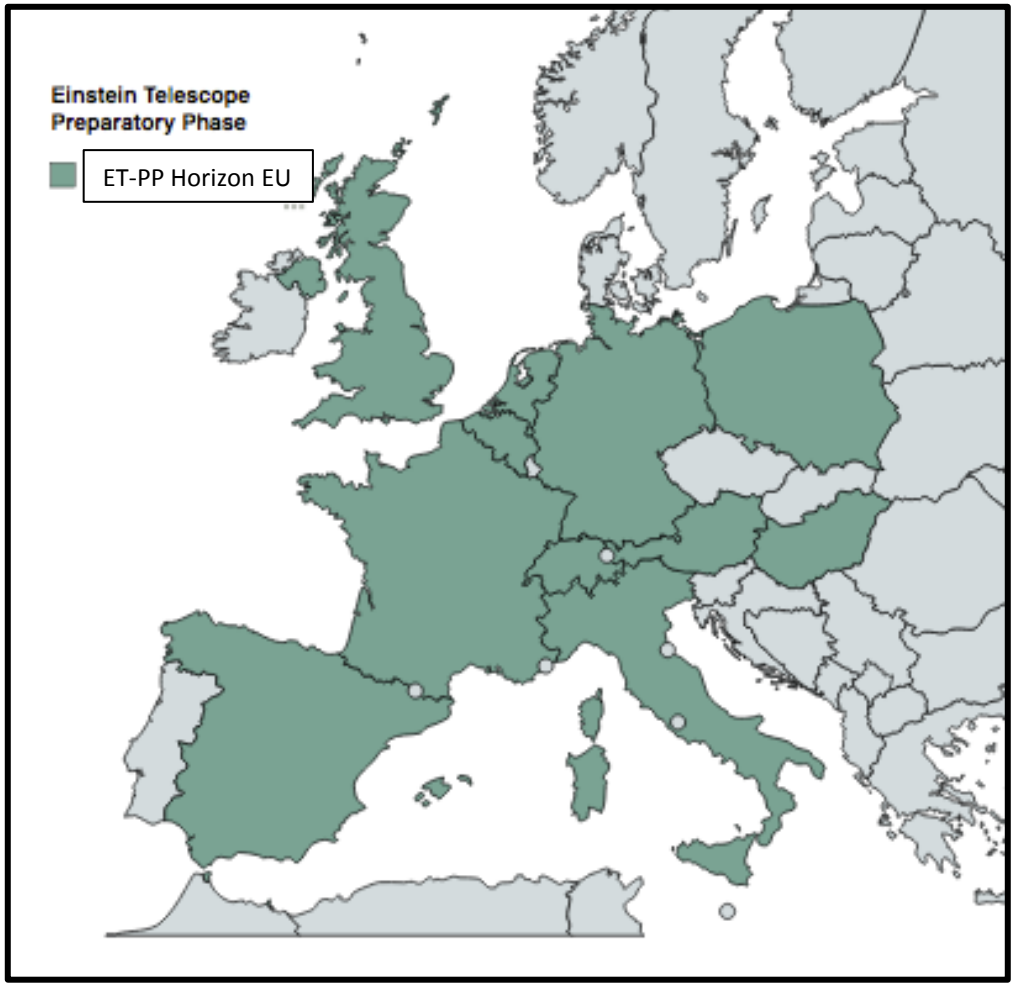
HORIZON-CSA HORIZON Coordination and Suppo

Get support



Einstein Telescope Preparatory Phase (ET-PP) in 2022 – 2026
HORIZON-INFRA-DEV EU Project coordinated by IFAE
→ Project started 1st September 2022 (https://etpp.ifae.es)

List of Partners & Third Parties



COUNTRY	Partners
AUSTRIA	U. LEOBEN
BELGIUM	U. ANTWERPEN
BELGIUM	U. LOUVAIN
EGO	EGO
FRANCE	CNRS
GERMANY	DESY
HUNGARY	WIGNER RCP
ITALY	INFN
THE NETHERLANDS	NIKHEF
POLAND	U. WARSAW
SPAIN	IFAE BSC-CNS (affiliated)
SWITZERLAND (associated partner)	U. GENEVA
UK	UKRI CARDIFF (affiliated) GLASGOW (affiliated)

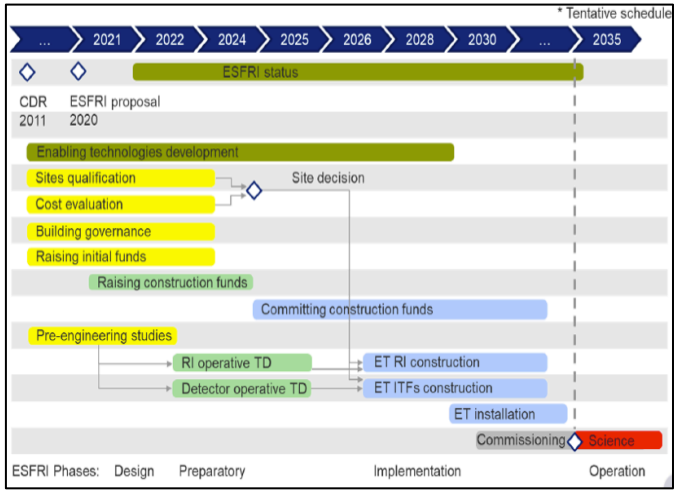
COUNTRY	Third parties
GERMANY	RWTH (Aachen), AEI (MPI), LUH (Hannover)
THE NETHERLANDS	VU (AMSTERDAM), UM (MAASTRICHT)
SPAIN	ICCUB (Barcelona), UV (Valencia), UIB (Mallorca) CDTI (Madrid)

(as submitted to Brussels)

ET INFRA-DEV mission

- A project of **3.45M€** with 4 years duration
- ET collaboration considers this is the most adequate time scale
  - **We aim for a site selection by 2025**

- The INFRA-DEV funding will be strategically used to (objectives)
  - Define the Governance and Financial Framework
  - ET legal entity
  - Revisited ET design and Cost Evaluation
  - **Geographic Enlargement of the ET consortium**
  - Define a strong Project Office
  - Pave the path towards a timely site decision
  - Environmental and sustainability aspects
  - Increase the social awareness on the project
  - Computing model and user services

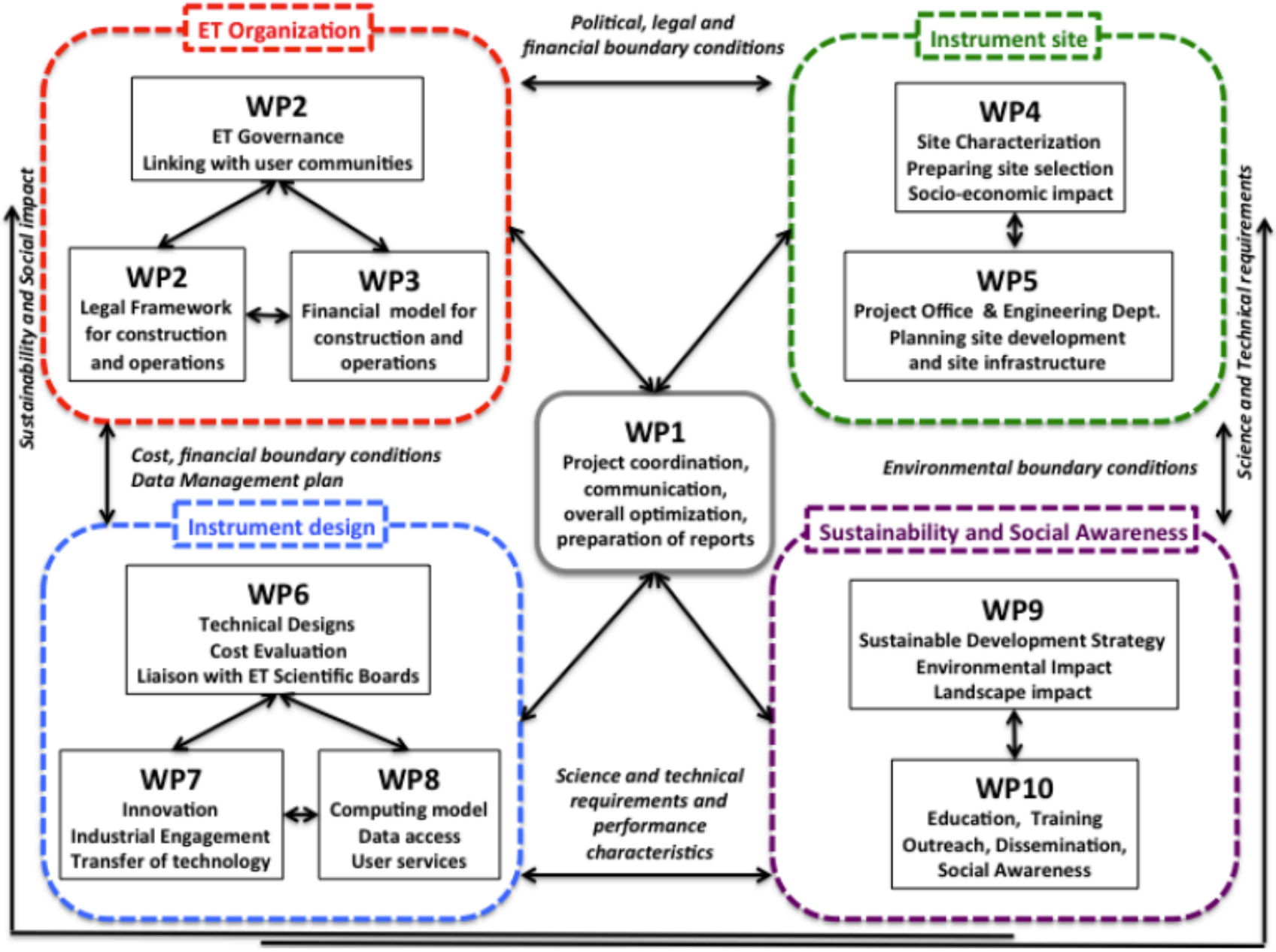


- **Most of the work on refined TDRs for the RI in the following 4 years will rely on existing resources in the collaboration but also bringing new very special expertise on different aspects**

Work Packages (WPs)

- WP1 Coordination and Management
- WP2 Organization, Governance and Legal Aspects
- WP3 Financial Architecture
- WP4 Site Preparation
- WP5 Project Office / Engineering Dept.
- WP6 Technical Design
- WP7 Transfer of Technology
- WP8 Computing and Data Access
- WP9 Sustainable Development Strategy
- WP10 Education, Outreach and Citizen Engagement

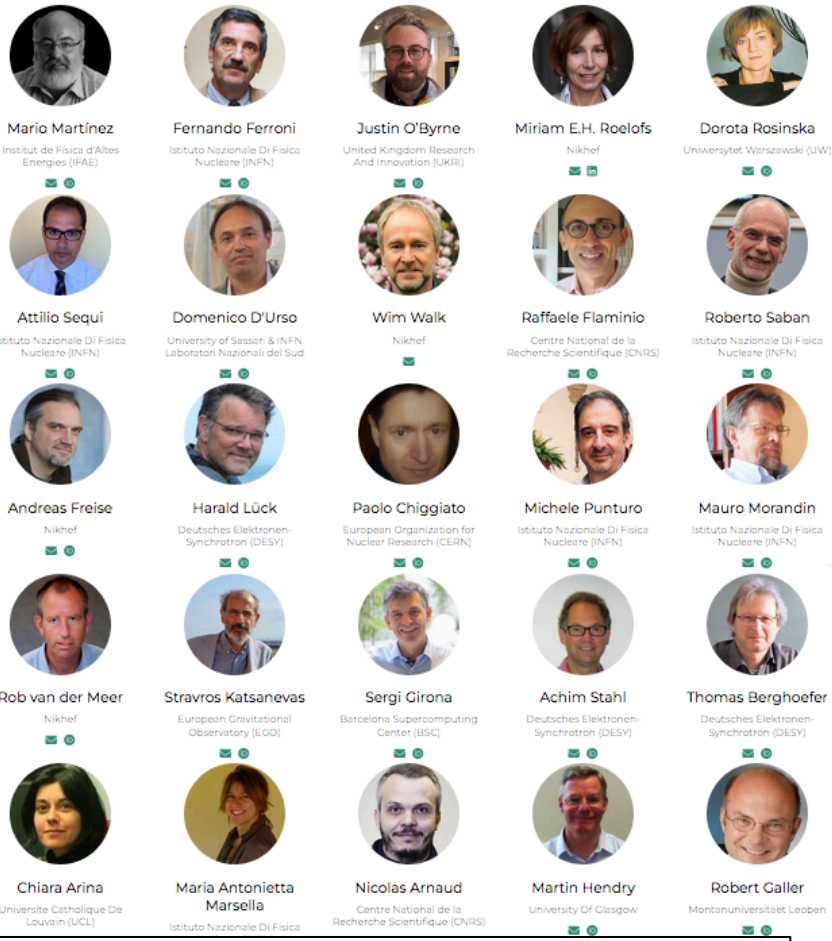
WPs were defined to cover the main INFRA-DEV missions and to address explicitly ESFRI recommendations


ET Organization
WP2
ET Governance
Linking with user communities
WP2
Legal Framework
for construction
and operations
WP3
Financial model for
construction and
operations
Political, legal and
financial boundary conditions
Instrument site
WP4
Site Characterization
Preparing site selection
Socio-economic impact
WP5
Project Office & Engineering Dept.
Planning site development
and site infrastructure
Sustainability and Social impact
Science and Technical requirements
Cost, financial boundary conditions
Data Management plan
WP1
Project coordination,
communication,
overall optimization,
preparation of reports
Environmental boundary conditions
Instrument design
Sustainability and Social Awareness
WP6
Technical Designs
Cost Evaluation
Liaison with ET Scientific Boards
WP9
Sustainable Development Strategy
Environmental Impact
Landscape impact
WP7
Innovation
Industrial Engagement
Transfer of technology
WP8
Computing model
Data access
User services
Science and technical
requirements and
performance
characteristics
WP10
Education, Training
Outreach, Dissemination,
Social Awareness

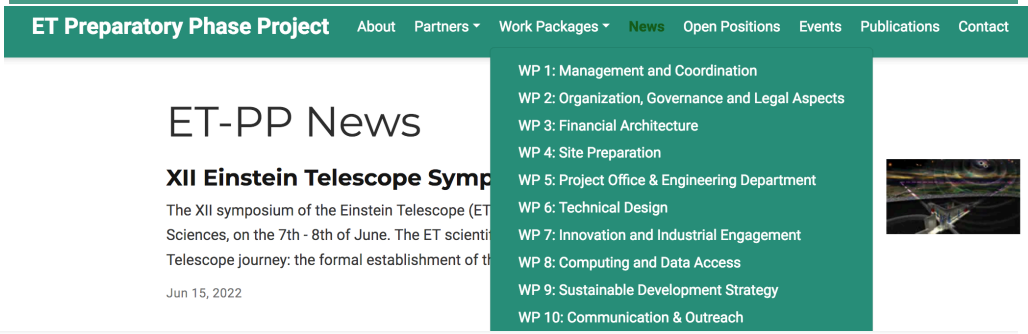
ET-PP web online

https://etpp.ifae.es

ET-PP Work Package Leaders



Will be portal for all the ET-PP information



WP 5: Project Office and Engineering Department

Work package led by CNRS

Objectives

WP5 - Project Office and Engineering Department [led by CNRS]- has the mission to establish the ET RI Project Office and the corresponding Engineering Department. The role of this WP is to set-up a project management environment for the ET construction project.

This environment will be supported by consultative and executive bodies equipped with means to monitor, control, coordinate and report on the technical design, the engineering, the technical specifications, the risks, the budget and the schedule.

These activities are project-wide and make use of methodologies and tools which are the same across the whole of the ET construction project.

R. Flaminio (CNRS), **A. Freise (NIKHEF)**, and **R. Saban (INFN)** act as co-coordinators of WP5 in this proposal.

Deliverables

- D5.1 Structure and the mandate of the Project Office. (M25)
- D5.2 Functionalities required from the tools in support of the project management. (M25)

WP missions (1/5)

- **WP1 Coordination and Managemen**
  1. Management
  2. Coordination
- **WP2 Organization, Governance and Legal Aspects**
  1. ET Internal Organization
  2. Legal Framework
  3. Enlargement of the ET Consortium
  4. Political convergence
  5. Connection to other observatories and communities
  6. RI layout, Strategic issues and international networking
- **WP3 Financial Architecture**
  1. Cost evaluation
  2. Cost Sharing
  3. In-kind Contributions

Mario Martínez
Institut de Física d'Altes Energies (IFAE)

Deliverables

- D1.1 Dissemination & Exploitation (D&E) Plan (M6)
- D1.2 Data Management (D&M) Plan (M6)

Fernando Ferroni
Istituto Nazionale Di Fisica Nucleare (INFN)

Justin O'Byrne
United Kingdom Research And Innovation (UKRI)

Miriam E.H. Roelofs
Nikhef

Deliverables

- D2.1 Report providing options for legal entity (M11);
- D2.2 Minutes of meetings with EC and involved ministries (M11);
- D2.3 Legal entity statutes (M36);
- D2.4 Roadmap to establish the legal entity and its implementation ready for approval by (proto Council) and/or Ministries (M47).

Attilio Sequi
Istituto Nazionale Di Fisica Nucleare (INFN)

Thomas Berghoefer
Deutsches Elektronen-Synchrotron (DESY)

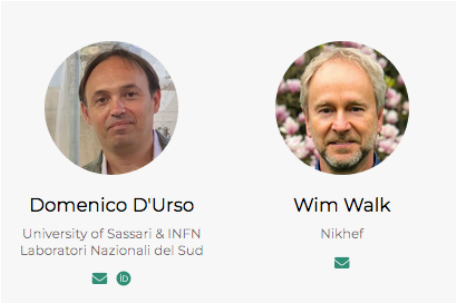
Chiara Arina
Universite Catholique De Louvain (UCL)

Deliverables

- D3.1 Handbook for design and construction phase (M36);
- D3.2 Handbook for operation phase (M42);
- D3.3 Financial plan and Scenario analysis (M47)

WP missions (2/5)

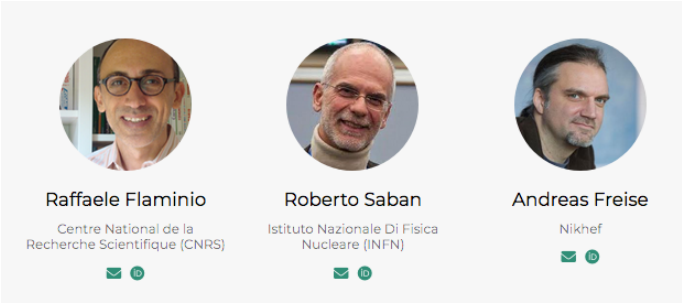
- **WP4 Site Preparation**
  1. Site scientific evaluation
  2. Socio-economic impact
  3. Legal/Financial aspects of the RI implementation
  4. Mediation planning



Deliverables

- D4.1 Scan of legal procedures, permitting and land acquisitions. (M10)
- D4.2 Updated socio-economic impact studies. (M15)
- D4.3 Complete quantification of all the aspects impacting the ET performance. (M28)
- D4.4 3D geology, hydrology, etc. model with detailed localisation of the ET infrastructure. (M29)
- D4.5 Updated cost and schedule estimates of the excavations (D42)

- **WP5 Project Office / Engineering Dept.**
  1. Technical Coordination of the Project
  2. Human resources qualification
  3. Strategic decisions making process
  4. Planning
  5. Preparation for Production
  6. Industrial Partnerships
  7. Risk Management

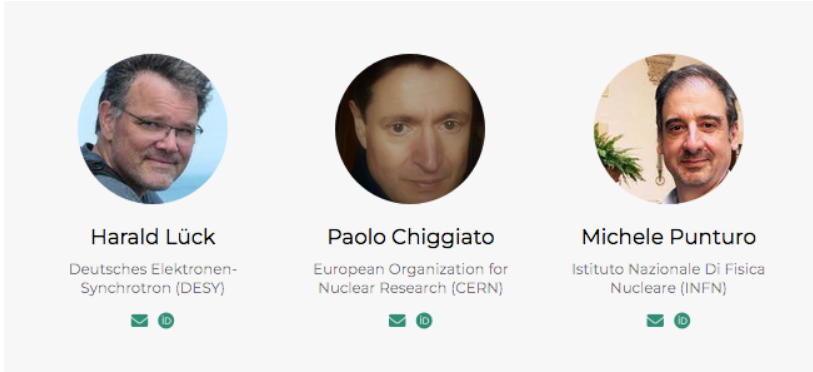


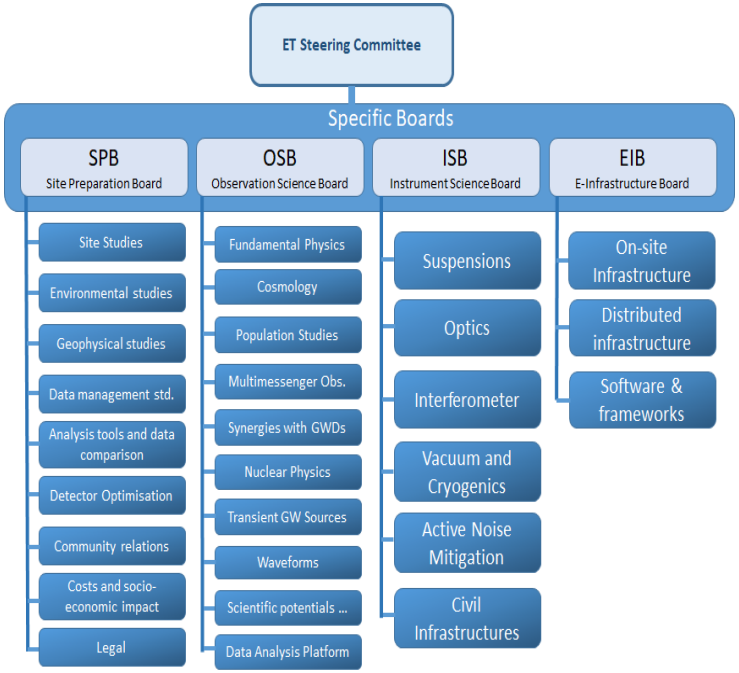
Deliverables

- D5.1 Structure and the mandate of the Project Office. (M25)
- D5.2 Functionalities required from the tools in support of the project management. (M25)
- D5.3 Structure and the mandate of the Engineering Department. (M25)
- D5.4 Functional Engineering Department. (M28)
- D5.5 Functional Project Office. (M28)

WP missions (3/5)

- **WP6 Technical Design**
  1. Infrastructure Technical Design
  2. Experiment Technical Design
  3. Scientific impact
  4. Open Data Access and Services





Deliverables

- D6.1 Refined Science Case (M18)
- D6.2 Vacuum pipe Design (M24);
- D6.3 Preliminary RI TDR (M24);
- D6.4 Preliminary DET TDR (M24);
- D6.5 RI TDR (M40);
- D6.6 DMP and Data Access Policy (M46).

As expected there is a strong synergy with existing ET internal organization
→ Seeking for the best coordination !
We also involved external experts with huge experience from CERN

WP missions (4/5)

- **WP7 Transfer of Technology**
  1. Promotion of Innovative technologies
  2. Liaison with industries, industrial returns
  3. Intellectual Property

Mauro Morandin
Istituto Nazionale Di Fisica Nucleare (INFN)

Rob van der Meer
Nikhef

Deliverables

- D7.1 Innovation Plan (M12)
- D7.2 Report on industry engagement plan execution (M42)
- D7.3 Model for pursuing in ET a balanced industrial return (M33)
- D7.4 Report on TT and Intellectual property management in ET (M44)

- **WP8 Computing and Data Access**
  1. Computing model
  2. Computing Resources
  3. T0 Data Center
  4. Data Preservation

Sergi Girona
Barcelona Supercomputing Center (BSC)

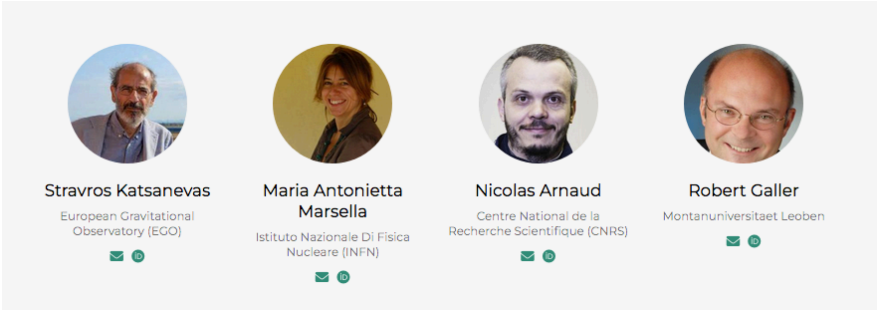
Achim Stahl
Deutsches Elektronen-Synchrotron (DESY)

Deliverables

- D8.1: Computing and Data Requirements (M18)
- D8.2: Computing and Data Model (M42)
- D8.3: Data Access Implementation Guidelines (M47)

WP missions (5/5)

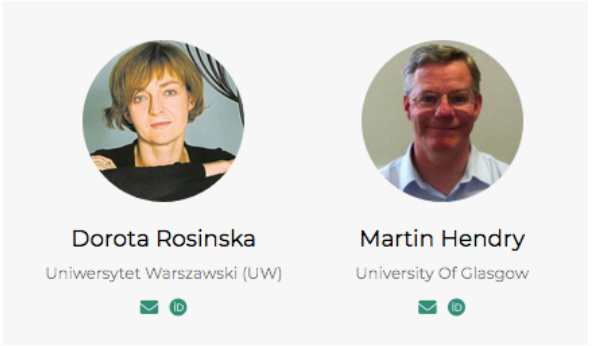
- **WP9 Sustainable Development Strategy**
  1. Low Carbon footprint
  2. Liaison with Climate Change and Geoscience
  3. Landscape and Environmental impact
  4. Transportation



Deliverables

- D9.1 ET Sustainable Development Implementation Strategy (M12)
- D9.2 ET Environmental impact assessment and mitigation strategy (M24)
- D9.3 ET CO2 footprint ET assessment and mitigation strategy (M36)

- **WP10 Education, Outreach and Citizen Engagement**
  1. School Education Program
  2. Dissemination and communication
  3. Mentoring and Training
  4. Diversity and Inclusion
  5. Early Career Scientists



Deliverables

- D10.1 Initiate strategic media and communications plan (M11)
- D10.2 Launch consortium website and social media accounts (M24)
- D10.3 Formulate strategic media and communications plan (M24)
- D10.4 Complete bank of graphics, multimedia resources (M36)
- D10.5 Launch ECR mentorship and training programme (M44)

Milestones

22 Milestones

First Recourse Board Meeting (M33)

ET Collaboration in place (M12)
(actually it is month minus 3)

Milestone No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Due Date (month)
1	Constitution / first meeting of the resource board	WP3	1-UCL	Workshop	33
2	Document detailing the site-specific characteristics that impact ET sensitivity and its duty cycle.	WP4	5-NIKHEF	Report	3
3	Common methodology to estimate impact of site characteristics on ET sensitivity and operation and, if required, a scheme to compensate it.	WP4	5-NIKHEF	Report	10
4	The recruitment of the Project Office team is completed.	WP5	4-CNRS	Report.	15
5	All three documents (WP5-D5.1, D5.2 and D5.3) are published.	WP5	4-CNRS	Report.	25
6	The Engineering Department as a functional unit complete	WP5	5-NIKHEF	Report.	27
7	The Project Office as a functional unit complete	WP5	2-INFN	Report.	27
8	ET Collaboration in place	WP6	2-INFN	ET Symposium	11
9	Analysis of promotion strategies accomplished	WP7	1-IFAE	Report.	8
10	Engagement plan produced	WP7	5-NIKHEF	Report.	10
11	Analysis of balanced industrial return strategies accomplished	WP7	2-INFN	Report.	15

Milestone No	Milestone Name	Work Package No	Lead Beneficiary	Means of Verification	Due Date (month)
12	Workflows Requirements collection and constraints: computing and data	WP8	1-IFAE	Workshop (+D8.1)	11
13	Computing Infrastructures availability for ET workflows, characteristics	WP9, WP8	1-IFAE	Workshop (+ D8.1)	24
14	On site infrastructure, computing and data model	WP6, WP8	4-CNRS	Workshop (+D8.2)	36
15	Low latency and offline workflows and computing model	WP6, WP8	2-INFN	Workshop (+D8.2)	40
16	Data management, access, policy and implementation	WP2, WP6, WP8	1-IFAE	Workshop (+D8.3)	46
17	Preliminary sustainability plan	WP9	8-EGO	Report.	11
18	ET Sustainability Workshop	WP9	8-EGO	Workshop+Report	18
19	Final sustainability plan	WP9	8-EGO	Reports.	47
20	Appointment of Communications and Outreach Coordinator	WP10	3-UW	Appointment contract	8
21	ET Consortium website and social media launched	WP10	8-EGO	Public launch	24
22	ECR Mentorship and Training programme established	WP10	3-UW	Report.	44

Common Methodology for site characterization (M10)

On site Computing model (M36)

Sustainability Workshop (M18)

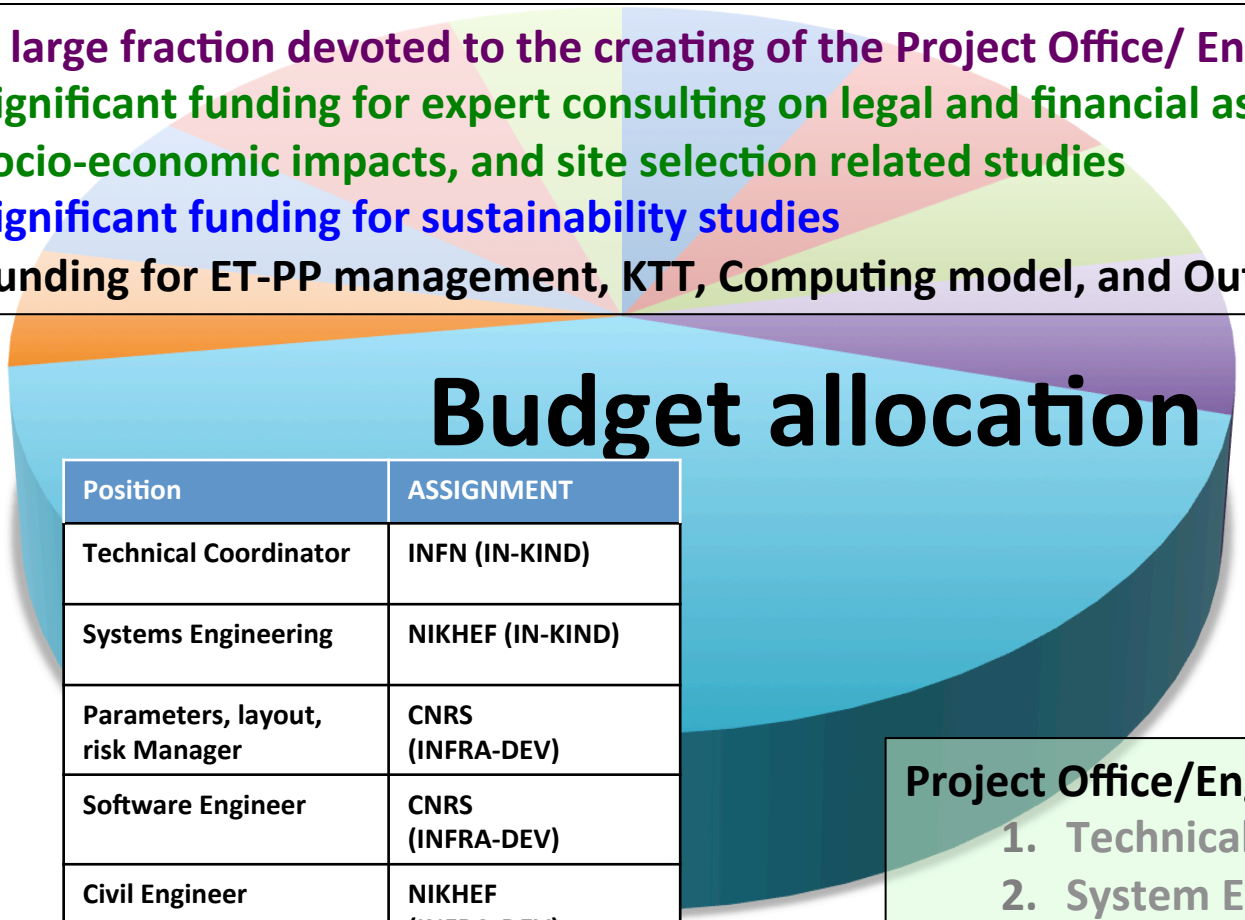
A large fraction devoted to the creating of the Project Office/ Engineering Department (44%)

Significant funding for expert consulting on legal and financial aspects, socio-economic impacts, and site selection related studies

Significant funding for sustainability studies

Funding for ET-PP management, KTT, Computing model, and Outreach/Communication

Budget allocation



Position	ASSIGNMENT
Technical Coordinator	INFN (IN-KIND)
Systems Engineering	NIKHEF (IN-KIND)
Parameters, layout, risk Manager	CNRS (INFRA-DEV)
Software Engineer	CNRS (INFRA-DEV)
Civil Engineer	NIKHEF (INFRA-DEV)
Vacuum Engineer	CNRS (INFRA-DEV)
Integration and Technical Infrastructures Engineer	INFN (INFRA-DEV)
Head Project Office	INFN (IN-KIND)
Head Engineering Department	NIKHEF (IN-KIND)

Project Office/Engineering Dept.

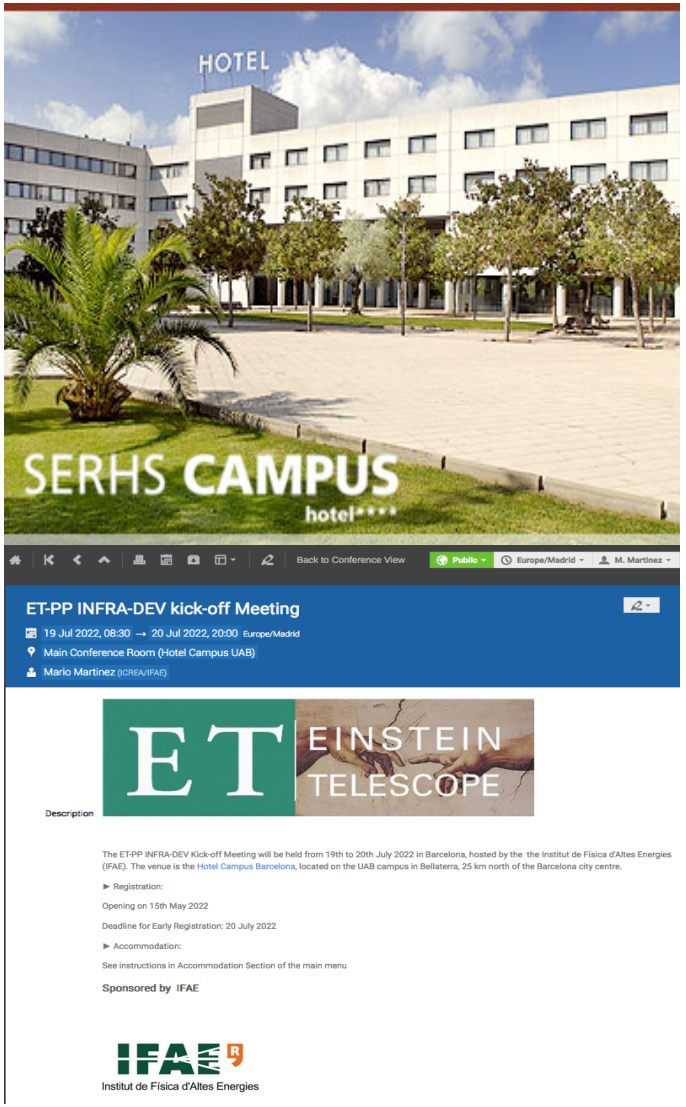
1. Technical Coordinator (in-kind)
2. System Engineering (in-kind)
3. Parameters, Layout, Risk Manager
4. Software Engineer
5. Civil Engineering
6. Vacuum Engineer
7. Integration and Technical Infrastructures Engineer

Design of the vacuum system by CERN (in-kind funding included for first year)

INFRA-DEV Kick-off meeting

July 19th – 20th @ Barcelona

- We had an **in-person 2 days** meeting of ET management & INFRA-DEV WP coordinators
- WP-WP discussions taking place during first day followed by plenary reports and plan drawing/ discussions the second day
- Dedicated slot for BSR and presence of BGR
- Dedicated slot on ET-PP Collaborative Agreement & EC Reporting details
- https://indico.ifae.es/event/1393
- **Running biweekly zoom meetings since then**
- **All hands in-person meeting @ BCN foreseen for Summer 2023 (covered by ET-PP funds)**



ET-PP Open positions

Open Position: Instrument Development Expert

The APC laboratory in Paris is recruiting a instrument system engineer for a 30 months temporary position to support the activities of the Einstein Telescope(ET) project

Nov 10, 2022

Open Position: software engineer at IP2I-Lyon

IP2I-Lyon is recruiting a software engineer for a 3 year temporary position to participate to the support effort of the Project Office in the framework of the EU project 'Einstein Telescope Preparatory Phase' (ET-PP).

Nov 9, 2022

Open Position: Senior IT/Computing Architect position at the Department of Astronomy and the Gravitational-Wave Science Center of the University of Geneva

The Department of Astronomy and the Gravitational-Wave Science Center (GWSC) at the University of Geneva is looking for a Senior Information Technology (IT) / Computing Architect ("Adjoint(e) Scientifique III") to support the activities of the Einstein Telescope (ET) project in the design of the computing model and infrastructure of the next-generation gravitational-wave observatory.

Oct 26, 2022

Open Position: System engineer for Project Support and Coordination at BSC

The Barcelona Supercomputing Center is offering a position for a system engineer who will become part of the Operations Department of the Center and participate in the activities of support and coordination for the Einstein Telescope Preparation Phase project (ET-PP).

Jul 11, 2022

Open Position: Technology Transfer Technician at IFAE

The Institute for High Energy Physics (IFAE) in Barcelona is looking for a Technology Transfer Technician to support the Knowledge and Technology Transfer (KTT) Unit. The main work will be the execution of innovation consultancy activities in the framework of an EU project ET-PP

Jun 14, 2022

Open Position: Project Manager Assistant at IFAE

The Institute for High Energy Physics (IFAE) in Barcelona is looking for a Project Manager Assistant to support the administrative/scientific coordination of the Gravitational Wave Group and the Research Projects Office.

Project: 101079696 — ET-PP — HORIZON-INFRA-2021-DEV-02

HE MGA — Multi & Mono: v1.0

Associated with document Ref. Ares(2022)5806126 - 18/08/2022

EUROPEAN RESEARCH EXECUTIVE AGENCY (REA)

REA.C – Future Society
C.4 – Reforming European R&I and Research Infrastructures

GRANT AGREEMENT

Project 101079696 — ET-PP

PREAMBLE

This **Agreement** ('the Agreement') is **between** the following parties:

on the one part,

the **European Research Executive Agency (REA)** ('EU executive agency' or 'granting authority'), under the powers delegated by the European Commission ('European Commission'),

and

on the other part,

1. 'the coordinator':

INSTITUTO DE FISICA DE ALTAS ENERGIAS (IFAE), PIC 999613907, established in CAMPUS DE BELLATERRA - UNIVERSIDAD AUTONOMA DE BARCELONA, CERDANYOLA DEL VALLES 08193, Spain,

and the following other beneficiaries, if they sign their 'accession form' (see Annex 3 and Article 40):

Grant Agreement finally signed with EC by middle August 2022

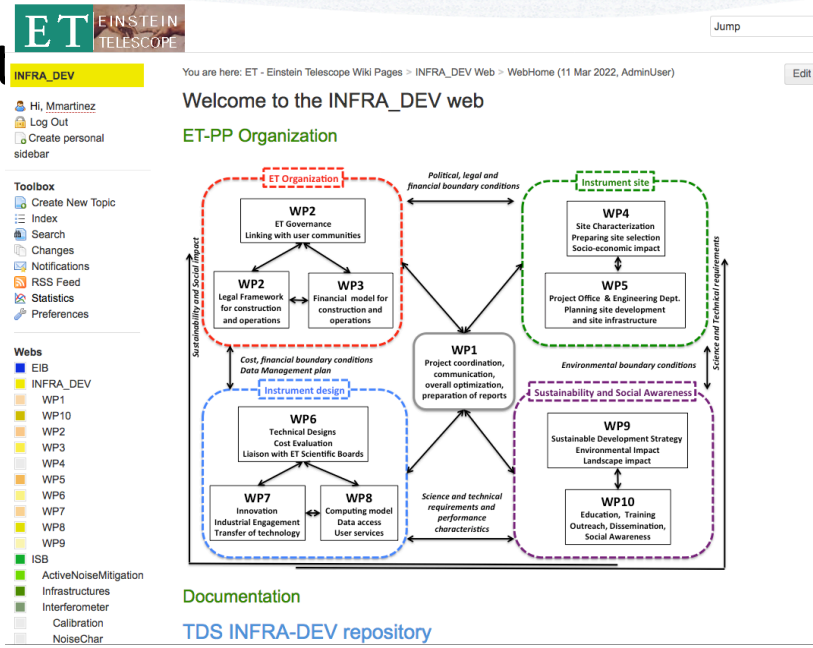
Concluding now the Collaborative Agreement among partners

Budget being now executed
→ A number of open positions are advertised in ET-PP page
→ More to come

ET-PP after submission

- ET-PP started already to work without waiting for the EC resolution
  - Running ET-PP coordinating meetings
  - First Common Document repository in place @ EGO (TDS + Wiki)
  - **ET initial bylaws in place**
  - **ET Collaboration in place**

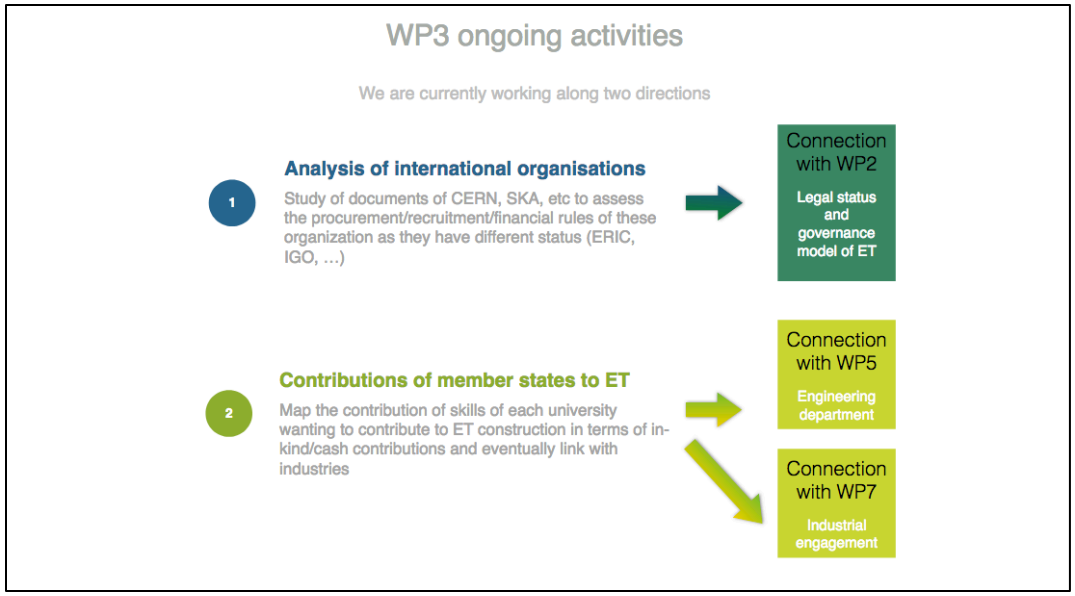
- Ongoing WP and WP-WP interactions
  - Collecting information on governance and financial models from other organizations (CERN, SKA, ESS,…)
  - Building the WP teams
  - Establishing regular meetings
  - SWOT analyses
  - Mapping Tasks with ET Divisions
  - **ET Collaboration – ET Project relationship**



	T8.1 T0 Data center	T8.2 Computing and Data Model	T8.3 Resources	T8.4 Data Access Implementation	
D1 Software, frameworks, data challenges		Computing frameworks computing domains data formats	Resources for frameworks execution and data storage availability	Data availability Data releases format	TTG Technology Tracking working Group
D2 Services and Collaboration Support			Resources and infrastructure for services and collaborative tools	Tools for monitoring, AAI (IAM), data access	
D3 Computing and data model, Resource Estimation	T0 storage and computing resources estimation	Computing model data model	Resources estimation		
D4 Multimessenger alerts infrastructure				Tools for multi messenger alerts	

Example: WP8 Tasks and EIB Divisions

Few examples (WP2/3)



This is to give you the flavor lots of work is on going in the exploration of Governance and Financial Models

Similar activity in other WPs

DELIVERABLES WP2, FIRST FOCUS

2.1. Report providing options for a legal entity (Q3 2023)

- Analysis of the ET Observatory characteristics with impact on governance
- Inventory of best practices for future ET governance
- Preferred options for pre-construction governance and long term governance

Sources of knowledge e.g.:

- *NSF Research infrastructures guide (2021)*
- *ESFRI public guide (2021), life cycle approach*

2.2. Minutes of meetings with involved Ministries (BGR) and EC (→ 2022-2026)

- Interactions with BGR, governance requirements
- Input for discussions in BGR, presentation of D.2.1., D 2.3, D 2.4, D 2.5
- Proposal to BGR on preferred governance model for all stages ET project

Click to add title

CONCLUSIONS KICK OFF 6-7 OCTOBER 22

Current governance: offer recommendation WP2

- Analysis current governance → need to flesh out current project organization
- Invite **ET directorate** to present a project organization plan, including the necessary steps for implementation
- - Study, discuss and provide feedback to ET directorate in next WP2 meeting

➢ Offer recommendations to the actors to further develop and strenghten the current governance

NON-INFRADEV dependencies:

BGR: informal interactions with BGR: governance requirements, input for discussions in BGR

BSR: no dependency at the moment, to be discussed after the adoption of the BSR ToR

APPEC/APIF: no dependencies

ET project and Collaboration are sufficiently represented in the INFRADEV workpackages

EGO/VIRGO and LIGO dynamics, at the moment not relevant for WP2

Gather best practices from IGO (SKA, CERN) and ERIC (ESS) on operational matters and maturity process.

Contactpersons via network:

John Wommersly (SKA, ESS, ESFRI), Richard Schilizzi (SKA), Simon Berry (SKA and other RI), Beatrice Vierkorn (ESS, SKA, CERN), Lars Bjornson (ESS, SKA).

Click to add title

Nikhef

Random final notes

- **ET-PP INFRA-DEV Horizon EU project on the run with 3.45M€**
  - Mission to facilitate the definition of a well organized and well functioning ET Project and timely decisions (lots of work ahead of us)
  - Putting together a Governance structure heavily inspired by the (successful) CERN model → adequate for a 2B€ project.
  - Defining the required tools / repositories adequate for a 2B€ project.
  - Funding Agencies recommend to learn from other ESFRI lessons and avoid known/old mistakes
  - Funding Agencies very sensitivity to delays as (too often) happens in other ESFRI endeavors

- **Four years ahead of us to define many important aspects of the ET project and to take important decisions**
  - Within ET-PP, most emphasis in defining a functional Project Office and Engineering Department, Governance, Legalities and Site Preparation
  - Other important aspects include financial model, sustainability, industrial returns and social awareness….
  - Key presence of CERN in vacuum design and CERN spirit / experience
  - Crucial to marry ET-PP WPs and ET Boards realities, deliverables, milestones
  - ET site characterization / cost estimates needed soon
  - **Delivery of a preliminary "TDR" in 2 years is main mission of ET Collaboration**

Thanks for your attention

(and apologies for not being there)