





Helix Nebula Science Cloud

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Helix Nebula Science Cloud Joint Pre-Commercial Procurement



Procurers: **CERN, CNRS, DESY, EMBL-EBI, ESRF, IFAE, INFN, KIT, STFC, SURFSara**

Experts: *Trust-IT & EGI.eu*

The group of procurers committed procurement funds, manpower for testing/evaluation, use-cases with applications & data, and in-house IT resources

Resulting made available to end-users from many research communities

High Energy Physics	Astronomy	Life Sciences	Photon/Neutron Sciences	Long Tail of Science
WLCG Worldwide LHC Computing Grid	cta Compact Telescope Array	elixir	PETRA III	Long tail of Science
B Belle II	The MAGIC Telescopes	EURO-BIOMAGING	3DIX	
COMPASS	PIERRE ALGER OBSERVATORY	PCAWG Pan-European Cancer Research Workout Genomes	OCEAN	
ilc International Linear Collider		BBMRI-ERIC®	OSIRIS	
		wE-nmr		
		JADDOCK		



Deployed in a hybrid cloud mode:

- procurers data centres
- commercial cloud service providers
- GEANT network, EduGAIN and ELIXIR Federated Identity Management

Co-funded via H2020 Grant Agreement 687614

Total procurement budget 5.3M€



Challenges



Innovative IaaS cloud services integrated with procurers in-house resources to support a range of scientific workloads

☛ *Compute and Storage*

- ☛ Support a range of architectures, virtual machine and container configurations including HPCaaS, working with datasets in the petabyte range with transparent data access

☛ *Network Connectivity and Federated Identity Management*

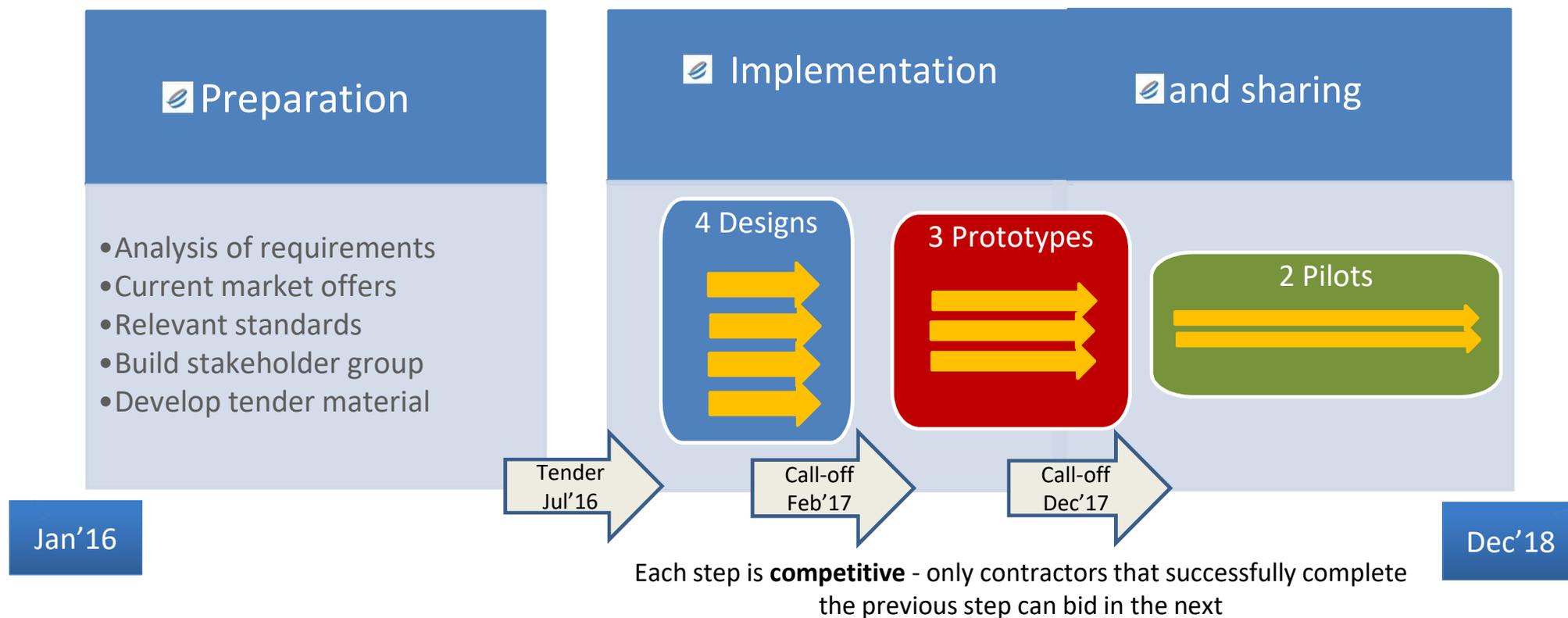
- ☛ Provide high-end network capacity via GEANT for the whole platform with common federated identity and access management

☛ *Service Payment Models*

- ☛ *Explore* a range of purchasing options to determine those most appropriate for the scientific application workloads, including **vouchers** or other means of easy integration in the organisations procurement models and production of a **TCO study** ready by end of 2018



HNSciCloud project phases



Phases of the tender are defined by the Horizon 2020 Pre-Commercial Procurement financial instrument

Preparation Phase

- End-user needs assessment:
 - Large buyers group, range of deployment scenarios
 - Working sessions to establish priorities and expectations
- Understanding state of the art:
 - Scientific journals, IP scan, interviews
- Standardisation possibilities:
 - Identify relevant existing standards and directives

Joshua Davison, CERN Procurement Service



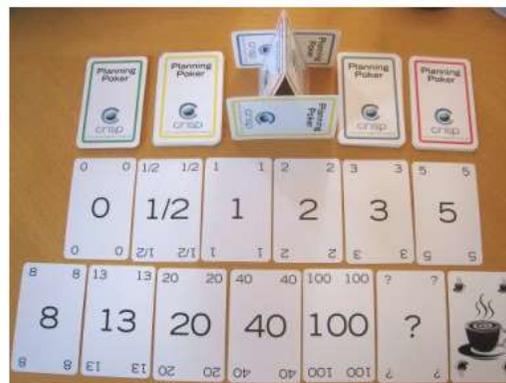
Open Market Consultation: HNSciCloud



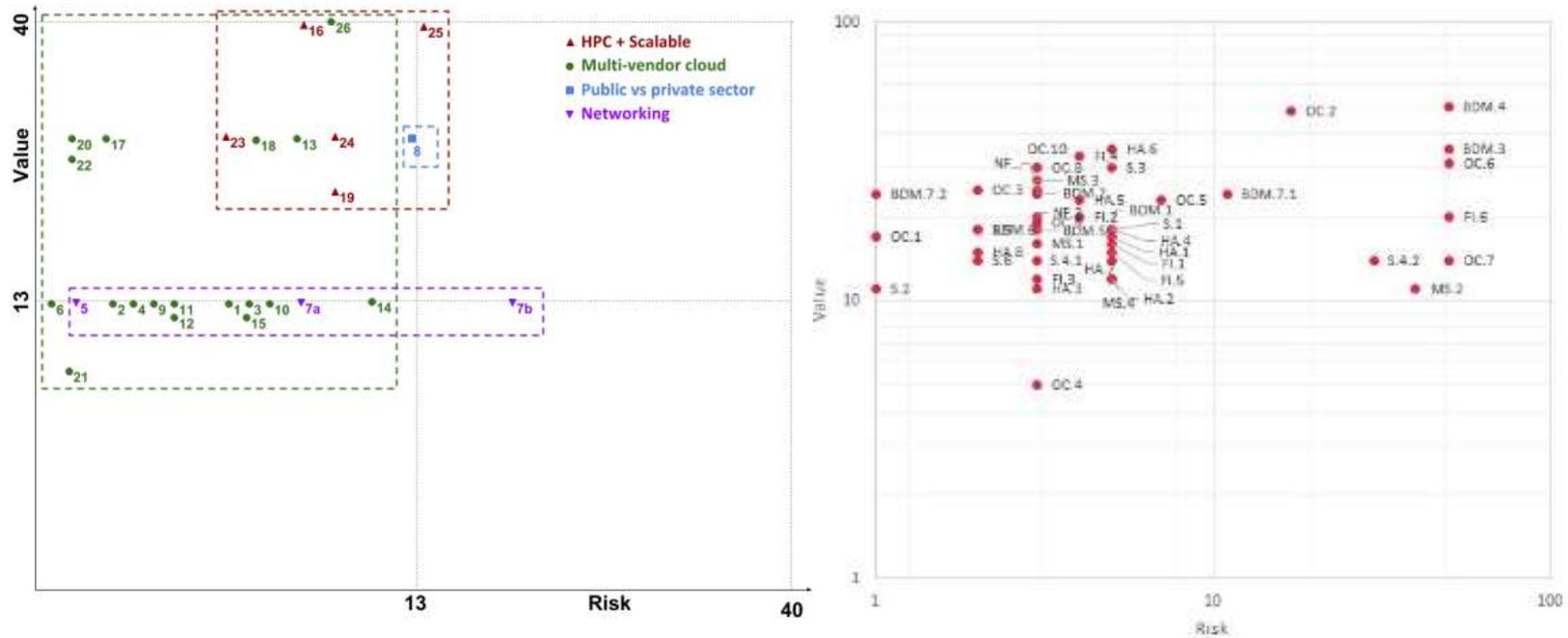
- 1 event
- 78 attendees



Open Market Consultation: Planning Poker

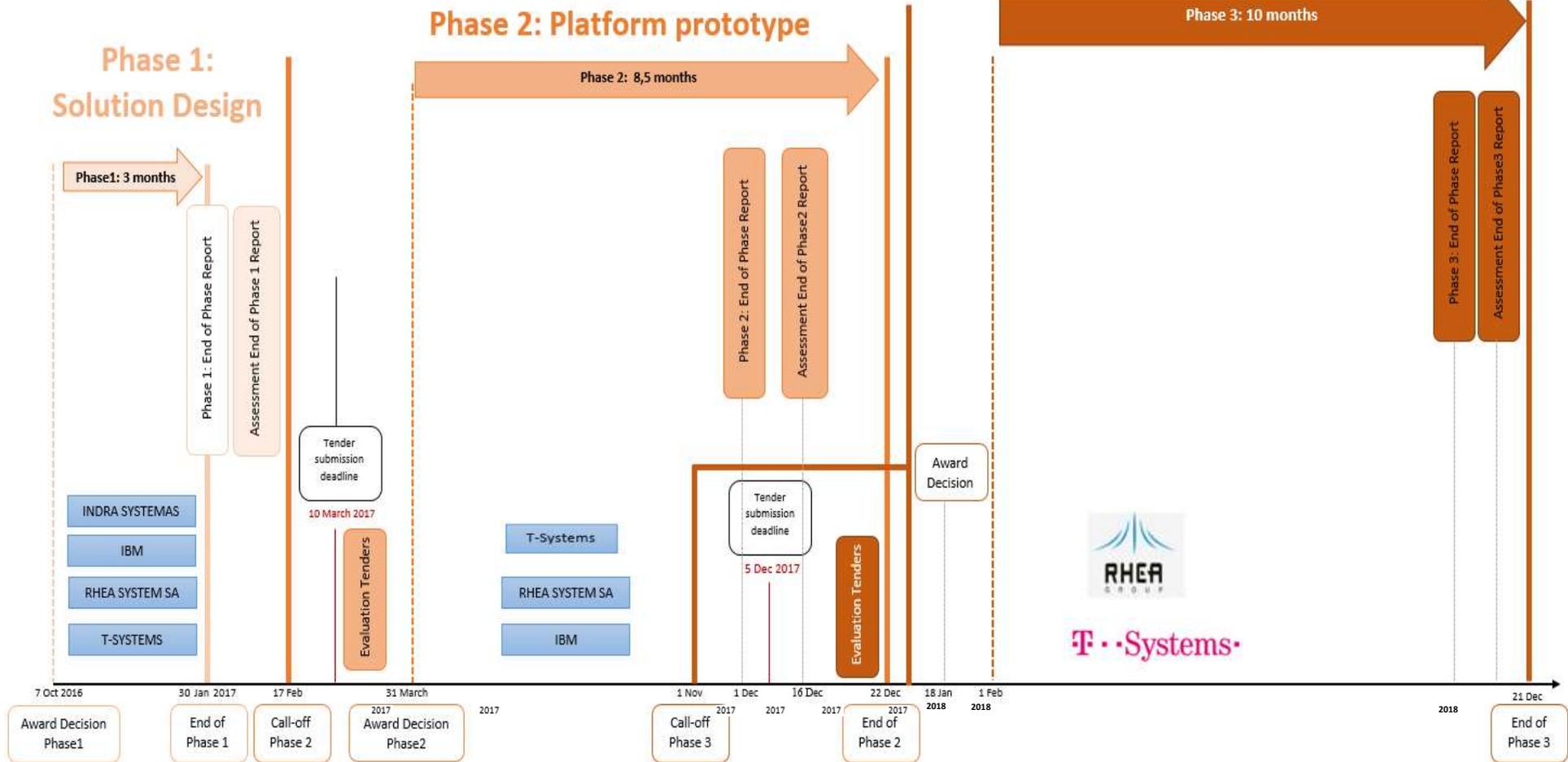


Open Market Consultation: Planning Poker



Contract Implementation: HNSciCloud

Phase3: Pilot Platform





Cloud Providers – Pilot phase



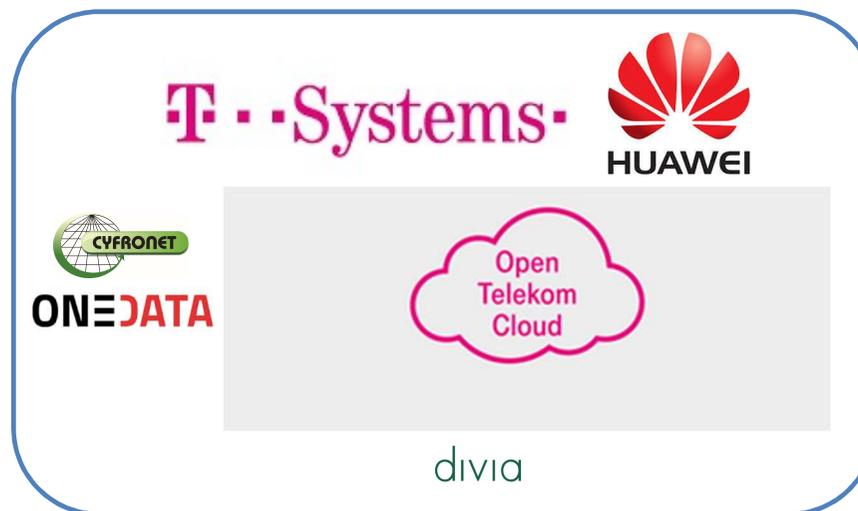
• T-Systems

• IaaS based on OTC



• RHEA

• IaaS provided by Exoscale





Initial Deployments



Buyers



Buyers	Tested features			Fields of Research					
	AAI Federated Identity	Storage blocks/objects	Computing capacity (VMs)	Photon / Neutron Science	High Energy Physic	Astronomy	Life sciences		
	● ● ●	● ●	● ● ●	FDMNES	CrystFEL	DODAS	LOFAR	PanCancer	WeNMR/HADDOCK
	● ● ●	● ● ● ●	● ●						
	● ● ●	● ●	●						
	● ● ●	● ●	● ●						
	● ● ●	●	●						
	● ● ●	●	●						
	● ● ●	●	● ● ● ●						
	● ●	●	● ● ●						
	● ● ●	● ●	●						
	● ● ●	● ●	●						

● useful, they can ease the way I do my job ● ● relevant, they can really improve the way I do my job ● ● ● strategic, they are fundamental to execute my job

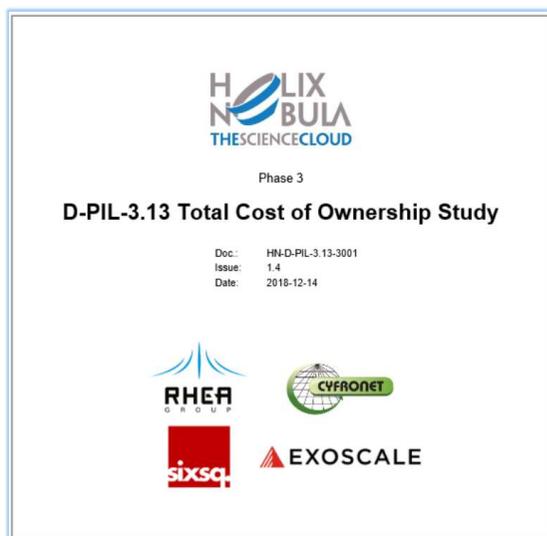
See [booklet](https://www.hnscicloud.eu) on <https://www.hnscicloud.eu>



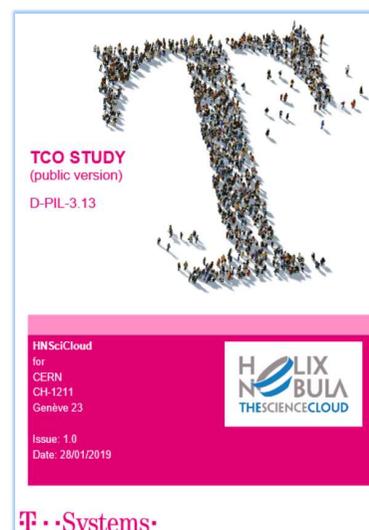
Total Cost of Ownership study



- Understand the costs of using commercial cloud services as part of a hybrid cloud model
- 2 use-cases selected with different requirements
 - **ALICE**: single core jobs, up to 50.000 at any time (monte-carlo, reconstruction, analysis)
 - **PANCANCER**: burst pattern, with minimal resources constantly used (few VMs) and periods of ramp-up (up to 400 VMs)



<https://doi.org/10.5281/zenodo.2605187>



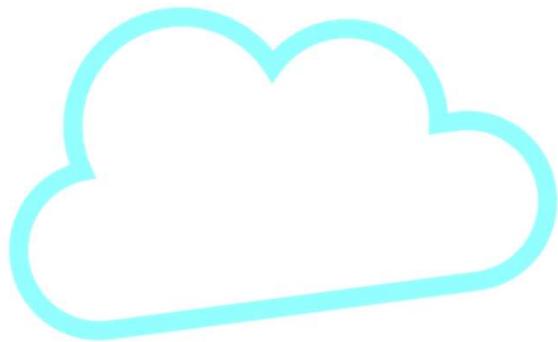
<https://doi.org/10.5281/zenodo.2605176>

European Open Science Cloud (EOSC)

The role of the European Open Science Cloud (EOSC) is to ensure that **European scientists reap the full benefits of data-driven science**, by offering:

1.9 million European researchers and **70 million** professionals in science and technology a **trusted open distributed environment** providing seamless access to data and interoperable services addressing the whole research data life cycle.

The development of the EOSC realises EU policy objectives including Open Science, FAIR data implementation and the Digital Single Market



Video <https://youtu.be/3HgnIe1Xu8I>



Lessons learned: preparation

- Open Market Consultation (OMC) is a highly valuable process
- The preparation and OMC phases of the PCP are critical and should be allocated sufficient resources/funds
 - Clear understanding on end-user needs and state of the art
 - Early market engagement
 - Create momentum
- Share draft tender documents during the OMC process as a way to engage firms and attract feedback on the feasibility of the innovation challenge
- Avoid long delays between the OMC and the tender publication that can be created by extensive tender reviews

Joshua Davison, CERN Procurement Service



Lessons learned: tender phase

- Financial competition was low since the budgets are announced in advance
- Ensuring distinct solutions through appropriate selection criteria key for competition and innovation of a range of solutions
- Underline the importance of the commercialization plan and total cost of ownership study (even as early as the design phase) through corresponding award criteria and deliverables

Joshua Davison, CERN Procurement Service



Lessons learned: contract implementation

- Dedicated technical and procurement teams in the buyers group are key for ensuring a proper contract follow-up:
 - Interim payments and reviews linked to clear milestones and deliverables keeps contractors engaged
 - Regular meetings and monitoring helps ensure focus and direction in the R&D

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Lessons learned: general remarks

- High administrative workload and complexity associated with the preparation, review, release and follow-up of PCPs
- Feedback received from contractors that the PCP process, methodology and associated financial support was appreciated and well-adapted to innovation, but they underestimated the time and effort linked with the process.
- The practice of allowing contractor's to retain ownership makes the PCP an extremely attractive tool for industry and encourages innovation. From the public procurer's perspective, non-ownership of IPR is usually acceptable provided that appropriate licenses to the IP are granted:
 - In many cases it will be necessary that the procurer be granted an unlimited, irrevocable, paid-up license to use the IP for its own purposes, including in particular to have the product/services manufactured by a third party;
 - Public procurers participating in PCPs must be given the flexibility to require license grants appropriate to their circumstances, but must understand that the broader the license grant they require, the less the contractor will be willing to co-fund the R&D (and so the higher the contract price).

Joshua Davison, CERN Procurement Service





Accelerating Science