CERN/SPC/963/Rev.
CERN/FC/5508/Rev.
CERN/2957/Rev.
Original: English
26 May 2011

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

Action to be taken		*Voting procedure*
For information	**SCIENTIFIC POLICY COMMITTEE** 272nd Meeting **20 and 21 June 2011**	—
For recommendation	**FINANCE COMMITTEE** 336th Meeting **22 June 2011**	Simple majority of Member States represented and voting and at least 51% of the contributions of all Member States
For approval	**COUNCIL** 159th Session **23 and 24 June 2011**	Simple majority of Member States represented and voting

Annual Progress Report

of the Organization

for the fifty-sixth financial year

2010

GENEVA, May 2011

Table of contents

I. Executive Summary

This document is the third edition of the Annual Progress Report (APR) following the introduction of new CERN governance principles decided by the Council in 2008. The purpose of the APR is to compare, by activity, the achievements with the objectives agreed by the Council and also to compare actual expenses by objective and activity with resources planning.

Dedicated information is provided on scientific progress and publications, core information on human resources and training, on health and safety, on user statistics and on collaboration agreements, as well as financial information on the carry-forward and details on the European Union-supported projects. The financial summary figures include the expense breakdown by nature.

This third APR implements the recommendations of the Council and its Committees as well as of the External Auditors. The layout of the financial figures has therefore been adapted to include more information on open commitments as at the end of the year. Notably, this includes a clear distinction between achievements, risk assessment and future impact. For some activities, the objectives set in the Medium Term Plan (MTP) in June 2009 for the year 2010 had to be revised in the second half of 2009 or early 2010, as explained in the fact sheets.

The main achievements and progress for 2010 can be summarized as follows:

- Excellent performance of the LHC machine for both proton and Pb-ion beams. Beam operation availability was 65% on average. Peak instantaneous luminosities of 2×10^{32} cm^{-2} s^{-1} were attained for proton-proton collisions, which were a factor of two above the 2010 goal and which resulted in almost 50 pb^{-1} of integrated luminosity delivered to the experiments. Following a short 4-day switch-over to Pb-ion beams, peak luminosities of 3×10^{25} cm^{-2} s^{-1} were attained for Pb-Pb collisions with almost 10 μb^{-1} of integrated luminosity delivered to the experiments.

- The experiments took data of excellent quality and with high efficiency. As a result, 54 physics papers based on the 2010 data were published and more than 1140 conference presentations were made by the LHC experiments.

- CMS and ATLAS have "rediscovered" all the known particles of the Standard Model, including the top quark for which they measured the production cross-section at 7 TeV. Limits which exceed those set at the Tevatron have been set in the search for new particles and new physics. LHCb has already shown evidence for new decay channels of the B mesons. ALICE measured properties of the soft proton-proton collisions which will serve as the reference for the study of ion collisions. The LHCf experiment was completed, and the TOTEM experiment was able to record a large sample of elastic collisions. The Pb-ion run at a centre-of-mass energy of 2.76 TeV NN was also very successful, leading to important measurements by ALICE, ATLAS and CMS concerning the properties of the dense nuclear matter produced in the Pb-Pb collisions. For example, the jet-quenching phenomenon was observed by all three detectors and the ALICE experiment has already been able to measure some hydrodynamics properties of the dense medium.

- The performance of the LHC Computing Grid was also outstanding, exceeding the design bandwidth and allowing a very fast reconstruction and analysis of the data.

- The non-LHC physics programme was highly successful at all facilities - SPS, PS, AD, nTOF, ISOLDE - and at the axion search experiments. The highlight was the first trapping of anti-hydrogen atoms by the ALPHA and ASACUSA experiments at the Antiproton Decelerator, which attracted much interest in the international media and which was cited as 'Breakthrough of the Year' by the Physics World Magazine. The CLOUD experiment recorded very clean data which allowed the first measurement of the critical cluster at the molecular level for various temperatures. In the case of the CNGS, the OPERA experiment published its first candidate for a $\nu_\mu \rightarrow \nu_\tau$ oscillation and the ICARUS detector started operation.

- The CLIC Test Facility CTF3 was commissioned with beam and demonstrated the feasibility of the novel scheme of high-intensity and high-frequency drive beam generation as well as of two-beam acceleration in a prototype two-beam test stand with nominal accelerating fields of 100 MeV/m. Broad international participation in the CLIC machine and detector design studies has been established, in order to proceed towards the Conceptual Design Report (CDR) for both the machine and the detector(s). Due to a small fire in the test facility in 2010, the CDR will be slightly delayed in 2011.

- The Theoretical Physics Unit hosted 719 paid visitors for periods of one to two weeks to collaborate with theoretical physicists and with the experiments. The Unit produced 323 TH Preprints.

- Bilateral agreements were signed between CERN and several parties. These included International Co-operation Agreements with non-Member State Governments and their Agencies, Protocols that govern a non-Member State's participation in specific CERN programmes, agreements with Inter-governmental Organizations, agreements with International Scientific Organizations and agreements with partner institutes, laboratories and universities. More details are given under Section III (Additional Information) below.

- A total of 984 teachers attended the CERN Teacher Programmes, either the international programme or one of the many sessions held in a national language. Many teachers returned to CERN with their classes, and this together with daily general public visits resulted in about 58 000 visitors in 2010, an increase of close to 50% compared to 2009. The new CERN permanent exhibition – *The Universe of Particles* – was inaugurated in July 2010 and received about 6 000 visitors per month.
- The VIP and Protocol Office managed 145 visits to CERN in 2010, a small increase over the 2009 figure.
- The Management continued with the implementation of an extensive programme aimed at consolidation of the general infrastructure, logistics and services, with enhanced support to Staff and Users as its principal priority.
- Several health and safety services have been improved or implemented in order to allow the Organization to systematically ensure preventive measures, including safety training and awareness campaigns, a review of safety technical specifications and the guarantee of safety compliance in new projects.
- The results of the Five-Yearly Review and a first set of measures to restore the financial balance of the Pension Fund were approved by the Council and were implemented with effect from the 1st January 2011.
- Romania became Candidate for Accession. The 2010 additional contribution helped funding a new library reading room, the launching of the visiting points project, and additional support to the ILC studies.

As shown in the summary of revenues and expenses (Figure 1), the budget balance was more positive than anticipated. The main reasons for the 110 MCHF difference are:

- Overall, the appreciation of the Swiss franc (CHF) resulted in about 21 MCHF savings (including energy costs), which improve the financial position. This appreciation resulted in the non-CHF cash outflow being reduced from 26% in 2009 to 25% in 2010.
- Limits on manpower: in spite of more personnel in 2010 with respect to 2009, the focus on the reliable exploitation of the LHC machine, its injectors, detectors, computing and infrastructure has resulted in some delays in the procurement of consolidation items and in some projects.
- Open commitments and multiannual projects: at the end of 2010, open commitments of unused materials budget and re-profiling of materials budget respecting the Cost-to-Completion of multiannual projects amounted to about 75 MCHF. This includes the new strategy for an offsite computing centre, for which a call for proposals has been sent out, and therefore the fact that no new computing centre started to be constructed at CERN in 2010.
- As in previous years, the revenues from sales of CERN supplies and services turned out to be higher than anticipated. Furthermore there are important revenues from collaboration agreements, compensations from insurances and additional in-kind contributions. All these extra revenues amount to about 11 MCHF.
- Centralised expenses are in general lower than anticipated. This is due to staff not having used all of their saved leave, fewer costs for arrival and departure indemnities and lower interest rates (about 3 MCHF).

The unused budget not carried forward is used to reduce the indebtedness of the Organization in line with the Management's commitment to the Council and its Committees.

II. Progress Report

Summary of Revenues and Expenses by Activity

Figure 1: Summary of Revenues and Expenses by Activity

(in MCHF, rounded off)	2010 Budget CERN/FC/5397 (2010 prices)	2010 Out-Turn CERN/FC/5508 (2010 prices)	Variations of Out-Turn with respect to Budget	
			kCHF	%
	(a)	(b)	(c)=(b)-(a)	(d)=(c)/(a)
REVENUES	**1 204.5**	**1 223.5**	**19.0**	**1.58%**
Member States' contributions	1 112.2	1 112.2		
Additional contributions from Host States	22.4	23.9	1.5	6.90%
Additional contribution from Romania as Candidate for Accession*		3.2	3.2	
EU contributions	13.8	15.1	1.3	9.51%
Other revenues (incl. other in-kind, housing fund, sales, int.tax., KTT etc.)	56.2	69.1	12.9	22.96%
OPERATING EXPENSES	**998.8**	**899.4**	**-99.3**	**-9.94%**
Scientific programmes	494.5	425.1	-69.4	-14.03%
Infrastructure and services	404.5	382.9	-21.5	-5.33%
Projects (including R&D)	99.8	91.4	-8.4	-8.43%
OTHER EXPENSES	**27.5**	**36.1**	**8.6**	**31.10%**
TOTAL EXPENSES	**1 026.3**	**935.5**	**-90.8**	**-8.84%**
BALANCE				
Annual balance	178.3	288.0	109.7	61.57%
Capital repayment allocated to the budget (Fortis, FIPOI 1,2 and 3)	-15.1	-15.1		
Annual balance allocated to budget deficit	163.2	272.9	109.7	67.25%
-Cumulative Balance- - 488.7	**-325.5**	**-215.8**	**109.7**	**-33.72%**

* Romania as Candidate for Accession paid 25% of its calculated total contribution of 2010 as defined in the Council Resolution CERN/2829 and updated by the Agreement signed by CERN and Romania on 11 February 2010.

More detailed summary figures are given in Figure 13 on page 36. The budget balance was more positive than anticipated. The main reasons for the 110 MCHF difference are due to the following: other revenues were significantly higher than planned due to sales, reimbursements from insurances, additional in-kind contributions. The expenses were lower due to the appreciation of the Swiss franc, limits on manpower that caused delays in the procurement notably for projects and the overall re-profiling due to the delay of the planned long shutdown. The new auditorium and computing centre construction projects are on hold, which further reduced expenses in 2010. Finally, we observed a reduction of centralised personnel expenses as explained in the Executive Summary and detailed further in Chapter II and IV.

The cumulative budget of -215.8 MCHF is the accumulated budget deficit as stated in the Annual Accounts for 2010. It does not contain 2010 open commitments and reprofiled projects of about 75 MCHF that are carried forward to the 2011 Budget (see Figure 25).

Figure 2: LHC programme: LHC machine and injectors

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	LHC programme (incl. projects)		
1	**LHC machine and injectors**		
	LHC machine and experimental areas	2010 Goals	Operation througout 2010 with around 250 pb^{-1} delivery to experiments. Modified goal after Chamonix 2010 - focus instantaneous luminosity: Commissioning and early operation of the LHC. The aim was a peak luminosity of 10^{32} cm^{-2} s^{-1} to allow for the possibility of reaching an integrated luminosity of 1 fb^{-1} in 2011.
		2010 Achievements	-Beam operation at 65% availability, stable beams at 16%. -Operation at energy levels of 7TeV centre of mass. -The proton operation had three distinct phases: (i) few (up to 13) low-intensity bunches; (ii) a few (up to 50) high-intensity bunches; (iii) many (almost 400) high-intensity bunches using the bunch train scheme with 150 ns spacing. Peak luminosities of 2×10^{32} cm^{-2} s^{-1} were attained (factor of 2 above goal) and almost 50 pb^{-1} of integrated luminosity delivered to the experiments by late October. Lead-ion running was a spectacular success; 4 days to switch from protons. Peak luminosities in excess of 3×10^{25} cm^{-2} s^{-1} have been achieved and almost 10 μb^{-1} of integrated luminosity delivered to the experiments
		Risks	-PS power system (POPS) was commissioned in 2010 with test magnets (six spare SPS dipoles) and will be connected to the PS magnets during the 2010/2011 technical stop. Commissioning on the PS machine will take place early in the year with the plan of switching permanently to POPS by end 2011. This will eliminate the risk of the failure of the PS motor generator set. -Failures of LINAC2: until LINAC4 is operational. Ageing of the injector chain: the risks have been assessed in the Chamonix (2010) meeting and an extensive consolidation programme is under way to keep the current injectors running for 25 years.
		Future prospects & longer term	Beam operation of the LHC in 2011 and 2012 with a target integrated luminosity of > 1fb^{-1} in 2011.
	Spares	2010 Goals	Start magnet repair due to sector 3-4 incident to achieve a spares inventory of more than 50% of previous level, by starting with less damaged magnets. Start purchasing spares parts.
		2010 Achievements	- The magnet spare stock was reconstituted to 60% of the level existing before the sector 3-4 incident. Spares for magnets components have been redefined. - First new spares following critical review bought for cryogenics and vacuum (3 MCHF).
		Risks	Following a critical review of the spares situation, a list of the most important spares has been established.
		Future prospects & longer term	- The last spares for magnets have to be bought to restore the spares situation before the 3-4 incident. - Buying and manufacturing of spares according to the critical list.
	LHC injectors (for heavy Ions)	2010 Goals	Commissioning of initial Pb^{82+} ion beam
		2010 Achievements	Reliable operation of the injector complex with Pb^{82+} delivered as needed and having characteristics well above nominal values: intensity per bunch approximately 40% above nominal and emittance 40% below. Overall factor of 2 better than expectations.
		Risks	Recovery time even after regular changes can be problematic. Vacuum degradation anywhere in the injector chain can lead to poor transmission.
		Future prospects & longer term	Preparation of the nominal Pb^{82+} beam is well underway in the injectors and will be used for operation in 2011. Studies on improving the reliability of the source are underway, including the possibility of making use of additional ovens. Re-establishing 18GHz operation of the source is still under investigation in order to increase further the ion intensity produced by the LINAC.

Figure 2 (cont.): LHC programme: LHC machine and injectors

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	kCHF Total	Comments
	LHC programme (incl. projects)						
1	**LHC machine and injectors**						
	LHC machine and experimental areas	2010 Budget	424.0	70 480	59 110	129 590	5.6 MCHF materials budget was committed and will be carried forward, the remaining underspending is due to savings that could be realised due to the appreciation of the Swiss franc as well as some reallocations from LHC machine operation to technical infrastructure items as well as from materials to personnel for additional GET fellows.
		2010 Out-Turn	419.8	66 896	41 481	108 376	
		Variations Out-Turn with respect to Budget	-4.2	-3 584	-17 629	-21 214	
		Budget usage in %	99%	95%	70%	84%	
	Spares	2010 Budget	4.2	710	6 880	7 590	The budget was fully committed for 2010. Due to delayed delivery of some spares in 2011, this is not reflected in the Out-Turn. The open commitments at the end of the year will result in a budget carry-forward of the unspent materials of 2054 kCHF. The higher FTE number with respect to the personnel cost is due to the allocation of more fellows than staff.
		2010 Out-Turn	6.9	708	4 826	5 534	
		Variations Out-Turn with respect to Budget	2.7	-2	-2 054	-2 056	
		Budget usage in %	164%	100%	70%	73%	
	LHC injectors (for heavy Ions)	2010 Budget	9.2	1 690	945	2 635	Most of the operation costs were charged against the LHC machine, showing an underspending of the materials budget. The lower personnel costs per FTE are due to allocation of more fellows to this heading.
		2010 Out-Turn	8.9	1 170	42	1 213	
		Variations Out-Turn with respect to Budget	-0.3	-520	-903	-1 422	
		Budget usage in %	97%	69%	4%	46%	

Figure 3: LHC programme: LHC experiments

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	LHC programme: LHC detectors		
2	**ATLAS detector**	2010 Goals	Data-taking, first measurements of Std Model physics processes
		2010 Achievements	Run with protons (sqrt(s) = 7 TeV) and first run with ions (sqrt(sNN)=2.76 TeV) with overall data-taking efficiency of about 95%, excellent detector performance and fast analyses with massive and successful use of the computing grid. Rediscovery of all Standard Model particles including cross-section measurements for W, Z bosons and Top quarks. New limits exceeding the previous Tevatron results set on various processes beyond Standard Model. 20 papers published/submitted including two on ions, more than 380 presentations at international conferences.
		Risks	No major managerial and financial risks identified. Technical: no specific risks identified. General risk related to the operation of a very complex detector system including many different detector technologies.
		Future prospects & longer term	Physics run at high luminosity in 2011 and beyond. Consolidation and upgrades during future shutdowns. Given the luminosity expected by the machine, by the end of 2012, combining ATLAS and CMS, expect to be able to exclude the existence of the Higgs boson over the full allowed mass range, or else to get evidence for it if its mass is greater than 125 GeV. Supersymmetry could be discovered up to masses of almost 1 TeV and carriers of new physics up to masses of 1.5 - 2 TeV.
3	**CMS detector**	2010 Goals	Trigger & physics commissioning, measure Std model processes
		2010 Achievements	Run with protons (sqrt(s) = 7 TeV) and first run with ions (sqrt(sNN)=2.76 TeV) with overall data-taking efficiency of about 95%, excellent detector performance and fast analyses using the computing grid. Rediscovery of all Standard Model particles including cross-section measurements of the W and Z bosons and of the Top quarks. New limits exceeding the previous Tevatron results set on various processes beyond Standard Model. 20 papers published/ submitted, about 440 presentations at international conferences on physics (172 at international conferences on instrumentation).
		Risks	No major managerial and financial risks identified. Technical: no specific risks identified. General risk related to the operation of a very complex detector system including many different detector technologies.
		Future prospects & longer term	Physics run at high luminosity in 2011 and beyond. Consolidation and upgrades during future shutdowns. Given the luminosity expected by the machine, by the end of 2012, combining ATLAS and CMS, expect to be able to exclude the existence of the Higgs boson over the full allowed mass range, or else to get evidence for it if its mass is greater than 125 GeV. Supersymmetry could be discovered up to masses of almost 1 TeV and carriers of new physics up to masses of 1.5 - 2 TeV.
4	**ALICE detector**	2010 Goals	PP data-taking and first Pb-Pb data-taking
		2010 Achievements	Run with protons (sqrt(s) = 7 TeV) and first run with ions (sqrt(sNN)=2.76 TeV) with overall data-taking efficiency above 90% and excellent detector performance. Fast analyses of protons and very large multiplicity ion data using the computing grid. 12 papers published/submitted, including 5 on the properties of the dense matter produced with ion collision. More than 180 presentations at international conferences.
		Risks	No major managerial and financial risks identified. Technical: no specific risks identified. General risk related to the operation of a very complex detector system including many different detector technologies.
		Future prospects & longer term	Heavy ion data-taking for one month per year and pp physics data-taking as needed for the rest of the year. Completion of the installation of TRD and EMCal modules. Consolidation and upgrades during future shutdowns.
5	**LHCb detector**	2010 Goals	Data-taking to Std Model expectation, improve on TEVATRON limits
		2010 Achievements	Run with protons (sqrt(s) = 7 TeV) with excellent (about 95%) data-taking efficiency and detector performance at a luminosity close to design value and despite higher pile-up than planned. Fast analyses using the computing grid. Large statistics of Bottom and Charm quarks decays recorded and analyzed, observations of new B decay channels. 2 papers published/submitted, several more ready for submission, more than 140 presentations at international conferences.
		Risks	No major managerial and financial risks identified. Technical: no specific risks identified. General risk related to the operation of a very complex detector system including many different detector technologies.
		Future prospects & longer term	Physics run at few 10^{32} $cm^{-2}s^{-1}$ luminosity in 2011 and beyond. LHCb could be sensitive to new physics in 2011/12 through rare decays such as B_s->mumu or J/Psi phi. Envisages an upgrade to enable the LHCb experiment to operate at 10 times the design luminosity, i.e. at about 2×10^{33} cm^{-2} s^{-1}, to collect a data sample of ~100 fb^{-1}.

Figure 3 (cont.): LHC programme: LHC experiments

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	Total	Comments
	LHC programme: LHC detectors						
2	**ATLAS detector**	2010 Budget	**124,1**	**21 880**	**4 445**	**26 325**	The excess in personnel allocations is due to reallocations from scientific support staff and more fellows being directly charged against the experiments. Open commitments at 31/12/2010 will allow a large fraction of the unspent materials budget to be carried forward.
		2010 Out-Turn	**137**	**24 326**	**3 928**	**28 254**	
		Variations Out-Turn with respect to Budget	**12,9**	**2 446**	**-517**	**1 929**	
		Budget usage in %	**110%**	**111%**	**88%**	**107%**	
3	**CMS detector**	2010 Budget	**120,4**	**21 270**	**3 470**	**24 740**	The excess in materials expenses will reduce the materials budget available in 2011. The oscillation of personnel costs is essentially due to the free choice of assignment for research fellows.
		2010 Out-Turn	**111,7**	**18 039**	**3 897**	**21 937**	
		Variations Out-Turn with respect to Budget	**-8,7**	**-3 231**	**427**	**-2 804**	
		Budget usage in %	**93%**	**85%**	**112%**	**89%**	
4	**ALICE detector**	2010 Budget	**48,1**	**8 885**	**2 265**	**11 150**	Open commitments amount to 100kCHF, subject to a carry-forward for the materials budget of that amount.The oscillation of personnel costs is essentially due to the free choice of assignment for research fellows.
		2010 Out-Turn	**45,5**	**7 547**	**2 116**	**9 663**	
		Variations Out-Turn with respect to Budget	**-2,6**	**-1 339**	**-149**	**-1 487**	
		Budget usage in %	**95%**	**85%**	**93%**	**87%**	
5	**LHCb detector**	2010 Budget	**50,9**	**9 410**	**1 985**	**11 395**	Open commitments amount to 70kCHF, subject to a carry-forward for the materials budget of that amount.The oscillation of personnel costs is essentially due to the free choice of assignment for research fellows.
		2010 Out-Turn	**50,2**	**9 068**	**1 754**	**10 822**	
		Variations Out-Turn with respect to Budget	**-0,7**	**-342**	**-231**	**-573**	
		Budget usage in %	**99%**	**96%**	**88%**	**95%**	

Figure 4: LHC programme: LHC experiments (cont.), consolidation & computing

Fact Sheet as in MTP 2009	Activity	2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term	
	LHC programme (cont.)		
6	**Common items, other experiments (inc. Totem, LHCf)**	2010 Goals	Detector and global commissioning of Totem, physics analysis LHCf
		2010 Achievements	Totem: Commissioned T2 and Roman Pots (RP) at 220m. Collection of about 80000 elastic scattering events recorded in a specific run with RPs at 7 sigmas from beam. T1 and RP stations at 147m tested and ready for installation during technical stop. LHCf: completed data-taking at 7TeV in July 2010. About 200M shower triggers in each arm. Publications under preparation.
		Risks	Technical risk for TOTEM: radiation damage of detectors close to beam, for example silicon sensors in RPs.
		Future prospects & longer term	TOTEM: Completion in 2011 of the detector with installation and commissioning of T1 detectors inside CMS and of Roman Pots at 147m on both sides of the IR5 interaction point. Special runs with high beta* to prepare for and later to perform the measurement of the total cross-section. LHCf: complete physics analysis with data taken, physics run at the highest possible energy
	Detectors re-scoping	2010 Goals	Continue with 4 year plan as indicated in the 2006 White Paper.
		2010 Achievements	Funds were allocated as foreseen.
		Risks	
		Future prospects & longer term	Finalise this activity in 2011.
21.a	**LHC machine and areas reliability and consolidation**	2010 Goals	Start the programme to consolidate the LHC and its infrastructure. This includes building up the required supply of spares parts for the machine elements, renovation of infrastructure services, and preparation of the activities for the first long LHC shutdown in 2013.
		2010 Achievements	The major consolidation items of 2010: - PS Power supply (POPS) practically finished within budget (4.6 MCHF) - Steel for urgent LHC radiation shielding (2.1 MCHF) - Renovations of mobile cranes (1.5 MCHF) - Preparatory work for LHC splices (0.5 MCHF); main technology and process selected and validated on a prototype. - Continuation of collimation consolidation (1.5 MCHF)
		Risks	The consolidation projects are organised in such a way that during the year, if the risk situation changes, priorities are shifted and the items with the highest priority will have budget allocated. In 2010, all priority 1 items have been addressed. For 2011 the LHC splice consolidation and the LHC R2E activities have become separate projects under the Consolidation umbrella. In 2011 and 2012 it is planned to start all priority 2 and 3 items. - In 2010 all LHC consolidation goals were achieved, but in future scarcity of "specialised/expert" personnel will determine the capacity to carry out the consolidation activities
		Future prospects & longer term	The strategy with respect to R2E items was discussed during the Chamonix meeting in January 2011 and there will be ongoing discussions for the associated consolidation plan.
7	**LHC computing**	2010 Goals	Sustained transfer of LHC data, data export to Tier 1 centres up to 1 GB/s
		2010 Achievements	Data transfer to Tier 1 centres at peak rates up to 5 GB/s, Stored ~15PB with peaks at 220TB/day during Pb+Pb Tier-0 bandwidth: - Average in: 2GB/s with peaks at 11.5GB/s - Average out: 6GB/s with peaks at 25GB/s Distribution of data to Tier 1 and Tier 2 centres within hours Tier 2s deliver > 50% of total CPU; ~1000 active grid users in each of ATLAS and CMS
		Risks	- Resource needs for 2012 if the accelerator run continues may not be satisfied by funding agencies. - Uninterruptable power in CERN Computer Centre will no longer be sufficient during 2013 - Additional Tier 0 capacity and power required from 2014; solution proposed is remote hosting of a major facility which carries unknown management and technical risks. - Implementation of a remote Tier 0 and assuring technical evolution of the grid to make use of new technologies, while maintaining adequate Tier 0 service with increasing data rates extremely difficult at present staffing levels
		Future prospects & longer term	Increased workloads and data rates as accelerator reaches design luminosity; particularly increasing performance of the Tier 0 facility as experiment trigger rates increase significantly

Figure 4 (cont.): LHC programme: LHC experiments (cont.), consolidation & computing

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	Total	Comments
	LHC programme (cont.)						
6	**Common items, other experiments (inc. Totem, LHCf)**	2010 Budget	**37.7**	**6 270**	**2 930**	**9 200**	Part of the personnel foreseen was reallocated to the experiments and to the new heading LHC detectors upgrade, created in June 2010. Open commitments of 430kCHF will allow for the equivalent carry-forward of the unused materials budget.
		2010 Out-Turn	**24.5**	**3 390**	**2 307**	**5 696**	
		Variations Out-Turn with respect to Budget	**-13.2**	**-2 880**	**-624**	**-3 504**	
		Budget usage in %	**65%**	**54%**	**79%**	**62%**	
	Detectors re-scoping	2010 Budget	**1.2**	**205**	**7 755**	**7 960**	Due to the focus on the LHC exploitation and physics, part of the project heading was not used and the personnel directly charged against the detectors. The unspent materials budget is part of the 4 year CtC (white paper for the years 2008 to 2011) and will be reallocated in 2011.
		2010 Out-Turn	**0.0**	**0**	**6 113**	**6 113**	
		Variations Out-Turn with respect to Budget	**-1.2**	**-205**	**-1 642**	**-1 847**	
		Budget usage in %	**0%**	**0%**	**79%**	**77%**	
21.a	**LHC machine and areas reliability and consolidation**	2010 Budget	**38.2**	**6 505**	**32 355**	**38 860**	The additional personnel is due to reallocations from LHC and other accelerators exploitation and M to P transfers for additional GET fellows. Open commitments amount to 5.2 MCHF subject to carry-forward of the equivalent amount of unused materials budget. For the Cost to Completion projects that also fall under this heading, an additional 3.8 MCHF of uncommitted budget will also be carried forward, due to reprofiling of the projects . This is in accordance with the Financial Rules. Some consolidation items that were planned could not be realised: a need for additional manpower to perform not only highest priority consolidation items in a timely fashion is clearly visible.
		2010 Out-Turn	**48.6**	**9 942**	**18 852**	**28 794**	
		Variations Out-Turn with respect to Budget	**10.4**	**3 437**	**-13 503**	**-10 066**	
		Budget usage in %	**127%**	**153%**	**58%**	**74%**	
7	**LHC computing**	2010 Budget	**96.9**	**18 020**	**37 670**	**55 690**	The important amount of unused materials budget is due to a change of strategy in 2010: Instead of aiming for construction of a new computing Tier0 centre on site (for which some 20 MCHF were anticipated in 2010), CERN has issued a call for proposals for alternative sites in the Member States and is following an upgrade strategy at CERN as well as renting capacity to overcome eventual shortfalls. Open commitments in materials amount to 1.5 MCHF.
		2010 Out-Turn	**88.3**	**16 721**	**21 158**	**37 879**	
		Variations Out-Turn with respect to Budget	**-8.6**	**-1 299**	**-16 513**	**-17 811**	
		Budget usage in %	**91%**	**93%**	**56%**	**68%**	

Figure 5: Other scientific programmes

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	Other programmes (LHC support and non-LHC programmes)		
8	**Non-LHC physics**	2010 Goals	Meet the goals set by the Research Board
		2010 Achievements	**Main achievements:** **CNGS:** More than 4*10^{19} protons on target. OPERA : first tau-neutrino candidate published. ICARUS: detector and trigger operational since October 2010. **AD**: ALPHA and ASACUSA obtained the award of the *Physics World* "2010 Breakthrough of the year" for first successful trapping of antihydrogen atoms. ATRAP: strong progress in antiprotons cooling down to 3.5K. AEGIS: Main magnets wound and tested; experimental zone prepared (beam line and infrastructure). **CLOUD:** First results showing clear impact of various chemical components on nucleation presented at summer conferences. Publication under preparation. **North Area:** COMPASS : muons run with transversely polarised target; proposal for future physics programme with muon beams accepted. NA61: Particle spectra p-C at 31 GeV/c (for T2K) under publication; successful test of fragmented light-ions beam. NA62: Production of detectors and refurbishment of beam area going ahead schedule. Prototype of GigaTracker successfully tested. **n-TOF:** very succesful operation with naked targets offering unique measurements, e.g. for astrophysics. **ISOLDE:** 443 shifts for 41 experiments.
		Risks	The total number of protons which can be delivered to the experiments is lower than expected by the experiments owing to the design of the accelerator chain.
		Future prospects & longer term	AD: Increased efficiency for antihydrogen trapping, enabling its spectroscopy. Measurement of gravitational properties of antimatter. Possible addition of a cooling ring (ELENA) to increase the trapping of antiprotons by 2 orders of magnitude. CLOUD: Low temperature and low pressure running to further study cloud formation. North Area: Availability of light and intermediate mass ions beams to study phase transition to QGP (NA61). Measurement of Generalized Parton Distributions and DrellYan with muon beams (COMPASS). Rare Kaon decays (NA62). ISOLDE: in the context of the HIE-ISOLDE project, further increase of REX energy. Installation of spectrometer at REX. n-TOF: The construction of a second experimental area (EAR-2) at 20 m from the spallation target has been proposed and could give unprecedented beam intensities and characteristics. Implementation of the outcome of the non-LHC diversity workshops in 2009.
9.a	**Theory**	2010 Goals	Support TH experiments and TH community
		2010 Achievements	In 2010 , the TH Unit hosted 719 visitors and produced 323 TH Preprints
		Risks	/
		Future prospects & longer term	Continue to be a research centre of excellence in Theoretical Physics. Provides support to world-wide theoretical community by hosting visitors and organising theory institutes or workshops.
9.b	**LHC physics centre**	2010 Goals	Starting works for creating the Physics Analysis Centre
		2010 Achievements	Large number of events/initiatives organised: joint EP/LPCC seminars. Monthly LHC physics days, Students lectures (5), Workshops on Luminosity, MC tools, Quarkonia. Working groups on MinBias events and Rate Normalisation.
		Risks	/
		Future prospects & longer term	Continue organizing scientific activities centred on the LHC physics programme (Workshops, Lectures and working groups, combination of results).
9.c	**Scientific support**	2010 Goals	Safe, efficient, reliable operation of the experiments, support to users
		2010 Achievements	The experiments ran with excellent efficiency throughout the year.
		Risks	No financial, technical or managerial risks identified, provided that the level of resources is kept at least at the present level to preserve expertise and to provide support to the community of users.
		Future prospects & longer term	Support operation, consolidation for running experiments. Support new initiatives and upgrade activities. Consolidate computing tools for the analysis of LHC data.

Figure 5 (cont.): Other scientific programmes

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	Total	Comments
	Other programmes						
8	**Non-LHC physics**	2010 Budget	**18.8**	**3 010**	**3 975**	**6 985**	The additional personnel is due to allocations of staff members from the scientific support to the individual experiments and facilities in the course of 2010. Open commitments amount to 210 kCHF subject to unused budget carry-forward. In addition, due to reprofiling of the CtC projects that are within this heading (NA61 and NA62) about 1 MCHF of uncommitted budget will be carried forward to 2011.
		2010 Out-Turn	**35.4**	**6 646**	**2 556**	**9 202**	
		Variations Out-Turn with respect to Budget	**16.6**	**3 636**	**-1 419**	**2 217**	
		Budget usage in %	**188%**	**221%**	**64%**	**132%**	
9.a	**Theory**	2010 Budget	**64.7**	**10 190**	**1 935**	**12 125**	
		2010 Out-Turn	**69.0**	**10 414**	**1 685**	**12 099**	
		Variations Out-Turn with respect to Budget	**4.3**	**224**	**-250**	**-26**	
		Budget usage in %	**107%**	**102%**	**87%**	**100%**	
9.b	**LHC physics centre**	2010 Budget	**18.6**	**3 800**	**2 070**	**5 870**	The personnel and part of the materials is linked to additional manpower for experiments and not to the LHC analysis centre, which on its own had a materials budget of 1.3 MCHF. This materials budget is essentially used for subsistence payments.
		2010 Out-Turn	**17.3**	**2 875**	**1 507**	**4 382**	
		Variations Out-Turn with respect to Budget	**-1.3**	**-925**	**-564**	**-1 488**	
		Budget usage in %	**93%**	**76%**	**73%**	**75%**	
9.c	**Scientific support**	2010 Budget	**176.6**	**31 765**	**7 850**	**39 615**	Personnel working for the various LHC and non-LHC experiments was re-allocated in the course of 2010, resulting in lower personnel expenses and similarly in lower materials expenses for industrial services. Open commitment amount to 585kCHF subject to a carry-forward of the unused materials budget.
		2010 Out-Turn	**129.3**	**21 634**	**5 212**	**26 846**	
		Variations Out-Turn with respect to Budget	**-47.3**	**-10 131**	**-2 638**	**-12 769**	
		Budget usage in %	**73%**	**68%**	**66%**	**68%**	

Figure 6: Other scientific programmes (cont.)

<table>
<tr><th>Fact Sheet as in MTP 2009</th><th>Activity</th><th colspan="2">2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term</th></tr>
<tr><td colspan="4">Other programmes (LHC support and non-LHC programmes)</td></tr>
<tr><td rowspan="4">10</td><td rowspan="4">Low- and medium-energy accelerators (PS and SPS complexes) Accelerator technical services</td><td>2010 Goals</td><td>Delivery of beams to all users with maximum overall efficiency, enabling LHC injection and delivery to non-LHC experimental facilities in parallel.</td></tr>
<tr><td>2010 Achievements</td><td>Beam availability from 29 April to 22 November
Very high accumulated LINAC2, PSB, PS and SPS machine availability.
Up to 25% more protons delivered than expected .</td></tr>
<tr><td>Risks</td><td>Specific risks have been identified and mitigation measures are underway.
Failure of the PS motor generator set: a new PS power system is being commissioned and will be put into service in 2012. In parallel, the present PS power system (with the rotating machines) will be kept in operation up to the long shutdown in 2013. It takes one day to swap from one system to the other.
Failures in LINAC2: A consolidation of the RF tanks in LINAC2 has already been undertaken to reduce the risk of a vacuum failure. A study to address the possible failure of a magnet in the drift tubes is underway. Radiation in target areas, especially in CNGS, represents a risk for the performance of the installed equipment.
The spares situation has been studied. In certain critical areas, insufficient spares currently exist in case of failure (e.g. CNGS Horn and Reflector).
The total number of protons which can be delivered through the accelerator chain to the experiments is lower than expected by the experiments.
Due to a lack of skilled manpower, detailed studies for upgrades and new projects are not possible (examples are ELENA, PS neutrinos, LHeC...). In addition, for the same reason, the progress in approved projects is slower than foreseen. Examples HIE-ISOLDE, HiRaDMat, R2E.</td></tr>
<tr><td>Future prospects & longer term</td><td>Preparations for NA61 and NA62 will continue. Continued studies to further enhance the beams for all users. A complete stop of the entire accelerator complex in 2012 is planned to allow for redeploying manpower to the consolidation and upgrade work packages.</td></tr>
<tr><td rowspan="4">21.a</td><td rowspan="4">Accelerator consolidation</td><td>2010 Goals</td><td>Add consolidation of (notably) PS control Access System, SPS 18kV substations.</td></tr>
<tr><td>2010 Achievements</td><td>The major consolidation items of 2010 :
- 18kV cables preparatory work for SPS (0.8 MCHF)
- SPS SVC spares (0.6 MCHF)
- SPS access system ZORA secondary (0.5 MCHF)
- Start of PS control Access System (10% completion)</td></tr>
<tr><td>Risks</td><td>The consolidation projects are organised in such a way that during the year, if new insights in risk are obtained, priorities are shifted and the items with the highest priority will have budget allocated. In 2010, all Priority 1 items have been addressed. Extensive risk assessment of a 25-year consolidation programme will drive planning. Scarcity of personnel will determine the capacity to carry out the consolidation work.</td></tr>
<tr><td>Future prospects & longer term</td><td>Contracts for manpower and material for the PS access system will be signed in February 2011, involving 10.5MCHF (8Meuro) 60% for materials and 40% for manpower. An additional 1.3MCHF will be needed for cabling and civil engineering. The 18kV cables are one of the highest priority items with peak spending in summer 2011 (subject to FC approval in March 2011)</td></tr>
</table>

Figure 6 (cont.): Other scientific programmes (cont.)

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	kCHF Total	Comments
	Other programmes (cont.)						
10	**Low and medium energy accelerators**	2010 Budget	**35.0**	**5 900**	**3 335**	**9 235**	Some personnel reallocations between LHC injectors and this heading as well as accelerator technical services are the reason for the personnel cost-variation; the unused materials budget was essentially covered with open commitments of 270kCHF at the end of 2010. Some funds for projects within the Cost to Completion like ISOLDE robots will be carried forward.
		2010 Out-Turn	**38.4**	**6 483**	**2 958**	**9 441**	
		Variations Out-Turn with respect to Budget	**3.4**	**583**	**-377**	**206**	
		Budget usage in %	**110%**	**110%**	**89%**	**102%**	
	PS and SPS complexes	2010 Budget	**197.5**	**33 820**	**19 370**	**53 190**	Some personnel reallocations between LHC injectors, accelerator technical services and this heading result in the small P+M overspend.
		2010 Out-Turn	**218.1**	**36 094**	**19 492**	**55 586**	
		Variations Out-Turn with respect to Budget	**20.6**	**2 274**	**122**	**2 396**	
		Budget usage in %	**110%**	**107%**	**101%**	**105%**	
	Accelerator technical services	2010 Budget	**125.7**	**21 435**	**9 185**	**30 620**	Some personnel was reallocated to the exploitation of the PS and SPS complexes and the accelerator consolidation. The excess in materials expenses is due to the increase of scope of the magnet faciility project, funded by reallocations from LHC operation, ITER revenues received during the year 2010, and carry-forward from 2009 to 2010.
		2010 Out-Turn	**94.4**	**15 703**	**12 570**	**28 272**	
		Variations Out-Turn with respect to Budget	**-31.3**	**-5 732**	**3 385**	**-2 348**	
		Budget usage in %	**75%**	**73%**	**137%**	**92%**	
21.a	**Accelerator consolidation**	2010 Budget	**17.2**	**2 980**	**8 745**	**11 725**	Personnel reallocations from accelerator technical services and M->P for additional GET fellows. Open commitments amount to 3.1 MCHF; the heading is therefore fully committed.
		2010 Out-Turn	**39.8**	**7 052**	**7 970**	**15 022**	
		Variations Out-Turn with respect to Budget	**22.6**	**4 072**	**-775**	**3 297**	
		Budget usage in %	**231%**	**237%**	**91%**	**128%**	

Figure 7: Infrastructure and services

Fact Sheet as in MTP 2009	Activity	2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term	
	Infrastructure and services		
11.a	**Manufacturing facilities (workshops, etc.)**	2010 Goals	Avoid delays in projects where design/production is on critical path.
		2010 Achievements	- Collimation LHC: pre-study and start of the mechanical design of the special collimators for the cryogenic zone in IR3. - LINAC4: mechanical design of the Drift Tube Linac (DTL), Cell-Coupled Drift Tube Linac (CCDTL), Medium Energy Beam Transport lines (MEBT) and the beam instrumentation. - CLIC: engineering study and instrumented mock-up construction proving the feasibility of the positioning and the stabilization of the quadrupoles within 2 nm. - HIE Isolde: Design and fabrication of the test cryostat for the RF cavity prototype in SM18. - Mechanical fabrication and assembly of the first RFQ module and the PIMS prototype for the LINAC4, both followed by successful RF testing. - Metrology and materials analysis for the LHC and for other projects, such as LINAC4, CLIC, SPL R&D, ITER.
		Risks	Production is on the project critical path, which puts enormous focus on priorities and resources.
		Future prospects & longer term	Keep the know-how of mechanical construction of beam accelerators, physics detectors and PCBs within CERN. Let outside industry produce the “standard components”.
11.b	**General facilities and logistics (site maintenance, transport)**	2010 Goals	/
		2010 Achievements	Improved services: - Online booking of hostels - Increased frequency of the shuttle services (on site as well as to and from the airport) ; increased and successful efforts to have the CERN hostel service standard also in the Robert Schuman foyer in St Genis to increase its attractivity; Car sharing experiment successfully concluded->extension of service planned for 2011 - New contract for maintenance and operation of cooling and ventilation installations
		Risks	The functioning of the basic infrastructure is more and more compromised by the urgent need for consolidation of both technical and general infrastructure at the end of their lifetime. Some examples of the ageing infrastructure are heating/cold water piping to be urgently replaced, leaking roofs and buildings in general. Main effort is still on corrective maintenance - the long-term goal is preventive maintenance.
		Future prospects & longer term	Further improve services to the users and staff as well as the maintenance of the site for reliable operation. Improved car-sharing should enable a diminution of the car fleet. The infrastructure consolidation programme and the move to "public transport" will improve energy usage and permit the use of more energy-efficient transport facilities.
11.c	**Informatics**	2010 Goals	
		2010 Achievements	- Management cockpit (provided one FTE can be assigned to this task during 2010) consolidate FP cockpit, evaluate extension to cover GS, and consolidate HR cockpit - IPSAS support in CET, Software support for Medical Service - introduction of standard, commercial tool. - SIR 2.0, E-Personnel File - Hostel Web Booking tool; preparations for the CERN Help desk with tools for the service catalogue and interfaces to "Service now". - The services were globally delivered to users' general satisfaction. - Some critical IT services were made available off-site. - Significant expansion of the backup data service (~ one billion files). - Preparation of the consolidation of the critical power at the CERN Computer Centre to increase the capacity for IT services from 350kW to 600 kW. - ITIL best practices for Service Management processes have been devised: Service Catalogue and common processes for Incident Management and Request Fulfilment, scheduled to enter operation first quarter of 2011. - Several Computer Security awareness campaigns were organised.
		Risks	- Unavailability of services due to causes such as software or hardware failures, damaged data due to corruption, human errors or deliberate actions. - Computer Security continues to be a major preoccupation due to the increasing number of attacks and their evolving technical nature.
		Future prospects & longer term	Proactive measures such as data backups, multi-site hosting and increased critical power for IT services all contribute to increased availability and performance while ensuring that the business continuity needs of the Organisation are met.

Figure 7 (cont.): Infrastructure and services

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	Total	Comments
	Infrastructure and services						
11.a	**Manufacturing facilities (workshops, etc.)**	2010 Budget	**84.9**	**14 085**	**2 065**	**16 150**	The unused budget is due to some personnel being charged directly to the project and exploitation headings and most of the industrial services tasks being directly charged against the consolidation and project headings. The open commitments amount to 0.5 MCHF, which will be carried forward to 2011, when the items will be delivered.
		2010 Out-Turn	**80.3**	**11 474**	**1 026**	**12 500**	
		Variations Out-Turn with respect to Budget	**-4.6**	**-2 611**	**-1 039**	**-3 650**	
		Budget usage in %	**95%**	**81%**	**50%**	**77%**	
11.b	**General facilities and logistics (site maintenance, transport)**	2010 Budget	**138.8**	**22 355**	**38 370**	**60 725**	
		2010 Out-Turn	**127.3**	**22 005**	**38 395**	**60 400**	
		Variations Out-Turn with respect to Budget	**-11.5**	**-350**	**25**	**-325**	
		Budget usage in %	**92%**	**98%**	**100%**	**99%**	
11.c	**Informatics**	2010 Budget	**148.1**	**25 465**	**16 455**	**41 920**	Open commitments of 0.7 MCHF allow for carry-forward of the unused materials budget.
		2010 Out-Turn	**157.6**	**26 108**	**15 812**	**41 921**	
		Variations Out-Turn with respect to Budget	**9.5**	**643**	**-642**	**1**	
		Budget usage in %	**106%**	**103%**	**96%**	**100%**	

Figure 8: Infrastructure and services (cont.)

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	Infrastructure and services (cont.)		
12	**Safety, Health and environment**	2010 Goals	Safe operation of LHC and other facilities (radiation protection, cryogenics)
		2010 Achievements	- Improved services for: safety training and safety awareness, review of technical specifications, assessment of new/consolidation projects, elaboration of Safety files for new/existing experiments, ALARA principle in radiation protection. - The preliminary 2010 accident statistics shows about the same low number of accidents as in previous years - The collective dose to personnel is about the same low value as last year. - Low environmental impact of CERN's activities. - CERN and its Host States signed a tripartite agreement in matters of radiation protection and radiation safety at CERN.
		Risks	Insufficient preventive measures might lead to incidents impacting people, the environment or investments. Realised risks resulting from insufficient safety measures could have operational and financial consequences and an impact on CERN's reputation. The systematic approach of (re-)assessing the HSE aspects of CERN's activities and facilities, might result in "earlier/further" consolidation of safety systems, additional collective protection aspects and others.
		Future prospects & longer term	Continuous improvement in the field of Occupational Health and Safety as well as Environmental Protection for both radiological and conventional aspects wrt. CERN Safety Policy
13	**Administration**	2010 Goals	Balance central/non-central administration, implementation of Key Performance Indicators, review inhouse-outsourcing.
		2010 Achievements	- Finalization of Five-Yearly Review and discussions - proposals accepted and implementated on salaries, health insurance and first set of measures for Pension Fund - Code of Conduct - completed on schedule with broad in-house agreement - Creation of Ombuds Office to handle conflictual situations - New recruitment unit enhancing CERN's visibility and attractivity on the employment markets with record-breaking number of applications. CERN received two awards in the UK for its new advertisement campaign and its recruitment brochure. - Key Performance Indicators for most administrative processes are in place.
		Risks	Too low workforce to cope with increasing variety of national programmes, additional constraints from the outside and higher number of users.
		Future prospects & longer term	Streamline administrative processes and regularly review and establish best practises.
14	**Outreach and KTT**	2010 Goals	
		2010 Achievements	Permanent exhibition: around 36000 visitors since July Visitors: around 58000, 145 VIP visits Teachers programme: 984 participants - Industry Advisor appointed - implementation of new policy of Intellectual Property management at CERN, including incentive scheme
		Risks	Risk of being perceived as not dealing in an equitable way with different external partners is now mitigated by the new IP Management policy. Loss of data, e.g. in the framework of the CERN Global Network.The amount of external revenues and expenses will depend on CERN's success to conclude new partnerships and TT contracts.
		Future prospects & longer term	Promoting CERN's achievements and possibilities even further in all areas (research, technology, education, training).
21.b	**Infrastructure consolidation, services and renovation**	2010 Goals	Refurbishment of buildings, Restaurant 1 extension, Restaurant 3 renewal
		2010 Achievements	- Extension Restaurant 1 finished, Water treatment centre (building 254) finished, Restaurant 3 cancelled - Renovation of main building and Council Chamber, urgent repairs of roofs, sanitary facilities and other infrastructure, asbestos removal - Start of building 867 (radiation workshop) and 107 (new surface building) - Treatment of transformers containing traces of PCBs, overhaul of the gas distribution system for LHC experiments - continuation of transport and handling equipment park: Major overhaul of 4 EOT cranes, replacement of 10 EOT cranes with capacities ≤ 10t. Major repair and consolidation work on 14 EOT cranes, 1 shielded door and 4 lifting platforms, safety upgrade of 43 EOT cranes (removal of asbestos brakes). Replacement of 2 lifts, 3 forklifts and 8 electrical tractors. Replacement of 1 access- and working platform. Retrofit of the second SPS magnet transport vehicle, rebuilding of 1 PS magnet transport vehicle, replacement of 1 mobile crane by a compact mobile crane with higher capacity
		Risks	Not pursuing the infrastructure consolidation entails serious risks for both the functioning of the accelerators and working conditions for the staff. Carbonation has started to undermine the stability of buildings (notably building 30). Pollution may be generated by oil rejects from transformers, exceeding the legal PCB concentration limit. Scarcity of personnel which will determine the capacity to carry out the consolidation items.
		Future prospects & longer term	Refurbishment of accelerator-related buildings and office buildings threatened by concrete carbonation. Some additional funds for computing infrastructure refurbishments and renewals. Asbestos removal.

Figure 8 (cont.): Infrastructure and services (cont.)

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	kCHF Total	Comments
	Infrastructure and services (cont.)						
12	**Safety, Health and environment**	2010 Budget	**137.0**	**20 635**	**7 895**	**28 530**	Some personnel was directly charged against the various exploitation headings. Open commitments of 1.6 MCHF allow for the carry-forward of the unused materials budget.
		2010 Out-Turn	**123.9**	**17 802**	**7 178**	**24 980**	
		Variations Out-Turn with respect to Budget	**-13.1**	**-2 833**	**-717**	**-3 550**	
		Budget usage in %	**90%**	**86%**	**91%**	**88%**	
13	**Administration**	2010 Budget	**196.8**	**32 185**	**8 245**	**40 430**	The extra personnel is due to the introduction of the ombudsman, additional guest professors and the project office staff charged centrally against Director General services. More personnel was needed to cover the HR workload.
		2010 Out-Turn	**202.6**	**35 172**	**8 535**	**43 707**	
		Variations Out-Turn with respect to Budget	**5.8**	**2 987**	**290**	**3 277**	
		Budget usage in %	**103%**	**109%**	**104%**	**108%**	
13	**Outreach and KTT**	2010 Budget	**40**	**8 485**	**9 570**	**18 055**	The different personnel costs are due to new recruitments and fellows reducing the average costs, fewer TT activities than in 2009 and open commitments of 520kCHF at 31/12/2010.
		2010 Out-Turn	**45.1**	**8 319**	**7 575**	**15 894**	
		Variations Out-Turn with respect to Budget	**5.1**	**-166**	**-1 995**	**-2 161**	
		Budget usage in %	**113%**	**98%**	**79%**	**88%**	
21.b	**Infrastructure consolidation, services and renovation**	2010 Budget	**17.1**	**2 765**	**28 870**	**31 635**	In the Budget for 2010 the Building 33bis was included. In the MTP 2010, it was decided to cancel this project as well as the renovation of restaurant 3. The freed funds have been allocated to Building 867, the renovation of the amphiteatre and the main building as well as the AMS control room and a new reading room for the library. In total this has resulted in a reduction of the 2010 Budget of 2 MCHF (which was reflected in the 2010 probable expenses in the 2011 Budget (CERN/FC/5495). The carry forward to 2011 will be 9.4 MCHF. For the general consolidation items this concerns open commitments, while for the defined CtC projects this concerns also the non-committed materials in line with the Financial Rules.
		2010 Out-Turn	**14.1**	**1 885**	**17 487**	**19 372**	
		Variations Out-Turn with respect to Budget	**-3.0**	**-880**	**-11 383**	**-12 263**	
		Budget usage in %	**82%**	**68%**	**61%**	**61%**	

Figure 9: Infrastructure and services (cont.)

Fact Sheet as in MTP 2009	Activity	2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term	
	Infrastructure and services (cont.)		
15	**Centralised expenses**		
	Centralised personnel expenses (inc. social sec.)	This heading is dominated by the CERN share of the health insurance scheme for the pensioners, the costs for personnel arrivals and departures and unemployment benefits. These costs can be estimated but there is no specific goal associated.	
	Internal taxation	The internal taxation appears in centralised expenses and offsets the equivalent heading in revenues. The personnel costs in all other headings are thus without internal taxation.	
	Paid but not available	The amount of staff members exercising their saved leave or compensation leave usually at the end of their career.	
	Personnel internal mobility	This heading aims to enhance internal mobility between Departments by helping to pay salary differencials between an experienced staff member and a new recruit.	
	Personnel on detachment	CERN personnel that is detached, i.e. working for a collaboration or other institute. CERN receives these personnel costs as revenues.	
	Energy and water	This heading is dominated by the electricity supply. It further includes heating gases and water costs.	
	Insurances and postal charges	Personnel and goods insurances as well as the postal charges.	
	Housing fund	The running costs for the CERN hostels in personnel and materials.	
15	**Interest and financial costs**	2010 Goals	Reducing short term loans
		2010 Achievements	There were 26MCHF short term loans outstanding as at 31.12.2010
		Risks	
		Future prospects & longer term	

Figure 9 (cont.): Infrastructure and services (cont.)

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	kCHF Total	Comments
	Infrastructure and services (cont.)						
15	**Centralised expenses**						
	Centralised personnel expenses (inc. social sec.)	2010 Budget		31 095		31 095	Variation due to the changes in provision for saved leave and lower costs for arrivals and departures.
		2010 Out-Turn		27 773		27 773	
		Variations Out-Turn with respect to Budget		-3 322		-3 322	
		Budget usage in %		89%		89%	
	Internal taxation	2010 Budget		24 015		24 015	The amount of internal taxation is an estimate that changes in both revenues and expenses without impact on the budget balance.
		2010 Out-Turn		26 198		26 198	
		Variations Out-Turn with respect to Budget		2 183		2 183	
		Budget usage in %		109%		109%	
	Paid but not available	2010 Budget	0.0	0		0	As of the MTP 2010, all paid but not available staff was regrouped to be shown directly under one heading instead as being part of each heading.
		2010 Out-Turn	49.8	9 503		9 503	
		Variations Out-Turn with respect to Budget	49.8	9 503		9 503	
		Budget usage in %					
	Personnel internal mobility	2010 Budget	0.0	0		0	The internal mobility fund was set up after approval of the 2010 Budget (it is included as of 2011 in the 2010 MTP); the first cases appeared in 2010
		2010 Out-Turn	0.6	158		158	
		Variations Out-Turn with respect to Budget	0.6	158		158	
		Budget usage in %					
	Personnel on detachment	2010 Budget	3.8	715		715	This heading has its equivalent in revenues and therefore no impact on the budget balance.
		2010 Out-Turn	3.6	953		953	
		Variations Out-Turn with respect to Budget	-0.2	238		238	
		Budget usage in %	95%	133%		133%	
	Energy and water	2010 Budget			83 350	83 350	The lower expenses are essentially due to the appreciation of the Swiss Franc with respect to the EUR.
		2010 Out-Turn			71 999	71 999	
		Variations Out-Turn with respect to Budget			-11 351	-11 351	
		Budget usage in %			86%	86%	
	Insurances and postal charges	2010 Budget			7 275	7 275	Insurance premiums and postal charges increased more than anticipated.
		2010 Out-Turn			8 261	8 261	
		Variations Out-Turn with respect to Budget			986	986	
		Budget usage in %			114%	114%	
	Housing fund	2010 Budget	2.4	395	3 790	4 185	
		2010 Out-Turn	2.8	402	3 511	3 913	
		Variations Out-Turn with respect to Budget	0.4	7	-279	-272	
		Budget usage in %		102%	93%	94%	
15	**Interest and financial costs**	2010 Budget			**16 370**	**16 370**	Lower interest rates than anticipated throughout 2010.
		2010 Out-Turn			**15 376**	**15 376**	
		Variations Out-Turn with respect to Budget			**-994**	**-994**	
		Budget usage in %			**94%**	**94%**	

Figure 10: Projects

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	Projects		
16.a	**CLIC / Linear Collider**	2010 Goals	Complete CLIC Test Facility installation, complete by end 2011 the conceptual design of a Multi-TeV Linear Collider up to 3TeV to be built in stages.
		2010 Achievements	Extension of the CLIC collaboration to 41 Institutes from 21 countries. Concerning the CLIC Test Facility CTF3, addressing the major CLIC feasibility issues was fully completed except for one beam line in the CLEX Experimental Area. Finalisation of the Conceptual Design Report (CDR) has been delayed to end 2011 because of a CTF3 modulator fire which delayed critical beam measurements by about six months. CTF3 was commissioned with beam and demonstrated the feasiblity of the novel scheme of the high-intensity/high-frequency drive beam generation as well as of the two beam acceleration in a prototype Two Beam Test Stand (TBTS) with nominal parameters of 100 MV/m accelerating fields.
		Risks	Technical: lack of availability of the experimental facility with minimum spares. Resources: limited manpower and material budget. Collaboration: progress strongly depending on effort from outside institutes.
		Future prospects & longer term	Conceptual Design Report by end of 2011 in time for recommendations of the European Strategy for Particle Physics due by mid-2012. Delay of CLIC Technical Design initially foreseen in 2016 due to reduced CLIC resources in the 2010 Medium Term Plan. Preparation of Project Implementation Plan by 2016 pending approval by the Council end of 2011 or 2012.
16.b	**Linear collider detector R&D**	2010 Goals	
		2010 Achievements	Broad international participation in the CLIC physics/detector conceptual design report (CDR) was established, significant progress was made with simulation tools and improved understanding of the conditions for performing experiments at a 3 TeV CLIC machine, detector geometries of simulation models for CLIC CDR benchmark studies for the ILD and SiD flavours were determined, engineering studies of the forward region were carried out including a detailed study of feasibility of final focus stability, in the framework of the CALICE collaboration a tungsten-based hadron calorimeter module was constructed and first beam tests were performed.
		Risks	At this early stage, there are no specific risks attached to this project yet.
		Future prospects & longer term	Participation in detector R&D for the linear collider in general, including specific R&D where CLIC imposes particular challenges. Continuation of simulations studies for linear collider physics and detectors. Engineering studies in view of constructing and operating experiments at a future linear collider. Participation in the construction, operation and data-taking of experiments at a future e+e- linear collider.
17	**LINAC4**	2010 Goals	Complete Civil Engineering, launch construction of accelerating structures and main components of RFQ.
		2010 Achievements	The building was completed and delivered in October. All contracts and collaboration agreements for the construction of the accelerating structures were completed and construction has started. Most of the contracts for RF and other important equipment were signed (klystrons, tuners, etc.) and for others the tendering was launched or prepared (modulators, loads, windows). The RFQ construction is late; one RFQ module out of 3 was completed and the others are well advanced. The ion source installed on the test stand could not achieve the design voltage; improvements are being implemented and the development of a new alternative source has started.
		Risks	Technical: risks on the accelerating structures are lower after the successful test of prototypes; the risk of poor performance of the ion source is higher after the failure of the first source assembly, mitigation by improved source development programme launched. The risk of beam problems discovered too late because of the delay in the RFQ remains high, the consequence could be a delay in the overall project schedule. Financial: reduced after the completion of the building and the attribution of the main contracts, and is now limited to the need of repair programmes in case of problem with new components. The LINAC4 risk register will be revised in 2011.
		Future prospects & longer term	Completion of the accelerator in 2014 and connection to the LHC injector chain (PSB-PS-SPS) at the end of 2015. Comment: 2015 probably needs to be adjusted in view of the new shutdown planning.

Figure 10 (cont.): Projects

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	Total	Comments
	Projects						
16.a	**CLIC / Linear Collider**	2010 Budget	**75.4**	**12 260**	**8 940**	**21 200**	The 2010 Budget did not contain the carry forward of 2.7 MCHF from 2009 to 2010, of which 2.2 MCHF are for committed materials. The budget was increased as well during 2010 by 0.8 MCHF for collaboration with UK institutes on work for the beam delivery system (funded by the 2010 Romania contribution). The carry forward to 2011 will be 1.5 MCHF, which is fully for ordered but not yet delivered material in 2010.
		2010 Out-Turn	**71.7**	**12 921**	**10 633**	**23 554**	
		Variations Out-Turn with respect to Budget	**-3.7**	**661**	**1 693**	**2 354**	
		Budget usage in %	**95%**	**105%**	**119%**	**111%**	
16.b	**Linear collider detector R&D**	2010 Budget	**9.5**	**1 540**	**550**	**2 090**	The 2010 Budget does not contain the 100kCHF carry forward from the EU funded part of the project for materials and 50kCHF for fellows (0.5 FTE). The carry forward to 2011 is 40 kCHF, in line with the Financial Rules.
		2010 Out-Turn	**11.4**	**1 953**	**587**	**2 540**	
		Variations Out-Turn with respect to Budget	**1.9**	**413**	**37**	**450**	
		Budget usage in %	**120%**	**127%**	**107%**	**122%**	
17	**LINAC4**	2010 Budget	**50.5**	**8 415**	**27 960**	**36 375**	Some additional personnel from other accelerator and areas headings was allocated to LINAC to allow for the progress of the multiannual project. During 2010, to anticipate partially the changed schedule,some reprofiling was done to future years. The rest of the unused materials budget, being part of the CtC will be reallocated in 2012 (reprofiling), which is in line with the new schedule. Open commitments as of 31/12/2010 were at 5.7 MCHF
		2010 Out-Turn	**60.5**	**11 123**	**14 395**	**25 518**	
		Variations Out-Turn with respect to Budget	**10.0**	**2 708**	**-13 565**	**-10 857**	
		Budget usage in %	**120%**	**132%**	**51%**	**70%**	

Figure 11: Projects (cont.)

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	Projects (cont.)		
-	**HIE-ISOLDE**	2010 Goals	Coordination of the proposal for a Marie-Curie Network to secure the necessary FTEs. Identification of proposals for in-kind contributions. Set-up of the RF test stand at SM18 and validation of the SC cavity specifications. Finalise layout of new buildings. Finalise concept of high-beta cryomodule. Finalise detailed design of SC solenoid. Finalise specifications of LLRF control system.
		2010 Achievements	The organization of the project in terms of breakdown in work packages, resource planning (both inside CERN and Marie Curie Fellows) was completed. External funding for work packages with national institutes was secured and agreements for in-kind contributions were obtained: this will allow the construction of a 5.5 MeV/a facility by end of 2013. Significant progress on the layout of the new infrastructure, on the conceptual design of the high-beta cryomodule and on the detailed design of the SC solenoid was achieved. The cold RF tests (one in TRIUMF and three at CERN) of the prototype cavity have been plagued by a series of difficulties ranging from RF cavity specific problems, mechanical workshop availability and stability of cryogenics in SM18. The low performance of this prototype RF cavity remains to be understood. A stronger involvement (human resources) by the groups concerned was agreed for the five test campaigns planned for 2011. A second prototype cavity was delivered in December and is presently being sputtered.
		Risks	Technical: some accelerator components are of novel design and require prototyping (Nb-sputtered superconducting copper cavities). In case of failure, alternative solutions exist but could lead to delay in the schedule. Financial: SC Linac financed entirely through external funds.
		Future prospects & longer term	Provision of accelerated ions A=6 to A=238 between 0.7 and 10 MeV/A to ISOLDE users by 2014.
	R&D		
19.a	**R&D accelerators**	2010 Goals	Prepare for construction of a prototype cryomodule equipped with 4 superconducting cavities
		2010 Achievements	R&D for a high-power SPL was started, based on the LP-SPL work. Three workshops and two collaboration meetings were organized. Technical design of the superconducting cavities, power couplers, HOM dampers and cryomodules has progressed. Some raw material has been ordered (Nb for cavities, steel and copper for couplers) and the construction of couplers has started. The support of the ESS project has been secured with the signature of a collaboration agreement. CEA has started building tuners as part of the French in-kind contribution.
		Risks	Technical and financial: quality and completeness of the R&D until 2012 will directly impact on the options of CERN's scientific programmes and facility update strategy. Relations with ESS: delays would be disruptive for the ESS Project.
		Future prospects & longer term	R&D for a high-power SPL has started based on the work done for the LP-SPL. A prototype cryomodule equipped with 4 sc cavities and their auxiliary equipment should be built before the end of 2012. In parallel, cryogenics in the SM18 test place should be upgraded to allow 2 K operation of a cryomodule in an RF bunker and in vertical cryostats, and a MW-class 704 MHz RF system must be installed. The assembled prototype cryomodule is planned to be tested in the upgraded SM18 test place during 2013. A report will be published at the end of 2013 summarizing the achievements and complementing the LP-SPL CDR for high beam power. The objectives of the SPL R&D after 2013 will be decided as a function of the scientific strategy of the Organization, taking into account the achievements at that date.
19.bcd	**Other R&D (computing supported by EU, detectors)**	2010 Goals	
		2010 Achievements	End of the following projects : EGI_DS, Health-e-Child, EGEE-III, D4Science, ETICS2, BalticGrid-II, GridTalk, SEE-GRID_SCI. Start-up of OpenAIRE, D4Science-II, EnviroGrids.
		Risks	
		Future prospects & longer term	Prepare for a LHC luminosity upgrade in line with the LHC machine upgrade schedule and for future generation of detector systems.

Figure 11 (cont.): Projects (cont.)

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	Total	Comments
Projects (cont.)							
-	**HIE-ISOLDE**	2010 Budget					
		2010 Out-Turn	**8,6**	**1 899**	**53**	**1 953**	This new project was introduced as of 2010 in the 2010 MTP and approved, obliging CERN to reallocate personnel, which further enhances manpower shortages in other areas. 100kCHF was paid by the collaboration in 2010 on materials expenses.
		Variations Out-Turn with respect to Budget	**8,6**	**1 899**	**53**	**1 953**	
		Budget usage in %					
R&D							
19.a	**R&D accelerators**	2010 Budget	20,3	2 885	2 400	5 285	During the year 2010 the heading for materials was increased by 0.8 MCHF and for personnel by 0.45 MCHF for expenses related to the ITER agreement (covered by revenues from ITER). The excess in personnel and materials is due to the additional resources granted for generic R&D on a high-power SPL. Further EU partnerships as introduced and approved as of 2010 in the MTP 2010, have resulted in an increase of 3.6 FTE (mainly fellows) and about 0.5 MCHF increase in materials.
		2010 Out-Turn	24,4	4 504	2 673	7 177	
		Variations Out-Turn with respect to Budget	4,1	1 619	273	1 892	
		Budget usage in %	120%	156%	111%	136%	
19.bcd	**Other R&D (computing supported by EU, detectors)**	2010 Budget	18,7	3 225	2 035	5 260	During 2010, 0.5 MCHF in materials budget was reallocated from this generic R&D heading to the Detectors upgrade project. The increase in personnel heading can be explained by further EU partnerships, as for example the Inspire and EMI project.
		2010 Out-Turn	32,1	5 094	801	5 895	
		Variations Out-Turn with respect to Budget	13,4	1 869	-1 234	635	
		Budget usage in %	172%	158%	39%	112%	

Figure 12: Projects (cont.)

Fact Sheet as in MTP 2009	Activity		2010 Goals (CERN/FC/5347), 2010 Achievements, Risks and Future Prospects & longer term
	Projects (cont.)		
	High luminosity machine upgrade		
	LHC machine upgrade	2010 Goals	
		2010 Achievements	The main goal of the project was defined, and plans to end the previous Phase 1 New Inner Triplets (NIT) were put in place. Project High Lumi (EU FP7 Design Study within the HL-LHC) was launched and collaboration with US and Japan labs were put in place. Superconducting links objectives and milestone for HL-LHC and R2E were defined. The new project for the development of 11 Tesla LHC dipole magnets was launched in collaboration with Fermilab.
		Risks	The definition of the risk of the new HL-LHC programme is underway. In particular for each equipment based on new technology a plan B is being identified. New machine studies are being launched to understand possible hard limits; these may influence the scheme of the HL-LHC.
		Future prospects & longer term	HL-LHC will provide a global framework for all upgrade R&D studies and hardware modifications on the LHC necessary to upgrade the luminosity beyond initial design.
18	LHC inner triplet	2010 Goals	-Completion of TDR. - Start of construction of the model magnets.
		2010 Achievements	Following the outcome of the Chamonix meeting in January 2010, the Inner Triplets programme has been revised. In 2010 all main tooling for the 2 m-long models have been designed and are in the process of being purchased. Design of magnet finished.
		Risks	Small risk, known technology: this programme will be a back up and remain a safety belt for the High Field Magnet (HFM) programme if unexpected difficulties arise.
		Future prospects & longer term	The Inner Triplets Phase-1 will be merged in 2011 with R&D on high-luminosity LHC project (HL-LHC), aiming for new inner triplets around 2020.
20	Low-power SPL and PS2 studies	2010 Goals	Construction and test of prototype components. Detailed design of subsystems.
		2010 Achievements	Following the outcome of the Chamonix meeting in January 2010, the goals of the LP-SPL and PS2 studies were reduced to the preparation of back-up solutions for the LHC injectors and limited to providing scaled-down Conceptual Design Reports at end 2010/early 2011.
		Risks	The main risk (for redefined goal) is that the CDRs could be delivered later than planned. Impact would be modest, except if the decision is soon taken to activate the back-up plan.
		Future prospects & longer term	The Conceptual Design Reports are well advanced and will be circulated in March 2011 for PS2 and mid-2011 for LP-SPL. Publication in the first half of 2011 of scaled-down CDRs describing the work done for the future LHC injectors. LP-SPL and PS2 kept as back-up solutions.
	High luminosity detectors upgrade		
	LHC detectors R&D	2010 Goals	
		2010 Achievements	Steady progress in the domains of radiation hard electronics, fast (2GB/s) optical links, detector cooling, software virtualisation and use of parallel processors. Strong participation including prototypes in the framework of RD50 (rad-hard silicon sensors) and RD51 (gaseous detectors)
		Risks	
		Future prospects & longer term	Develop technologies needed for the upgrades of detectors in view of the High Luminosity LHC phase (detectors and cooling, electronics, software and simulation)
	LHC detectors upgrade	2010 Goals	
		2010 Achievements	TDR (ATLAS IBL) and Letter of Intent (CMS ~10 years upgrade program) reviewed by LHC Committee. LoIs under preparation for LHCb and ALICE.
		Risks	Without these upgrades, the performance of the detectors would not be optimal and would not allow to take full profit of this unprecedented step in energy and lunimosity of the LHC.
		Future prospects & longer term	Continue R&D and in some cases start procurements and construction of components which will be installed during shutdowns planned around 2016 before the bulk LHC run. The planned CERN participation will mainly focus on: DAQ and ITS for ALICE, Insertable B Layer (IBL) and improved trigger for ATLAS, New pixel detector, luminosity telescope and 4th RPC station and DAQ for CMS, new electronics for a 40 MHZ trigger for LHCb.
	High-energy LHC studies / High-field magnets	2010 Goals	Construction of two small coils, finishing design of 13 T dipole for FRESCA2 station. Qualification of European vendor of Nb3Sn. Tooling fot HFM.
		2010 Achievements	The first SMC (Small Magnet Coil) was tested and construction of a second one launched. Preliminary design of the 13 T magnets done and ready for international review. The space of parameters for HE-LHC 20 T dipole was studied and a preliminary cross-section designed. The European conductor in Nb_3Sn was successfully delivered (1 supplier out of 3) and qualified for the first time.
		Risks	Delays in the objectives caused by possible inherent difficulties, conductor deliveries or budget cuts from partners could impact on the readiness for the magnet design and the consequent luminosity upgrade. Tooling not yet ready. The avaibility of manpower will be challenging due to the splice consolidation work in the 2013 shutdown. A plan to mitigate the manpower risk by reinforcing international collaboration is underway (see HL-LHC).
		Future prospects & longer term	The HFM programme will be incorporated into HL-LHC

Figure 12 (cont.): Projects (cont.)

Fact Sheet as in MTP 2009	Activity	Comparison 2010 Budget (CERN/FC/5397) and 2010 Out-Turn (CERN/FC/5508) in 2010 prices	FTE Personnel	kCHF Personnel	kCHF Materials	kCHF Total	Comments
	Projects (cont.)						
	High luminosity machine upgrade						
	LHC machine upgrade	2010 Budget	17.4	2 940	1 500	4 440	As of the 2010 MTP, the LHC machine upgrade strategy has been revisited, also due to the changed overall schedule. As a consequence, significantly less personnel and materials was used for this focused R&D activity. In addition, work on the RF 200 MHz system (part of he White Paper initiatives) was further delayed due to manpower shortage. The carry forward to 2011 will amount to 1 MCHF for this CtC project.
		2010 Out-Turn	13.7	2 244	250	2 494	
		Variations Out-Turn with respect to Budget	-3.7	-696	-1 250	-1 946	
		Budget usage in %	79%	76%	17%	56%	
18	LHC inner triplet	2010 Budget	18.1	2 990	9 750	12 740	Following a review in 2010, the LHC Inner Triplet phase 1 project was closed. The personnel was made available to finalise a prototype. The project is merged as of 2011 with the HL-LHC project, and about 2 MCHF were reprofiled from 2010 to future years following the new planning. Open commitments amount to 1.2 MCHF as of 31/12/2010. Please note that the 2010 Materials Budget also contained a 4 MCHF in-kind contribution, which is not reflected in the Out-Turn.
		2010 Out-Turn	20.0	3 459	1 593	5 052	
		Variations Out-Turn with respect to Budget	1.9	469	-8 157	-7 688	
		Budget usage in %	110%	116%	16%	40%	
20	Low-power SPL and PS2 studies	2010 Budget	9.3	1 485	765	2 250	Following a review in 2010, the project LIU (LHC Injector Upgrade) has been created, which will change the activity breakdown. These headings are part of the 2006 White Paper initiatives with the aim to arrive at a conceptional design report in 2011. The difference between the 2010 Budget and 2010 OutTurn can be explained through the carry forward from 2009 that was added to the budget in the beginning of 2010 in line with the Financial rules.
		2010 Out-Turn	16.3	2 414	1 224	3 638	
		Variations Out-Turn with respect to Budget	7.0	929	459	1 388	
		Budget usage in %	175%	163%	160%	162%	
	High luminosity detectors upgrade						
	LHC detectors R&D	2010 Budget	16.5	2 615	2 765	5 380	During 2010 0.5 MCHF has been reprofiled to future years, in line with the planning. Open commitments amounted to 0.3 MCHF at the end of 2010
		2010 Out-Turn	40.3	7 777	1 984	9 761	
		Variations Out-Turn with respect to Budget	23.8	5 162	-781	4 381	
		Budget usage in %	244%	297%	72%	181%	
	LHC detectors upgrade	2010 Budget					During the year 2010, a budget of 950kCHF was reallocated to this project from the common items. Open commitments amounted to 150kCHF at the end of 2010.
		2010 Out-Turn	3.0	794	752	1 546	
		Variations Out-Turn with respect to Budget	3.0	794	752	1 546	
		Budget usage in %					
	High-energy LHC studies / High-field magnets	2010 Budget	**12.5**	**2 080**	**1 710**	**3 790**	At the end of 2010 open commitments amounted to 1 MCHF, the materials heading is thus fully used.
		2010 Out-Turn	**8.4**	**1 566**	**705**	**2 271**	
		Variations Out-Turn with respect to Budget	**-4.1**	**-514**	**-1 005**	**-1 519**	
		Budget usage in %	67%	75%	41%	60%	

III. Additional Information

1. Scientific Progress and Publications

The highlight of 2010 has been the very successful run of the LHC with protons and with lead–ion beams. From the first collisions on March 30th to the end of the run in early November, the luminosity for proton-proton collisions at a centre-of-mass energy of 7 TeV has increased by 5 orders of magnitude, reaching $2x10^{32}$ $cm^{-2}s^{-1}$, a factor of two above the target set early in the year. All experiments performed extremely well with a data-taking efficiency well above 90%, a record for a first year of operation. The performance of the LHC Computing Grid was also outstanding, exceeding the design bandwidth and allowing a very fast reconstruction and analysis of the data. As a result, more than 50 papers were submitted to scientific journals. CMS and ATLAS have “rediscovered” all the known particles of the Standard Model, including the top quark for which they measured the production cross-section at 7 TeV. Limits which exceed those set at the Tevatron have been set in the search for new particles and new physics. LHCb has already shown evidence for new decay channels of the B mesons. ALICE measured properties of the soft proton-proton collisions which will serve as the reference for the study of ion collisions. The LHCf experiment was completed, and the TOTEM experiment was able to record a large sample of elastic collisions. The Pb-ion run at a centre-of-mass energy of 2.76 TeV NN was also very successful, leading to important measurements by ALICE, ATLAS and CMS concerning the properties of the dense nuclear matter produced in the Pb-Pb collisions. For example, the jet-quenching phenomenon was observed by all three detectors and the ALICE experiment has already been able to measure some hydrodynamics properties of the dense medium.

The non-LHC programme was also rich and successful. Its highlight was certainly the first trapping of anti-hydrogen atoms by the ALPHA and ASACUSA experiments at the AD which attracted a lot of attention by the media, classified for example as “Breakthrough of the Year” by Physics World Magazine. More generally, all AD experiments made strong progress thanks to the excellent availability (>91%) of the AD complex. For the CNGS, the number of protons delivered on target (4.04x1019) exceeded the aim by 5%. The OPERA experiment published its first candidate for a $\nu\mu \rightarrow \nu\tau$ oscillation and the ICARUS detector started operation during the spring. At the SPS, the NA58-COMPASS experiment published new results on spin asymmetries with muon-proton and muon-deuteron scattering while recording new data with a transversely-polarized target. The NA61 experiment recorded 80M proton-proton interactions out of which 10M with a replica of the T2K experiment target, to serve as reference for this neutrino experiment in Japan. Furthermore, at the end of the year, a successful test of a fragmented light-ion beam produced by interactions of Pb ions confirmed the feasibility of the physics programme planned for NA61 in 2011/2012. The construction of the NA62 experiment is progressing according to schedule: the experimental area has been reconfigured, the first Large Angle Veto rings and first production straws have been delivered. The group continues to publish results from NA48 providing stringent tests of Chiral Perturbation Theory and lattice QCD calculations. The UA9 experiment successfully demonstrated collimation of a beam in the SPS using crystal channeling, opening the possibility for a future test on the LHC. At the PS, the DIRAC experiment continued measurements on pi-K atoms, which should lead to evidence of such atoms at the 5σ level. The CLOUD experiment, which studies atmospheric nucleation, recorded very clean data which allowed a first measurement of the critical cluster at molecular level for various temperatures. These data, which give a new insight into the nucleation mechanism, were the highlight of the International Aerosol Conference in September. The ISOLDE physics run was also successful, serving 41 experiments from nuclear, atomic, solid-state physics, astrophysics and biology. With 1.18 x 1019 protons on target, the nTOF complex exceeded its goal by 20%. The CAST experiment extended its axion search to a mass of 1.04 eV.

Finally, CLIC is proceeding towards the Conceptual Design Report for both the machine and the detector.

2. Human Resources

Status

The personnel FTE numbers paid on CERN accounts (including EU support and other external revenue sources) in 2010 contain 2,277.4 FTEs staff, 375.9 FTEs fellows, 47.6 FTEs scientific associates, 126.9 FTEs technical students, 134.7 FTEs doctoral students, 133.8 FTEs project associates, 23.8 FTEs apprentices, and 33.5 FTEs summer students.

The active staff members (paid out of CERN funds and available) during 2010 were 2,183.8 FTA, which is within the 2,250 FTAs target essentially due to the gradual implementation of the self-set target and delays in the recruitment process. In that context, the Management held a dedicated meeting in

December 2010 to assess the manpower requirements and to adjust the recruitment to achieve the objectives laid down in the MTP.

Work has been ongoing for the code of conduct. Furthermore, the new recruitment unit has made a successful start in enhancing CERN's diversity in the recruitment process. As of 31.12.2010, women amount for 20.9% of the staff.

Training information

On average, each staff member spent about 3 working days on training in 2010. This figure does not contain the training hours spent for the series of academic lectures or training courses that are not organized by CERN. Students spent some 5.5 working days on training, Fellows around 4 working days (not counting conferences or workshop participation).

Total training hours for staff members amounted to 54,200, and nearly twice that amount - almost 95,500 hours - for all members of personnel and contractors. These break down as follows: 38,700 hours for language training, 30,800 for technical training (without the academic lectures), 9,600 hours for safety training and 11,900 hours for management and communication.

A total of 984 teachers attended the CERN Teacher Programmes, with 896 coming from the Member States and the remainder from 16 non-Member States, and attended either the international programme or one of the many sessions held in a national language.

Users

CERN has enhanced its services to its over 10,000 Users. Following the additional shuttle services, a car-sharing system was put in place, and more video conference rooms were established. Work has progressed for the consolidation of the general infrastructure, especially for user facilities.

3. Health and Safety

Several Safety services have been improved or established to allow the Organization to systematically implement preventive measures, including in particular the following:

- technical safety inspections on various equipment (>5000 safety inspections carried out) and buildings (548 buildings inspected)
- overall safety training and safety awareness activities especially with a view to regular LHC operation (e.g. 1414 persons trained in the use of self-rescue breathing apparatus, 863 persons instructed on radiation protection at CERN)
- review of technical specifications with respect to safety matters (~85 reviewed, e.g. the HVAC system for LINAC 4, redundant Helium compressors skids for ATLAS, etc)
- review the safety compliance of new/consolidation projects at an early stage (~55 followed, e.g. the complete renovation of bldg. 107, power distribution of building 513, LHC splices, etc)
- safety advice including support in the elaboration of safety files and procedure for safety clearance conditions for new/existing experiments (e.g. ISOLDE, AD and North area experiments)
- ALARA principle in radiation protection (e.g. handling of ISOLDE targets, WANF dismantling, LHC collimators upgrade, etc).

The preliminary accident statistics for the year 2010 indicate 221 days of sick leave due to accidents for the CERN members of personnel and paid associates. The respective statistics for contractor staff are not yet available. These numbers confirm the positive trend of the last years [2006: 1009 days; 2007: 817.5 days; 2008: 464 days; 2009: 390 days] in line with the start-up of the LHC (installation completed in 2009). Following the road safety campaigns of 2008/9, the number of accidents on the journey to and from work has stabilised in 2010 at the 2009 level.

The preliminary collective radiation dose to personnel for the year 2010 is 4 % above the 2009 value (2009: 400 person-mSv; 2010: 414 person-mSv). At the same time the number of dosimeters distributed has increased by 10% to 6,957 dosimeters. 5,217 persons had their dosimeter for the whole year, whereas other people received several times during the year a dosimeter for a short period. The distribution among the different categories of personnel is as follows:

- CERN staff : 1539 persons with a collective dose of 144 mSv,
- Contractor staff: 1046 persons with a collective dose of 97.2 mSv,
- Users : 4372 persons with a collective dose of 172.9.

The continuous monitoring of CERN's environmental impact showed a negligible impact including the few low-impact pollution events during 2010. In the framework of the Memorandum of Collaboration with the Host States in matters of environmental protection, a tripartite (CERN, France, Geneva) technical working group was set up to analyse possible actions for optimising the quantity and the quality of the water released from the CERN sites.

On 15 November CERN and its Host States signed a tripartite agreement replacing the bilateral agreements in matters of radiation protection and radiation safety. The agreement covers a wide range of issues, including the general protection of members of personnel and the public against ionising radiation, the handling of sealed and unsealed sources as well as the management of radioactive waste. For the first time, a single forum has been established, in which the three parties can discuss how to further enhance the overall safety in the specific CERN context.

4. Collaboration Agreements

Bilateral agreements were signed between CERN and several parties. These include International Co-operation Agreements with non-Member State Governments and their Agencies, Protocols that govern a non-Member State's participation in specific CERN programmes, agreements with Inter-governmental Organizations, agreements with International Scientific Organizations and agreements with partner institutes, laboratories and universities.

CERN contributes with its personnel and expertise to research projects such as CNAO, MedAustron, Fair, Iter, ULICE, and others. As detailed in Section IV.6, the number of European Union supported projects increases, notably with CERN being the co-ordinator for more EU projects.

New International Co-operation Agreements (ICAs) were concluded with Estonia, Jordan (& SESAME), with the International Telecommunications Union (ITU), the World Intellectual Property Organization (WIPO) and the World Meteorological Organization (WMO).

Agreements and collaborations newly established in 2010:

COUNTRY	PARTNER	COLLABORATION	DETAILS
EU	European Atomic Energy Community	K1721, Material transfer agreement N°31631	Provision of radioactive targets from CERN to IRMM
Germany	GSI/FAIR	CERN AGREEMENT K 1727/DG, Collaboration in Accelerator Sciences and technologies and other scientific domains of mutual interest	Superconducting magnets, power supplies, controls; diagnostics, antiproton production, other systems, training
Germany	FZD	K1719 Collaboration Agreement ForschungsZentrum Dresden	Provision of radioactive targets to FZD
Greece	NTUA	K1720 Collaboration agreement University Athens	Provision of radioactive targets to department of physics
Jordan	SESAME	P099, Addendum 1 & 2 & 3 & 4	1. Support for Magnet Design. 2. Preparation for magnet measurements.3. Support for safety and personnel protection issues. 4. Fluka training for shielding calculations.
Russia	JINR	ICA-RU-011	Scientific and Technical co-operation in High energy Physics
Sweden	ESS	K1577/AB Addendum 6	Advise on Accelerators for the ESS
Switzerland	ADAM	K1117/ETT/AB/AT/PH/007C Add 2	Energy deposition studies in matter and design of innovative shielding for hadrontheraphy accelerators
Switzerland	ADAM	K1117/ETT/AB/AT/PH/007C Add 1	Development of high-frequency linear accelerator technologies for hadrontheraphy
Switzerland	PSI	K1635 DG Addendum 1:	Reaction cross sections for the calculation of radioactive nuclide production at high-energy particle accelerators.
US	Fermilab	Coll. Agreement (under preparation)	Research, design, and development of multi megawatt proton facilities based on superconduction RF technologies
US	Fermilab	Letter of Intent	Research on Multi-Megawatt Proton Facilities Based on Superconducting RF Technologies and Energy Frontier Colliders
US	Fermilab	Coll. Agreement	Research, design and development of Accelerator and Detector Technologies for Multi-TeV Lepton colliders

IV. Financial Tables and Explanations

1. Overview of Revenues and Expenses by Activity

Figure 13: Overview of Revenues and Expenses by Activity

(in MCHF, rounded off)	2010 Budget CERN/FC/5397 (2010 prices)	2010 Out-Turn CERN/FC/5508 (2010 prices)	Variations of Out-Turn with respect to Budget	
			kCHF	%
	(a)	(b)	(c)=(b)-(a)	(d)=(c)/(a)
REVENUES	**1,204.5**	**1,223.5**	**19.0**	**1.58%**
Member States' contributions	1,112.2	1,112.2		
Additional contributions from Host States	22.4	23.9	1.5	6.90%
Additional contribution from Romania as Candidate for Accession*		3.2	3.2	
EU contributions	13.8	15.1	1.3	9.51%
Personnel paid on team accounts	10.4	12.6	2.2	21.49%
Personnel on detachment	0.7	1.1	0.4	55.48%
Internal taxation	24.0	26.2	2.2	9.09%
Knowledge and technology transfer	2.5	1.2	-1.3	-52.11%
External revenues for new amphitheatre	10.0		-10.0	-100.00%
Other revenues (including other in-kind, housing fund, sales)	8.6	28.0	19.4	225.25%
OPERATING EXPENSES	**998.8**	**899.4**	**-99.3**	**-9.94%**
Running of scientific programmes and support	**899.0**	**808.0**	**-90.9**	**-10.11%**
Scientific programmes	**494.5**	**425.1**	**-69.4**	**-14.03%**
LHC (including spares and new initiatives support to detectors)	*325.1*	*264.3*	*-60.9*	*-18.72%*
Non-LHC physics and scientific support	*64.6*	*52.5*	*-12.1*	*-18.68%*
Accelerators and areas	*104.8*	*108.3*	*3.6*	*3.39%*
Infrastructure and services	**404.5**	**382.9**	**-21.5**	**-5.33%**
General infrastructure and services	*205.8*	*199.4*	*-6.4*	*-3.11%*
Infrastructure consolidation, buildings and renovation	*31.6*	*19.4*	*-12.3*	*-38.76%*
Centralised personnel expenses	*31.1*	*27.8*	*-3.3*	*-10.68%*
Internal taxation	*24.0*	*26.2*	*2.2*	*9.09%*
Paid but not available		*9.5*	*9.5*	
Personnel internal mobility		*0.2*	*0.2*	
Personnel on detachment	*0.7*	*1.0*	*0.2*	*33.26%*
Insurances and postal charges, energy and water	*90.6*	*80.3*	*-10.4*	*-11.44%*
Housing fund	*4.2*	*3.9*	*-0.3*	*-6.49%*
Interest and financial costs	*16.4*	*15.4*	*-1.0*	*-6.07%*
Projects (including R&D)	**99.8**	**91.4**	**-8.4**	**-8.43%**
CLIC / Linear collider	*21.2*	*23.6*	*2.4*	*11.10%*
Linear collider detector R&D	*2.1*	*2.5*	*0.4*	*21.52%*
LINAC 4	*36.4*	*25.5*	*-10.9*	*-29.85%*
HIE-ISOLDE		*2.0*	*2.0*	
R&D and studies	*10.5*	*13.1*	*2.5*	*23.96%*
High luminosity machine upgrade	*19.4*	*11.2*	*-8.2*	*-42.45%*
High luminosity detectors upgrade	*5.4*	*11.3*	*5.9*	*110.15%*
High energy LHC studies / High field magnets	*3.8*	*2.3*	*-1.5*	
Construction PS2/SPL/S-LHC (machine and detectors)	*1.0*		*-1.0*	*-100.00%*
OTHER EXPENSES	**27.5**	**36.1**	**8.6**	**31.10%**
Personnel paid on team accounts	10.4	12.6	2.2	21.49%
Various	17.2	23.5	6.3	36.91%
Reversal of sector 3-4 provision		-7.7	-7.7	
In-kind		12.8	12.8	
Stores activity	0.2	0.1	-0.1	-63.45%
Depreciation of current assets		0.2	0.2	
Miscellaneous (inc. schools, conferences)		0.8	0.8	
Budget amortization of staff benefits accruals	*17.0*	*17.3*	*0.3*	*1.93%*
TOTAL EXPENSES	**1,026.3**	**935.5**	**-90.8**	**-8.84%**
BALANCE				
Annual balance	178.3	288.0	109.7	61.57%
Capital repayment allocated to the budget (Fortis, FIPOI 1 and 2)	-15.1	-15.1		
Annual balance allocated to budget deficit	163.2	272.9	109.7	67.25%
-Cumulative Balance- - 488.7	**-325.5**	**-215.8**	**109.7**	**-33.72%**

* Romania as Candidate for Accession paid 25% of its calculated total contribution for 2010 as specified in Council Resolution CERN/2829 and updated by the Agreement signed by CERN and Romania on 11 February 2010.

2. Total Revenues

Figure 14: Total Revenues

(in kCHF)	2010 Budget CERN/FC/5397 (2010 prices)	2010 Out-Turn CERN/FC/5508 (2010 prices)	Variations of Out-Turn with respect to Budget	
			kCHF	%
	(a)	(b)	(c)=(b)-(a)	(d)=(c)/(a)
REVENUES	**1 204 530**	**1 223 518**	**18 988**	**1.58%**
Member States' contributions	1 112 155	1 112 153	-2	0.00%
Additional contributions from Host States	22 375	23 919	1 544	6.90%
Cash	*16 675*	*16 675*		
In-kind	*5 700*	*7 244*	1 544	27.09%
Additional contribution from Romania as Candidate for Accession*		3 232	3 232	
EU contributions	13 810	15 124	1 314	9.51%
Personnel paid on team accounts	10 360	12 586	2 226	21.49%
Personnel on detachment	700	1 088	388	55.48%
Internal taxation	24 015	26 198	2 183	9.09%
Knowledge and technology transfer	2 500	1 197	-1 303	-52.11%
External revenues for new amphitheatre	10 000			
Other revenues	8 615	28 020	19 405	225.25%
Sales and miscellaneous	*2 000*	*14 067*	12 067	603.33%
OpenLab revenues	*360*	*1 435*	1 075	298.72%
Financial revenues	*200*	*823*	623	311.58%
*In-kind ***		*5 528*	5 528	
Housing fund	*6 055*	*6 167*	112	1.86%

* Romania as Candidate for Accession paid 25% of its calculated total contribution for 2010 as specified in Council Resolution CERN/2829 and updated by the Agreement signed by CERN and Romania on 11 February 2010.

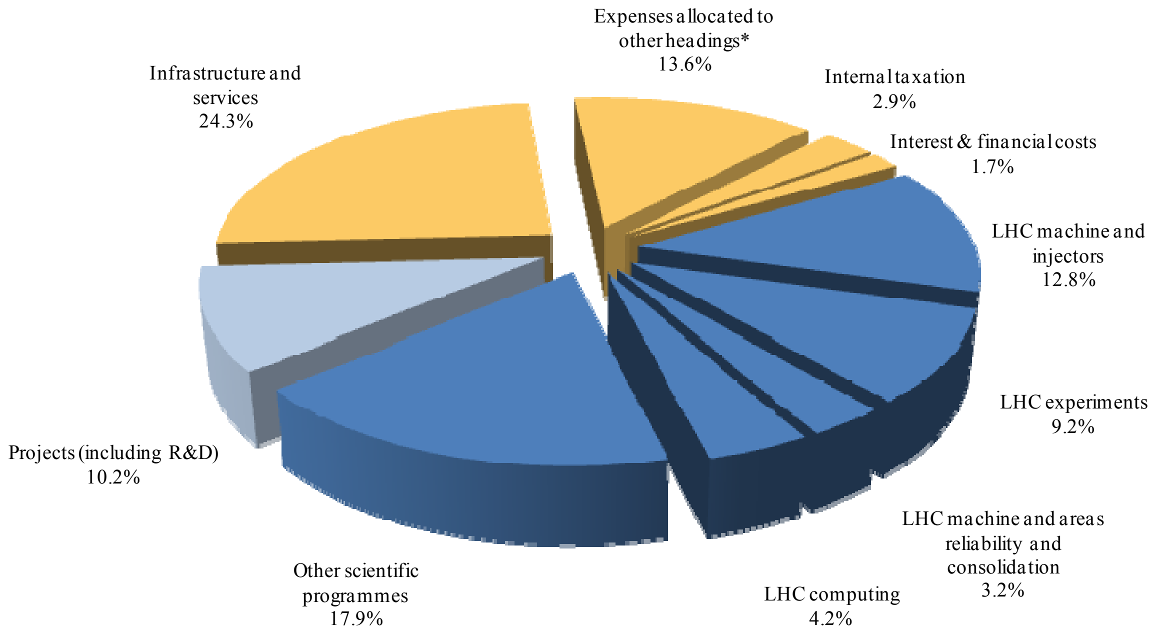
** In-kind from Novae, Intel, CEA/CNRS plus the theoretical interest of the FIPOI loan and advantage from free use of land.

Outstanding contributions amounted to 43.8 MCHF as of 31/12/2010. Revenues increased notably due to contributions from Romania as Candidate for Accession, more EU projects and personnel paid on team accounts or detached personnel as well as other revenues (including sales, compensation from insurances, in-kind and collaboration agreements). The fact that sales were continuously higher than budgeted over will be reflecting in the Medium Term Plan (MTP) for the coming years.

The project for a new auditorium was put on hold, notably because external revenues to fund the construction costs could not be secured. With the exception of 2008, knowledge and technology transfer revenues have been significantly below the self-set target of 2.5 MCHF due to the nature of CERN partnerships which, although numerous, in most cases have a small annual turnover. The expected KTT revenues for the coming years will be revised in the next MTP.

3. Operating Expenses by Scientific and Non-Scientific Programmes[1]

Figure 15: Expenses breakdown by activity (Personnel, Materials and Interest & Financial costs)



* Including Centralised personnel expenses, Social security, Internal mobility, Personnel on detachment (4.3%), Energy and water (8%), Insurances and postal charges (0.9%), Housing Fund (0.4%)

---

[1] Please note that this Section only gives details of the operating expenses. Other expenses not linked to the scientific and non-scientific programmes are summarized in Figure 13.

3.1. Experiments (CERN's contribution to the collaborations and experiments on site) and Accelerators

Figure 16: Scientific Programme

2010 Budget CERN/FC/5397 (2010 prices) (a)				Fact sheet	Fact Sheet as in MTP 2009	Activity	2010 Out-Turn CERN/FC/5508 (2010 prices) (b)				Budget usage in % (c) = (b)/(a)				Variations of Out-Turn with respect to Budget (d)=(b)-(a)	(e)=(d)/(a)
FTE	kCHF						FTE	kCHF			FTE	kCHF			kCHF	%
Personnel	Personnel	Materials	Total				Personnel	Personnel	Materials	Total	Personnel	Personnel	Materials	Total	Total	Total
955.0	165 325	159 810	325 135			LHC programme (incl. projects)	941.3	157 806	106 474	264 280	98.6%	95.5%	66.6%	81.3%	-60 855	-18.7%
437.5	**72 880**	**66 935**	**139 815**	**1**	**1**	**LHC machine and injectors**	**435.5**	**68 774**	**46 350**	**115 123**	**99.5%**	**94.4%**	**69.2%**	**82.3%**	**-24 692**	**-17.7%**
424.0	70 480	59 110	129 590			LHC machine and experimental areas	419.8	66 896	41 481	108 376	99.0%	94.9%	70.2%	83.6%	-21 214	-16.4%
4.2	710	6 880	7 590			Spares	6.9	708	4 826	5 534	164.3%	99.7%	70.1%	72.9%	-2 056	-27.1%
9.2	1 690	945	2 635			LHC injectors (for heavy Ions)	8.9	1 170	42	1 213	96.7%	69.3%	4.5%	46.0%	-1 422	-54.0%
382.4	**67 920**	**22 850**	**90 770**			**LHC experiments**	**368.9**	**62 369**	**20 115**	**82 484**	**96.5%**	**91.8%**	**88.0%**	**90.9%**	**-8 286**	**-9.1%**
124.1	21 880	4 445	26 325	2	2	ATLAS detector	137.0	24 326	3 928	28 254	110.4%	111.2%	88.4%	107.3%	1 929	7.3%
120.4	21 270	3 470	24 740	3	3	CMS detector	111.7	18 039	3 897	21 937	92.8%	84.8%	112.3%	88.7%	-2 804	-11.3%
48.1	8 885	2 265	11 150	4	4	ALICE detector	45.5	7 547	2 116	9 663	94.6%	84.9%	93.4%	86.7%	-1 487	-13.3%
50.9	9 410	1 985	11 395	5	5	LHCb detector	50.2	9 068	1 754	10 822	98.6%	96.4%	88.4%	95.0%	-573	-5.0%
37.7	6 270	2 930	9 200	6	6	Common items, other experiments (inc. Totem, LHCf)	24.5	3 390	2 307	5 696	65.0%	54.1%	78.7%	61.9%	-3 504	-38.1%
1.2	205	7 755	7 960			Detectors re-scoping			6 113	6 113			78.8%	76.8%	-1 847	-23.2%
38.2	**6 505**	**32 355**	**38 860**	**7**	**21.a**	**LHC machine and areas reliability and consolidation**	**48.6**	**9 942**	**18 852**	**28 794**	**127.2%**	**152.8%**	**58.3%**	**74.1%**	**-10 066**	**-25.9%**
96.9	**18 020**	**37 670**	**55 690**	**9**	**7**	**LHC computing**	**88.3**	**16 721**	**21 158**	**37 879**	**91.1%**	**92.8%**	**56.2%**	**68.0%**	**-17 811**	**-32.0%**
654.2	112 900	56 465	169 365			Other programmes (LHC support and non-LHC programmes	641.6	106 901	53 949	160 850	98.1%	94.7%	95.5%	95.0%	-8 515	-5.0%
18.8	**3 010**	**3 975**	**6 985**	**10**	**8**	**Non-LHC physics**	**35.4**	**6 646**	**2 556**	**9 202**	**188.3%**	**220.8%**	**64.3%**	**131.7%**	**2 217**	**31.7%**
64.7	**10 190**	**1 935**	**12 125**	**11**	**9.a**	**Theory**	**69.0**	**10 414**	**1 685**	**12 099**	**106.6%**	**102.2%**	**87.1%**	**99.8%**	**-26**	**-0.2%**
18.6	**3 800**	**2 070**	**5 870**	**12**	**9.b**	**LHC physics centre**	**17.3**	**2 875**	**1 507**	**4 382**	**93.0%**	**75.7%**	**72.8%**	**74.6%**	**-1 488**	**-25.4%**
176.6	**31 765**	**7 850**	**39 615**	**13**	**9.c**	**Scientific support**	**129.3**	**21 634**	**5 212**	**26 846**	**73.2%**	**68.1%**	**66.4%**	**67.8%**	**-12 769**	**-32.2%**
35.0	**5 900**	**3 335**	**9 235**	**14**	**10**	**Low and medium energy accelerators**	**38.4**	**6 483**	**2 958**	**9 441**	**109.7%**	**109.9%**	**88.7%**	**102.2%**	**206**	**2.2%**
197.5	**33 820**	**19 370**	**53 190**	**14**	**10**	**PS and SPS complexes**	**218.1**	**36 094**	**19 492**	**55 586**	**110.4%**	**106.7%**	**100.6%**	**104.5%**	**2 396**	**4.5%**
125.7	**21 435**	**9 185**	**30 620**	**14**	**10**	**Accelerator technical services**	**94.4**	**15 703**	**12 570**	**28 272**	**75.1%**	**73.3%**	**136.8%**	**92.3%**	**-2 348**	**-7.7%**
17.2	**2 980**	**8 745**	**11 725**	**15**	**21.a**	**Accelerator consolidation**	**39.8**	**7 052**	**7 970**	**15 022**	**231.4%**	**236.6%**	**91.1%**	**128.1%**	**3 297**	**28.1%**
1 609.2	278 225	216 275	494 500			Grand Total	1 582.9	264 707	160 423	425 130	98.4%	95.1%	74.2%	86.0%	-69 370	-14.0%
	23.10%	17.96%	41.05%					21.63%	13.11%	34.75%						

Explanations on Figure 16:

As mentioned above, the appreciation of the Swiss franc resulted in lower expenses than planned for materials. Furthermore, lower expenses on consolidation are explained by shortages of manpower.

For the LHC machine, some materials budget was transferred to GET fellows.

The strategy with regard to a new computing centre was changed, resulting in significantly lower expenses for LHC computing with re-profiled budgets over the MTP period.

Reallocations of staff from scientific support directly charged against the experiments explain the variations in the personnel strength.

The heading LHC physics centre combines the previous white paper heading "additional manpower for computing in experiments" and the new LHC physics analysis centre (in materials).

3.2. Non-scientific Programme (Infrastructure and Supporting Services)

Figure 17: Infrastructure and Services

2010 Budget CERN/FC/5397 (2010 prices) (a)				Fact sheet	Fact Sheet as in MTP 2009	Activity	2010 Out-Turn CERN/FC/5508 (2010 prices) (b)				Budget usage in % (c) = (b)/(a)				Variations of Out-Turn with respect to Budget (d)=(b)-(a)	(e)=(d)/(a)
FTE	kCHF						FTE	kCHF			FTE	kCHF			kCHF	%
Personnel	Personnel	Materials	Total				Personnel	Personnel	Materials	Total	Personnel	Personnel	Materials	Total	Total	Total
769.0	**182 195**	**222 255**	**404 450**			**Infrastructure and services**	**807.6**	**187 752**	**195 156**	**382 908**	**105.0%**	**103.1%**	**87.8%**	**94.7%**	**-21 542**	**-5.3%**
84.9	**14 085**	**2 065**	**16 150**	**16**	**11.a**	**Manufacturing facilities (workshops, etc.)**	**80.3**	**11 474**	**1 026**	**12 500**	**94.6%**	**81.5%**	**49.7%**	**77.4%**	**-3 650**	**-22.6%**
138.8	**22 355**	**38 370**	**60 725**	**17**	**11.b**	**General facilities and logistics (site maintenance, transport)**	**127.3**	**22 005**	**38 395**	**60 400**	**91.7%**	**98.4%**	**100.1%**	**99.5%**	**-325**	**-0.5%**
148.1	**25 465**	**16 455**	**41 920**	**18**	**11.c**	**Informatics**	**157.6**	**26 108**	**15 812**	**41 921**	**106.4%**	**102.5%**	**96.1%**	**100.0%**	**1**	**0.0%**
137.0	**20 635**	**7 895**	**28 530**	**19**	**12**	**Safety, health and environment**	**123.9**	**17 802**	**7 178**	**24 980**	**90.4%**	**86.3%**	**90.9%**	**87.6%**	**-3 550**	**-12.4%**
196.8	**32 185**	**8 245**	**40 430**	**20**	**13**	**Administration**	**202.6**	**35 172**	**8 535**	**43 707**	**102.9%**	**109.3%**	**103.5%**	**108.1%**	**3 277**	**8.1%**
40.0	**8 485**	**9 570**	**18 055**	**21**	**14**	**Outreach and KTT**	**45.1**	**8 319**	**7 575**	**15 894**	**112.8%**	**98.0%**	**79.2%**	**88.0%**	**-2 161**	**-12.0%**
17.1	**2 765**	**28 870**	**31 635**	**22**	**21.b**	**Infrastructure consolidation, buildings and renovation**	**14.1**	**1 885**	**17 487**	**19 372**	**82.5%**	**68.2%**	**60.6%**	**61.2%**	**-12 263**	**-38.8%**
6.2	**56 220**	**94 415**	**150 635**	**23**	**15**	**Centralised expenses**	**56.7**	**64 987**	**83 772**	**148 758**	**914.5%**	**115.6%**	**88.7%**	**98.8%**	**-1 877**	**-1.2%**
	31 095		31 095			Centralised personnel expenses (inc. social sec.)		27 773		27 773		89.3%		89.3%	-3 322	-10.7%
	24 015		24 015			Internal taxation		26 198		26 198		109.1%		109.1%	2 183	9.1%
						Paid but not available	50	9 503		9 503					9 503	
						Personnel internal mobility	0.6	158		158					158	
3.8	715		715			Personnel on detachment	3.6	953		953	94.7%	133.3%		133.3%	238	33.3%
		83 350	83 350			Energy and water			71 999	71 999			86.4%	86.4%	-11 351	-13.6%
		7 275	7 275			Insurances and postal charges			8 261	8 261			113.6%	113.6%	986	13.6%
2.4	395	3 790	4 185			Housing fund	2.8	402	3 511	3 913	116.7%	101.8%	92.6%	93.5%	-272	-6.5%
		16 370	**16 370**	**23**	**15**	**Interest and financial costs**			**15 376**	**15 376**			**93.9%**	**93.9%**	**-994**	**-6.1%**
	15.13%	18.45%	33.58%					15.35%	15.95%	31.30%						

Explanations on Figure 17:

The total expenses on infrastructure and services were as foreseen, however some transfers between the sub-headings occurred:

Personnel in the workshop was charged against project-headings more than foreseen in the budget, which resulted in an 18% reduction of personnel costs under the manufacturing facilities heading.

The 2010 Budget for infrastructure consolidation, buildings and renovation contained the start of the construction of Building 33bis and the renovation of Restaurant 3; both projects were cancelled in the course of 2010. Projects that were introduced in 2010 were Building 867 (radiation workshop) and the renovation of the existing main auditorium.

Administration expenses are in line with the probable expenses including the renovation of the main building and additional visiting personnel for scientific exchanges.

The expenses for Energy were less than foreseen, mostly due to the EUR-CHF exchange rate.

Finally, interest expenses were lower due to historically low interest rates and a more positive cash-flow situation than anticipated.

.

3.3. Projects (construction, R&D)

Figure 18: Projects

2010 Budget CERN/FC/5397 (2010 prices) (a)				Fact sheet	Fact Sheet as in MTP 2009	Activity	2010 Out-Turn CERN/FC/5508 (2010 prices) (b)				Budget usage in % (c) = (b)/(a)				Variations of Out-Turn with respect to Budget (d)=(b)-(a)	(e)=(d)/(a)
FTE	kCHF						FTE	kCHF			FTE	kCHF			kCHF	%
Personnel	Personnel	Materials	Total				Personnel	Personnel	Materials	Total	Personnel	Personnel	Materials	Total	Total	Total
248.2	**40,435**	**59,370**	**99,805**			**Projects**	**310.3**	**55,746**	**35,650**	**91,396**	**125.0%**	**137.9%**	**60.0%**	**91.6%**	**-8,409**	**-8.4%**
75.4	**12,260**	**8,940**	**21,200**	**24**	**16.a**	**CLIC / Linear collider**	**71.7**	**12,921**	**10,633**	**23,554**	**95.1%**	**105.4%**	**118.9%**	**111.1%**	**2,354**	**11.1%**
9.5	**1,540**	**550**	**2,090**	**25**	**16.b**	**Linear collider detector R&D**	**11.4**	**1,953**	**587**	**2,540**	**120.0%**	**126.8%**	**106.8%**	**121.5%**	**450**	**21.5%**
50.5	**8,415**	**27,960**	**36,375**	**26**	**17**	**LINAC 4**	**60.5**	**11,123**	**14,395**	**25,518**	**119.8%**	**132.2%**	**51.5%**	**70.2%**	**-10,857**	**-29.8%**
				27		**HIE-ISOLDE**	**8.6**	**1,899**	**53**	**1,953**					**1,953**	
39.0	**6,110**	**4,435**	**10,545**			**R&D**	**56.5**	**9,598**	**3,474**	**13,072**	**144.9%**	**157.1%**	**78.3%**	**124.0%**	**2,527**	**24.0%**
20.3	2,885	2,400	5,285	**28**	**19.a**	R&D accelerators	24.4	4,504	2,673	7,177	120.2%	156.1%	111.4%	135.8%	**1,892**	**35.8%**
18.7	3,225	2,035	5,260	**29**	**19.b, c, d**	Other R&D (computing supported by EU, detectors)	32.1	5,094	801	5,895	171.7%	158.0%	39.4%	112.1%	635	12.1%
44.8	**7,415**	**12,015**	**19,430**	**30**		**High luminosity machine upgrade**	**50.0**	**8,116**	**3,067**	**11,183**	**111.6%**	**109.4%**	**25.5%**	**57.6%**	**-8,247**	**-42.4%**
17.4	2,940	1,500	4,440			LHC machine upgrade	13.7	2,244	250	2,494	78.7%	76.3%	16.7%	56.2%	-1,946	-43.8%
18.1	2,990	9,750	12,740		**18**	LHC inner triplet	20.0	3,459	1,593	5,052	110.5%	115.7%	16.3%	39.7%	-7,688	-60.3%
9.3	1,485	765	2,250			Low power SPL and PS2 studies	16.3	2,414	1,224	3,638	175.3%	162.5%	160.0%	161.7%	1,388	61.7%
16.5	**2,615**	**2,765**	**5,380**	**31**		**High luminosity detectors upgrade**	**43.3**	**8,571**	**2,735**	**11,306**	**262.4%**	**327.8%**	**98.9%**	**210.2%**	**5,926**	**110.2%**
16.5	2,615	2,765	5,380			LHC detectors R&D	40.3	7,777	1,984	9,761	244.2%	297.4%	71.7%	181.4%	4,381	81.4%
						LHC detectors upgrade	3.0	794	752	1,546					1,546	
12.5	**2,080**	**1,710**	**3,790**	**32**		**High energy LHC studies / High field magnets**	**8.4**	**1,566**	**705**	**2,271**	**67.2%**	**75.3%**	**41.2%**	**59.9%**	**-1,519**	**-40.1%**
		995	**995**			**Construction PS2/SPL/S-LHC (machine and detectors)**									**-995**	**-100.0%**
	3.36%	4.93%	8.29%					4.56%	2.91%	7.47%						

Explanations on Figure 18:

CLIC and the Linear Collider (including Detector R&D) slightly exceeded their budget.

The HIE-ISOLDE project, which is about 50% externally funded, was approved within the revised 2010 MTP. In addition, the new generic R&D on a high-power SPL was started, explaining the difference in expenses with respect to the budget for R&D accelerators.

The change of strategy for the LHC upgrade resulted in the cancellation of the LHC inner triplet Phase 1, of the heading for the preparation for the construction of PS2/LP-SPL as well as a new schedule for commissioning and construction of LINAC 4 (CtC unchanged). Conversely, a new High Luminosity LHC project was created including the LHC detectors R&D and upgrade. In addition, the High Energy LHC project was launched, which notably includes the high-field magnets R&D.

Figure 19: Energy and Water

(in MCHF, rounded off)

Activity	2010 Budget CERN/FC/5397 (2010 prices)	2010 Out-Turn CERN/FC/5508 (2009 prices)	Budget usage in %	Variations of Out-Turn with respect to Budget kCHF	%
	(a)	(b)	(c)=(b)/(a)	(d)=(b)-(a)	(e)=(d)/(a)
Energy and water (baseload)	**24.41**	**22.02**	**90.22%**	**-2.39**	**-9.78%**
Electricity	10.48	11.11	106.05%	0.63	6.05%
Heating oil and gas	5.94	3.45	58.08%	-2.49	-41.92%
Water and miscellaneous	7.99	7.46	93.34%	-0.53	-6.66%
Energy for basic programmes	**58.97**	**49.97**	**84.74%**	**-9.00**	**-15.26%**
Particle physics	2.16			-2.16	
Experimental areas 1)		10.87		10.87	
Data handling	1.30	1.30	100.31%	0.00	0.31%
Accelerators:	13.93	18.50	132.79%	4.57	32.79%
AD	*0.54*	*1.00*	*185.19%*	*0.46*	85.19%
PS	*2.27*	*4.10*	*180.78%*	*1.83*	80.78%
SPS (including CNGS)	*11.12*	*13.40*	*120.46%*	*2.28*	20.46%
LHC	41.58	19.30	46.42%	-22.28	-53.58%
Grand Total Energy programme	**83.38**	**71.99**	**86.34%**	**-11.39**	**-13.66%**

1) This includes particle physics (PS and SPS fixed target), ISOLDE, LHC experiments and LHC test beam into East, West and North Area.

Explanations on Figure 19:

The categories of electrical power distribution have been redefined, resulting in a larger part for the LHC experiments and fixed-target experiments, which is now grouped under the heading “Experimental Areas”. This heading also includes the energy for LHC test beams. With respect to last year’s operation, PS and SPS now have higher power consumption due to LHC needs.

Figure 20: Expenses for Fixed Assets Projects (non-recurrent activities and approved projects without EU funds)

(in kCHF)

2010 Budget * CERN/FC/5397 (2010 prices) (a)			Activity	Project	2010 Out-Turn * CERN/FC/5508 (2010 prices) (b)			Budget usage in % (c) = (b)/(a)			Variations of Out-Turn with respect to Budget	
											(d) = (b)-(a)	(e) = (d)/(a)
Personnel	Materials	Total			Personnel	Materials	Total	Personnel	Materials	Total	kCHF	%
44 045	**179 490**	**223 535**	**Programme**	**Projects**	**62 030**	**114 808**	**176 838**	**140.8%**	**64.0%**	**79.1%**	**-46 697**	**-20.9%**
835	**945**	**1 780**		**LHC machine and injectors**	**1 541**	**4 743**	**6 284**	**184.5%**	**501.9%**	**353.0%**	**4 504**	**253.0%**
				LHC spares	240	2 421	2 661				2 661	
				Rebuilding Spares Stock after 3-4 incident	468	2 280	2 748				2 748	
835	945	1 780		LHC injectors	833	42	876	99.8%	4.5%	49.2%	-904	-50.8%
6 405	**39 070**	**45 475**		**LHC machine and areas reliability and consolidation**	**9 796**	**18 668**	**28 465**	**152.9%**	**47.8%**	**62.6%**	**-17 010**	**-37.4%**
6 235	29 985	36 220		LHC consolidation #	6 354	10 479	16 834	101.9%	34.9%	46.5%	-19 386	-53.5%
170	2 205	2 375		Induced consolidation following 3-4 incident	198	1 546	1 744	116.6%	**70.1%**	73.4%	-631	-26.6%
	6 880	6 880	**LHC programme**	Liquid helium additional storage tanks		3 003	3 003		43.6%	43.6%	-3 877	-56.4%
			Included in figure 16	Collimation system enhancements #	1 799	900	2 698				2 698	
				Radiation to electronics (R2E)	417	2 227	2 644				2 644	
				Splice consolidation and repair	1 028	514	1 542				1 542	
				LHC detectors consolidation								
	5 460	**5 460**		**LHC experiments**		**6 113**	**6 113**		**112.0%**	**112.0%**	**653**	**12.0%**
	5 460	5 460		Detectors re-scoping		6 113	6 113		112.0%	112.0%	653	12.0%
	32 850	**32 850**		**LHC computing**		**16 524**	**16 524**		**50.3%**	**50.3%**	**-16 326**	**-49.7%**
	12 995	12 995		LHC Computing Grid		16 524	16 524		127.2%	127.2%	3 529	27.2%
	19 855	19 855		Green Computing Centre							-19 855	-100.0%
				AEGIS	**320**	**447**	**766**				**766**	
	895	**895**		**NA62**	**1 768**	**675**	**2 443**		**75.4%**	**273.0%**	**1 548**	**173.0%**
			Other programmes	**Isolde robots**		**49**	**49**				**49**	
635		**635**	Included in figure 16	**Magnet rescue facility**	**583**	**2 877**	**3 460**	**91.8%**		**544.9%**	**2 825**	**444.9%**
				AD consolidation	**324**	**253**	**577**				**577**	
2 980	**8 745**	**11 725**		**Accelerator consolidation**	**6 729**	**7 717**	**14 446**	**225.8%**	**88.2%**	**123.2%**	**2 721**	**23.2%**
170	**6 410**	**6 580**		**Extension building 40**	**122**	**6 506**	**6 628**	**72.0%**	**101.5%**	**100.7%**	**48**	**0.7%**
				Radio Infrastructure upgrade for firefighters								
				**High radiation material test facility ** **	**57**	**770**	**827**				**827**	
				**Isolde robots ** **	**32**	**51**	**83**				**83**	
				Ramses II light		**1 687**	**1 687**				**1 687**	
440	**1 955**	**2 395**		**Radioactive waste management**	**240**	**12**	**252**	**54.5%**	**0.6%**	**10.5%**	**-2 143**	**-89.5%**
			Infrastructure and services	**Visitpoint**								
2 765	**28 870**	**31 635**	Included in figure 17	**General and technical infrastructure consolidation**	**1 885**	**17 487**	**19 372**	**68.2%**	**60.6%**	**61.2%**	**-12 263**	**-38.8%**
				Renovation auditorium & ground floor main bldg		295	295				295	
				Building 867 (radiation workshop)	628	2 050	2 679				2 679	
				Building 107 (surface treatment)	100	25	125				125	
				Surface infrastructure consolidation (roofs, facades, etc)	970	9 577	10 548				10 548	
				AMS payload operations control center	73	585	658				658	
				Technical infrastructure consolidation (heating, electricity, etc)	113	4 954	5 067				5 067	
11 370	**8 820**	**20 190**		**CLIC**	**12 358**	**10 472**	**22 830**	**108.7%**	**118.7%**	**113.1%**	**2 640**	**13.1%**
1 540	**390**	**1 930**		**Linear collider detector R&D**	**1 884**	**355**	**2 239**	**122.3%**	**90.9%**	**116.0%**	**309**	**16.0%**
7 765	**27 960**	**35 725**		**LINAC 4**	**10 994**	**14 395**	**25 389**	**141.6%**	**51.5%**	**71.1%**	**-10 336**	**-28.9%**
2 670	**9 440**	**12 110**		**Focus quadrupoles (NbTi)**							**-12 110**	**-100.0%**
				HIE-ISOLDE	**1 899**	**53**	**1 953**				**1 953**	
	1 985	**1 985**		**High radiation material test facility**	**1 717**	**1 714**	**3 431**		**86.4%**	**172.8%**	**1 446**	**72.8%**
1 290		**1 290**		**s-LHC**							**-1 290**	**-100.0%**
			Projects	**PS Booster upgrade**								
			Included in figure 18	**SPS upgrade**								
185	**1 055**	**1 240**		**RF 200 MHz system**	**118**	**24**	**142**	**63.7%**	**2.3%**	**11.5%**	**-1 098**	**-88.5%**
				LHC detectors upgrade	**794**	**752**	**1 546**				**1 546**	
2 205	**2 645**	**4 850**		**LHC detectors R&D ##**	**7 563**	**1 862**	**9 424**	**343.0%**	**70.4%**	**194.3%**	**4 574**	**94.3%**
1 825	**1 490**	**3 315**		**High field magnets (HFM)**	**1 307**	**604**	**1 911**	**71.6%**	**40.5%**	**57.6%**	**-1 404**	**-42.4%**
440	**425**	**865**		**Fast cycled magnets (FCM)**							**-865**	**-100.0%**
525	**80**	**605**		**PS2 studies**							**-605**	**-100.0%**

* Excluding EU projects.

** Refers to the Radioactive waste management activities of the project.

For 2010 budget, this includes the Collimation system enhancements.

This line will not be shown anymore as from 2011.

The variations are essentially related to carry-forwards from 2009 to 2010, the decision not to start constructing a new auditorium and computing centre and the new LHC upgrade strategy which entails terminated projects and new headings.

4. Operating Expenses by Nature

Figure 21: Materials Expenses by Nature (including Interest and Financial costs)

(in kCHF)

Nature	2010 Budget CERN/FC/5397 (2010 prices)	2010 Out-Turn CERN/FC/5508 (2010 prices)	Budget usage in %	Variations of Out-Turn with respect to Budget kCHF	%
	(a)	(b)	(c)=(b)/(a)	(d)=(b)-(a)	(e)=(d)/(a)
Materials expenses [1)]	**477 740**	**380 129**	**79.57%**	**-97 611**	**-20.43%**
Goods, consumables and supplies	236 310	165 196	69.91%	-71 114	-30.09%
Electricity, heating gas and water [2)]	83 350	71 585	85.89%	-11 765	-14.11%
Industrial services (service contracts) [3)]	54 250	50 246	92.62%	-4 004	-7.38%
Repair and maintenance (other indus. services contracts) [3)]	35 480	32 514	91.64%	-2 966	-8.36%
Third party payments and consultants	30 995	26 835	86.58%	-4 160	-13.42%
Other overheads [4)]	37 355	33 752	90.36%	-3 603	-9.64%
Interest and financial costs	**16 370**	**17 273**	**105.51%**	**903**	**5.51%**
Fortis bank	14 120	14 118	99.99%	-2	-0.01%
In-kind (FIPOI interest 0%) [5)]		1 845		1 845	
Short-term interest	2 000	888	44.38%	-1 112	-55.62%
Ppbar indexation [6)]		237		237	
Bank charges	250	185	73.84%	-65	-26.16%
TOTAL MATERIALS	**494 110**	**397 401**	**80.43%**	**-96 709**	**-19.57%**
Housing fund [7)]	3 790				
Stores activity [7)]	165				
TOTAL materials incl. housing fund and stores activity	**498 065**	**397 401**	**79.79%**	**-100 664**	**-20.21%**

1) 2010 Budget (CERN/FC/5397) referred only to the operating expenses, excluding housing fund and stores activity. In the Out-Turn (CERN/FC/5508), this heading includes housing fund, stores activity and reflects also the in-kind contributions.

2) This heading for 2010 Budget (CERN/FC/5397) referred to the Energy programme, whereas the 2010 Out-Turn comprises also the expenses for the Housing Fund.

3) Variation in the total for industrial services: -6,970 kCHF.

4) Including insurances and postal charges, CERN contributions to collaborations, depreciation of current assets, reversal of sector 3-4 provision.

5) Theoretical interest at market rate for FIPOI 1 and 2 loans at 0%. This heading is compensated by the corresponding revenue line "Other revenues / In-kind".

6) In 2010 Budget (CERN/FC/5397) this amount was included under interest.

7) In the Out-Turn these headings are included in Materials Expenses, please see note 1.

The main reason for the variation of materials expenses is due to re-profiling and delays in the procurement of goods related to projects and consolidation activities as described above and the appreciation of the Swiss Franc which notably reduced the expenses on energy and industrial services.

Figure 22: Breakdown of Materials Expenses by Nature

Materials expenses: 95.7%

Interest and financial costs: 4.3%

* Total of industrial services: 12.6% + 8.2% = 20.8%.

** Including insurances and postal charges, CERN contributions to collaborations, depreciation of current assets, reversal of sector 3-4 provision.

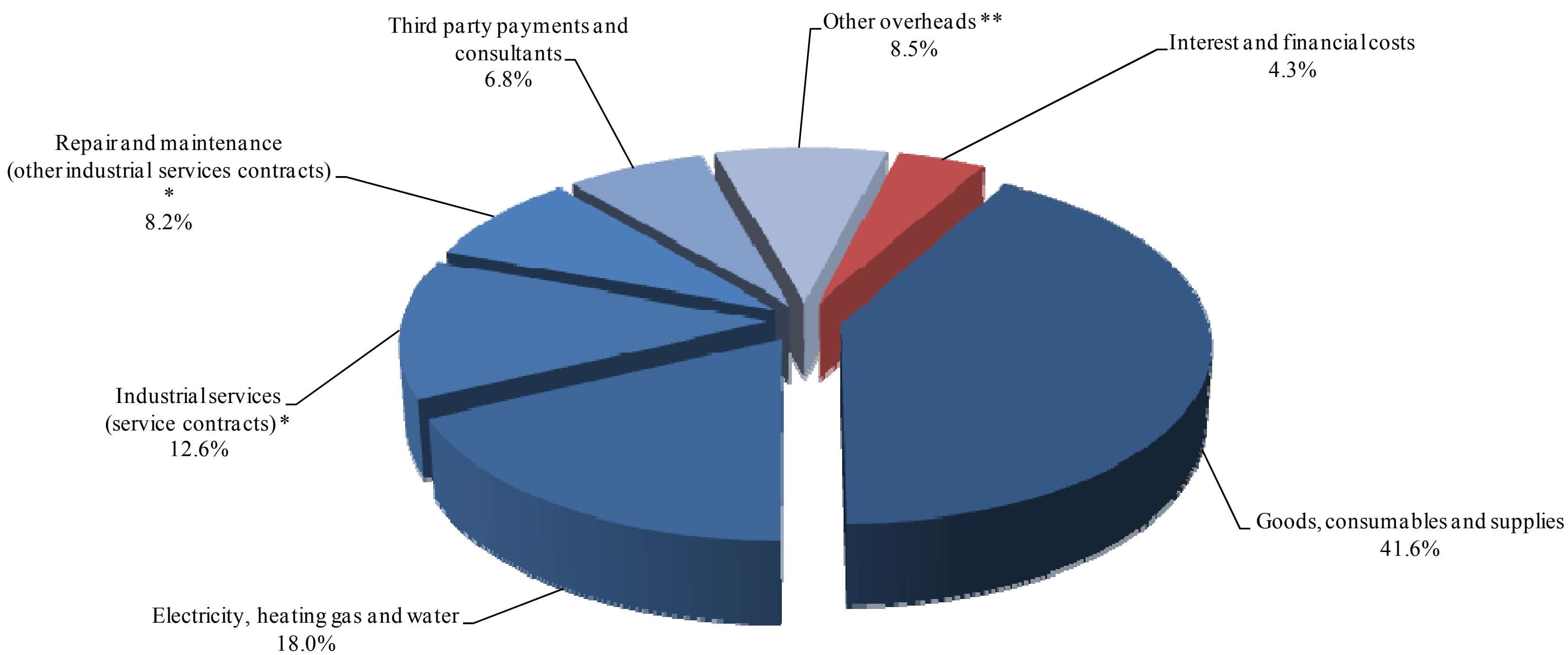


Figure 23: Personnel Expenses by Nature

(in kCHF)

Nature	2010 Budget CERN/FC/5397 (2010 prices)	2010 Out-Turn CERN/FC/5508 (2010 prices)	Budget usage in %	Variations of Out-Turn with respect to Budget kCHF	%
	(a)	(b)	(c)=(b)/(a)	(d)=(b)-(a)	(e)=(d)/(a)
Staff members[1)]	**455,915**	**471,061**	**103.32%**	**15,146**	**3.32%**
Basic salaries[2)]	***259,610***	***270,494***	***104.19%***	***10,884***	***4.19%***
Allowances	***55,355***	***60,642***	***109.55%***	***5,287***	***9.55%***
Non-residence / international indemnity	18,935	19,195	101.38%	260	1.38%
Family allowances	20,690	22,841	110.40%	2,151	10.40%
Special allowances	3,190	4,024	126.13%	834	26.13%
Overtime	1,845	2,809	152.26%	964	52.26%
Various allowances	9,835	10,896	110.78%	1,061	10.78%
Termination indemnities	860			-860	-100.00%
Variation termination indemnities[3)]		877		877	
Variation paid leave[4)]		***-2,644***		***-2,644***	
Social contributions	***85,840***	***88,525***	***103.13%***	***2,685***	***3.13%***
Pension fund	65,585	69,510	105.99%	3,925	5.99%
Health insurance	20,255	19,015	93.88%	-1,240	-6.12%
Centralised personnel expenses	***31,095***	***27,846***	***89.55%***	***-3,249***	***-10.45%***
Installation, recruitment and termination of contracts	6,295	6,752	107.25%	457	7.25%
Additional periods of membership in the pension fund for shift work[5)]	4,050	-173	-4.27%	-4,223	-104.27%
Contribution to health insurance for pensioners	20,750	21,267	102.49%	517	2.49%
Internal taxation	***24,015***	***26,198***	***109.09%***	***2,183***	***9.09%***
Fellows and Associates (including overhead for students)[1)]	**44,095**	**49,304**	**111.81%**	**5,209**	**11.81%**
Apprentices	**450**	**427**	**94.83%**	**-23**	**-5.17%**
TOTAL PERSONNEL	**500,460**	**520,791**	**20,331**	**20,331**	**4.06%**
Budget amortization of staff benefits accruals	17,000	17,328	101.93%	328	1.93%
TOTAL PERSONNEL after amortization of staff benefits accruals	**517,460**	**538,119**	**20,659**	**20,659**	
Personnel Housing Fund (included in Personnel costs in 2010 Out-Turn)[6)]	395				
Personnel paid on team accounts (included in Personnel costs in 2010 Out-Turn)[6)]	10,360				
TOTAL PERSONNEL including personnel paid on team accounts	**528,215**	**538,119**	**101.88%**	**9,904**	**1.88%**

1) 2010 Budget (CERN/FC/5397) referred only to Staff and Fellows & Associates on CERN accounts. In the Out-Turn (CERN/FC/5508), Staff and Fellows & Associates paid on team accounts and Housing Fund are included under this heading.

2) Including savings from the short-term SLS participation.

3) Following IPSAS a provision was made for the termination indemnities. The variation on the provision is 877 kCHF.

4) Introduced as a consequence of IPSAS.

5) This is a variation on the provision for personnel on shiftwork in line with Administratrative Circular 22A.

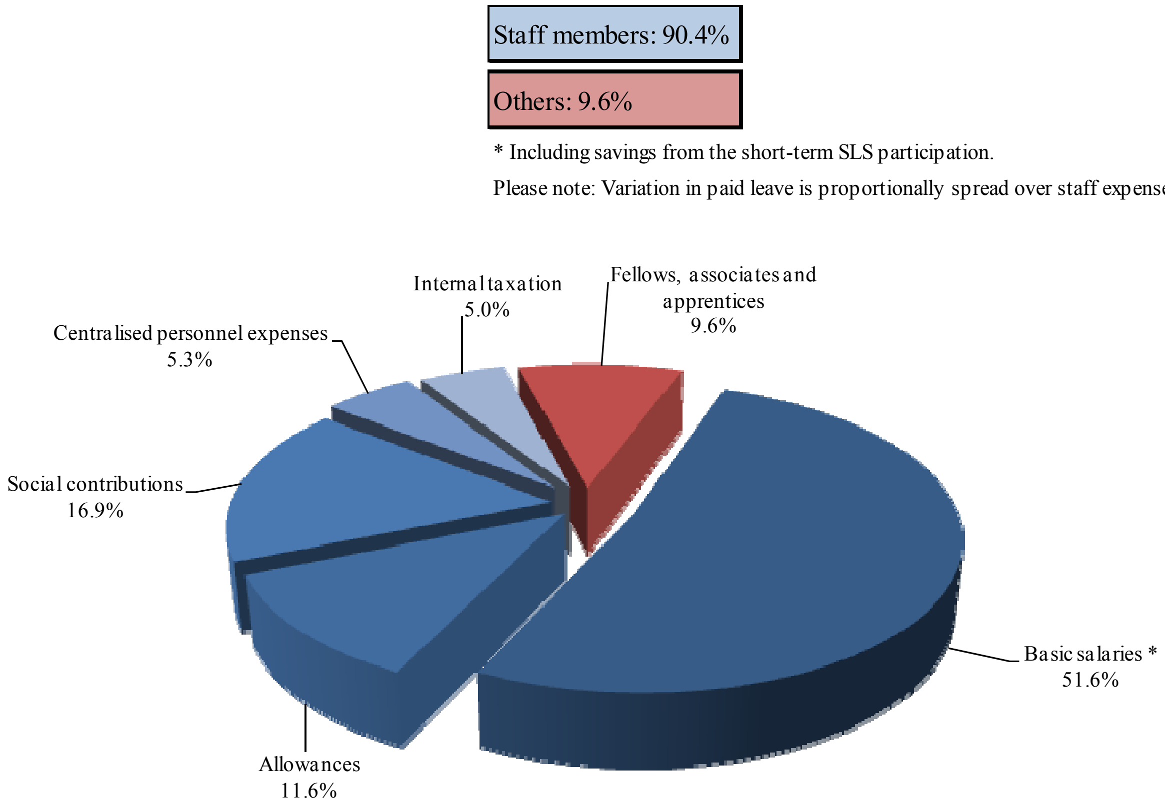
6) In the Out-Turn these lines are included in the Staff and Fellows & Associates headings, please see note 1).

Explanations on Figure 23:

The total staff strength of CERN in 2010 was 2,340.5 FTE, of which 2,277.4 FTE staff members were paid on CERN accounts and 63.1 FTE staff members were paid on team accounts. For fellows and associates the total staff strength was 444.6 FTE, comprising 375.9 FTE fellows paid on CERN accounts, 20.8 fellows paid on team accounts, 47.6 FTE associates paid on CERN accounts and 0.3 FTE associates paid on team accounts. The total staff strength of apprentices was 23.8 FTE, all paid on CERN accounts. The total number of employed members of personnel on CERN accounts was 2,808.9 FTE. The personnel costs are slightly higher due to more experienced staff being recruited as well as the continuing trend to later retirement. Furthermore, there is an increase in costs for family allowances and overtime payments related to the operation of the LHC.

In the Personnel expenses in the budget, personnel paid on team accounts was excluded from the table. For 2010, the budget for personnel paid on team accounts was 10.36 MCHF.

Figure 24: Breakdown of Personnel Expenses by Nature



5. Carry-forward

Figure 25: Carry-Forward

(in MCHF, rounded off)	Carry-forward to 2011	Deficit reduction
Operation	**14.5**	**4.0**
LHC programme	5.4	1.3
Other programmes	3.9	1.3
Infrastructure and services	5.0	1.4
R&D studies and projects	0.2	0.0
General Consolidation*	**7.5**	**1.1**
LHC programme	3.6	0.5
Other programmes	2.2	0.6
Infrastructure and services	1.7	0.0
Project	**53.1**	**3.5**
LHC programme	16.1	2.9
Other programmes	5.9	0.6
Infrastructure and services	12.3	0.0
R&D studies and projects	18.8	0.0

*All consolidation projects without Cost-to-Completion

Explanations on Figure 25:

Article 9 of the Financial Rules states: “The budget amounts shall be compared with the amounts of the final budget outturn. The positive balance of that part of the budget which is allocated to multi-annual projects shall be carried forward to the following year within the cost to completion. The unused part of the budget allocated to operation shall be carried forward to the following financial year, provided that it relates to commitments open when the accounts for the financial year concerned are closed. Any excess budget expenses shall be carried forward to the next financial year.”

As indicated by the CERN Management in the 2010 Medium Term Plan (CERN/FC/5450/Rev), the projects under consolidation headings for LHC reliability, accelerators and technical and general infrastructure, which do not have a Cost to Completion but are comprised of many smaller-scale items, will only be granted the carry-forward of unused budget corresponding to open commitments to the next year. Any positive balance between the budget and expenses plus open commitments is used to further reduce the deficit. These projects are mentioned under the General Consolidation heading. The Cost-to-Completion consolidation projects, like Radiation to Electronics, collimation system enhancement, Building 867 and Building 107 are shown under the Project heading.

The figures under the Operation heading do not include the impact of advanced payments for licences, subscriptions, etc.

6. EU Supported Projects

Figure 26: EU Projects

		kEUR	kEUR	kCHF	kCHF	kCHF
Project name	**Project title**	**Total EC contribution**	**EC contribution to CERN**	**2010 spending**	**2010 spending: EU resources**	**2010 spending: additional resources (1)**
EGEE III	Enabling Grids For E-Science III	32 000	7 958	1 543	1 543	
EMI	European Middleware Initiative	12 000	3 398	1 371	924	447
SLHC-PP	Preparatory Phase Of The Large Hadron Collider Upgrade	5 200	3 087	4 143	2 365	1 778
EUCard	European Coordination For Accelerator Research And Development	10 000	2 269	1 698	844	854
EGI-inspire	European Grid Initiative: Integrated Sustainable Pan-European Infrastructure for Researchers in Europe	25 000	2 254	1 175	407	768
MassTeV	Mass Hierarchy And Particle Physics At The Tev Scale	2 000	1 226	376	376	
Envision	European Novel Imaging Systems for ION therapy	5 996	955	145	145	
D4-Science II	Data Infrastructure Ecosystem For Science	4 300	859	575	575	
ETICS-2	E-Infrastructure For Testing, Integration And Configuration Of Software Phase 2	2 672	837	139	139	
Ulice	Union Of Light-Ion Centres In Europe	8 400	824	223	150	73
Cosmo@LHC	Cosmology At The Cern Large Hadron Collider	800	800	293	293	
ENSAR2	European Nuclear Science and Applications Research	8 000	784	63	54	9
Superfields	Supersymmetry, Quantum Gravity And Gauge Fields	1 700	689	116	116	
EUROnu	A High Intensity Neutrino Oscillation Facility In Europe	4 000	621	804	350	454
EGI-DS	European Grid Initiative - Design Study	2 497	516	4	4	
eScienceTalk	Supporting Grid and High Performance Computing reporting across Europe	1 300	466	91	91	
D4Science	Distributed Collaboratories Infrastructure On Grid Enabled Technology For Science	3 150	435	5	5	
Health-e-Child	Health-E-Child	12 186	400	23	23	
ILC-HiGrade	International Linear Collider And High Gradient Superconducting Rf-Cavities	5 000	350	182	182	
OpenAIRE	Open Access Infrastructure For Research In Europe	4 170	309	164	164	
EUDET	Detector R&D Towards The International Linear Collider	7 000	303	395	15	380
EnviroGRIDs	Building Capacity For A Black Sea Catchment Observation And Assessment System Supporting Sustainable Development	6 223	268	112	112	
SOAP	Study Of Open Access Publishing	810	265	204	204	
Parse.insight	Insight Into Issues Of Permanent Access To The Records Of Science In Europe	1 250	240	57	57	
ODE	Opportunities for Data Exchange	720	225	10	10	
Aspera II	Deepening And Broadening Of Astroparticle Physics European Coordination	2 383	196	93	93	
EFNUDAT	European Facilities For Nuclear Data Measurements	2 400	188	238	115	123
GridTalk	Co-Ordinating Grid Reporting Across Europe	500	188	87	87	
BalticGrid II	Baltic Grid Second Phase	2 998	185	38	38	
SEEGRID-SCI	See-Grid Einfrastructure For Regional Escience	2 500	156	32	32	
			Other (2)	180	75	105
			SUB-TOTAL	**14 579**	**9 588** (3)	**4 991**

(1) Costs incurred by CERN and declared to the European Commission as additional contribution; does not take into consideration other direct support and central administrative costs

(2) Costs incurred in 2010 for projects ended on 2009 (open commitments on 31.12.2009)

(3) 77% of the EU resources have been used on Personnel costs (7.43 MCHF), 23% on Material (2.16 MCHF)

Explanations on Figure 26:

Figure 26 shows all EU projects other than Marie Curie projects still active in 2010. 2010 figures are split into EU-funded expenses and additional expenses funded by CERN's core budget in line with the specific contracts signed separately for each project. Most of the EU-supported projects concern IT developments (like EGEE, EMI) or R&D for accelerators and detectors (like SLHC-PP and EUCARD).

With the end of EGEE III in April, the EU contribution for projects other then Marie Curie projects has decreased.

However, with 18 new EU projects selected for funding, and associated EC contribution of 23.8 M€ (over a period of 2-to-5 years), **2010 has been the most successful year for CERN as regards the participation in the 7th Framework Programme**. In addition to the Marie-Curie projects, E-infrastructure, and Research Infrastructures programmes, where the Organization has been very active for several years, the involvement of CERN in FP7 is now expanding to other programmes.

The newly selected projects are funded under the following FP7 programmes:

- Marie-Curie: 5 projects, EC funding for CERN of 11.9 M€
- E-infrastructure: 4 projects, EC funding for CERN of 6.6 M€
- Research Infrastructures: 4 projects, EC funding for CERN of 3.4 M€
- Health: 1 project, EC funding for CERN of 1.0 M€
- Information and Communication Technologies: 1 project, EC funding for CERN of 0.3 M€
- Ideas (ERC Advanced Grant): 1 project, EC funding for CERN of 0.4 M€
- Science in Society: 1 project, EC funding for CERN of 0.1 M€
- EURATOM: 1 project, EC funding for CERN of 0.1 M€

Out of these 18 projects, 5 are coordinated by CERN and 2 are mono-sites (CERN is the only beneficiary of the Grant Agreement), which is in line with the trend for FP7 to have more and more projects coordinated by CERN (11 out of 34 in FP6).

Figure 27: Marie Curie Projects

Project name	Project title	kEUR Total EC contribution	kEUR EC contribution to CERN	kCHF 2010 spending	kCHF 2010 EU resources	kCHF 2010 additional resources
COFUND	Cofunding Of The Cern Fellowship Programme	4 996	4 996	1 650	1 650	
ACEOLE	Data Acquisition, Electronics, And Optoelectronics For Lhc Experiments	3 469	3 469	1 278	1 278	
ELACCO	Electronics, Acquisition And Controls Developments For Physics Experiments	2 315	2 315	90	90	
EUROTHEPHY	Training In Theoritical Physics	1 498	1 498	-	-	
Partner	Particle Training Network For European Radiotherapy	5 601	1 200	533	533	
MC-PAD	Marie Curie Training Network On Particle Detectors	4 670	1 070	527	527	
DitaNet	Novel Diagnostic Techniques For Future Particle Accelerators: A Marie Curie Initial Training Network	4 163	690	304	304	
Mechanics	Marie Curie linking Industry to CERN	1 026	597	31	31	
RADENV	Radiation Protection And Environmental Impact Of Future Accelerators	580	580	12	12	
MCnet	Monte Carlo Event Generators For High Energy Particle Physics	1 793	477	87	87	
UNILHC	Unification In The Lhc Era	3 674	460	117	117	
Cloud	Cloud Initial Training Network	2 385	297	136	136	
Lepton Pairs	Determination Of Proton Parton Densities Using Early Lhc Data And Of Contrains On New Physics Beyond The Standard Model	189	189	120	120	
HeavyRib	Nuclear Structure Studies Of Neutron-Deficient Nuclei In Light Pb Region Using Radioactive Ion Beams	188	188	132	132	
CMSMuRe coTrigBSM	Muon reconstruction and trigger optimization towards early beyond the Standard Model discovery at the LHC with the CMS detector	180	180	38	38	
Jet X Section	Measurement of the inclusive jet cross section	175	175	43	43	
HICSCERN	Heavy Ion Collisions And Strings At Cern	173	173	84	84	
Universenet	The Origin Of Our Universe: Seeking Links Between Fundamental Physics And Cosmology	3 533	158	33	33	
LATQCD-CHIPT	Robing Chiral Perturbation Theory From Realistic Two-Flavour Lattice Qcd Simulations	137	137	71	71	
BEST	BEING A EUROPEAN SCIENTIST TODAY	232	25	41	35	6
HEPTOOLS	Tools And Precision Calculations For Physics Discoveries At Colliders	3 900	13	6	6	
			Other (1)	246	246	
			SUB-TOTAL	**5 579**	**5 573** (2)	**6**

(1) Central expenses for Marie Curie projects administration and financial management (HR-RPM and DG-RPC)

(2) The main objective of Marie Curie Actions is to train young researchers; a large portion of their salary is covered by EU funds. Personnel costs represent 85% of EU resources, (4.74 MCHF), Material 15% (0.83 MCHF)

Explanations on Figure 27:

Figure 27 shows all EU Marie Curie Projects at CERN still active in 2010. 2010 figures are split into EU-funded expenses and additional expenses funded by CERN's core budget in line with the specific contract signed separately for each project.

For the first time, Marie Curie Projects have represented over one third of CERN's total EU funding. This is mostly due to the 4-year Initial Training Networks that started in 2008 and the first COFUND, which aims at co-funding a CERN fellowship programme.

Since September 2010, CERN has also been involved in its first IAPP (Industry-Academia Partnerships and Pathways) aimed at stimulating intersectoral mobility and increasing knowledge-sharing through joint research partnerships between organizations in academia and industry.

Whereas 2010 has seen the end of the last projects funded under the 6th Framework Programme (ELACCO, MCnet), the launch of CATHI (November 2010), COFUND-2, Entervision and PureSafe (2011) confirms CERN's success in obtaining training-oriented projects and should ensure an at least equivalent annual contribution for Marie Curie Actions for the next two years.

Figure 28: EU projects financial status – Projects completed in 2010

Project name	Start date	End Date	EC contribution to CERN (kEUR)	% completion (time)	% contribution used
D4Science	01-Jan-08	31-Dec-09	435	100%	90%
EGI-DS	01-Sep-07	31-Dec-09	516	100%	100%
EUROTHEPHY	01-Jan-06	31-Dec-09	1 498	100%	100%
Parse.insight	01-Mar-08	28-Feb-10	240	100%	100%
ETICS-2	01-Mar-08	28-Feb-10	837	100%	100%
SEEGRID-SCI	01-May-08	30-Apr-10	156	100%	100%
BalticGrid II	01-May-08	30-Apr-10	185	100%	86%
GridTalk	01-May-08	30-Apr-10	188	100%	100%
Health-e-Child	01-Jan-06	30-Apr-10	400	100%	100%
EGEE III	01-May-08	30-Apr-10	7 958	100%	100%
CMSMuRe coTrigBSM	01-May-08	30-Apr-10	180	100%	100%
ELACCO	01-Jun-06	31-May-10	2 315	100%	100%
LATQCD-CHIPT	01-Mar-09	31-Aug-10	137	100%	100%
RADENV	01-Sep-06	31-Aug-10	580	100%	100%
Universenet	01-Oct-06	30-Sep-10	158	100%	67%
HICSCERN	01-Oct-08	30-Sep-10	173	100%	100%
EFNUDAT	01-Nov-06	31-Oct-10	188	100%	97%
BEST	01-Apr-10	31-Oct-10	25	100%	100%
HEPTOOLS	01-Dec-06	30-Nov-10	13	100%	100%
		Total	**16 253**	**Average**	**99%**

Explanations on Figure 28:

Table 28 shows the use of EU contributions at CERN for the whole project duration for finished projects with a financial activity in 2010.

The financial contribution specified at the beginning of the project is normally entirely used. Some variations can occur due to the exchange rate variation during the duration of the project (D4Science, BalticGrid II, EFNUDAT) or reallocation of budget between partners of the consortium during the project (Universenet).

Figure 29: EU projects financial status - on-going projects

Project name	Start date	End Date	EC contribution to CERN (kEUR)	% completion (time)	% contribution used
EUDET [(1)]	01-Jan-06	31-Dec-10	303	100%	96%
Mcnet [(1)]	01-Jan-07	31-Dec-10	477	100%	87%
SOAP	01-Mar-09	28-Feb-11	265	92%	100%
SLHC-PP	01-Apr-08	31-Mar-11	3 087	92%	98%
HeavyRib	01-Sep-09	31-May-11	188	76%	74%
Lepton Pairs	01-Sep-09	31-Aug-11	189	67%	69%
D4-Science II	01-Oct-09	30-Sep-11	859	63%	66%
ILC-HiGrade	01-Feb-08	31-Jan-12	350	73%	78%
DitaNet	01-Jun-08	31-May-12	690	65%	65%
Aspera II	01-Jul-09	30-Jun-12	196	50%	59%
Cloud	01-Aug-08	31-Jul-12	297	60%	69%
EUROnu	01-Sep-08	31-Aug-12	621	58%	81%
Jet X Section	01-Sep-10	31-Aug-12	175	17%	20%
Partner	01-Oct-08	30-Sep-12	1 200	56%	65%
ACEOLE	01-Oct-08	30-Sep-12	3 469	56%	64%
ODE	01-Nov-10	31-Oct-12	225	8%	3%
MC-PAD	01-Nov-08	31-Oct-12	1 070	54%	72%
OpenAIRE	01-Dec-09	30-Nov-12	309	36%	42%
EUCard	01-Apr-09	31-Mar-13	2 269	44%	39%
EnviroGRIDs	01-Apr-09	31-Mar-13	268	44%	51%
COFUND	01-Apr-09	31-Mar-13	4 996	44%	30%
EMI	01-May-10	30-Apr-13	3 398	22%	22%
eScienceTalk	01-Sep-10	31-May-13	466	12%	16%
Cosmo@LHC	01-Jul-08	30-Jun-13	800	50%	55%
Ulice	01-Sep-09	31-Aug-13	824	33%	18%
UNILHC	01-Oct-09	30-Sep-13	460	31%	21%
MassTeV	01-Dec-08	30-Nov-13	1 226	42%	36%
Envision	01-Feb-10	31-Jan-14	955	23%	12%
EGI-inspire	01-May-10	30-Apr-14	2 254	17%	14%
Superfields	01-Jun-09	31-May-14	689	32%	16%
ENSAR2	01-Sep-10	30-Aug-14	784	8%	6%
Mechanics	01-Sep-10	31-Aug-14	597	8%	4%
		Total	**33 956**	**48%** [(2)]	**45%** [(2)]

[(1)] Final report to the European Commission in preparation in February 2011

[(2)] average for all listed projects

Explanations on Figure 29:

Table 29 compares the time spent since the beginning of each EU project and the financial EU contribution used at 31.12.2010. Though expenses on a project are not linear (COFUND, EUROnu, MC-PAD, Superfields), the table shows a strong correlation between time and the contribution used.

EGEE III

The Enabling Grids for E-sciencE project closed in April 2010 with the end of Phase III, having nurtured innovative, world-class research across Europe and around the globe.

EGEE has created the largest collaborative production grid infrastructure in the world for e-science, providing seamless access to a vast computing resource, 24/7; it has demonstrated that such a production infrastructure can be used by a wide range of research disciplines, producing scientific results which without the Grid, would not have been possible to achieve.

EGEE has formed collaborations within Europe and allowed Europe to collaborate as a whole with other regions world-wide. With EGEE, scientists were able to do more work, on a larger scale, and get results in a shorter time-frame. By the end of the project, around 13 million jobs were executed on the EGEE grid each month.

A new organisation (EGI.eu) has been created to continue the coordination and evolution of the European Grid Infrastructure (EGI) with the EGEE Grid forming the foundation, ensuring the European research community has access to a distributed computing infrastructure to maintain its leadership position in research and support its work in global collaborations for many years to come.

EUCARD

The FP7 EuCARD project has released its first 18 month periodic report in December 2010. So far, the project has fulfilled all its contractual goals.

The calendar of milestones, more numerous than contractual deliverables, is respected except for minor variations and the project already published some 200 scientific papers. Networks have organized 5 well attended topical meetings, including the first collaboration meeting on the Higher-energy LHC. The MICE@STFC TA is active, while HiRadMat@CERN will come late due to the LHC incident. With much effort, it will open soon before the end of the project, but still plans to deliver its access units.

The Joint Research Activities form the bulk of the project and progress smoothly. Out of so many results, one can note good progress in the feasibility studies of the 13T magnet. The new warm and cold collimators are ahead of schedule. The LHC warm one is already assembled and tested. Its position monitoring has proven its efficiency. In the field of RF, new simulations combining molecular dynamics and plasma physics shed new light on breakdown physics. Nanometre stabilization is demonstrated. Crab cavities are rapidly progressing. The crab waist crossing/KLOE upgrade is ahead of schedule, while the EMMA commissioning has started, but suffers a delay due to late delivery of BPM front-ends.

SLHC-PP

The EU-supported SLHC-PP started in April 2008 with the goal of preparing for the LHC luminosity upgrade. Due to finish on March 31, 2011, the achievements in 2010 illustrate that this project will, as expected, provide important contributions to the upgrade of the LHC and its injectors. The technical work has progressed as foreseen:

- an experimental set-up for studying plasma generation for an H-ion source has been assembled and used. It will be extensively exploited for the needs of Linac4.
- the behaviour of superconducting cavities in pulsed mode has been measured and modelled, giving the capability to study and optimize the RF system of a future pulsed proton linac such as the SPL.
- the design and the process of horizontal construction of long and large aperture quadrupoles using NbTi cables has been developed and is being demonstrated with the realization of 2-metre-long models. This technology extends the range of application of NbTi and will minimize the use of the more expensive and delicate NbSn technology in the future LHC insertion magnets.
- novel distribution schemes have been developed for the next generation of central trackers, which allow a substantial reduction of the conductors cross-section despite the much larger channel count. Prototype systems have been realized and fully characterized.

The support activity on radiation protection issues is providing data on activation both in the detectors and the accelerators. The coordination activities have favoured the organization of the collaborations for the upgrade of the ATLAS and CMS detectors. Detailed plans have been developed for the different stages of the detector upgrades, along with the MoUs for their implementation. Updated management tools have been prepared which are already in use for Linac4.