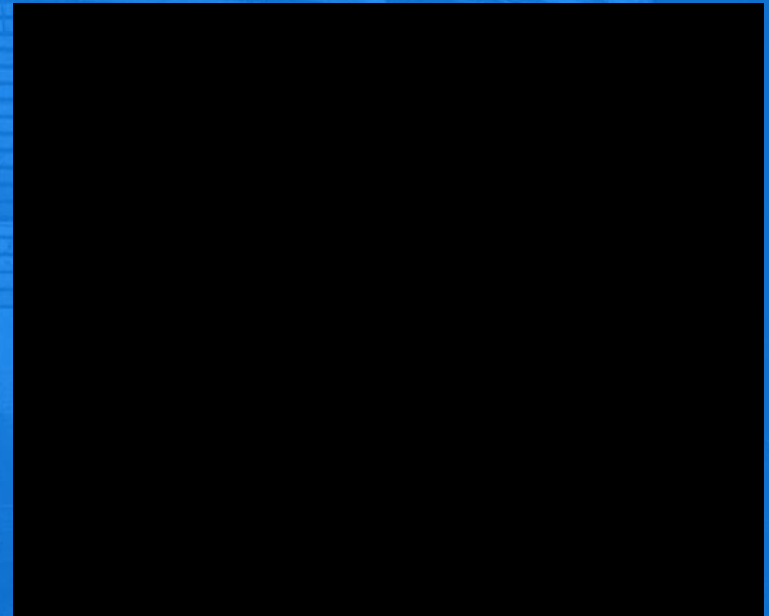




# CERN's Industrial Policy

Poland April 2008

Thierry Lagrange



# CERN Vision



*Physics*

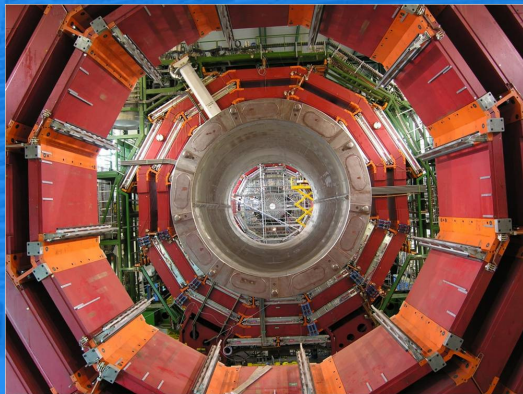


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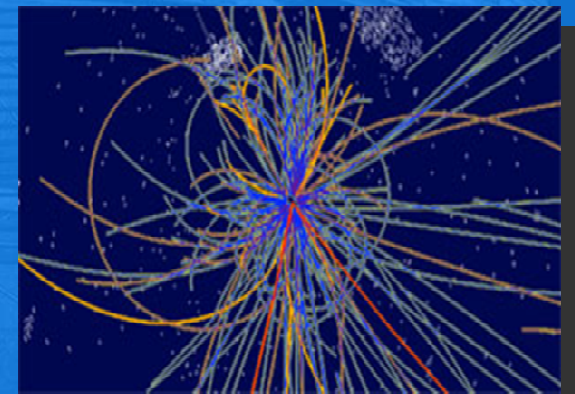
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# CERN in Numbers

2502 staff\*

776 Fellows and Associates\*

8855 users\*

Budget (2008): **937 MCHF** (605M EUR)

\*17 July 2007

## Member States:

Austria, Belgium, Bulgaria, the Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Italy, Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## Observers:

India, Israel, Japan, the Russian Federation, the United States of America, Turkey, the European Commission and Unesco

## POLISH NATIONALS AT CERN (31.12.2007)

	Employees of a sub- contractor	Fellows	Paid Associates	Project Associates	Staff Members	Students	Summer Students	Unpaid Associates	Users	Total
20-24						4	4	1	13	22
25-29	1	14		10	11	9		2	33	80
30-34	3	6		10	10			1	36	66
35-39	1	1		3	9			2	13	29
40-44	3			1	1			1	11	17
45-49	3			2	4			4	14	27
50-54	4		1	6				3	17	31
55-59				8	3			2	18	31
60-65			1	4				2	19	26
>65									10	10
<b>Total</b>	<b>15</b>	<b>21</b>	<b>2</b>	<b>44</b>	<b>38</b>	<b>13</b>	<b>4</b>	<b>18</b>	<b>184</b>	<b>339</b>

## Polish staff by professional category *(31.12.2007)*

Professional Class	Total
2	34
3	1
5A	2
5B	1
<b>Grand Total</b>	<b>38</b>

Professional code description	Total
Engineering work	1
Mechanics	1
Electricity	1
Electronics	3
Computing Engineers	23
Applied physics	3
Computing physicists	2
Computing technician	1
General professional administr.	1
Personnel management	1
General administrative work	1
<b>Grand Total</b>	<b>38</b>



# An Aerial View of CERN





Accelerators are highly complex systems, requiring equipment and technology designed and made to the highest specifications.

To build an accelerator as the LHC requires a broad range of generic research and development projects with industry and new advances in such high-tech and fast-moving fields as computing, electronics, superconducting magnets,....

Prototype equipment on an industrial scale.



# Technology at CERN

Computing/IT

Vacuum & cryogenics

Electronics

Electricity

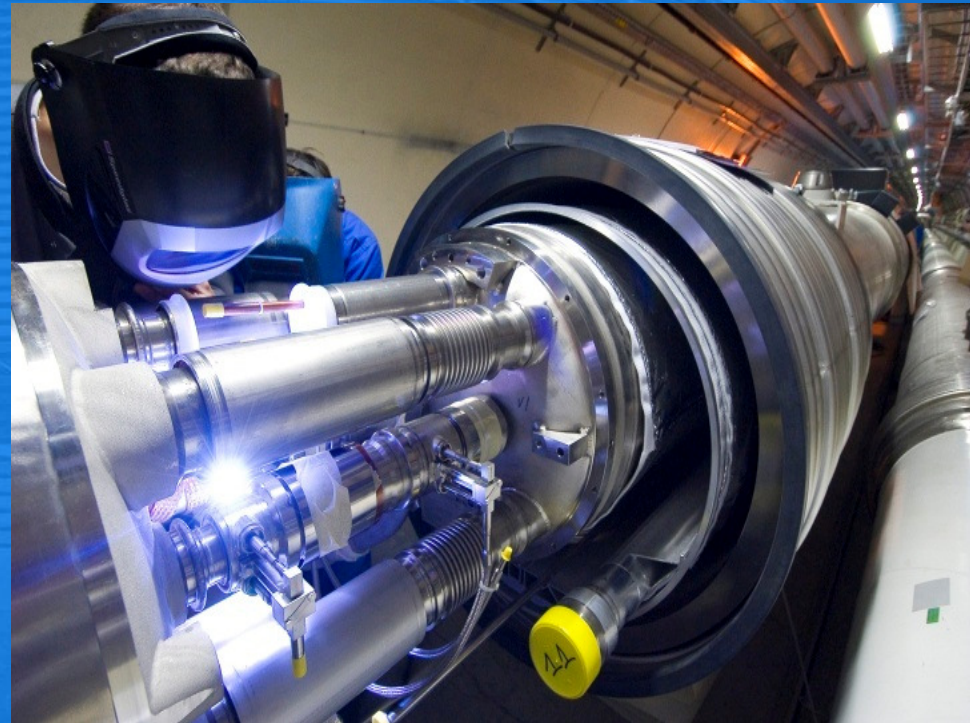
Magnets

Mechanics

Material Science

Radiofrequency

Control Systems





# WHAT DO WE BUY



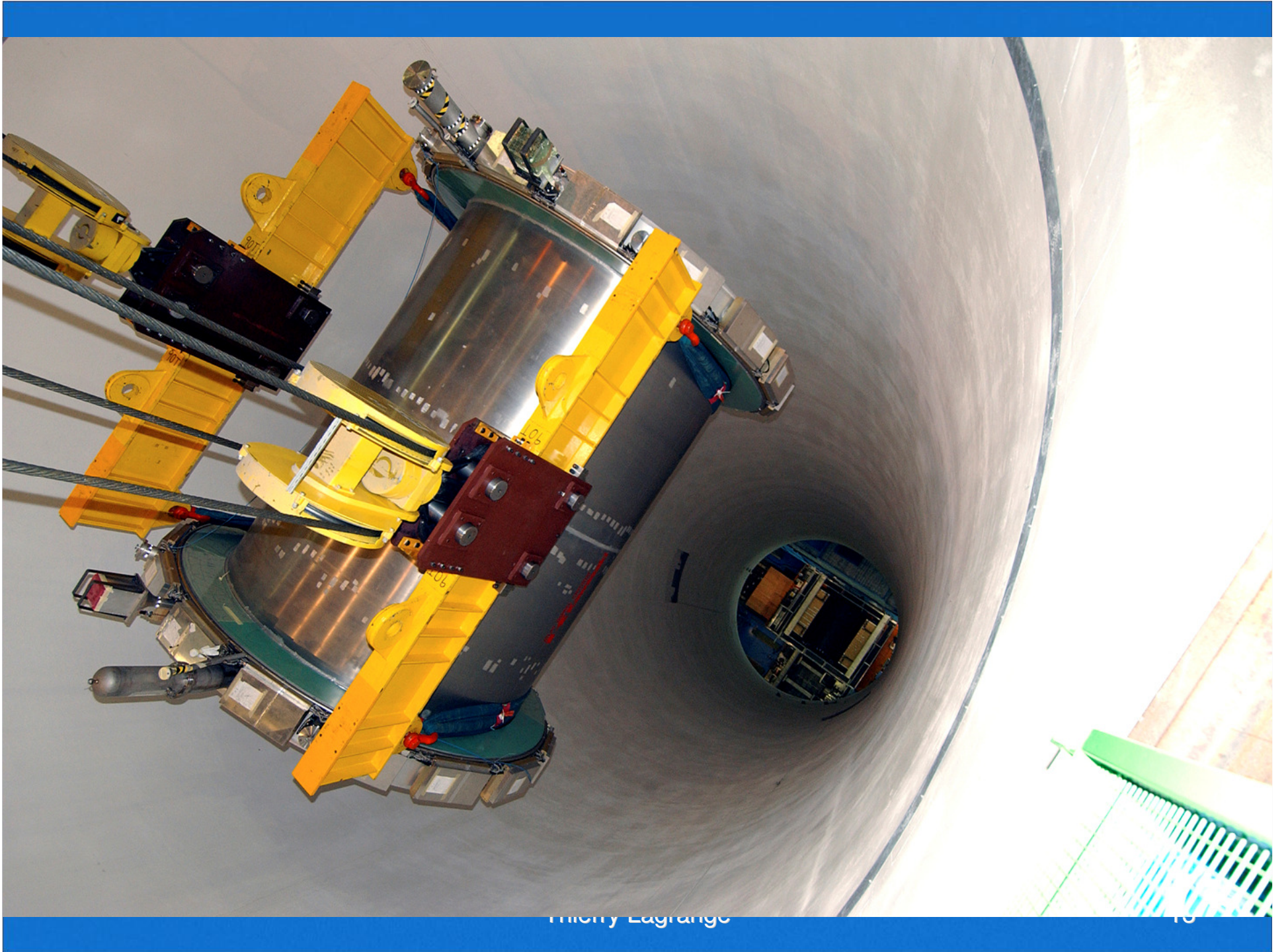
# WHAT DO WE BUY ? (2007)

## SUPPLIES FOR CHF 264'137'379.-

- CIVIL ENGINEERING : CHF 32'525'081.-
- ELECTRICAL ENGINEERING : CHF 59'445'951.-
- ELECTRONICS : CHF 27'493'134.-
- COMPUTER SYSTEMS : CHF 31'474'649.-
- MECHANICAL SUPPLIES : CHF 39'878'702.-

- **VACUUM AND LOW-TEMPERATURE TECHNOLOGY : CHF 32'634'822.-**
- **PARTICLE DETECTORS : CHF 1'712'047.-**
- **MISCELLANEOUS (PHOTO EQUIPMENT, GASES, VEHICLES, PETROL, TOOLS, FURNITURE, OFFICE SUPPLIES, PUBLICATIONS) : CHF 36'135'572.-**
- **DESIGN STUDIES - MISCELLANEOUS SUPPLIES CHF 2'837'421.-**





# CERN's purchasing policy for project's

CERN's policy for large project consists in acting as a general contractor. CERN does the conceptual design of the accelerators and its main components (plus part of the hardware for the detectors) and subcontracts to industry. This mitigates the risks (delays, extra costs, failure to perform the contract) and reduces cost. It also allows to satisfy the need to distribute contracts in the MS.

# CERN's policy for project procurement

CERN's projects requirements are divided in 2 categories:

- 1) Standard industrial products
- 2) New high-tech products requiring a conceptual design phase. The manufacturing methodology has to be developed.
- Each category has a different strategy. The risk as well as the expected benefits and spin-offs are entirely different.

## 1) Standard products

The responsibility lies with the supplier. (power converters, transformers, cryoplants)

A performance specification using international quality standards is the basis for tendering.

EX: Large Helium cryogenic plants for LHC



# EX: Large Helium cryogenic plants for LHC

Cryoplant 18 kW equivalent @ 4.5 K

A compressor station. (90 t, 300 m<sup>2</sup>).

A cold box with expansion turbines. (100 m<sup>3</sup>, 60 t)

Cryogenic infrastructure (storage vessel and tanks).

A lot of utilities:

- Electrical power supply: **5 MW** per plant
- Cooling Water : **450 m<sup>3</sup>/h** per plant
- Compressed air: **100 Nm<sup>3</sup>/h** per plant
- Building ventilation (**300 kW**)
- Cranes for installation and maintenance (**5 to 20 t**)



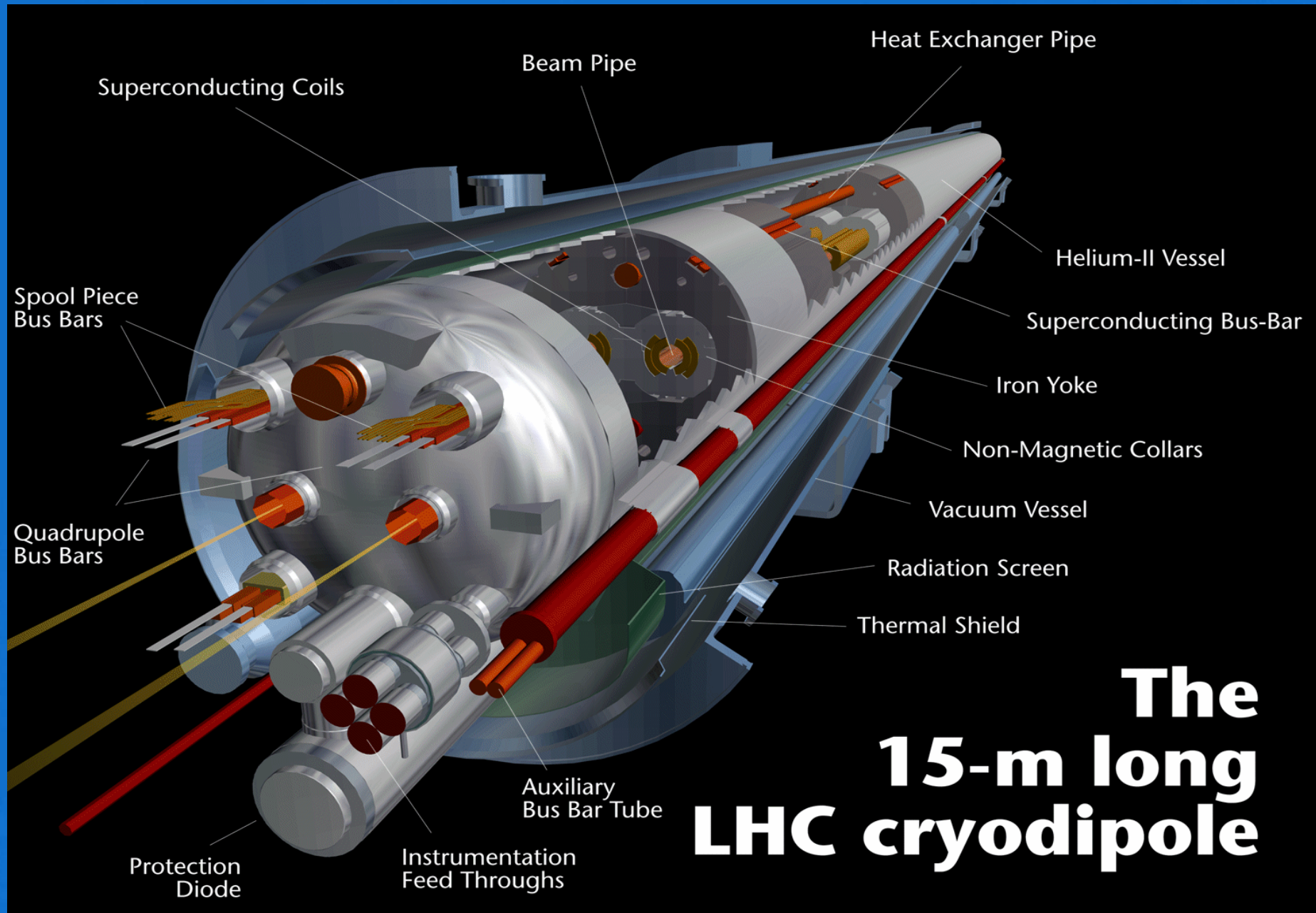
Cold box integration at D.E.A.L. (Madrid)

## 2) New high-tech products for HEP

These products are strategic and exclusively designed for CERN needs.

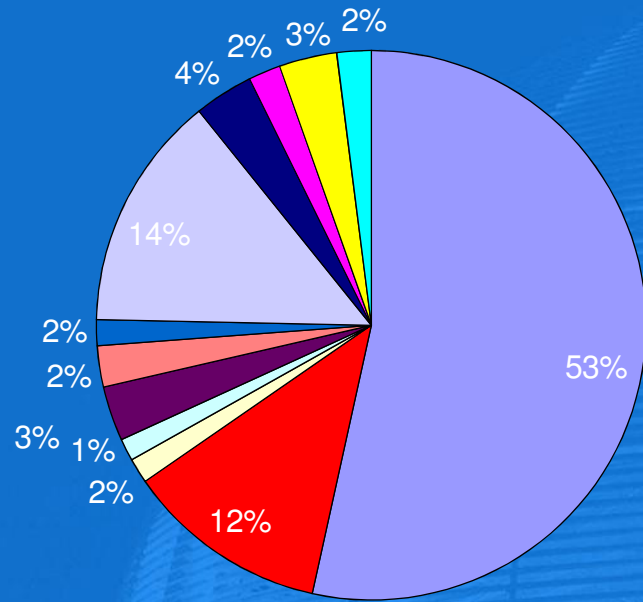
To reduce price and risk, CERN buys most of the components. This gives better control over the production and allows to spread the procurement over all the Member States as more companies can be involved.

Ex:superconducting magnet

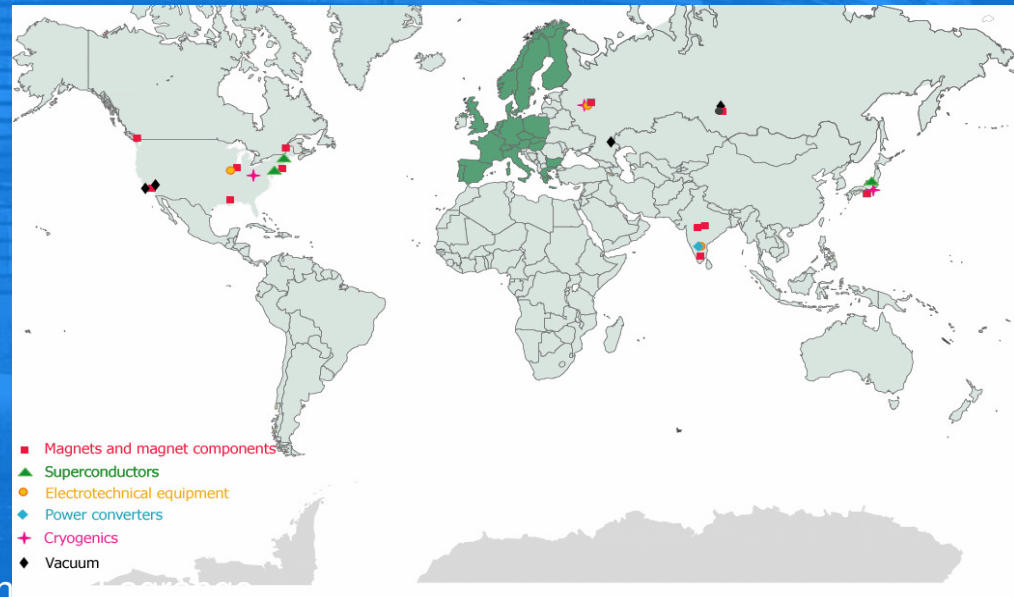


# The 15-m long LHC cryodipole

# Procuring the components of an accelerator: example of purchasing policy for large projects



- Magnets
- Cryogenics
- Beam dump
- Radio-frequency
- Vacuum
- Power converters
- Beam instrumentation
- Civil Engineering
- Cooling & ventilation
- Power distribution
- Infrastructure & services
- Installation & coordination



# Rules

Purchasing rules have been written to guarantee to the Member states a fair and transparent process and to distribute the contracts over the Member States while keeping competition.

- Cheapest compliant bidder for supply contracts.
- Limited to Member States.
- Fair return (selective tendering, realignment, splitting, subcontracting).

# Lowest compliant bidder

Lowest compliant bidder vs. best value for money or best technical offer/fixed budget.

Best price at first shot. No price negotiations.

# Mechanism of fair return

THE RETURN COEFFICIENT OF MEMBER STATES IS THE RATIO BETWEEN THAT MEMBER STATE'S SHARE OF THE VALUE OF CONTRACTS AND THAT MEMBER STATE'S CONTRIBUTION TO THE CERN BUDGET OVER 4 YEARS

$$\sum_{1-4} 1 - \text{NMS}$$

NMS= Non Member States

# BALANCED MEMBER STATES

FOR 2008, A MEMBER STATE IS CONSIDERED POORLY BALANCED IF ITS INDUSTRIAL RETURN COEFFICIENT IS:

< 0.93 FOR SUPPLY CONTRACTS

< 0.40 FOR INDUSTRIAL SERVICE CONTRACTS

OTHERWISE, IT IS CONSIDERED TO BE WELL BALANCED



	Supplies		Industrial Services	
	Total (CHF)	Return Coefficient Target: 0.93	Total (CHF)	Return Coefficient Target: 0.4
Austria	16 635 566	0.39	4 343 025	0.32
Belgium	52 064 221	<b>1.02</b>	14 706 837	<b>0.88</b>
Bulgaria	1 379 532	0.36	331 913	0.27
Switzerland	163 886 259	<b>2.70</b>	107 827 484	<b>5.46</b>
Czech Republic	7 806 158	0.50	-	-
Germany	374 348 383	<b>0.95</b>	60 406 608	<b>0.47</b>
Denmark	30 126 570	0.90	11 409 640	<b>1.05</b>
Spain	78 623 695	0.52	6 276 992	0.13
Finland	45 555 718	<b>1.78</b>	127 471	0.02
France	498 950 868	<b>1.65</b>	258 603 921	<b>2.63</b>
United Kingdom	100 736 698	0.30	6 282 129	0.06
Greece	1 857 371	0.07	1 985 412	0.22
Hungary	5 387 620	0.34	135 984	0.03
Italy	328 109 444	<b>1.37</b>	28 268 490	0.36
Netherlands	44 037 862	0.52	82 756 020	<b>3.01</b>
Norway	1 456 792	0.04	1 511 082	0.12
Poland	13 792 307	0.36	11 112 929	<b>0.89</b>
Portugal	13 853 692	0.63	28 033 408	<b>3.89</b>
Sweden	17 309 054	0.35	2 090 387	0.13
Slovak Republic	15 621 447	<b>2.53</b>	-	-

# How?

## Selective tendering

CERN/FC/4884  
Original: English  
17 November 2004

**ORGANISATION EUROPEENNE POUR LA RECHERCHE NUCLEAIRE**  
**CERN** EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH

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FINANCE COMMITTEE  
Three-hundred-and-fourth Meeting  
Geneva – 15 December 2004

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

This document lists all calls for tenders expected to exceed 200 000 Swiss francs or, when applicable, the preceding market surveys which are scheduled to be issued during the period from **December 2004 to the end of April 2005**.

The numbers in the Requirement field correspond to the Activity Codes used by CERN which facilitate the drawing up of lists of potential suppliers.

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** or **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.

Table IV gives information concerning previously announced market surveys and invitations to tender which no longer appear in Table I to III of this document.

Table V lists technology transfer possibilities.

Thierry Lagrange

# MARKET SURVEY

## PURPOSE

- Encourage early exchange of information
- Allows Delegates, ILO's, etc., to propose potential bidders
- Allows CERN to draw up a final specification
- Fair return policy: subcontracting (or co-contracting) in several countries with less return.

- Allows CERN to draw up a list of qualified bidders

=> Selection of companies is based on qualifications of firms, return coefficient and contributions.

# BUDGET 2007

## 20 MEMBER STATES' CONTRIBUTIONS

### Amounts in Swiss francs

 Germany	19.73%	202'452'100	 Norway	2.37%	24'299'950
 United Kingdom	17.67%	181'370'000	 Poland	2.21%	22'687'350
 France*	14.88%	152'718'800	 Denmark	1.76%	18'100'250
 Italy	12.05%	123'635'450	 Greece	1.54%	15'854'400
 Spain	8.16%	83'790'450	 Finland	1.40%	14'416'100
 Netherlands	4.46%	45'739'400	 Portugal	1.19%	12'243'100
 Switzerland	3.07%	31'462'150	 Hungary	0.76%	7'839'950
 Belgium	2.66%	27'260'750	 Czech Republic	0.88%	9'075'800
 Sweden	2.48%	25'451'950	 Slovak Republic	0.34%	3'491'100
 Austria	2.17%	22'250'950	 Bulgaria	0.21%	2'147'800

\* Additional contribution from France 9'000'000 CHF

**Total CHF 100% 1'026'287'800**

# THE ALIGNMENT RULE

2 possibilities:

1. Lowest bidder is from PB Member State : CONTRACT

2. Lowest bidder is from WB Member State

If first bidder from PB Member States is  $< 20\%$  and aligns with cheapest offer: CONTRACT

# COUNTRY OF ORIGIN

## SUPPLY CONTRACTS

The country in which goods are manufactured or where the last major transformation took place.

## INDUSTRIAL SERVICE CONTRACTS

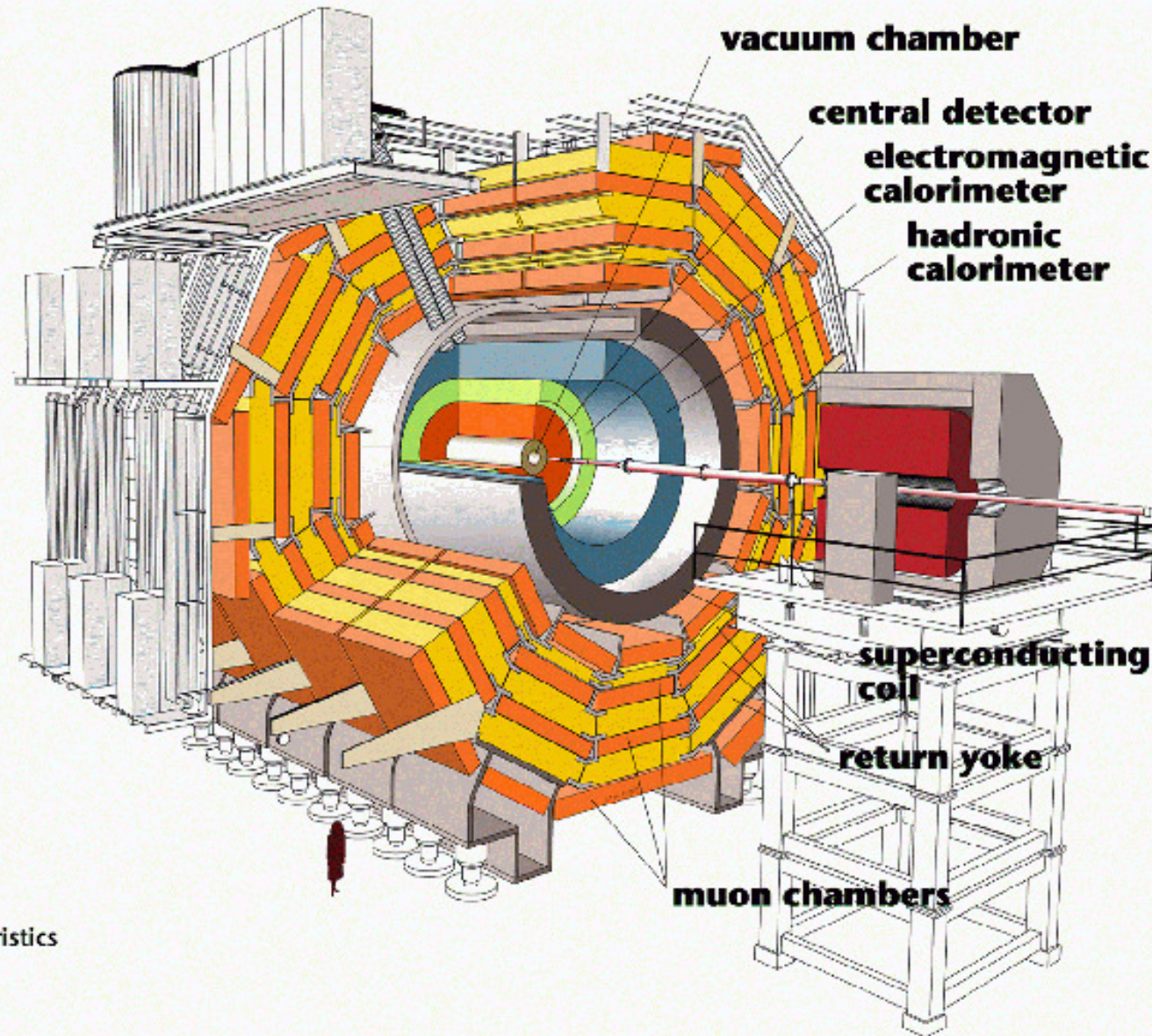
The country in which the bidder is located.



# COUNTRY OF ORIGIN

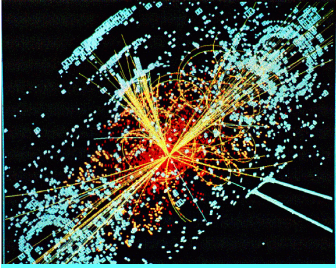
If at least 50% (40% for industrial services) of the total amount of the tender comes from a poorly balanced MS, the whole offer will be treated as that from a bidder in a poorly balanced Member State.

# CMS DETECTOR LAYOUT



## Detector characteristics

Width: 22m  
Diameter: 15m  
Weight: 14'500t



EXPERIMENTS

# PROCUREMENT FOR EXPERIMENTS

- No CERN money, but still.....
- CERN contract partner

CERN places the contract on behalf of the collaboration according to CERN rules

EXCEPT : not limited to CERN MS.

no realignment procedure

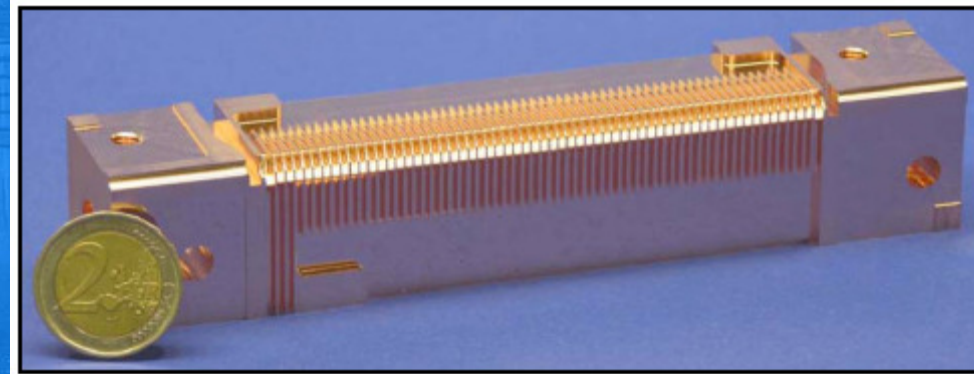
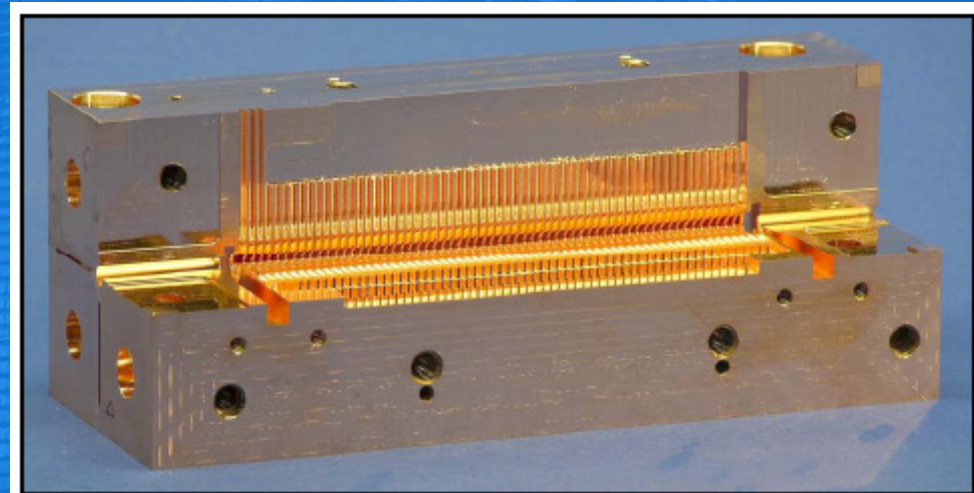
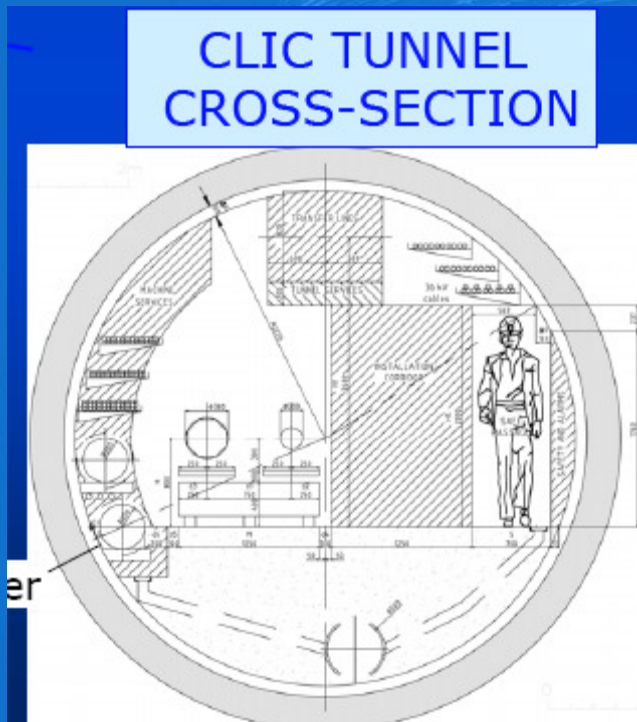
# Benefits deriving from CERN's contracts

- Research and development benefits
- Improved technical skills
- Improved marketing position (reference)
- Common development of new products, shared IP
- International benchmarking
- Technology transfer



# CERN's future projects

## After the LHC

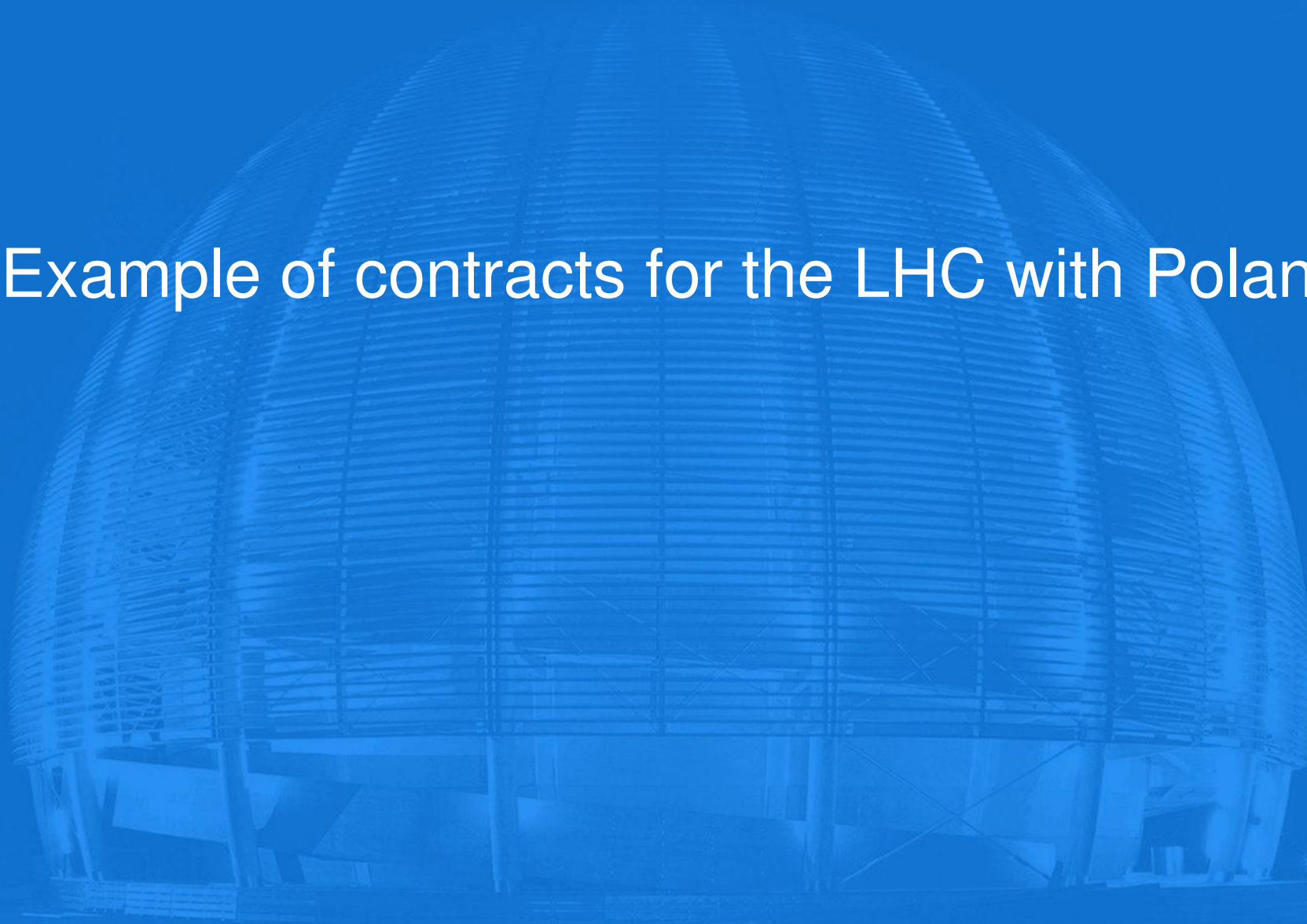


# CERN's procurement during operation phase

More 'Standard products' products.

Requirements often below 200kCHF.

- Example of contracts for the LHC with Poland



ZEC: pipelines for cooling plants. CERN and the experiments are very satisfied with the quality of the work done.

This is explained by the very qualified workforce.





## Cooling plants

CERN defined the technical requirements and made the conceptual design

Zec final design, calculations and manufacturing.

When problems: collaboration with CERN to find solutions



DESCRIPTION	SUPPLIER	AMOUNT
CMS UNDERGROUND COOLING SYSTEM	ZEC SERVICE SP. Z O.O.	3,877,940
COOLING PLANTS FOR CNGS	ZEC SERVICE SP.Z O.O.	3,085,668
STEEL PIPING IN THE TI2 & TI8	ZEC SERVICE SP. Z O.O.	2,277,279
TRANSPORT AND HANDLING	ALLIED PICKFORDS POL	1,472,230
SUPPLY OF 19 INCH ELECTRONICS	MICROOMEGA SP. Z.O.C	863,489
IT2907/LHC/LHC INTERFACE BOXES FOR LHC	THE MINING ELECTRONI	808,621
VAC VESSELS FOR ISOLDE TARGETS	INSTYTUT PROBLEMOW	741,916
WATER COOLING SYSTEM ON THE CMS YOKE	ZEC SERVICE SP. Z O.O.	731,380
HF TRUCKS FOR THE ATLAS EXPERIMENT	BUDIMEX DROMEX S.A.	608,351
DISK SERVERS FOR PHYSICS DATA	JTT COMPUTER SA	492,866
CMS YOKE RACKS COOLING CIRCUIT	ZEC SERVICE SP. Z O.O.	425,280
HV POWER SUPPLY UNITS FOR THE ATLAS SCT	FIDELTRONIK ZBIGNIEW	421,686
CMS YOKE GAS PIPING	ZEC SERVICE SP. Z O.O.	413,091
INSTRUMENTATION RACKS - IT-3242/AT/LHC	THE MINING ELECTRONI	388,058
PIPING OF YE1	ZEC SERVICE SP. Z O.O.	247,300

# What to do

Mapping of CERN future requirements and match with Polish companies

Involvement at early stage in development work of new projects.

Networking at CERN.

NUMBERS OF RESPONSES ON IT/PE FOR POLISH FIRMS										
Year	PL	DECLINED	%	INTEREST	%	NOREPLY	%	(blank)	%	TOTAL
<b>IT</b>		<b>6</b>	<b>11%</b>	<b>21</b>	<b>40%</b>	<b>21</b>	<b>40%</b>	<b>5</b>	<b>9%</b>	<b>53</b>
2003	PL	1		5		3		2		11
2004	PL	2		9		5				16
2005	PL	2		5		9		3		19
2006	PL	1		1		4				6
2007	PL			1						1
<b>PE</b>		<b>37</b>	<b>15%</b>	<b>104</b>	<b>42%</b>	<b>97</b>	<b>39%</b>	<b>10</b>	<b>4%</b>	<b>248</b>
2003	PL	15		36		31		1		83
2004	PL	5		12		15		1		33
2005	PL	12		24		36		4		76
2006	PL	4		25		10		3		42
2007	PL	1		7		5		1		14
<b>TOTAL</b>		<b>43</b>	<b>14%</b>	<b>125</b>	<b>42%</b>	<b>118</b>	<b>39%</b>	<b>15</b>	<b>5%</b>	<b>301</b>

NUMBERS OF RESPONSES ON IT/PE FOR ALL COUNTRIES FIRMS (INCLUDED POLISH FIRMS)										
Year	CERN	DECLINED	%	INTEREST	%	NOREPLY	%	(blank)	%	TOTAL
<b>IT</b>		<b>635</b>	<b>24%</b>	<b>1323</b>	<b>49%</b>	<b>520</b>	<b>19%</b>	<b>206</b>	<b>8%</b>	<b>2684</b>
2003	CERN	141		307		93		86		627
2004	CERN	138		274		95		23		530
2005	CERN	169		342		115		57		683
2006	CERN	83		226		112		18		439
2007	CERN	104		174		105		22		405
<b>PE</b>		<b>2657</b>	<b>14%</b>	<b>9648</b>	<b>49%</b>	<b>5577</b>	<b>29%</b>	<b>1633</b>	<b>8%</b>	<b>19515</b>
2003	CERN	655		2389		1410		286		4740
2004	CERN	609		2216		1335		466		4626
2005	CERN	649		2398		1463		395		4905
2006	CERN	448		1703		877		281		3309
2007	CERN	296		942		492		205		1935
<b>TOTAL</b>		<b>3292</b>	<b>15%</b>	<b>10971</b>	<b>49%</b>	<b>6097</b>	<b>27%</b>	<b>1839</b>	<b>8%</b>	<b>22199</b>

# What to do

Communication with the companies keyword.

Visit to CERN (exhibitions, groups of companies)

Distribution in Poland of CERN's procurement requirements

Work of Industrial Liaison Officer crucial.

# Future projects & needs

- Long term future; CLIC
- Short & medium term future
  - Refurbishment of PS and SPS
  - Linac 4
  - Disc servers & Industrial PC
  - Upgrade SUPER LHC
  - R&D on injection lines
- Services



Thank You!