

# 3<sup>RD</sup> HI-LUMI Industry Day

22-23

May 2017

The Park Royal

Warrington

UNITED KINGDOM

Registration before 31 March 2017  
<https://indico.cern.ch/event/607165/>

More information on HL-LHC and future needs  
<https://project-hl-lhc-industry.web.cern.ch>



Science & Technology  
Facilities Council

**AN EVENT FOR  
COMPANIES WILLING  
TO TAKE ON THE HL-LHC  
TECHNICAL CHALLENGES**

## Doing business with CERN

Anders Unnervik





# Legal framework

- CERN, an Intergovernmental Organization, was established in July 1953, by the “Convention for the establishment of a European Organization for Nuclear Research”.
- As an Intergovernmental Organization, CERN is not a legal entity under national law but governed by public international law.
- CERN benefits from immunity from national jurisdiction and execution. Thus, legal disputes between CERN and its suppliers and contractors are not submitted to national courts but solved via international arbitration.
- CERN is thus entitled to establish its own internal rules necessary for its proper functioning, such as the rules under which it purchases equipment and services.

# Mission of Procurement and Industrial Services

The mission of the Procurement and Industrial Services group is to:

- procure all supplies and services for CERN;
- meeting all requirements;
- at the lowest possible overall cost, while;
- achieving balanced industrial return for the CERN Member States, and;
- respecting the CERN Procurement Rules.

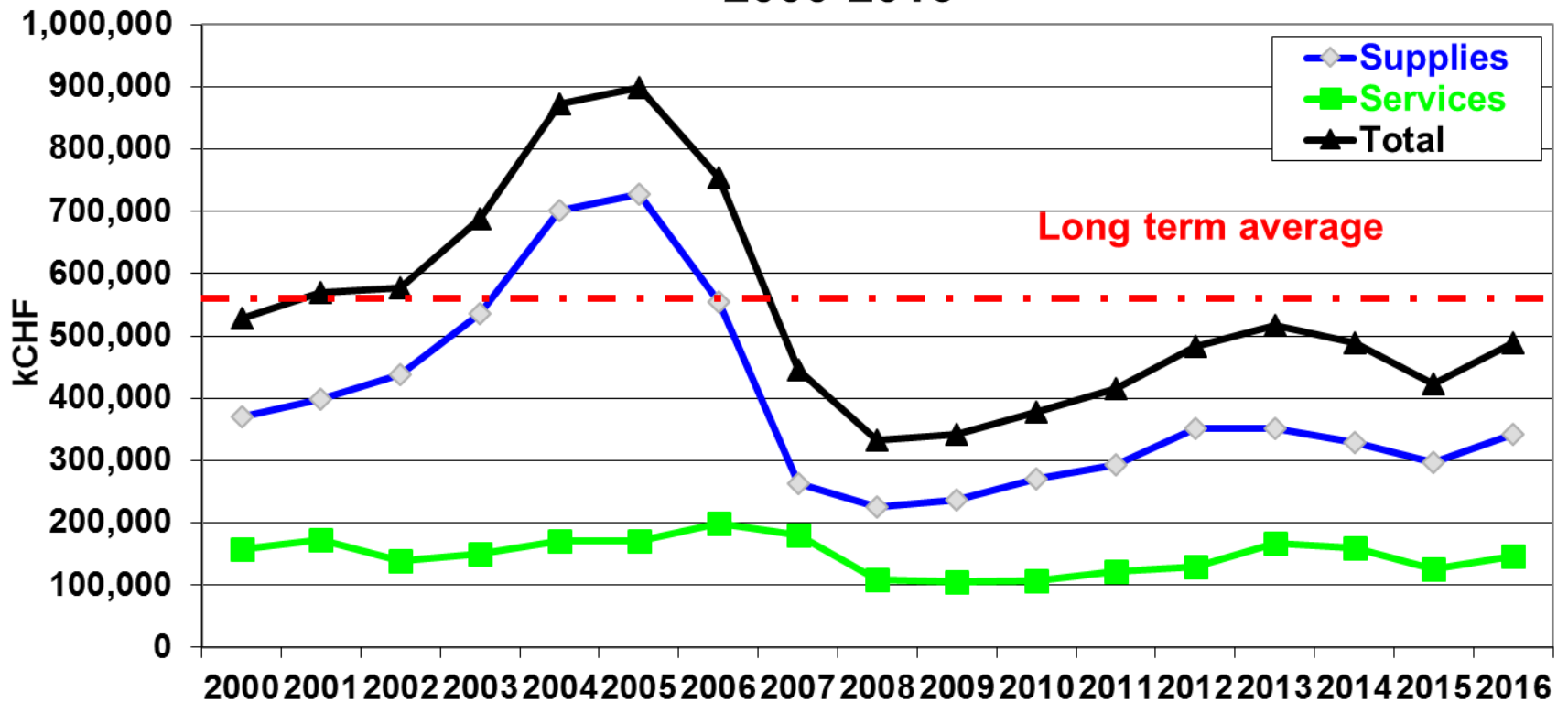
# Procurement Principles

- CERN purchases supplies and services and awards contracts in compliance with the principles of *transparency* and *impartiality*
- **Limited to firms established in the Member States.**
- Invitation to tender documents are drafted in an *objective* way so as to guarantee *fair competition*
- As a rule, CERN's tendering procedure is *selective* and does not take the form of open invitations to tender or price enquiries
- The opening, negotiation and evaluation processes of the bids are *strictly confidential*
- **Award basis:**
  - Is either the lowest; or
  - Represents the best value for money.



# Procurement Expenditures 2000-2015

## Procurement Expenditures 2000-2016



# What do we buy?

## Recurrent supplies and services

- **Civil engineering**

Buildings, roadworks

- **Utilities**

Cooling & ventilation

Power distribution, cables, overhead cranes

- **Infrastructure & services**

Metal structures

Mechanical engineering

Radiation shielding

Transport & handling

Safety & access control

- **Installation, operation & maintenance**

- **Data acquisition, computing & networking**

- **Various supplies**

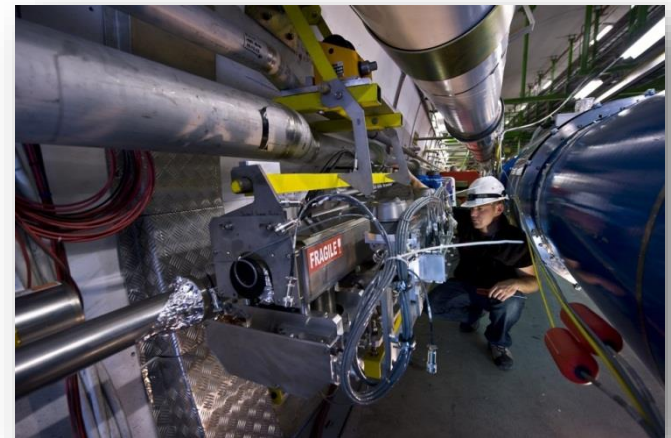
Furniture, tooling, gases, etc.



# What do we buy?

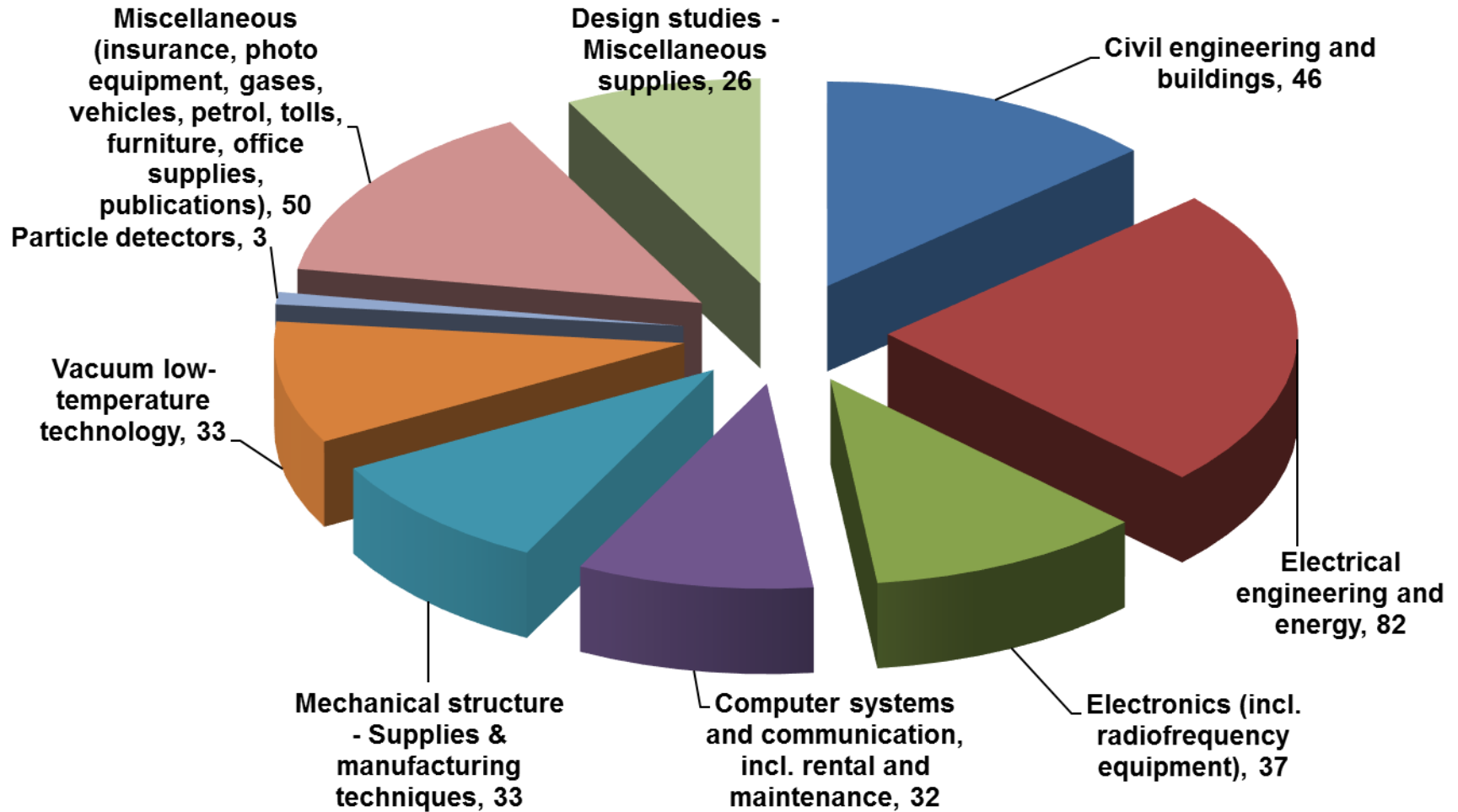
## Accelerator technologies required for consolidation projects and new developments

- Industrial controls & field buses
- Timing & “fast” real-time controls
- Beam collimation
- Beam injection, ejection & dump
- Radio-frequency equipment
- Power converters
- Beam instrumentation & diagnostics
- Permanent and electro-magnets
- Cryogenic equipment
- Vacuum equipment



# What do we buy ?

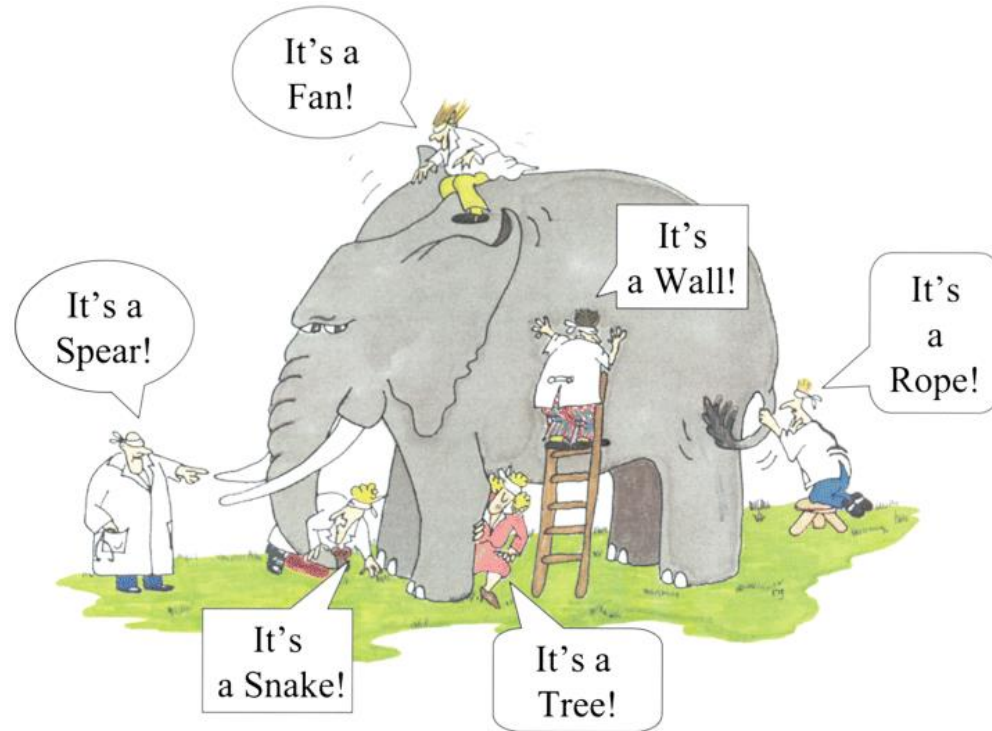
## Supplies for 342 MCHF (2016)





# What do we buy ? Standard or Non-Standard?

- Off-the-shelf or non-standard products which can be produced with existing manufacturing techniques and/or technologies => functional specification
- Non-standard products where industry has neither the required know-how nor the immediate interest to develop and design the products for its existing markets => built to print
- Prototypes and/or pre-series needed?



# HL-LHC “Shopping list”



**HL-LHC Industry**

Industry Relations and Procurement Website for the HL-LHC project

Search this site

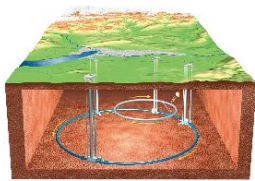
- Home
- General Info
- Procurement Overview
- Tendering
- Acquisition Timeline
- Events
- Contact

## Building the HL-LHC with the Industry

The HL-LHC Industry Website has been specially designed for all those firms that wish to participate in this ambitious project. We want to share all the relevant information related to the procurement that will be required to accomplish this major upgrade of the LHC.

The industry will have a crucial role and will be heavily involved within the HL-LHC Project since it will be the main source to provide the technologies and equipment that are required to successfully achieve the goals of this upgrade of the LHC.

The HL-LHC will collaborate with many types of industries and businesses to pursue its goals. Knowledge and technology to be developed during the HL-LHC project will make a lasting impact on society.



**ILOS**  
ILOS Portal <#>

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**HIGHLIGHTS**

**10 Mar 2016**  
[HL-LHC is now part of the ESFRI Roadmap](#)  
The 2016 Roadmap highlights the strong socio-economic impact of research infrastructures as well as their potential to generate innovation through collaboration with industrial partners.  
[More information on the ESFRI Roadmap 2016](#) <#>

**8 Feb 2016**  
[QUACO Open Market Consultation](#)  
CERN, as member of the European pre-competitive procurement (PCP) instrument QUACO, is pleased to invite you to the Open Market Consultation (OMC) that will take place on 30<sup>th</sup>

## Main Domains of Activity - HL-LHC Project

## Work Packages

Cryogenics systems	WP9
Magnets components and assemblies	WP3, WP11
Electrical equipments, electronics & instrumentation for accelerators	WP4, WP5, WP6A, WP6B, WP7, WP13
Ultra High vacuum components and systems	WP12
Collimators and new material resistant to high temperatures	WP5, WP8, WP14
Cryostats and subcomponents for cryogenic equipment	WP3, WP4, WP6A, WP9, WP11
High precision assembling and manufacturing technologies	WP4, WP5, WP8, WP12, WP14
Others	WP6A, WP10, WP15, WP16
Raw materials	WP3, WP4, WP5, WP8, WP11, WP12, WP14
Civil engineering and technical infrastructures	WP17

<http://project-hl-lhc-industry.web.cern.ch/content/main-procurement-needs-hl-lhc>



# CERN "Shopping list"

## Forthcoming market surveys and calls for tenders

Advance information on forthcoming market surveys and calls for tenders expected to exceed 200,000 Swiss francs.

In the line entitled Cost Range, a very rough indication of the cost range of the product is given in the form of letters **A, B, C, D**.

**A** represents items estimated at less than 750 kCHF, **B** represents items between 750 kCHF and 5 MCHF, **C** represents items between 5 MCHF and 10 MCHF and **D** represents items above 10 MCHF.

Firms may reply to the Market Survey published in the table below up to two weeks before the corresponding Invitation to Tender is sent out. Therefore, in case the deadline for replies indicated in the Market Survey cover letter is over, please send your reply to the Market Survey at the earliest possible date.

The countries of origin of supplies and services shall be [CERN Member States](#), except if provided otherwise in the table below.

References marked with "New" have been posted during the last 8 weeks.

<b>Search Menu</b>		<b>Links Menu</b>	
Type of Contract: <input type="text" value="All"/>	Market Survey dispatched: <input type="text" value="All"/>	Reference: <input type="text"/>	Call for Tenders scheduled for dispatch: <input type="text" value="All"/> <input type="text" value="All"/>
Activity Code: <input type="text"/>	Description and/or Specific Condition: <input type="text"/>	Requirement: <input type="text"/>	Commercial contact: <input type="text" value="All"/>
Cost Range: <input type="text" value="All"/>	Publication Date: <input type="text" value="From"/> <input type="text" value="To"/> dd-mm-yyyy		
<input type="button" value="Search"/>		<input type="button" value="Reset"/>	

Publication Date	Type of Contract	Reference	Requirement (Activity Code)	Description/Specific Condition	Cost Range	Market Survey scheduled for dispatch	Contacts and Interest in being contacted / Market Survey Documents	Invitation to Tender scheduled to dispatch
07-07-2016	Supply	<b>New</b> <a href="#">MS-4212/SMB</a>	Framework Market Survey concerning the provision of building refurbishment works at CERN ( <a href="#">111</a> )	The contract will cover construction works including interior refurbishment (e.g. partition ... <input type="button" value="Read More"/> The firms shall have a proven international competence and experience in ...	B	Second quarter 2016	To express an interest please send an e-mail to <a href="mailto:procurement.service@cern.ch">procurement.service@cern.ch</a> Technically: <a href="#">E. Perez-Duenas</a> Commercially: <a href="#">C. Masoura</a>	First quarter 2018
04-07-2016	Supply	<b>New</b> <a href="#">IT-4245/IT</a>	Supply of servers for physics data processing and infrastructure services ( <a href="#">413</a> )	CERN intends to place a contract for the supply of ... <input type="button" value="Read More"/> Interested firms must be ISO 9001 certified and be Intel Technology ...	D	Refer to MS-4165/IT	To express an interest please send an e-mail to <a href="mailto:procurement.service@cern.ch">procurement.service@cern.ch</a> Technically: <a href="#">E. Bonfillou</a> Commercially: <a href="#">F. Najeh</a>	Third quarter 2016
			Supply of a numerically controlled millino	CERN intends to place a contract for the supply of			To express an interest please send an e-mail to	

<https://found.cern.ch/java-ext/found/CFTSearch.do>

# Procedures for obtaining offers

- **Requirements < 10'000 CHF**

Users may issue enquiries directly provided CERN procurement rules are followed

- **Requirements > 10'000 CHF and < 200'000 CHF**

- Price Enquiries issued by Procurement Service
- Time for bidding 4 weeks; Invite 3 - 5 firms; if > 50'000 CHF sent to Industrial Liaison Officers (ILOs) for information
- Adjudication based on lowest offer (FCA price) which complies with all requirements, subject to the rules aimed at achieving well balanced industrial return coefficients for the Member States (from 100'000 CHF)

- **Requirements > 200'000 CHF**

Market Surveys & Calls for Tenders issued by Procurement Service



# Requirements exceeding 200'000 CHF

- Announcement
- List of firms
- Market Survey
- Invitation to Tender
- Clarification Process
- Opening of bids – Basis of award
- Analysis of lowest bid or Best Value For Money ranking:
  - Price calculation ok?
  - Technical compliance?
  - All requested documents submitted?
  - Country of origin of bid?
  - Alignment rule?
- Contractual negotiation
- Contract



# Country of origin

**Supply contract:** country(ies) in which the goods are manufactured or where the last major modification will take place. If at least 60% of the total amount of the bid comes from poorly balanced Member States, then the **whole bid** will be treated as that from a bidder in a poorly balanced Member State.

**Service contract:** country(ies) in which the bidder is established.



# The alignment rule



- For supply contracts to be awarded on the lowest compliant bid basis and exceeding **100'000 CHF** in value
- A bidder offering goods originating from **poorly balanced** Member States is offered to **align** his price, under certain conditions, to that of the lowest bidder and thereby be awarded the contract

The following countries are considered to be well-balanced in the period 01.03.2017 until 28.02.2018 for Supply contracts:

**Bulgaria, Czech Republic, France, Hungary, Italy, Switzerland**

# Basis of Award – Supply contracts

Supply contracts shall be awarded on FCA price,  
«Lowest compliant bid » basis....



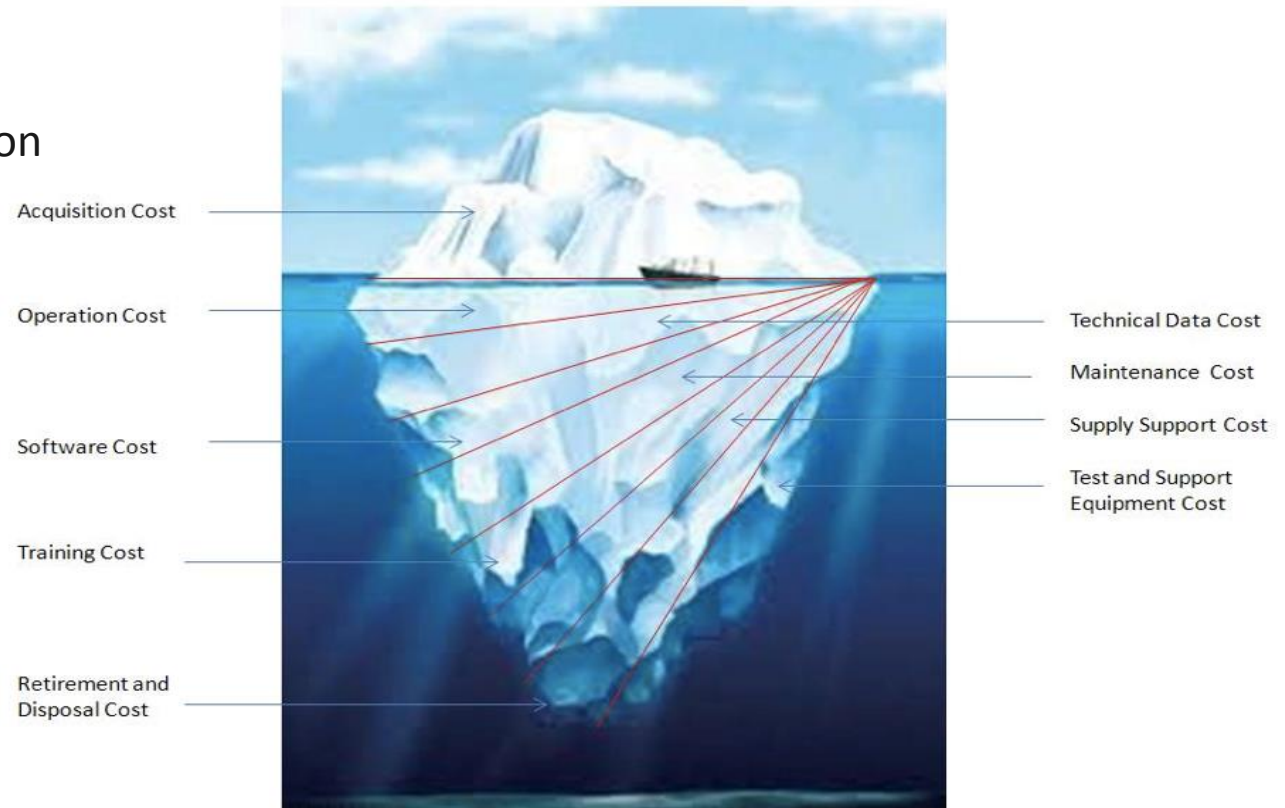
....and....



# Lowest cost .....?

## Takes into account:

- Initial investment
- Operating costs:
  - Energy consumption
  - Spares
  - Maintenance
  - Training, etc.
- Disposal costs



# Basis of Award – Service contracts

Service contracts are awarded on a  
«Best Value for Money» basis  
to the bidder submitting  
the most economically advantageous bid

Price // Quality

A diagram illustrating the relationship between Price and Quality. The word "Price" is written in orange, with a black arrow pointing downwards from its center. The word "Quality" is also written in orange, with a black arrow pointing upwards from its center. The two words are separated by a double slash "//".

# Best Value For Money

The following criteria and weights will be applied by CERN to evaluate the bids for Service contracts:

Criterion	Weight
<b>Price</b> (inc. all relevant costs)	<b>XX</b>
<b>Quality</b>	<b>XX</b>
<ul style="list-style-type: none"><li>▪ Experience of the key personnel</li><li>▪ Stability of the personnel</li><li>▪ External references</li><li>▪ Technical know-how</li><li>▪ Technical training</li><li>▪ Quality of the bid</li><li>▪ Tests</li><li>▪ Etc.</li></ul>	
<b>TOTAL</b>	<b>100</b>

# Reports and studies

Report on the Impacts of Large  
on Economic Innovati

CASE STUDIES



UPPSALA  
UNIVERSITET

Företagsekonomiska institutionen  
Department of Business Studies

## Science in Business Interaction

A Study of the Collaboration between  
CERN and Swedish Companies

Susanne Åberg

PRELIMINARY VERSION



ORGANISATION EUROPÉENNE POUR LA RECHERCHE NUCLEAIRE  
CERN EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

TECHNOLOGY TRANSFER AND TECHNOLOGICAL  
LEARNING THROUGH CERN'S PROCUREMENT  
ACTIVITY

Erikko Autio  
*Helsinki Institute of Physics, Helsinki, Finland & CERN, Geneva, Switzerland*

Marilena Bianchi-Streit  
*CERN, Geneva, Switzerland*

Ari-Pekka Hamén  
*Helsinki Institute of Physics, Helsinki, Finland & IHEP, Lausanne, Switzerland*

GENEVA  
2003

arXiv:1507.05638v1 [physics.soc-ph] 20 Jul 2015

TIF-UNIMI-2015-9

## Cost-Benefit Analysis of the Large Hadron Collider to 2025 and beyond

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<sup>2</sup> TIF Lab, Dipartimento di Fisica, Università di Milano and  
INFN, Sezione di Milano, Via Celoria 16, I-20133 Milano, Italy

<sup>3</sup> CSIL, Centre for Industrial Studies  
Corso Monforte 15, I-20122 Milano, Italy

### Abstract

Social cost-benefit analysis (CBA) of projects has been successfully applied in different fields such as transport, energy, health, education, and environment, including climate change. It is often argued that it is impossible to extend the CBA approach to the evaluation of the social impact of research infrastructures, because the final benefit to society of scientific discovery is generally unpredictable. Here, we propose a quantitative approach to this problem, we use it to design an empirically testable CBA model, and we apply it to the the Large Hadron Collider (LHC), the highest-energy accelerator in the world, currently operating at CERN. We show that the evaluation of benefits can be made quantitative by determining their value to users (scientists, early-stage researchers, firms, visitors) and non-users (the general public). Four classes of contributions to users are identified: knowledge output, human capital development, technological spillovers, and cultural effects. Benefits for non-users can be estimated, in analogy to public goods with no practical use (such as environment preservation), using willingness to pay. We determine the probability distribution of cost and benefits for the LHC since 1993 until planned decommissioning in 2025, and we find there is a 92% probability that benefits exceed its costs, with an expected net present value (NPV) of about 3 billion €, not including the unpredictable economic value of discovery of any new physics. We argue that the evaluation approach proposed here can be replicated for any large-scale research infrastructure, thus helping the decision-making on competing projects, with a socio-economic appraisal complementary to other evaluation criteria.

# Results of contracts with CERN

- 38% had developed new products
- 42% increased international exposure
- 44% improved technological learning
- 52% would have had poorer sales performance without CERN
- 17% opened a new market
- 60% acquired new customers
- all firms had derived great value from CERN as a marketing reference



# Successful bidders and contractors



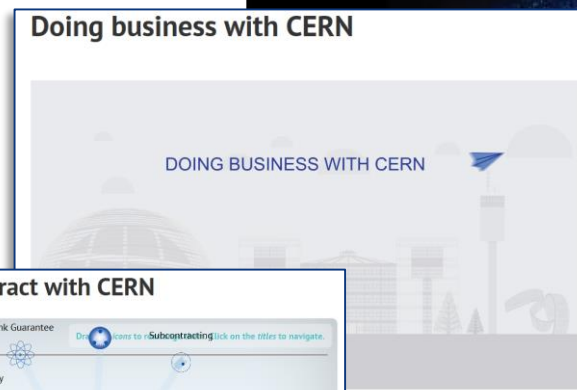
- Often small – medium sized and **flexible** firms
- Ensure **full** understanding of specifications – **exceeded** specifications may be **too expensive** (adjudication to lowest compliant bid for supplies)
- Communicate with CERN (problems, issues, alternatives, etc.)
- Take into account test requirements and documentation
- Make best offer directly
- Ensure good working relationship with partners and sub-contractors

# Contacts with CERN

Procurement web page

<http://procurement.web.cern.ch/>

Industrial liaison Officer (ILO)



## Who to contact in your Country



**Industrial Liaison Officers (ILO's)** are appointed by CERN's Member States to facilitate the flow of communication between CERN and its suppliers. ILO's can provide advice on the opportunities available for doing business with CERN and the support available to firms in their local regions.

- Austria
- Belgium
- Bulgaria
- Cyprus
- Czech Republic
- Denmark
- Finland
- France





**Big  
Science  
Business  
Forum  
2018**

**BIG** SCIENCE  
BUSINESS FORUM

**26-28 FEBRUARY 2018  
COPENHAGEN, DENMARK**

Photo credit: LNM / Engage



European Organization for Nuclear Research  
*Organisation européenne pour la recherche nucléaire*



## Who

In total is expected 1 000 participants from mainly European businesses and organisations, who wish to engage on the Big Science market. BSBF2018 is hosted by bigscience.dk and the Danish Ministry for Science and Higher Education and organised by the European Big Science organisations:



## BSBF2018 business areas

- Electrical, electromechanical and RF systems
- High precision and large mechanical components
- Remote handling systems for hazardous environment
- Diagnostics and detectors
- Cryogenic technology
- Vacuum and leak detection technologies
- Instrumentation, control and CODAC
- Engineering methodologies and tools
- Safety systems, licensing and protection of hazardous installations, access control, fire and gas detection
- Basic material technologies, manufacturing and assembly technologies
- Superconductivity and superconducting magnets
- Information and communication technologies



