Gamma Rays

Johannes Knapp DESY

	M€
European Research Council (ERC) Frontier research by the best individual teams	**13 095**
Future and Emerging Technologies Collaborative research to open new fields of innovation	**2 696**
Marie Skłodowska-Curie actions (MSCA) Opportunities for training and career development	**6 162**
Research infrastructures *(including e-infrastructure)* Ensuring access to world-class facilities	**2 488**

ERC grants: 13 Billion € !!!

researcher + host institution

Excellence as sole criterion

High risk & High gain

Investigator-driven

European Research Council

erc

Groundbreaking
Frontier Research

“Bottom-Up”

Portability of grant

All research fields

Marie Curie Actions,

Network opportunities (community/international networks)

- MSCA Innovation Training Networks (ITN)
  - 3 year PHD, 500 person-months
  - Deadline April 2014, Budget 350 ME, success 10%
- MSCA-COFUND, cofunding of training programs, 3-5 years
  - National funds 50% / EC 50%
  - Deadline November 2014, Budget 80 ME
- MSCA-RISE, Global research and innovation staff exchange
  - Staff exchange with European and non-European countries
  - Deadline Jan 2015, Budget 80 ME, success 60%

Individual opportunities

- MSCA Individual Fellowships (IF)
  - Deadline April 2014, Budget 350 ME

C. Future Emerging technologies (FET)

- Open:
  - Short programs funded on aggressive R&D with industrial application 80 ME/year
- Proactive 9 themes 60-82 ME/year
  - Understanding time for new technologies 20 ME
  - Symbiosis between artificial and natural systems 25 ME
  - Adaptive bottom-up construction 35 ME
  - New possibilities at the nano-bio-chem interface 25 ME
  - Knowing, doing and being: Cognition beyond problem solving 35 ME
  - Ecological ubiquitous technology 25 ME
  - Exploiting light-matter interaction 20 ME
  - Quantum simulation and networking 30 ME
  - Global Systems Science 20 ME
  - CSA 2,3 ME
- Flagships
  - Graphène
  - Humain Brain Project
- Computer Science, towards hexascale
  - HPC workloads 20 ME

→ **APPEC interests, can we map them to FET ?**

- **Sensor networks in hostile environments**
- **Low radioactivity tracing**
- **Photonics**
- **Photodetectors (large area, small pixels)**
- **Extreme photonics (lasers/mirrors)**
- **Cryogenic detectors (MKIDs, TES)**
- **Materials of extreme radiopurity**
- **Space**

Research Infrastructures

- **B1 Call 1 - Developing new world-class research infrastructures**
  - **INFRADEV 1-2014: Design Studies (15 ME)**
    - **1-3 ME, September 2014**
  - **INFRADEV 2-2015: Preparatory Phase of ESFRI projects (14 ME)**
    - **New RI (after update of ESFRI Roadmap, 2016) 5 ME**
    - **Extra funds to existing PP (up to 2 ME)**
    - **January 2015**
  - **INFRADEV 3-2015: Individual implementation and operation of ESFRI projects (90 ME)**
    - **Based on ESFRI prioritisation, up to 15 ME, January 2015**
  - **INFRADEV 4-2014/2015: Solutions for clusters of ESFRI and other relevant research infrastructure initiatives (55 ME 2014, 25 ME 2015)**
    - **6-15 ME, September 2014**

B2 Call 2 - INFRAIA 1-2014/2015:
I3 for research infrastructures of pan-European interest

- Physical Sciences - Starting Communities
  - European laboratory astrophysics.
  - Research infrastructures for high-energy astrophysics.
  - Science at deep-underground laboratories.
  - Integrating gravitational wave research.
- Physical Sciences - Advanced Communities
  - Detectors for future accelerators.
  - Research infrastructures for nuclear physics.
  - European planetary science.

→ Starting communities , up to 5 ME, September 2014

→ Advanced Communities, up to 10 ME, September 2014

B3 Call 3 - e-Infrastructures

- EINFRA 1-2014 – Managing, preserving and computing with big research data
  - September 2014, 55 ME
- EINFRA 9-2015 – e-Infrastructures for virtual research environments (VRE)
  - January 2015, 42ME

- B4 Call 4- INFRASUPP 6-2014 – International cooperation for research infrastructures, September 2014, 7 ME

Scope: In this context, the research infrastructure action will focus its activities on international cooperation in three different but complementary ways, as required: bilaterally with a single third country at policy level; multi-laterally with different third countries, targeting specific research and innovation aspects of research infrastructures of common interest in one area of science and technology; multi-laterally with different third countries if a specific effort is required in the context of a specific world class research infrastructure. Support to activities decided in the context of the Group of Senior officials on Global Research Infrastructures may fall in the latter two categories.

Proposals will address one of the following areas:

- Facilitate the development of global research infrastructures and the cooperation of European RI with their non-European counterparts, ensuring their global interoperability and reach, and to pursue international agreements on the reciprocal use, openness or co-financing of infrastructures, on the basis of the recommendations of the Group of Senior Officials on Global Research Infrastructures;
- Support bilateral cooperation on research infrastructures with Russia. The proposal will in particular help develop cooperation between European research infrastructures and the Russian Megascience facilities[31], including the underpinning e-infrastructure.
- Support multilateral cooperation with European Neighbourhood Policy countries and Western Balkan Countries. The proposal will aim at developing regional roadmaps of research infrastructures jointly with stakeholders and policymakers and help them develop closer cooperation with research infrastructures of pan-European interest through training, data management and trans-national access.

INDUSTRIAL LEADERSHIP: LEIT ICT

- **1.A.1 ICT Challenge 1 – A new generation of components and systems**
  - **1.A.1.3 Advanced Thin, Organic and Large Area Electronics (TOLAE) technologies**
- **1.A.2 ICT Challenge 2 - Advanced Computing**
  - **1.A.2.1 Customised and low power computing**
- **1.A.3 ICT Challenge 3 – Future Internet**
  - **1.A.3.1 Smart Networks and novel Internet Architectures**
  - **1.A.3.2 Smart optical and wireless network technologies**
  - **1.A.3.3 Advanced Cloud Infrastructures and Services**
  - **1.A.3.5 Tools and Methods for Software Development**
  - **1.A.3.7 FIRE+ (Future Internet Research & Experimentation)**
- **1.A.4 ICT Challenge 4 – Content technologies and information management**
  - **1.A.4.1 Big Data Innovation and take-up**
  - **1.A.4.2 Big Data - research**
- **1.A.5 ICT Challenge 5 – Robotics**
  - **1.A.5.1 Roadmap-based R&D&I in Robotics**
- **1.A.6 ICT Challenge 6 – Micro- and nano-electronic technologies, Photonics**
  - **1.A.6.2 Photonics KET 2014**
  - **1.A.6.3 Photonics KET 2015**
- **1.A.8 ICT Cross-Cutting and Horizontal Activities**
  - **1.A.8.1 Internet of Things and Platforms for Connected Smart Objects**

INDUSTRIAL LEADERSHIP: A. LEIT Space

- 2.1.7.A.2 Call "Earth Observation"
  - Objective 1 – Space enabled Applications
    - Topic A – New ideas for Earth-relevant space applications
- 2.1.7.A.3 Call "Competitiveness of the European Space Sector"
  - Objective 1 - Protection of European Assets in and from Space
    - Topic A – Space Weather
  - Objective 5 – Outreach and Communication
    - Topic A – Global outreach through education
    - Topic B – European outreach through education
- 2.1.7.A.5 Call "Competitiveness of the European Space Sector"
  - Objective 3 - Space Science
    - Topic A – Scientific exploitation of astrophysics data

Societal Challenges

① HEALTH
② FOOD SECURITY, SUSTAINABLE AGRICULTURE, MARINE AND MARITIME RESEARCH AND THE BIO-ECONOMY
③ ENERGY
④ TRANSPORT
⑤ CLIMATE ACTION, RESOURCE EFFICIENCY AND RAW MATERIALS
⑥ INCLUSIVE, INNOVATIVE AND REFLECTIVE SOCIETIES
⑦ SECURE SOCIETIES CHALLENGE

Working group checklist:

Who will do ERC application? Probably many ...

Will we do a MSCA? (ITN, COFUND, RISE) ?

A new Design Study ?

Present/future ESFRI projects ? PP?, Implementation ?

Can we propose an I3 beyond GW, UL

Can we participate in an RI cluster ?

Can we bid for an e-infrastructure ? (calls 1 and 9)

Can we participate in a FET ?

What are the global aspects of our research ?

What are the R&D themes for an ERANET+ ?

Can we apply for LEITs, societal challenge R&D ?

Our infrastructure for the decade(s) ahead:

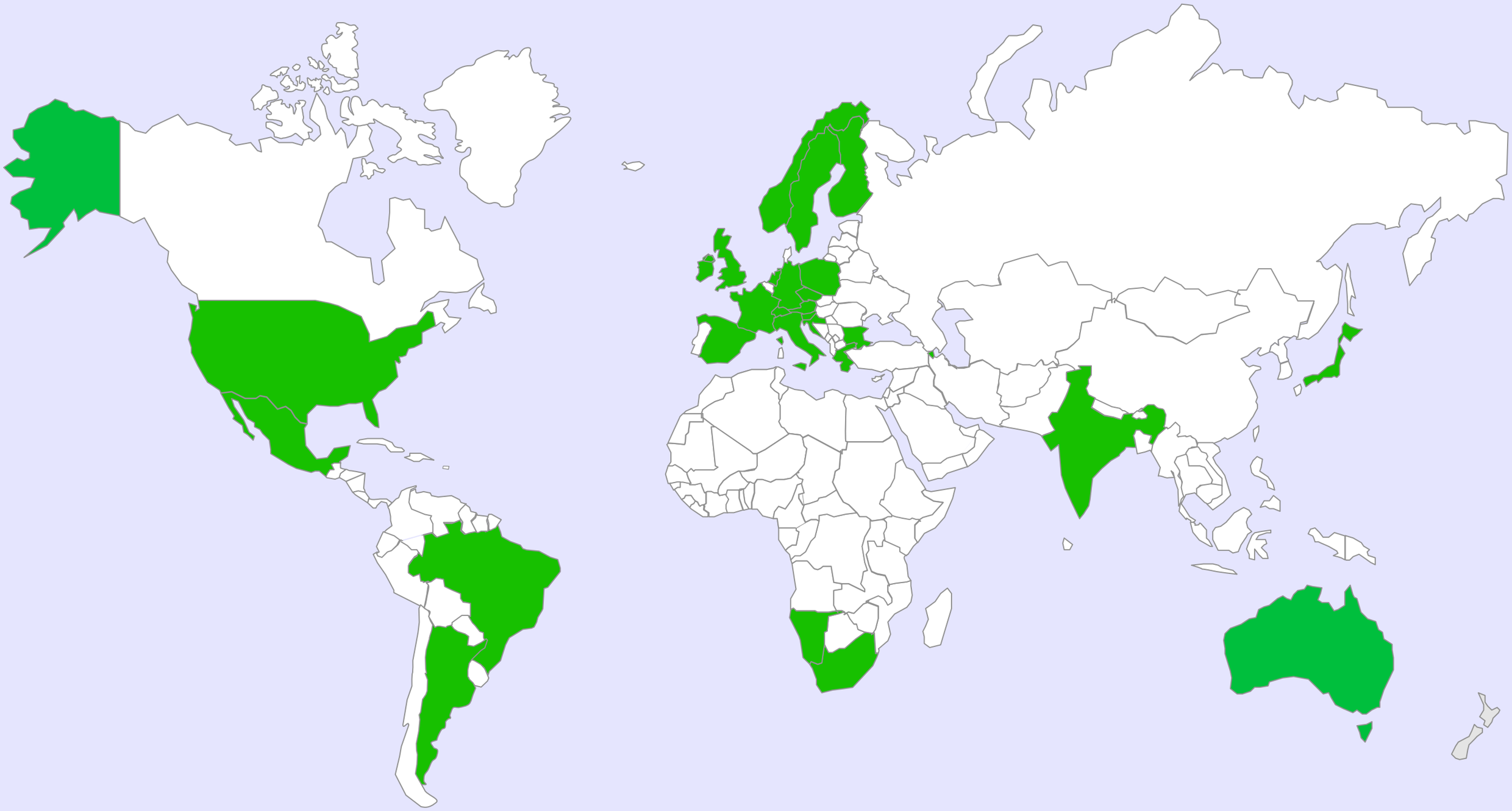
cta

cherenkov telescope array

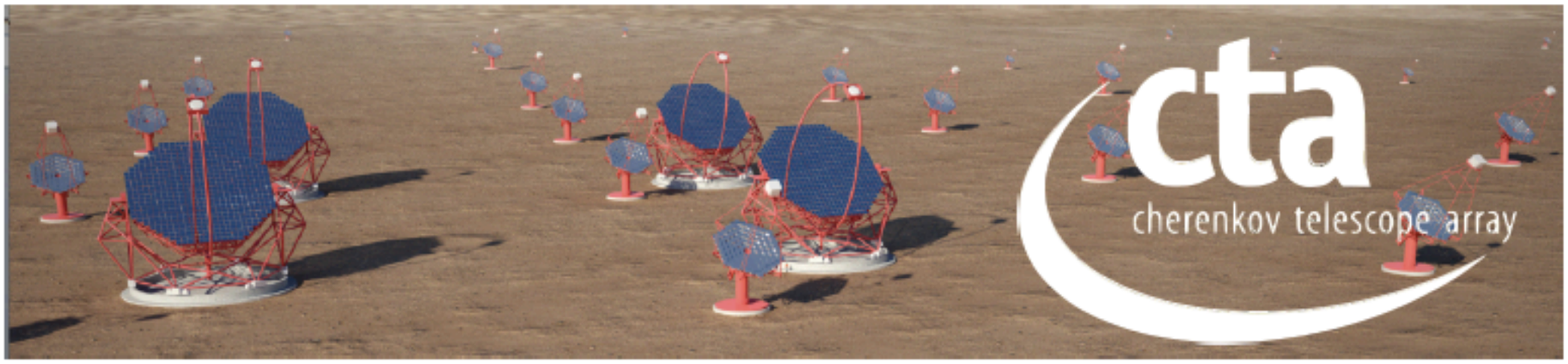
ESFRI infrastructure, open access,
global, pan-European, international, ...

CTA Members

Members (28 countries)
170 institutions,
>1100 scientists and engineers
... still growing



Argentina, Armenia, Australia, **Austria**, Brazil, **Bulgaria, Czech Republic, Croatia, Finland, France, Germany, Greece**, India, **Italy, Ireland**, Japan, Mexico, Namibia, **Netherlands, Norway, Poland, Slovenia, Spain**, South Africa, **Sweden, Switzerland, UK**, USA



Interim support for moving CTA into the implementation phase

The years 2014 and 2015 will represent a crucial and critical phase for CTA. In the years 2011-2013, the FP7-funded Preparatory Phase has allowed a central project office for CTA to be established, has supported work addressing the governance, legal and financial structure of the future CTA Observatory, and has provided funding to support the transfer of technologies from laboratories to industry, and adaption of industrial products to the specific needs of CTA. Whilst the Preparatory Phase has been extended until mid-2014 to allow use of some remaining funds, funding of key project activities in most of 2014 and in 2015, until approval of implementation of CTA and availability of funding for implementation, is not secured at this time.

Interim funding from the EC is sought to achieve the following **objectives**, which are considered crucial for moving CTA into the implementation phase:

- Build-up and operation of an interim legal entity, preparing the implementation of CTA and the transition to a final legal structure;
- Operation and enhancement of the central project management established in the Preparatory Phase;
- Transition to project management tools appropriate to handle the implementation phase; with requirements management, resource management, documentation management, interface management and legal and technical management of in-kind contributions;
- Identification and implementation of the final legal and organizational structure of the CTA Observatory and identification and transition to final headquarters;
- Design of the infrastructure at the observatory sites and preparation for its implementation; hiring of personnel in host countries to interface with central project management and to prepare implementation;
- External support and consulting regarding measures to optimize the crucial RAMS[1] aspects of CTA and support of RAMS related (HALT/HASS[2]) testing using industrial testing facilities;
- Optimisation of the characteristics, and of the industrial production, of key large-volume items such as light sensors and mirror facets, and central procurement of production of a representative pre-series to establish production parameters and equip pre-production telescopes, on the basis of general CTA procurement strategy;
- Professional support and consulting regarding the development of data management systems and data dissemination facilities;
- Support of outreach and dissemination activities.

Planned **schedule / milestones:**

Organisational / legal	
Establishment of a Limited Liability Company as an interim legal entity	Q1 / 2014
Decision regarding the final LE and organisation of CTA	Q4 / 2014
Preparation and implementation of final LE and of final HQ	Throughout 2015
Establishment of the In-Kind Review Committee	Q1 / 2014
Launch of formal process regarding in-kind contributions	Q2 or 3 / 2014
Reviews/approval process	
Critical Design Review	Q4 / 2014
Production readiness reviews	Q4/2014 – Q1/2015
Site	
Site decision by agencies	Q1 / 2014
Negotiation of site-related agreements and contracts	Throughout 2014
Design of site infrastructure and preparation of call for bids	Mid-2014 through 2015
Technical	
Manufacturing of prototypes and tests for design verification	Through 2014 and 2015, depending on sub-system
Manufacturing of pre-production telescopes	Starting late 2014

Resources requested are listed below. Additional resources are sought from the national European parties and from non-EC countries, and will be required in particular to support project office operation through most of 2014, in addition to prototyping of CTA telescopes. While approval of implementation of CTA and availability of appropriate funding is anticipated for 2015, the request given below ensures continuity of project management and preparation of implementation through the first half of 2016, covering the transition to the final CTA Observatory organisation. Numbers given assume that EC funding becomes available for Q4 of 2014. All resources provided under this scheme will be made available to, and be managed by, the CTA interim legal entity, under supervision of the CTA Resource Board, composed of agency representatives.

Year	**2014 (partial)**	**2015**	**2016 (partial)**	**Total**
	(T€)	(T€)	(T€)	(T€)
Project management personnel	300	1600	800	2700
Committee support and travel	60	240	120	420
Legal consulting and suppport	50	150	80	280
Project management support, tools, consulting	160	300	100	560
Setting up of final legal entity, headquarters	0	450	0	450
Design of site infrastructure, preparation of calls for bids, and local coordination in host countries	400	950	300	1650
RAMS conculting and testing	180	280	80	540
Data management support, tools, consulting	100	220	110	430
PMT development and pre-series production	150	1080	0	1230
Silicon sensor development and pre-series production	150	600	0	750
Mirror facet pre-series production	180	620	0	800
Support of outreach and dissemination activities	20	40	20	80
Total	**1750**	**6530**	**1610**	**9890**

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