CERN/SPC/970
CERN/FC/5534
CERN/2970
Original: English
6 June 2011

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

Action to be taken		*Voting procedure*
For discussion	**SCIENTIFIC POLICY COMMITTEE** 272nd Meeting **20 and 21 June 2011**	–
For recommendation to Council	**FINANCE COMMITTEE** 336th Meeting **22 June 2011**	Chapter I and II: Simple majority of Member States represented and voting (abstentions are not counted) and 70% of the contributions of the Member States represented and present for the voting (abstentions are counted as votes against) and at least 51% of the contributions of all Member States Chapter IV: Two-thirds majority of Member States represented and voting (abstentions are not counted) and 70% of the contributions of the Member States represented and present for the voting (abstentions are counted as votes against) and at least 51% of the contributions of all Member States
For approval	**COUNCIL** 159th Session **23 and 24 June 2011**	Chapter I and II: Simple majority of Member States represented and voting (abstentions are not counted) Chapter IV: Two-thirds majority of Member States represented and voting (abstentions are not counted)

Medium-Term Plan for the period 2012-2016 and Draft Budget of the Organization for the fifty-eighth financial year 2012

GENEVA, June 2011

Finance Committee is invited to recommend the Council and Council is invited:

- **To approve the overall strategy for the reference period as presented in Chapters I and II;**
- **To take note of the Resources Plan for 2012 to 2016 in Chapter III;**
- **To approve the 2012 Draft Budget in 2011 prices as proposed in Chapter IV.**

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I. Overall Strategy

Observations of the Director-General

With the excellent performance of the LHC machine, experiments and computing achieved to date, CERN has entered a new and exciting era of research and discovery in particle physics. Building on the success of the LHC and on the excellent results from the fixed-target experiments, it is appropriate to continue preparing the Laboratory for the coming decades. The LHC will be operated and upgraded and a vigorous fixed-target programme implemented. In parallel, the Laboratory must be prepared for major roles in the new, even more global, projects that are emerging. The coming years will be decisive in determining the future of CERN beyond 2030, i.e. beyond LHC and its luminosity upgrade.

The goals of the Management, already defined in the last MTP, are to:

1. position and maintain CERN as the laboratory at the energy frontier;
2. prepare CERN to bid for the next large project in particle physics; and
3. make possible European participation in neutrino physics.

Therefore, although this MTP covers the period 2012 to 2016, it lays the foundation for the coming decades of high-energy physics at CERN. The research programme until around 2030 is determined by the full exploitation of the LHC's physics potential, consisting of the design luminosity phase and the high-luminosity upgrade (HL-LHC), together with focused R&D for a Linear Collider (machine and detectors) and for a higher-energy proton collider (HE-LHC). This will foster the CERN's position as the laboratory at the energy frontier. Dedicated R&D for neutrino projects will prepare for European participation in neutrino physics at CERN or elsewhere. This programme is complemented by a unique world-class fixed-target programme.

In the years 2011 and 2012, sizeable data sets will be collected by the LHC experiments, leading potentially to the first important particle physics discoveries at the LHC and to input for the update of the European strategy for particle physics planned for 2012. The updated European strategy will in turn provide input for CERN's long-term planning. As a consequence, the scientific programme beyond 2012 may need to be adjusted in the next MTPs according to the outcome of the strategy process. Preparatory works for new projects at the energy frontier as well as studies for unique fixed-target experiments provide the basis and the flexibility for this process.

This MTP presented here addresses all areas of CERN's activities, from science and engineering to infrastructure and user-friendliness, all aimed at achieving the above-mentioned goals.

This MTP is science-driven, firstly by the LHC, i.e.:

- exploitation of the physics potential of the LHC;
- preparation of the LHC for a long operational life;
- improvement of the reliability of the LHC through the construction of LINAC4;
- the R&D and subsequent implementation necessary for a significant luminosity increase of the LHC, i.e. HL-LHC; and
- the detector modifications and R&D necessary for optimum use of the delivered luminosity.

The LHC programme above is CERN's dominant scientific activity, and this is reflected in the allocation of a budget, which amounts to more than 80 % of the total CERN budget in 2011 (when splitting the indirect costs like support activities, injectors, infrastructure and services, energy and other expenses) on a pro rata basis in between direct LHC and direct non LHC activities). This breakdown is explained in more detail further below.

This MTP is also driven by the necessity to bring the LHC injector chain and the technical and general infrastructure up to the high standards required to maintain CERN's position as a world laboratory.

This MTP is science-driven secondly by the preparations for the longer-term aim of ensuring that CERN remains the main global accelerator laboratory at the energy frontier:

- R&D for CLIC in the framework of a world-wide collaboration, leading to a Conceptual Design Report in 2011/2012;
- enhanced CLIC – ILC collaboration, including detector R&D and preparation for the Conceptual Design Report to be finalized in 2012;
- R&D for superconducting high-field magnets for a possible higher-energy proton collider, HE-LHC, if necessitated by the physics; and
- R&D for high-power proton sources, such as the high-power superconducting proton linac (HP-SPL), in line with European participation in neutrino physics.

Thirdly, this MTP is science-driven by a unique world-class fixed-target programme, which will consist of:

- the SPS, PS, AD, n-TOF and ISOLDE experiments as already planned; it also includes the neutrino beam to the Gran Sasso laboratory; and
- new projects emerging as a result of the two events:
  a) the physics diversity workshop "New Opportunities in the Physics Landscape at CERN", held in May 2009; and
  b) the dedicated neutrino workshop, held in October 2009, followed by SPC panel recommendations.

As a result of these two workshops, several new proposals were submitted to the SPSC and INTC, of which some were approved and others are under consideration. Approved projects include HIE-ISOLDE, ELENA (newly approved in 2011, providing a unique world-wide opportunity for CERN to study the properties of antimatter), the decelerator for the AD complex, NA62, light-ion beams (NA61), COMPASS2 and the CLOUD facility. Future projects on neutrino physics are being pursued by EU-funded initiatives (LAGUNA-LBNO) and through the Expression of Interest for neutrino experiments at the PS.

At the LHC Performance Workshop in Chamonix, held at the end of January 2011, the current state of the LHC was evaluated and presented. The excellent performance of the LHC machine and experiments together with the technical recommendations resulting from this Workshop have been taken into account by the Management in this MTP, leading to the following decisions:

- The LHC will be operated during 2011 and 2012, with target integrated luminosities of $1 fb^{-1}$ by the end of 2011 at 3.5 TeV/beam and of several fb^{-1} by the end of 2012. Heavy-ion runs are scheduled at the end of both years, each of about 4 weeks' duration. A technical stop of about 3 months around Christmas 2011 is needed.
- This extended operations period will be followed by a long shutdown (of about 20 months beam-to-beam) starting at the end of 2012 to repair and consolidate the inter-magnet copper-stabilizers (splices) to allow for safe operation up to 7 TeV/beam for the lifetime of the LHC.
- In the shadow of the inter-magnet copper-stabilizer work, the installation of the pressure rupture disks (DN200) will be completed and around 20 magnets which are known to have problems for high energy will be repaired or replaced. In addition, PS and SPS consolidation and upgrade work will be carried out.
- During this shutdown, the collimation system will also be upgraded at Point 3.

Taking into account the required length of the shutdown and the time needed to start up the LHC at the higher energy, physics might only start towards the late autumn of 2014. Therefore, consideration is currently being given to extending the present run into 2013 and to starting the shutdown only around March 2013, with the re-start for physics after the long shutdown in early 2015. Since the implications of such a scenario for the whole accelerator complex, including for the fixed-target experiments, has not yet been fully assessed, this MTP is not based on this scenario. The proposal on the exact timing of the shutdown will be presented to the SPC and Council in time for the next MTP.

- The LHC experiments will use the shutdown as follows:
  - ALICE: installation of the Dijet Calorimeter; general detector consolidation, including specifically the Silicon Pixel Detector cooling system.
  - ATLAS: installation of the Insertable B-Layer (IBL) detector; installation of staged Muon Stations; replacement of Pixel Detector Service Quarter Panels; separation of the toroid and solenoid cryogenic delivery loops; improvements to the Tracker cooling system; replacement of low-voltage power supplies of the LAr Calorimeter and Tile Calorimeter; replacement of the experimental beam pipe section; installation of an additional cryogenic helium compressor.
  - CMS: installation of an additional yoke end shielding wall and forward muon stations to complete the high-luminosity Muon Detector; installation of a smaller-diameter beam pipe required for the installation of the upgraded Pixel Detector; change of phototransducers in some calorimeters; other important improvements in the experiment infrastructure.
  - LHCb: consolidation and improvements; exchange of a new experimental beam pipe section; preparation of infrastructure for the experiment upgrade.

- In the years 2015, 2016 and 2017, the LHC will be operated towards 7 TeV/beam with increased intensities and luminosities.
- In 2017/2018, the next long shutdown is scheduled to connect LINAC4, to complete the PS Booster energy upgrade, to finalize the collimation system enhancement and to install LHC detector improvements. After this shutdown, a further period of three years of LHC operation at

7 TeV/beam and at least the design luminosity is planned (with short technical stops around the end of each year);

- The ambitious longer-term plans include a total integrated luminosity of the order of 3000 fb^{-1} (on tape) by the end of the life of the LHC. This High-Luminosity LHC (HL-LHC) implies an annual luminosity of about 250-300 fb^{-1} in the second decade of running the LHC. The HL-LHC upgrade is also required to implement modifications to elements in the insertion regions of the machine whose performance will have deteriorated due to radiation effects, such as the inner triplet quadrupole magnets. The HL-LHC upgrade is scheduled for the 2021/2022 long shutdown.

The results from the LHC will be vital to decide the direction that particle physics will take in the future. In order for CERN to be ready to play an appropriate role in the next large project in particle physics at the energy frontier, diverse but focused R&D for future projects is mandatory for the future of the Laboratory.

The MTP presented here combines reduced revenues, reduced spending on research and consolidation by a careful and responsible adjustment of the pace and an injection of capital into the social security systems with an acceptable decrease of the budget deficit as was introduced for the MTP in 2010.

With respect to the revised and approved MTP in 2010, the figures in this MTP are reviewed and updated as follows:

- The Council decision on the Cost-Variation Index is applied (i.e. zero indexation of Member States but applying a negative materials index). This reduces the cumulative budget deficit to less than 200 MCHF by the end of the projection period.
- Romania signed the accession protocol in 2010 and has become a Candidate for Accession. These additional revenues allow funding of the CERN share of the personnel and materials for the ELENA project, which is a unique project and opportunity for CERN, especially given the exciting results obtained at the AD in 2010. The additional revenues also allow radioactive waste elimination, the consolidation and enhancement of the cooling and ventilation of the CERN Control Centre and the enhancement of the HL-LHC focused R&D.
- The activities for the LHC upgrade are re-grouped by identifying four headings: LHC Injector Upgrade (LIU); HL-LHC machine upgrade; R&D for HL-LHC detector upgrades; and implementation of the HL-LHC detector upgrades.

However, given the financial constraints, some very important work packages and projects identified in the course of the LHC operations review in 2009/2010 cannot be funded within this MTP:

- This MTP includes the cost estimates for the R&D work and some prototyping for the HL-LHC upgrade of the machine and the detectors. However, the CERN share for the construction of the detector components as well as the construction costs of the upgrade of the LHC insertions cannot be fully funded within the current envelope. Similarly, it is likely that part of the LHC injector upgrade costs will exceed the current level of funding. The construction will have to start following the end of the first long shutdown in 2013/2014. As the Cost-to-Completion for these projects is still to be evaluated and scrutinized, the amounts cannot yet be entered in the financial figures of this MTP. A very preliminary estimate for the HL-LHC indicates a Cost-to-Completion in investments of about 700 MCHF, which includes up to 200 MCHF in external contributions.
- CERN does not currently have the resources to fund the proposal to reconstruct the neutrino beam line at the PS to study and finally clarify the LSND anomaly. This could yield exciting results in the neutrino sector such as the existence of sterile neutrinos, which could form part of the dark matter in the universe. The experiment is under discussion in the committees. A very preliminary cost estimate amounts to about 25 MCHF, not including the work required to remove existing infrastructure. A small study group has been set up to evaluate the cost to completion in more detail.
- CERN’s heating facilities are close to the end of their lifetime. A preliminary cost estimate for their renovation amounts to some 45 MCHF.
- In order to maintain CERN’s capacity to provide test beams, the East Hall and the North Area need consolidation of the technical infrastructure, which can amount to up to 85 MCHF in personnel and materials. A more detailed study is underway. Test beams at CERN are oversubscribed and requests for beam-time are expected to increase further.
- The expansion of the new radiation monitoring system to all experimental areas is estimated at 10 MCHF.
- In order to enhance the operational reliability linked to uninterruptable power supplies, the materials cost for a complete refurbishment is estimated at 6 MCHF.

The Management is looking forward to being able to fund most of these work packages as new Associate and Member States start to join the Organization.

If additional funds do not become available, the progress towards HL-LHC and other scientific projects will be delayed.

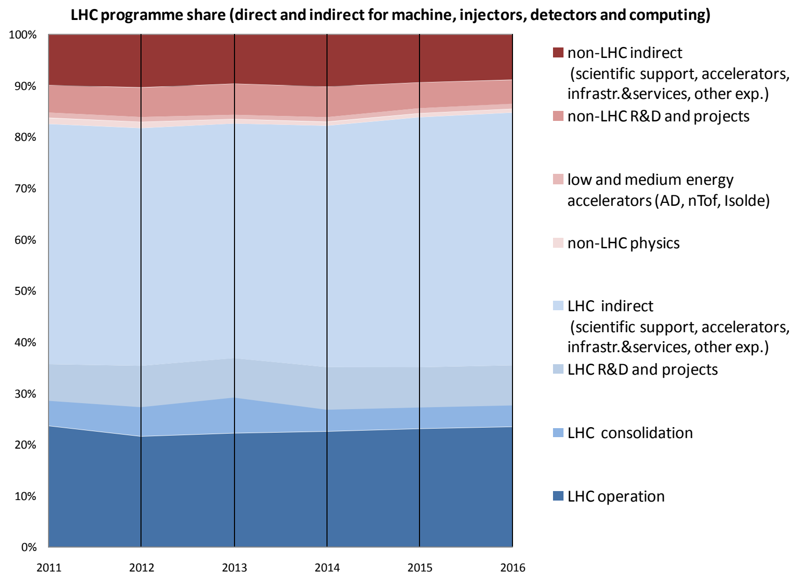
In line with the financial rules, Council will be invited in future years to approve any major construction projects (such as the HL-LHC upgrade for the machine and CERN's share to the detectors).

In March, the Management has explained the need for flexibility concerning the overall staff strength, fully in line with the new governance principles introduced by the Council in 2008 (CERN/FC/5228-CERN/2777). The Management has also explained that this flexibility will be applied only for staff positions in projects (including consolidation and operational reliability). The figures shown in this document make use of this flexibility notably for the projects HIE-ISOLDE and ELENA as well as for waste management and the consolidation headings for infrastructure, detectors and accelerators. Furthermore, the Management has identified several high-priority items for the coming years requiring such flexibility, such as Radiation-to-Electronics (R2E), LHC collimation, LHC detectors improvements, consolidation of the LHC machine and its injector complex, LIU project and HL-LHC activities for both detectors and machine, which will need such flexibility.

Additional information following the SPC review in May

The SPC requested to illustrate the LHC share with respect to all expenses which is shown below. Whereas the direct costs for the LHC and non-LHC activities are clearly stated in the activity tables, the indirect costs such as scientific support, accelerator and areas, infrastructure and services including energy and administration as well as the other expenses are broken down on a pro rata sharing. It should be noted that the attempt to split the costs of the PS and SPS as a function of protons delivered to a facility would result in large year to year variations. In case of one year with less time allocated to fixed-target experiments, the LHC share on the essentially fixed running costs of the PS and SPS complexes would simply increase. As already stated in the 2010 MTP, the Management will therefore continue to present the activity breakdown identifying the direct costs as well as the costs by facility, service and infrastructure activity to allow for the comparison from year to year of these support activities.

LHC direct costs with respect to all direct costs are about 82 to 85% depending on the years within the MTP period. As can be seen the percentage of the indirect costs are higher than direct costs. This is simply due to the unavoidable fixed costs to operate the laboratory (scientific support, injectors, infrastructure and site facilities, administration, informatics, energy and central expenses for personnel such as the CERN share for the pensioner's health insurance and the amortization of staff benefits accruals as well as insurance premiums and financial costs). The annual fluctuation of the indirect costs is dominated by the estimated energy consumption linked to the operation of the accelerator complexes.



Following the staff rules and their application, only paid members of personnel are reported under personnel whereas subsistence payments to associated members of personnel are shown under materials (third party payments). This meant a transfer of some 4 MCHF per annum from P to M for the scientific associates notably in the PH department (including the Theory group).

II. Scientific and Non-Scientific Programmes

LHC Programme

1. LHC machine and injectors, reliability and consolidation

Goal		Reliable operation of the LHC as a 7 TeV centre-of-mass energy proton-proton collider until end 2011 and a review of centre-of-mass energy for 2012, with a target integrated luminosity of greater than 1 fb^{-1} in 2011 and several fb^{-1} in 2012. Reliable operation of the LHC as Pb82+ collider in both 2011 and 2012. This heading also includes the continuing studies to improve the performance of the LHC and its injector complex. Included here are also the specific injector machines for the LHC heavy-ion programme (LINAC3 and LEIR).
Approval		1996
Start date		R&D 1990, Construction 1998
Costs		Total costs of the consolidation programme and of the continuing studies to improve the performance of the LHC and its injectors are under evaluation. The consolidation heading for LHC reliability is of a non-recurrent nature but ongoing without an end date since it is comprised of many smaller-scale items necessary for reliable LHC operation. Cost-to-Completion has been defined for the enhancement of the collimation system until 2013 (35 MCHF materials) to enhance the LHC performance towards design parameters. CtC for the splice consolidation is 24.9 MCHF. For Radiation to electronics (R2E), the CtC is still under review.
Running conditions		LHC proton-proton collisions at 7 TeV centre-of-mass energy until end 2011 and a review of centre-of-mass energy for 2012. Following initial operation, the LHC will progressively increase its luminosity, by increasing the number of bunches and the proton intensity per bunch as well as by implementing stronger focusing in the interaction points, with the aim of accumulating greater than 1 fb^{-1} of integrated luminosity by the end of 2011. At the end of the proton runs a period of operation with collisions of Pb82+ ions is scheduled in both 2011 and 2012. Long shutdowns are foreseen in 2013 (for splice consolidation, repair of helium leaks in Sectors 3-4 and 4-5 and possibly collimation enhancement; the duration of the shutdown will be defined by the end of 2011) as well as in 2017 (presently foreseen for collimation installation in the dispersion surpressors and preparation for crab cavities and new RF cryosystem). These two long shutdowns will also concern the LHC injectors. In between the two long shutdowns, the LHC machine will be running for 3 years, with about a 3-month technical stop at the end of every year (to minimize the increase in energy consumption and for maintenance purposes).
Competitiveness		Highest centre-of-mass energy collisions worldwide.
Organisation		CERN, through the Departments within the Accelerator and Technology Sector, manages the resources and technical operation. Technical management via a specific committee structure. Overall organization under the Directorate for Accelerators and Technology.
Risks	**LHC Machine and experimental areas**	A new PS power supply system (POPS) was commissioned in 2010 with test magnets (six spare SPS dipoles) and was connected to the PS magnets during the 2010/2011 technical stop. Commissioning on the PS machine took place at the beginning of 2011. This eliminates the risk of the failure of the PS motor generator set. Failures of LINAC2 are possible until LINAC4 is operational and steps to mitigate this are under study. Ageing of the injector chain: the risks have been assessed in the LHC Performance Workshop at Chamonix (2011) and an extensive consolidation programme is under way to keep the current injectors running for 25 years.
	Spares	Following a critical review of the spares situation, a list of the most important spares has been established.
	LHC injectors for heavy ions	Recovery after regular Pb ion source ovens can be problematic. Vacuum degradation anywhere in the injector chain can lead to poor transmission.
	Consolidation	The consolidation projects are organized in such a way that during the year, if new insights on risk are obtained, priorities are shifted and the items with the highest priority will have budget allocated - for instance the R2E priorities. Scarcity of personnel will determine the capacity to carry out the consolidation items.
2012 targets	**LHC Machine and experimental areas**	Beam operation of the LHC in 2012 with a target integrated luminosity of several fb^{-1}.
	Spares	The last spares for magnets must be bought to restore the spares inventory to the situation before the Sector 3-4 incident. Buying and manufacturing of spares according to the critical list.
	LHC injectors for heavy ions	Reliable operation of LHC as Pb82+ collider.
	Consolidation	Consolidation will cover mainly the old LEP infrastructure that has been re-used for the LHC (cooling, ventilation, electrical networks...) and a major campaign to build up the necessary LHC spare parts that were not included in the final LHC Cost-to-Completion. Also, preparations are being made for the consolidation of the splices and the enhancement of the collimation system, i.e. finalizing the collimation in the insertions (both being planned to be carried-out during the shutdown 2013).
Future prospects & longer term	**LHC Machine and experimental areas**	Beam operation of the LHC in 2011 and 2012 with a target integrated luminosity of greater than 1 fb^{-1} in 2011. Progressive increase in the centre-of-mass energy and luminosity towards the nominal values of 14 TeV and 10^{34} cm^{-2} s^{-1} in the coming years.
	Spares	Buying and manufacturing of spares according to the critical list.
	LHC injectors for heavy ions	Preparation of the nominal Pb82+ beam is well underway in the injectors and will be used for operation in 2011. Studies to improve the reliability of the source are underway, including the possibility of making use of additional ovens. Re-establishing 18 GHz operation of the source is still under investigation in order to increase further the ion intensity produced by LINAC3.
	Consolidation	During the LHC Performance Workshop at Chamonix in January 2011 the strategy with respect to R2E items was discussed and the associated consolidation plan was agreed.
Specific Health and Safety issues		Losses throughout the LHC accelerator may produce some activated equipment. The beam-cleaning areas and the high-luminosity insertions will become particularly activated. Sites are identified for the treatment and storage of this equipment. Budget is set aside to deal with the disposal of activated accelerator components. RP plans and surveys all such operations following the ALARA principle.
Outreach		The LHC is highly visible in the press and public domain.
CERN budget for 2012	**LHC machine and experimental areas**	Personnel: 66.6 MCHF; Materials: 49.7 MCHF.
	Spares	Personnel: 1.1 MCHF; Materials: 7.1 MCHF.
	LHC injectors for heavy ions	Personnel: 1.9 MCHF; Materials: 0.5 MCHF.
	Consolidation	Personnel: 17.6 MCHF; Materials: 41.1 MCHF.

LHC experiments

2. ATLAS detector

Goal	Verify the Standard Model and search for new physics.
Approval	January 31st, 1996
Start date	1998
Costs	Total CERN share of Materials for ATLAS construction: 128.8 MCHF; Total Personnel and Materials (CERN share, project, tests and operation until 2008 incl.): 509.2 MCHF.
Running conditions	Runs up to full design luminosity. Ready to use any luminosity provided.
Competitiveness	Together with CMS, very competitive compared to existing facilities.
Organisation	A total of 174 institutions from 38 countries with about 3000 authors with PhD (or equivalent), students included. *Governing body*: Collaboration Board (one representative per member institution) and Chair. *Executive bodies*: Management: Spokesperson and two Deputies, Technical Coordinator, Resource Coordinator. Executive Board chaired by the Spokesperson. Subsystem Projects led by Project Leaders. Physics Working Groups with two co-conveners per working group. Interface with CERN through a dedicated CERN team.
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.
2012 targets	Data-taking with the complete detector at luminosities up to 10^{33} $cm^{-2}s^{-1}$ or higher (depending on the machine performance) with CERN physicists playing an important role. With 3 fb^{-1} of accumulated data, ATLAS could exclude the existence of the SM Higgs boson for masses above 120 GeV or get evidence for it (3 sigmas) for masses above 130 GeV. It could discover supersymmetric particles with masses up to 0.9 TeV, as well explore several other scenarios for physics beyond the Standard Model in the multi-TeV mass range.
Future prospects & longer term	Consolidation and upgrades during future shutdowns. New pixel service quarter panel and pixel layer (IBL) in the 2013 shutdown. The collaboration is discussing trigger improvements and a possible miniature forward calorimeter for the following shutdown. Physics run at nominal energy and increased luminosity after the 2013 shutdown.
Outreach	Organized by the Collaboration and documented in the ATLAS Communication Plan.
CERN contribution	Infrastructure in the experimental area. Strong contribution towards the technical coordination of the experiment including the subsystem installation. Providing Tier-0 centre as well as some analysis capability. Important contributions to all sub-systems (CORE 33 MCHF) and non-CORE support (68 MCHF). A total of 128 MCHF was spent. At present, a total of 80 FTE. Now very important contribution to the physics results.
CERN budget for 2012	Personnel: 19.9 MCHF; Materials: 3.7 MCHF of which M&O: 1.5 MCHF.

3. CMS detector

Goal	Verify the Standard Model and search for new physics.
Approval	April 29, 1998
Start date	1998
Costs	Cost-to-Completion (CERN share of Materials): 127.8 MCHF; Total Personnel and Materials (CERN share, project, tests and operation until 2008 incl.): 488 MCHF.
Running conditions	Runs up to full design luminosity. Ready to use any luminosity provided.
Competitiveness	The CMS detector is a very versatile scientific instrument, capable of outstanding performances in hadron runs as well as in heavy ion runs.
Organisation	A total of 173 institutes finance the CMS experiment, funded by 42 Funding Agencies from over 39 countries with 2162 signing scientists with PhD (or equivalent). *Governing body*: Collaboration Board (one representative per member institution) chaired by an elected Chairperson (2-year mandate). *Executive bodies*: Management Board, Executive Board, Finance Board. Spokesperson (2-year mandate), Technical Coordinator, Resources Manager, Subsystem Project Leaders. Interface with CERN through a dedicated CERN team.
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. Delays in the upgrade construction might result in CMS not being able to upgrade the forward muon stations during the 2013 shutdown as planned. This in turn would affect the upgrade of the pixel system scheduled for the next shutdown (2016).
2012 targets	Physics run at 7 TeV and luminosities up to 10^{33} $cm^{-2}s^{-1}$ or higher (depending on the machine performance) with CERN physicists playing an important role. With 3 fb^{-1} of accumulated data, CMS could exclude the existence of the SM Higgs boson above 120 GeV/c^2 or get evidence for it (3 sigmas) above 130 GeV/c^2. It could discover supersymmetric particles with masses up to 0.9 TeV, as well explore several other scenarios for physics beyond the Standard Model.
Future prospects & longer term	Consolidation and upgrades during future shutdowns. The Collaboration has endorsed the re-scoping of the forward resistive plate chambers muon detectors, the 4th shielding disks (YE4) plus associated CSCs and the change of photosensors for HCAL. A pixel detector upgrade is being studied and costed with installation for the following shutdown. Physics run at nominal energy and increased luminosity after the first shutdown.
Outreach	Organized by the Collaboration and regularly reported to the Scrutiny Group for the activities financed by M&O-A. Linking regularly with CERN outreach efforts.
CERN contribution	Complete responsibility for the experiment infrastructure. Leading role in the DAQ, financially and technically. Other very important contributions to ECAL, Tracker and Muon Chambers. Providing the CMS Centre infrastructure and TIER-0 facilities. Strong contribution to software tools and data analysis. A total of 77 FTEs work on CMS.
CERN budget for 2012	Personnel: 18.9 MCHF; Materials: 3.4 MCHF of which M&O: 1.3 MCHF.

4. ALICE detector

Goal	Study of heavy ion collisions: measuring properties of strongly interacting matter at extreme energy densities where the formation of a quark-gluon plasma is expected. Study of proton-proton (pp) collisions: establishing reference data for the study of the quark-gluon plasma and studying properties of pp collisions where ALICE has unique capabilities thanks to particle identification and low-p_t acceptance.
Approval	1997
Start date	1998
Costs	Cost-to-Completion (CERN share of Materials): 28.6 MCHF; Total Personnel and Materials (CERN share, project, tests and operation until 2008 incl.): 182.9 MCHF.
Running conditions	Dedicated heavy ion running and systematic pp running.
Competitiveness	ALICE is the only general-purpose detector dedicated to heavy ion physics at the LHC. It covers in a single experiment all the main measurements and allows major improvements for most variables in comparison to the RHIC experiments.
Organisation	121 institutes from 33 countries with 598 participants with PhD (or equivalent). *Governing body*: Collaboration Board with one representative each of the participating institutes, chaired by an elected Chairperson. *Executive bodies*: Management Board: Spokesperson plus two deputies, Technical, Resources, Computing, Upgrade and Physics Coordinators, Project Leaders, and elected members. Interface with CERN through a dedicated CERN team.
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.
2012 targets	pp reference data-taking and 3rd Pb-Pb physics data-taking. The possibility of a p-Pb run in 2012 is currently being studied by the LHC, and is considered an attractive alternative, since it could allow the clarification of shadowing and other effects on the observed features of PbPb collisions. Physics analysis. Preparation of 2013 shutdown to complete the detector and carry out detector maintenance tasks.
Future prospects & longer term	Consolidation and upgrades during future shutdowns. ALICE has been able to handle several major upgrades during its construction. In the winter 2010/2011 the EMCAL installation has been completed, and will add considerably to the potential of the experiment in 2011. The TRD will be completed in the 2011/2012 shutdown. The installation of the DCal, which requires the replacement of the PHOS support, will take place during the long shutdown scheduled for 2013. The collaboration is studying an upgrade of the internal silicon tracker, an upgrade of its forward coverage and an increase of the PID capability for future shutdowns. Heavy ion (A-A and possibly p-A) data-taking for one month per year; pp reference data-taking during the rest of the year at the nominal energy.
Specific Health and Safety issues	Nothing specific identified.
Outreach	Organized by the Collaboration, in collaboration with ALICE CERN Team. Effort to increase visibility of ALICE, and to guarantee the dissemination of correct information on the scientific results to the mass media.
CERN contribution	Overall scientific, technical and financial coordination, including safety. Experimental infrastructure and responsibility for installation and planning and execution of shutdown activities. Participation in detector construction, maintenance and operation projects: ITS (Project Leader), Si Pixel detector and level zero trigger, TPC (field cage, electronics), HMPID and Muon Arm (magnet). Contribution to PHOS and EmCal electronics. Financial contribution to Si Strip detector. Participation in other systems: responsibility for ACT, ECS, DAQ, DCS, electronic logbook, ALICE-LHC interface and infrastructure/installation, including test beam areas. Electronics coordination. Coordination of offline computing, including simulation and data processing. Development of offline computing framework, Physics coordination. Currently the CERN-ALICE Team is 33 FTE strong.
CERN budget for 2012	Personnel: 9.4 MCHF; Materials: 1.9 MCHF of which M&O: 0.6 MCHF.

5. LHCb detector

Goal	Search for physics beyond the Standard Model in CP violation and rare decays of beauty and charm hadrons.
Approval	September 1998
Start date	1998 (construction)
Costs	Cost-to-Completion (CERN share of Materials): 20.5 MCHF; Total Personnel and Materials (CERN share, project, tests and operation until 2008 incl.): 121 MCHF.
Running conditions	Modest luminosity of a few times 10^{32} $cm^{-2}s^{-1}$, compared to the LHC nominal luminosity of 10^{34} required (less focused interaction point locally tunable). Displaced collision point in order to accommodate the spectrometer without enlarging the existing cavern at IP8.
Competitiveness	Large number of beauty and charm hadrons produced by LHC compared to the existing facilities. Efficient inclusive heavy flavour trigger and hadron particle identification compared to the other LHC experiments.
Organisation	A total of 54 institutes from 15 countries with 745 participants with PhD (or equivalent), students included. *Governing body*: Collaboration Board (one representative per member institute) and Chair. *Executive bodies*: Management: Spokesperson and Deputy, Technical Coordinator, Resource Coordinator. Interface with CERN through a dedicated CERN team.
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.
2012 targets	Normal data-taking with complete detector at close to nominal luminosity. Further extend the constraints on new physics (or its discovery) by exploring the key measurements, down to the level of the Standard Model expectation. With ~1 fb^{-1} of data expected each year during 2011 and 2012, LHCb will significantly improve on the world limits for $Br(B_s \to \mu^+\mu^-)$ and f_s (phase of the B_s oscillation amplitude), as well as making first measurements of the CP angle gamma, and the rare decays K* μμ and φγ. LHCb also expects to make the world's most precise measurements of charm mixing and CP violation.
Future prospects & longer term	Physics run at few 10^{32} $cm^{-2}s^{-1}$ luminosity will continue after the shutdown in 2013. LHCb will be sensitive to new physics in the period up to 2017 through rare decays (such as $B_s \to \mu^+\mu^-$) or CP asymmetries (such as $B_s \to J/\psi\ \phi$). A Letter of Intent has been submitted for an upgrade to enable the LHCb experiment to operate at 5 times higher luminosity after about 5 years of running at design luminosity, i.e. at about 10^{33} cm^{-2} s^{-1}. This will allow the collection of a data sample of ~50 fb^{-1}, for the precision study of new physics in the flavour sector.
Outreach	LHCb places a strong emphasis on communication to the general public as well as to specifically targeted interest groups, such as students, schools and journals.
CERN contribution	CORE contribution 13.5 MCHF plus iron blocks for the muon filter. Total cash investment to the experiment 23.1 MCHF, which also includes providing infrastructure and R&D. A total (2011) of 39 FTE paid by CERN (29.5 physicists and engineers, 8 technicians, 1.5 secretariat support).
CERN budget for 2012	Personnel: 9.4 MCHF; Materials: 1.7 MCHF of which M&O: 0.8 MCHF.

6. Common items, other experiments

6.a Totem detector

Goal	Measurement of total cross-section, elastic scattering and diffractive phenomena.
Approval	Research Board decision of July 2004.
Start date	2005 construction, physics with first LHC stable beams.
Costs	Cost-to-Completion (CERN share of materials): 2.7 MCHF. Total Personnel and Materials (CERN share, project, tests and operation until 2008 incl.): 10.8 MCHF.
Running conditions	Special runs: with large β^* (90 m and 1540 m) and with standard optics but reduced luminosity; continuous running under normal LHC beam conditions.
Competitiveness	The total cross-section and elastic scattering measurements have almost no competition. Diffractive studies are complementary to ATLAS and CMS, but TOTEM has the most complete proton measurements.
Organisation	A total of 10 institutes from 7 countries with 70 participants with PhD (or equivalent). *Governing body:* Collaboration Board (one representative per member institute) and Chair. *Executive bodies:* Management: Spokesperson and Deputy, Technical Coordinator, Resource Coordinator. Technical Board chaired by Technical Coordinator. Subsystem projects led by project leaders. Physics and Analysis groups chaired by physics and analysis coordinators.
Risks	Technical risk for TOTEM: radiation damage of detectors close to beam, for example silicon sensors in RPs.
2012 targets	Carry out the physics programme, initially described in the TDR only for 14TeV centre of mass, also at the reduced =7TeV centre of mass : Measurement of s_{tot} in special runs with high β* : completion of the b*=90m programme started in 2011, and development of an optics with β*~1km. Study of diffractive processes with nominal optics both in standard runs and in special runs with reduced luminosity, partly together with CMS. Preparation of replacement silicon detectors for the Roman pots to be installed during the shutdown 2013.
Future prospects & longer term	After the 2013 shutdown: carry out the full physics programme at 14TeV centre of mass. Common data-taking with CMS. Contribution to the development of large GEM detectors within RD51 with a view to a possible T1 upgrade starting in the 2013 shutdown. Continuation of R&D for radiation-hard edgeless silicon detectors. Continuation of studies for near-beam detectors in IR3.
Outreach	Spin-off from the TOTEM development of edgeless silicon detectors and VFAT chips (front-end readout and trigger) for industrial applications.
CERN contribution	Overall technical coordination for the experiment including the subsystem installation; Infrastructure in the experimental area; coordination of the physics data analysis; Leading responsibility in the Roman pot system including silicon detectors; run coordination; Responsibility in online (incl. DCS) and coordination of offline computing. The CERN-TOTEM Team is 5 FTE strong.
CERN budget for 2012	Personnel: 1.3 MCHF, Materials: 0.4 MCHF of which M&O: 0.2 MCHF.

6.b LHCf detector

Goal	Measurement of forward production spectra of pi0's and neutrons at the LHC energy for the purpose of verification of hadron interaction models for cosmic-ray physics.
Approval	June 2006
Start date	2006
Costs	Total Personnel and Materials: 2 MCHF.
Running conditions	Short low-luminosity (~ 10**29) runs with < 43 bunch operations foreseen at the beam commissioning. Wish to run with a beam crossing angle to enhance the covered Pt region. Runs with different energy would also be interesting to verify interaction models.
Competitiveness	Other zero degree hadron calorimeters in LHC experiments, but complementary to each other since the LHCf is dedicated to measuring EM components.
Organisation	32 members from 6 countries participating (incl. 8 PhDs, 4 students); spokesperson, deputy spokesperson, technical coordinator, GLIMOS.
2012 targets	Complete physics analysis with data taken.
Future prospects & longer term	Complete physics analysis with data taken. Physics run with proton-proton collisions at the highest possible energy after 2013 shutdown. Possible run in 2012 under discussion if proton-ion collisions are available.
Outreach	To communicate information to the public using web, publicity and press releases, etc. and to create interdisciplinary connection between cosmic ray physics and particle physics.
CERN contribution	Overall technical coordination for the experimental infrastructure, installation, planning and execution of shutdown activities. General interface to the machine before and during data-taking. GLIMOS, Computer administration and Outreach activities (2 people from EN/MEF: ~ 0.7 FTE).
CERN budget for 2012	No direct CERN contribution for Materials.

6.c MoEDAL

Goal	Monopole and Exotics Detector At the LHC (MoEDAL). The prime motivation of this experiment is to search for the direct production of magnetic monopoles at the LHC.
Approval	December 2009
Start date	2010
Running conditions	The MoEDAL detector will consist of layers of plastic attached to the walls and ceiling of the cavern that houses the VELO detector of the LHCb experiment.
Competitiveness	Unique research for magnetic monopoles.
Organisation	Physicists from Canada, CERN, the Czech Republic, Germany, Italy, Romania and the US.
2012 targets	Continue running with the $8m^2$ test array already deployed. If the LHC energy is substantially increased in 2012, the test array could be replaced by another one of similar size and the stacks exposed to 7 TeV data would be analysed in 2012.
Risks	None identified.
Future prospects & longer term	During the first long shutdown: dismantle and analyse the stacks exposed to 7 TeV data to search for the presence of highly ionizing particles; deploy the full size MoEDAL detector, with a view to recording data at the highest possible LHC energy.
CERN budget for 2012	No direct CERN contribution for Materials.

7. LHC detectors consolidation

Goal	The overall aim is to improve the reliability and redundancy of infrastructure and common equipment for the detectors to ensure their efficient operation during the period following the 2013 shutdown.
Approval	This is a consolidation programme for the approved detectors at the LHC.
Running conditions	This activity consists of many projects which will take place in the next 2 years. Thus the quantum is a sub-project, not the yearly budget. The requested budget corresponds to the CERN share of a substantial funding effort by all the funding agencies.
Competitiveness	The higher luminosity running at the nominal energy of 14 TeV will establish the CERN leadership at the high energy frontier and define the future roadmap of high energy physics.
Organisation	The projects are organized and coordinated for each individual experiment by the Technical Coordination Office.
2012 targets	Procure all the necessary equipment and prepare for the consolidation effort during the 2013 shutdown. Main domains of consolidation work are: magnets; cryogenics; electrical, UPS, cooling & ventilation equipment; shielding; networks; preparation of assembly and maintenance areas.
CERN budget for 2012	Personnel: 0.4 MCHF; Materials: 4.9 MCHF, manpower will be deployed from operation and maintenance headings.

8. LHC computing

Goal	Build, maintain, and operate a data storage and analysis infrastructure for the worldwide LHC physics community.
Approval	2001
Start date	2002
Costs	Total Personnel and Materials (CERN share, project and operation): 249 MCHF up to end 2010.
Running conditions	- Service to run 24hrs x 365 days a year; distributed infrastructure allows individual external sites to be down while maintaining overall service. - Typical data rates over 2 GB/s with significantly higher peak rates from CERN to Tier 1s, equivalent rates between Tier1/2 sites. - In 2011-12 plan to manage well in excess of 1M jobs per day.
Competitiveness	Largest ever computing endeavour to store and analyse massive amounts of physics data for access world-wide.
Organisation	- CERN + 11 Tier1 sites + 66 Tier 2 federations (~129 sites). - Dedicated boards (C-RRB, OB, MB, GDB, CB) and committees (LHCC, C-RSG, AF). - Resources mainly in IT Department, some PH, and external in the collaborating institutes. - Collaboration established with a Memorandum of Understanding signed by 34 countries.
Risks	- Uninterruptable power in CERN Computer Centre will no longer be sufficient during 2013. - Additional Tier 0 capacity and power required from 2014; remote hosting of capacity at a major facility is being investigated as a solution. This 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. - Resource needs for 2012 and future years may not be met by funding agencies in present economic climate. May mean significantly increased load at CERN.
2012 targets	Extended production run ensuring: - Sustained transfer of LHC data (raw and processed) to tape at >2 GB/s (up to 5 GB/s for heavy ion running), - Data export to Tier 1 centres of >2 GB/s, - Support for increasing numbers of users performing analysis at Tier 2s, - And more generally providing a service capable of withstanding planned and unplanned incidents: improving recovery procedures.
Future prospects & longer term	Increased workloads and data rates as LHC reaches design luminosity; in particular increasing the performance of the Tier 0 facility as experiment trigger rates increase significantly.
Outreach	- International Science Grid This Week (ISGTW) support, - Working with OpenLab partners to improve knowledge and technology transfer, - GridCafe and frequent Computer Centre tours, and large number of VIP visits, - LCG Public website http://lcg.web.cern.ch/LCG/public/ and updated LCG dissemination material; including new material to give visibility to collaborators.
CERN contribution	Tier 0 and Analysis facility to provide ~15% of total computer and storage resources. Project management and coordination of all activities.
CERN budget for 2012	Personnel: 19.6 MCHF; Materials: 20.9 MCHF.

Other Scientific Programmes

9. Non-LHC Physics (fixed-target programme)

Goal	SPS fixed-targets -NA 62 is a new experiment to study the rare decay of charged K mesons. In 2012, the experiment is expected to have its first test run with a partially installed detector. - NA 61: proton running and physics run with a light ion beam obtained by lead fragmentation at the end of year, partly in parallel with LHC ion running. - NA 58, COMPASS: Exact running conditions will depend on the outcome of 2011 run and the consideration by SPSC of a proposal to study the Primakoff effect. PS fixed-targets - PS212 (DIRAC): Running will depend on consideration by SPSC and of the results of the 2011 run to measure long-lived pi-pi atoms. - PS 215 (CLOUD): continued exploitation of the newly commissioned state-of-the-art large volume chamber to study the influence of cosmic rays on climate. AD, ISOLDE, n-TOF - AD: use decelerated anti-protons and positrons to measure differences if any between hydrogen and anti-hydrogen. The new AD-6 experiment (to measure the gravitational interaction of antimatter) will be in installation and pre-test phase. - ISOLDE: Study the structure of short-lived (exotic) nuclei and employ them in neighbouring disciplines (nuclear astrophysics, weak interaction studies, condensed matter physics, life sciences). - n-TOF: Measure neutron-induced reaction cross-sections of relevance for nuclear astrophysics, advanced nuclear technologies and fundamental nuclear physics. - CNGS measuring Tau-neutrino appearance. Non-accelerator-based experiments - CAST: search for axion particles from the sun. Exact running conditions will depend on consideration by SPSC. - OSQAR: an optical research for QED vacuum magnetic birefringence, axion and photon regeneration. Each of the two experiments uses a decommissioned LHC prototype dipole.
Approval	**ISOLDE**: first approved in 1964, latest approval for continuation in June 2007. **n-TOF**: first approved April 1999. **AD**: latest approval for continuation in December 2008.
Start date	**ISOLDE**: first beam 1967, at present location first beam June 1992. First post-accelerated beam October 2001. **n-TOF**: first beam November 2000 until 2004, resume operation end of 2008. **AD**: first beam July 2000.
Competitiveness	All experiments, after approval by the dedicated committee (SPSC or INTC, and Research Board), are quite unique in the world. The facilities at CERN (SPS, PS, ISOLDE, nTOF, AD) support the requirements of substantial communities and provide unique conditions for numerous experiments.
Organisation	Each experiment or facility has a specific organisation, similar for all collaborations. Each is controlled by a specific MoU.
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.
2012 targets	Reach goals defined in the experiment proposals and approved by scientific committees and Research Board.
Future prospects & longer term	AD: Increased efficiency for anti-hydrogen trapping, enabling its spectroscopy. Measurement of gravitational properties of antimatter. Possible addition of a cooling ring (ELENA) to increase the trapping of anti-protons by 2 orders of magnitude. CLOUD: low pressure running to further study cloud formation. North Area: Availability of 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. PS/SPS test beams and irradiation facilities: long-term consolidation (to be specified) to be able to satisfy the increasing number of requests. Implementation of the outcome of the non-LHC diversity workshops in 2009.
Specific Health and Safety issues	**ISOLDE**: Some experiments involve handling of open radioactive sources. For these cases individual training by RP is done. **n-TOF**: Safety issues related to the use of radioactive sample material for measurements, in particular for actinides; these have been cleared by CERN safety authorities. **AD**: Safety issues related to the use of radioactive sources; these have been cleared by CERN safety authorities.
Outreach	Continue diversity workshops.
CERN contribution	General support in line with the General Conditions applicable to experiments performed at CERN.
CERN budget for 2012	Personnel: 7.5 MCHF; Materials: 5.5 MCHF.

Note that information on the ISOLDE and n-TOF facilities, as operated by the BE and EN Departments, is included in fact sheet 13.

10. Theory

Goal	Provide high quality theoretical research and a general service to the theoretical and experimental communities. In particular, stimulate and provide support to the analysis of data generated by the LHC and other experiments at CERN and elsewhere.
Competitiveness	Maximum sharing is encouraged. The CERN Theory Group also continues to be one of the top 5 theory groups in the world.
Organisation	Group PH-TH.
2012 targets	Support experiments and the TH community.
Future prospects & longer term	Continue to be a research centre of excellence in theoretical physics. Provides support to the world-wide theoretical community by hosting visitors and organising theory institutes or workshops.
Outreach	The PH-TH group participates actively and systematically in the Organization's outreach activities in the form of public lectures in the Member States and whenever required for visits on-site. Studies concerning scientific risk and discovery potential.
CERN contribution	Logistics and general support. Budget for TH visitors has been restructured in a more efficient way in terms of focussed programmes, most of which are related to LHC data and prospects. 18 research physicists and 4 administrative assistants provide the necessary coordination and support for the visiting and associates programme of about 40 fellows, 15 scientific associates and 750 visitors per year.
CERN budget for 2012	Personnel: 10.8 MCHF; Materials: 2.1 MCHF. The scientific associates' budget is handled centrally.

11. LHC physics centre

Goal	Coordinate and optimize existing resources, and introduce new initiatives, dedicated to the best possible exploitation of the LHC data.
Approval	The initiative to create the Physics Centre was first introduced in 2009.
Start date	Coordination of the activities implemented in December 2009.
Competitiveness	The LHC Physics Centre at CERN will be complementary to LHC analysis centres world-wide, and will provide scientific support to the whole LHC community.
2012 targets	Provide resources needed to operate the Centre; organize scientific activities centred on the LHC physics programme (Seminars, Workshops, Lectures and working groups).
Future prospects & longer term	Continue organizing scientific activities centred on the LHC physics programme (Seminars, Workshops, Lectures and working groups, combination of results).
CERN budget for 2012	Materials: 0.2 MCHF (mainly for subsistences for visitors and some equipment).

12. Scientific Support (computing and technical support)

Goal	Support to the various experiments at CERN on: scientific computing tools, detector mechanics and electronics development, design, construction, installation and maintenance (including associated services) and provision of administrative and logistics services to the community of users.
Running conditions	General scientific computing, technical, logistics and administrative support for experiments. The engineering (PH-DT) and electronics (PH-ESE) groups are involved in the operation of the experiments and provide on-call services. The resources are shared between operation and new initiatives, the sharing being adapted to the requests for operation and shut-down periods of the experiments. The PH-SFT group provides and maintains general applications software required for the reconstruction and analysis of experimental data or the corresponding simulations.
Competitiveness	The resources are used on a multi-projects basis focusing mainly on common activities for all experiments.
Organisation	Groups of PH involved: AGS, DT, ESE and SFT. Steering boards involving representatives from experiments and PH management periodically review the current activities, agree on new common or specific activities, and define the priorities.
Risks	No financial, technical or managerial risks identified, provided that the level of resources are kept at least at the present level to preserve expertise and to provide support to the community of users.
2012 targets	Assure a safe, efficient and reliable operation of the experiments. 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.
Outreach	Publication and regular updating of activities on Web sites. The expertise developed in the support groups is regularly consulted by external institutes (computing, detector technologies and electronics). Participation in R&D collaborations and KTT activities.
CERN contribution	Administrative, logistics, computing, technical and general support.
CERN budget for 2012	Personnel: 22.9 MCHF; Materials: 8 MCHF.

13. Low- and medium-energy accelerators / PS and SPS complexes / Accelerator technical services / Accelerator consolidation

Goal		This heading comprises the non-LHC accelerators forming the CERN complex. Included are LINAC2, PS Booster, PS, AD and SPS. These machines provide a range of beams to several experimental facilities including ISOLDE, the PS fixed-targets, nToF, AD, the SPS fixed-targets and CNGS. LINAC2, PS Booster, PS and SPS also form the main injector chain for the LHC. Concerning the low- and medium-energy accelerators, the goal is to deliver the requested intensities for the experiments. This includes 4.7×10^{19} protons on target for CNGS and 1.55×10^{19} protons on target for nToF. To reduce losses, a new extraction and transfer system has been built in the PS (the Multi-turn Extraction). Commissioning is still continuing and will be put into full operation as soon as the quality of the beam that can be delivered to the SPS is sufficient. The initial urgent consolidation of the complex is well underway, but further consolidation will be required from 2012 onwards in order to keep the machines working at optimum performance until the proposed new LHC injector chain can be put into operation. The heading also includes accelerator technical services, generic expenses for accelerator engineering, controls and operation.
Costs		The consolidation heading for accelerators (i.e. injectors and technical infrastructure) is of a non-recurrent nature and is ongoing without an end date since it is comprised of several smaller-scale items. For that reason, there is no Cost-to-Completion but a foreseen funding level that has been reduced since June 2010 to a steady-state of 20 MCHF p.a. instead of 30 MCHF p.a. Within the consolidation of the injectors some CtC projects have been defined: the PS access system (12 MCHF), the consolidation of electrical infrastructure of the SPS (21MCHF) and of the PS (11.5 MCHF)
Running conditions		The number of facilities, together with the diversity of beams to be delivered, means that there is an overall shortage of protons available. Very dynamic optimization of the operational machine cycles is needed to maximize the availability of beam to all experiments. A prioritization between the different facilities will continue to be needed and is under discussion between the Management and the relevant scientific committees. The consolidation activity consists of many multi-annual projects. Therefore, the quantum is a sub-project, not the yearly budget.
Competitiveness		The CERN accelerator complex represents a unique facility over a range of particle types and energies.
Organisation		There is a specific organization of each facility with CERN being in charge of the resources and technical operation. Overall organization under the Directorate for Accelerators and Technology. The consolidation projects are organized 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.
Risks		Specific risks have been identified and mitigation measures are underway. Failure of the PS motor generator set: a new PS power system has been commissioned and put into service at the beginning of 2011. In parallel, the present PS power system (with the rotating machines) will be kept in operation up to the long shutdown in 2013. Failures in LINAC2: A consolidation of the RF tanks in LINAC2 has already been undertaken to reduce the risk of a vacuum failure and a study to address the possible failure of a magnet in the drift tubes is underway. Also, LINAC4 is being prepared for early use should a failure of LINAC2 stop the injector chain from 2013 onwards. 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 the event of failure (e.g. CNGS Horn and Reflector). Due to a lack of skilled manpower, detailed studies for upgrades and new projects are subject to delay (e.g. for ELENA, PS Neutrinos, LHeC). In addition, for the same reason, the progress in approved projects is slower than foreseen, e.g. HIE-ISOLDE, HiRaDMat and R2E. 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. Without increasing investments in CERN's accelerator, technical and general infrastructure, the operation of the scientific programme is endangered. Renovating the general infrastructure is necessary to reduce operation and maintenance costs (cooling, ventilation, electricity distribution, powering, lighting, etc.).
2012 targets		Delivery of beams to all users with the maximum overall efficiency. All the non-LHC physics programmes are done in parallel with operation for LHC injection. Continuation of accelerator consolidation to ensure reliable operation of the LHC and fixed-target physics experiments, e.g. PS access system, 18 kV cables for the SPS and the SPS power converters.
Future prospects and longer term		Continue studies to further enhance the beams for all users. A complete shutdown of the entire accelerator complex in 2013 is planned to allow for redeploying manpower to the LHC and injectors consolidation and to the upgrade work packages.
Specific Health and Safety issues		Losses throughout the accelerator complex produce some activated equipment. Sites are identified for the treatment and storage of this equipment. Budget is set aside to deal with the disposal of activated accelerator components, especially the treatment of the used ISOLDE targets. The Radiation Protection Group plans and surveys all such operations following the ALARA principle.
CERN budget for 2012	**Low and medium accelerators**	Personnel: 6.9 MCHF; Materials: 3.4 MCHF.
	PS and SPS complexes	Personnel: 38.5 MCHF; Materials: 23.2 MCHF.
	Accelerator technical services	Personnel: 16.3 MCHF; Materials: 11.1 MCHF.
	Consolidation	Personnel: 14.6 MCHF; Materials: 27.5 MCHF.

Infrastructure and Services

14. Manufacturing facilities

Goal	Provide specific engineering solutions combining mechanical design, production facilities and material sciences. Prototyping and feasibility developments. Design and manufacture of high complexity PCBs where the production time and cost in industry would be too long/high.
Start date	Big re-organisation where the projects started paying for the services provided: 1992.
Running conditions	Projects at CERN pay for the development and production.
Competitiveness	Projects at CERN not obliged to pass by the workshops so in real competition with private industry.
Organisation	Mechanical design and production (mainly in the EN-MME group). Design and production of PCBs using either conventional or fine-pitch photolithography techniques are carried out in a section with the TE-MPE group. Both managed by the Engineering Department under the Directorate for Accelerators and Technology. CAD and engineering/equipment data management is provided by the GS department on an overall basis to all departments.
Risks	Production is on the project critical paths, which puts enormous focus on priorities and resources.
2012 targets	Avoid any delays in projects where the design/production is on the critical path. Launch the project of the removal of the fine-pitch photolithography workshop to a new building.
Future prospects & longer term	Retain the know-how of mechanical construction of beam accelerators, physics detectors and PCBs within CERN with industry producing the “standard components”. Maintain equipment & manufacturing data management competences (industry term - PLM).
Specific Health and Safety issues	Comply with the international standards of safety. A study is under way to improve the long-term working conditions in the workshops.
Outreach	Collaborating with outside industry. Development at CERN, production of standardized products outside.
CERN budget for 2012	Personnel: 12.2 MCHF; Materials: 3.0 MCHF.

15. General facilities and logistics

Activities	This consists of technical infrastructure (i.e. cooling and ventilation, electrical distribution, heavy handling, access and safety systems, fire and gas detection); site facility management (cleaning, guards, green areas, site management, registration services); and logistics (i.e. stores, shipping, goods reception, personnel transport/mobility and mail services). The materials cover essentially industrial service supplies and maintenance contracts. This heading is a stable baseload over time.
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 its 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 – long-term goal is preventive maintenance.
2012 targets	The increased budget with respect to 2008 aims to further improve the services offered to the users and staff as well as the operation & maintenance of the sites and their infrastructures, particularly in terms of fire & gas detection as recommended by SAPOCO. A central helpdesk will be provided to users/staff/contractors to improve the quality of services offered using relevant key performance indicators, best practices and standardisation of support processes wherever possible.
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 and development of shuttle services should enable a diminution of the car fleet. The infrastructure consolidation programme and the move to "internal public transport" will improve energy usage and permit the use of more energy-efficient transport facilities, e.g. hybrid cars. The evolution of the central helpdesk and the extension of the implementation of the associated best practices should over time provide a more efficient use of manpower resources.
CERN budget for 2012	Personnel: 23.2 MCHF; Materials: 35.6 MCHF (of which 15.8 MCHF are technical infrastructure, 19.1 MCHF are for site facility management and 0.7 MCHF are for logistics).

16. Informatics

Activities	Informatics include the Computing Infrastructure (internal & external networking, telephony, databases, Computer Centre operation, helpdesk), desktop support (pc support, mail, web, collaborative tools and windows services), administrative computing services and scientific information services for CERN users & staff, which means the support of significantly more than 10'000 people.
Risks	- Some external funding is secured at short notice, consolidation and upgrading of the network infrastructure as well as the communication system become more and more urgent. - Unavailability of services due to causes such as software or hardware failures, damaged data due to corruption, human error or deliberate action. - Computer Security continues to be a major preoccupation due to the increasing number of attacks and their evolving technical nature. - The obsolescence of hardware platforms and software packages leads to lack of support from software providers depriving CERN of bug fixes and security patches, particularly in database areas. The risk of attack of the HR and accounting databases could have heavy consequences in terms of reputation as well as financially. - The diversification of activity and the expansion of the user communities increase the demand on reliable and robust scientific information access. Not following such developments could endanger the image of the Organization.
2012 targets	Ensure adequate level of availability of the informatics services including data-loss protection (backups) against accidental errors or human mistakes for its user base, as well as perform capacity planning to anticipate the needs. Ensure prompt corrective actions in the event of service failures. Protect and educate against the risks of computer security vulnerabilities. Launch a re-engineering programme of the administrative information applications suite. Start-up of the INSPIRE service at CERN. Start-up of the SCOAP3 (Open Access) activities administered by the GS/SIS group.
Future prospects & longer term	Proactive measures such as data back-ups, 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 Organization are met. Review/reengineering of the AIS suite of applications to profit from the evolution of technology since their conception. Operation of the INSPIRE service at CERN (GS/SIS &IT). Operation of the SCOAP3 activities administered by the GS/SIS group.
CERN budget for 2012	Personnel: 27.9 MCHF; Materials: 15.5 MCHF.

17. Safety, health and environment

Activities	Services and expenses for the implementation of CERN Safety Policy aiming at a continuous improvement in risk prevention, emergency preparedness and incident/crisis management covered by the following domains: **Occupational Health and Safety:** - Workplace safety including monitoring of specific risks such as asbestos - Advice and expert support in matters of safety - Safety training & campaigns - Technical safety inspections and safety coordination **Occupational Medicine:** - Medical service (2 doctors, 5 nurses), - Preventive health campaigns, - Work-related health studies/statistics **Radiation protection:** - Operational radiation protection - Design studies/estimates/simulations on radiological impacts (activation, doses, shielding) - Services: spectrometry, personal dosimetry, radioactive sources and import/export of radioactive material - Radiological ambient monitoring - RAMSES, ARCON (machine, workers, public, environment) - Radioactive waste management (storage, conditioning, evacuation) - Radiation protection instrumentation calibration service **Safe operation, maintenance and consolidation of CERN beams facilities:** - LHC safety improvements following 19th Sept. 2008 incident (outcome of the LHC Safety Task Force) - General and continuous LHC safety consolidation **Environmental protection:** - Protection of air, water, soils and noise emissions (measurement, analysis, improvements) - Waste management (conventional, industrial, special wastes) - Noise limitation - Environmental incident preparedness (monitoring, reporting) **Emergency preparedness and incident/crisis management:** - Fire Brigade (57 fire fighters) - Firefighting equipment; Safety oriented communications system; methodology for preventive measures.
Risks	Besides the legal risk of not meeting safety requirements, the lack of active prevention might lead to incidents impacting people, the environment or investments. The risks related to the lack of Safety will have consequences on reputation, operation and/or finance. The systematic approach of (re-)assessing the HSE matters of CERN's activities and facilities might result in the need for "earlier/further" consolidation of safety systems, additional collective protection resources, etc.
Targets for 2012	**Occupational Health and Safety:** - Reduction of the number of injuries (incl. more complete incident reporting) - Safety training and safety training refresher courses - Towards a systematic risk analysis (workplaces, operation of equipment/facilities) - Towards a systematic elaboration of safety files and related procedures **Emergency preparedness and incident management:** Installation of a new encrypted radiocommunications system for the Fire Brigade compatible with the Host States' emergency networks. Installation of a fire simulator. Upgrade of the Fire Brigade's heavy vehicles (ambulances, fire engines). Installation of a modern OHS information system. **Radiation protection:** - Limit and monitor prompt radiation - Limit induced activity (reduce beam losses, shielding, studies, …) - RP optimisation – ALARA - Rad. waste management: towards elimination of waste **Safe operation, maintenance and consolidation of CERN beams facilities:** - Implement Chamonix 2009 recommendations to improve safety of LHC operation. **Environmental protection:** - Inventory, assessment and priorities in matters of environmental protection actions
Future prospects and longer term	Continuous improvement in the field of occupational health and safety as well as environmental protection for both radiological and conventional aspects with respect to CERN Safety Policy
CERN budget for 2012	Personnel: 20.5 MCHF; Materials: 14.2 MCHF (of which radioactive waste management amounts to 2.1 MCHF).

18. Administration

Activity	Generic expenses of the Director-General's office and dedicated services, human resources management, financial services (accounting, planning, controlling) and purchasing. It also includes the expenses related to Council and its committees.
Goal	Streamline administrative processes and regularly review and establish best practices. Improve administrative processes to fulfil the needs, be transparent and service-oriented and provide high quality services whilst limiting the total P+M cost so that it does not exceed the current level with respect to total expenses.
2012 targets	Integration of the service portal across all services in the Organization. Review in-house versus outsourcing. For Human Resources: implementation of Five-Yearly Review outcome and Pension Fund package of measures to restore full funding (2nd phase); support for Council initiatives.
CERN budget for 2012	Personnel: 36.0 MCHF; Materials: 10.5 MCHF.

19. Outreach & KTT (including Scientific Exchanges)

19.a Outreach and Scientific Exchanges

Goal / activities	To promote the public understanding of particle physics, cosmology, and related technologies through activities such as the visits, teachers and exhibition programme. To foster the engagement of CERN with society and key-target audiences through a range of activities on and near to the CERN sites and throughout European countries. To foster support for CERN and its missions. CERN Teacher Programmes (between 3 days and 3 weeks): to update the knowledge and to enthuse school teachers so that they can better motivate their students to continue their scientific studies at secondary level; to raise more interest and inspire young people to continue their scientific studies at secondary level; to make school teachers ambassadors for CERN. The goal is to organize programmes for about 1000 teachers per year. Together with UNESCO and ICTP, education programmes for teachers in Africa (Ghana, Rwanda, Mozambique) are also organized. Visits and exhibitions: to inform the outside world about the science that is done at CERN by providing the opportunity to visit the Laboratory, meet scientists, and visit experimental facilities, aiming to reach 60,000+ visits per year, about 50% of which are from schools in the Member States. The new permanent exhibition in the Globe of Science and Innovation was inaugurated in 2010 and has become the focal point of CERN visits. The Globe of Science and Innovation features an extensive programme of events, with partners from European industry, political authorities, and the general public. Three popular visit points (SM18, LHC Control Centre and the Computing Centre) are being transformed into state-of-the-art exhibition venues, to facilitate visitors' comprehension of CERN technology. The travelling exhibition continues to tour Europe (2011: Austria, Portugal) to inform citizens in the Member States about CERN research. The CERN Communication Group's mandate is to increase awareness of and foster support for CERN and its activities, and to promote the interaction of science with society in Europe. Working with a number of key-target audiences, the group aims to generate public engagement in science, to produce and distribute information, to foster community building and to build support for CERN and its missions. The group seeks to ensure that CERN communicates a coherent message of CERN's missions to key-target audiences using a variety of tools, and to establish a consistent recognizable identity for CERN with all audiences, both internal and external. This heading also includes the scientific exchanges programme, which funds the summer student programme as well as the central funding for the technical and doctoral students as well as for the scientific associates for the LHC experiments and the Theory Group.
2012 targets	Further increase of general awareness of CERN and prepare for a continuing increase of visitors.
Future prospects & longer term	Promoting CERN's achievements and possibilities even further in all areas (research, technology, education, training).
CERN budget for 2012	Personnel: 6.9 MCHF, Materials: 12.1 MCHF.

19.b Knowledge and Technology Transfer

Goal	To maximize dissemination of CERN technologies and know-how. To demonstrate that, through KTT activities, CERN is having a positive and durable impact on global and societal issues. To foster knowledge-exchange across a number of European networks as well as through a new worldwide network of people and institutions associated with CERN (which includes an Alumni programme).
Activities	Identification, protection and dissemination of CERN's Intellectual Property (IP). Implementation of the new policy for IP Management at CERN, including an incentive scheme for CERN units involved in KTT projects. Further development of the CERN Global Network as a facilitator for knowledge exchange in Europe and beyond. Additional networking activities, in particular in relation to medical applications of CERN technologies and know-how (including the management of several European projects in the domain of hadron therapy).
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 in concluding new partnerships and TT contracts.
2012 targets	Implementing new KT policy and enhance KT importance at CERN.
Future prospects & longer term	Promoting CERN's achievements and possibilities even further in all areas (research, technology, education, training) to stimulate technology transfer and generate partnerships and revenues.
CERN budget for 2012	Personnel: 2.1 MCHF, Materials: 1.5 MCHF.

20. Infrastructure consolidation, buildings and renovation

Goal	General infrastructure covers machine, experiment and tertiary buildings, caverns and tunnels. Machine-specific infrastructures such as electrical power distribution and cooling systems are not included. Over the years since LHC project approval, the maintenance of this infrastructure has been kept to a strict bare minimum. Only vital repairs have been executed. During the next few years a major consolidation programme will be executed to allow the Organization to face the challenges of LHC operation in terms of site usage. In addition the evolution of sustainable development and responsible energy usage in tertiary applications, i.e. heating/air conditioning, etc., will have to be taken into account in line with developments in society in general. Following the Council's request to the Management in June 2010 to submit a revised MTP, this activity was scaled back and active asbestos removal is no longer planned.
Costs	The consolidation headings for general infrastructure are of a non-recurrent nature but ongoing without an end date since they are comprised of many smaller-scale items. The Cost to Completion for Building 107 (new surface technology building) is set at 30 MCHF (materials), and for Building 867 (grouping together of the CERN radiation workshops) of 13.9 MCHF (materials), for the CCC consolidation project (6 MCHF), the CMS site (2 MCHF) and the Pavillion B936 (8 MCHF).
Running conditions	This activity consists of large-scale multi-annual projects and multiple short-term projects.
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). Scarcity of personnel which will determine the capacity to carry out the consolidation items.
2012 targets	Refurbishment of accelerator-related buildings and office buildings threatened by concrete carbonation. Completion of the approved project for Building 867 (grouping together of all workplaces for radioactive equipment) and start of the new Building 107 for all surface finishing activities to comply with safety and environmental directives. The AMS POCC will be completed and handed over to AMS while the civil engineering for the Building 513 extension and the HIE-ISOLDE is expected to be terminated. Construction work for the CCC consolidation project. Delocalisation of control rooms outside the AD hall. Start of Pavillion renovation (Building 936) and completion of consolidation work on the CMS site. The global site consolidation project is spread over at least 10 years and site maintenance will then have to be maintained at a consistent level to avoid further deterioration. Additional office buildings are also planned in order to host an increasing number of users.
Future prospects	Refurbishment of accelerator-related buildings and office buildings threatened by concrete carbonation. Some additional funds for computing infrastructure refurbishments and renewals. Asbestos removal. Development of "soft" transport: a new bicycle path between the Meyrin and Prevessin sites to improve road safety for cyclists. Alignment to European environmental rules & regulations in terms of energy savings. Longer term: replacement of the heating plants (45 MCHF).
Specific Health and Safety issues	As in the 1950s and 1960s many buildings on the sites were constructed using asbestos technology. Their future refurbishment or demolition will incur major costs.
CERN budget for 2012	Personnel: 3.5 MCHF; Materials: 36.7 MCHF (of which 16.2 MCHF for Building 107 and 3 MCHF for Building 936).

21. Centralised expenses, Interest and financial costs, Annual balance

Centralised Personnel Expenses, which are expenses related to previous and future staff such as the CERN's contribution to the pensioners' health insurance, pre-retirement of shift workers, arrival and departure entitlements and unemployment benefits. Please also note the heading of 17 MCHF under other expenses to amortize over 10 years the provision for accruals of staff's paid leaves and shift worker compensation and the special contribution to the Pension Fund of 60 MCHF per annum (under balance) to recapitalize the Pension Fund.
Internal taxation relating to the amount of basic salaries of CERN personnel (28.5 MCHF estimate for 2012).
Personnel internal mobility is a central fund with an initial amount of 1 MCHF per annum to ease the transfer from one organic unit to another.
Personnel on detachment is linked to staff working in other organizations for which CERN recuperates the expenses as revenues. The heading is assumed to stay relatively stable over time at around 1.0 MCHF.
Energy and water: 77.2 MCHF for 2012.
Central insurance and postal **charges** of 7.3 MCHF for 2012.
Housing fund relates to the expenses of the hostel and apartments (4.2 MCHF covered by revenues).
Interest and financial costs include the interest on the FORTIS bank loan and short-term loans as well as bank charges. The 2012 estimate amounts to 13.3 MCHF.
Any positive **annual balance** of the budget is used for capital repayment according to the schedule agreed with FIPOI and FORTIS banks and as a function of the cash position to minimize the short-term loans.

Projects

22. CLIC / Linear collider studies

Goal	Design of a e+/e- multi-TeV linear collider based on a novel two-beam accelerator scheme, addressing all feasibility issues and documented in a draft CLIC Conceptual Design Report (CDR) by 2011. A test facility (CTF3) has been built and is operated by a collaboration of **41** institutes providing additional (M&P) resources. In parallel with conclusion of the CDR, work is being planned and has started in several areas towards being able to present a project implementation plan by 2016. Develop a close collaboration with the International Linear Collider (ILC) based on RF superconducting structures for a LC in the TeV energy range with the aim of: - joint studies wherever possible to optimize use of resources, - fostering a common linear collider community. Develop the two complementary linear collider technologies in order to be in a position to identify the next HEP facility that will be best adapted to the favoured physics scenario emerging from LHC physics results.
Approval	Accelerated CLIC R&D by the CERN Council in 2004
Start date	July 2004, Rome
Costs	Total from 2004 to 2010: 112.1 MCHF (51.9 MCHF Materials + 60.2 MCHF Personnel). The projected increase in earmarked funding beyond 2011 was reduced significantly in the final 2010 MTP, and the planning for the phase until 2016 is now proceeding within this much more constrained framework. The collaboration aims to increase external contributions to compensate as much as possible for the reduced resources from CERN.
Running conditions	CLIC/CTF3 Collaboration of **41** Institutes from **21** countries organised like a physics experiment with members represented in a Collaboration Board and by a Spokesperson. The contribution of each member is described in a specific MoU addendum with a total external contribution of 15 MCHF and 110 FTE integrated over 2005-11.
Competitiveness	Collaborative competition with the International Linear Collider (ILC) based on RF superconducting structures for a LC in the TeV energy range. The CLIC design is complementary to ILC since it extends LC operation into the multi-TeV energy range. A constructive collaboration between CLIC and ILC has been launched with 8 joint working groups on subjects with strong synergies between the two studies. This collaboration is evolving towards developing common strategy and synchronised scenarios concerning linear colliders. The CLIC and ILC workshops have been fused into an annual joint Linear Collider Workshop, the first of which was hosted by CERN in October 2010.
Organisation	CLIC nucleus study team hosted at CERN and reporting to the CLIC/CTF3 Collaboration Board with representatives of all collaborating institutes. Distribution and follow-up of work packages by the CLIC Steering Committee to CERN groups and external collaborators. Overall organization under the Directorate for Accelerators and Technology.
Risks	Technical: unreliability of longer-term operation of CTF3 due to aging components and absence of consolidation and of testing facilities for RF structures due to lack of appropriate klystrons. Resources: limited manpower and materials budget. Collaboration: progress strongly depends on effort from outside institutes.
2012 targets	Complete CLIC Test Facility (CTF3) measurements to address major CLIC technical issues and demonstrate performances of the novel two-beam acceleration scheme with nominal parameters (100 MV/m at 10-7 breakdown rate). Complete final version of Conceptual Design of a Multi-TeV Linear Collider in stages. Develop plans for next phase of the CLIC project preparation in time for the European Strategy for Particle Physics in 2012. Contribute to discussion of and participate in future governance structures for a linear collider as a global project.
Future prospects & longer term	Delay in the CLIC Technical Design Report initially scheduled for 2016 due to reduced CLIC resources in the 2010 Medium Term Plan. Preparation by 2016 of a project implementation plan for a linear collider at CERN.
Specific Health and Safety issues	High beam power and radiation issues.
CERN contribution	Overall coordination of the CLIC study and CTF3 project. Hosting of the CLIC/CTF3 Collaboration. Validation, distribution and follow-up of the work-packages. Contribution to the ILC design through the CLIC/ILC collaboration.
CERN budget for 2012	Personnel: 12.9 MCHF; Materials: 15.8 MCHF.

23. Linear collider detector R&D

Goal	Physics and detector studies for a future e+e- linear collider up to 3 TeV (CLIC or ILC) in a world-wide collaboration.
Approval	Development project, no formal approval by a scientific committee yet.
Start date	January 1st 2009
Costs	For the development phase, reduced pace to around 3-4 MCHF per annum (P+M).
Running conditions	Not a running experiment. Use of CERN test beams during ~4 weeks/year.
Competitiveness	In collaboration with world-wide linear collider physics/detector studies. A future linear e+e- collider is generally seen as the best facility to expand the particle physics discovery potential after the LHC.
Organisation	CERN
Risks	At this early stage, there are no specific risks associated with this project.
2012 targets	Based on the CLIC Conceptual Design Report, provide relevant input on linear collider physics and detectors for the update process of the European Strategy for Particle Physics (due in 2012). Taking account of incoming LHC results. Participate in the ILC Detailed Baseline Document (DBD) for the SiD and ILD detector concepts (due end 2012). Perform hardware R&D in the priority areas of: compact hadron calorimetry, CLIC vertex detector R&D, power delivery and power pulsing, reinforced conductor for a large detector solenoid (ongoing activites).
Future prospects & longer term	Contribute to the project preparation phase (2011-2016) and subsequent technical design phase of CLIC. Participation in detector R&D for a 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 with a view to constructing and operating experiments at a future linear collider.
Specific Health and Safety issues	None for the moment.
Outreach	http://lcd.web.cern.ch/LCD/
CERN contribution	In 2011: simulation studies, engineering and integration studies, solenoid development, R&D on particle detectors and associated electronics.
CERN budget for 2012	Personnel: 3.4 MCHF; Materials: 0.5 MCHF.

24. HIE-ISOLDE

Goal	Build a 10 MeV/A SC Linac to post-accelerate radioactive ion beams from ISOLDE; design study for ISOLDE target intensity upgrade.
Approval	CERN Research Board September 2009.
Start date	January 2010. The project start-up has been deferred to the second half of 2011 with a view to completion in 2015/2016 following the Council's request to the Management in June 2010 to submit a revised MTP.
Costs	CtC 35.3 MCHF for materials (of which 17.6 MCHF CERN funded), 165 FTE (Personnel).
Running conditions	Project funded partly by Member States, with 5.5 MeV/A intermediate stage almost fully funded. 11.7 MCHF materials and 77 FTE already found externally (5.4 MCHF and 9 FTE already spent for the beam quality improvement and part of the Linac design study and prototyping from 2008-2010). - Additional 0.5 MCHF and 2 FTE requested within Spanish "Industry for Science" programme. - 3.3 MCHF applied from the Wallenberg Foundation, Sweden. - 1 to 2 MCHF in-kind contribution under discussion within KoRIA accelerator project. - 1 to 2 MCHF in-kind contribution under discussion with BARC, India.
Competitiveness	All 700 radionuclides produced at ISOLDE from 1.4 GeV PSB beams can be post-accelerated efficiently up to 10 MeV/A. This capability will be unique world-wide.
Organisation	Projects composed of 60 Work Units distributed into 50 Work Packages assigned to CERN groups. Project managed by Project Leader supported by 6 deputy managers and a Technical Coordinator. Progress of work units controlled via appropriate monitoring tools. Overall organization under the Directorate for Accelerators and Technology.
Risks	Technical: some accelerator components are of novel design and require prototyping (Nb-sputtered superconducting copper cavities). In the event of failure, alternative solutions exist but could lead to delay in the schedule. Financial: SC Linac financed entirely through external funds.
2012 targets	Completion of civil-engineering work. Launch series production of high-beta superconducting RF cavities and SC solenoids. Procurement of 1st cryomodule, cryogenics plant and transfer line magnets. Finalize LLRF system
Future prospects	Provision of accelerated ions A=6 to A=238 between 0.7 and 10 MeV/A to ISOLDE users by 2017 in 3 stages: 5.5 MeV/A in 2015, 10 MeV/A in 2016 and deceleration down to 0.7 MeV/A in 2017.
Specific Health and Safety issues	Standard health and safety issues for accelerators including cryogenics.
CERN contribution	Project fully controlled by CERN, integrating in-kind contributions from Member and non-Member States.
CERN budget for 2012	Personnel: 5.0 MCHF; Materials: 7.4 MCHF.

25. ELENA

Goal	The Extra Low ENergy Antiprotons (ELENA) upgrade to the AD involves the addition of a small storage ring and electrostatic beam lines whose design parameters have been carefully studied and agreed upon over several years. The ELENA upgrade will not only enable higher quality low-energy antihydrogen physics at CERN over the next decade, it will also be an accelerator test platform of use in developing the methods needed for future generations of low-energy facilities.
Approval	Approved by the CERN Research Board in spring 2011.
Start date	January 2012
Costs	CtC 14.6 MCHF for materials, 72 FTE (Personnel).
Running conditions	Project partly externally funded, with 2 MCHF already confirmed and an additional 4.65 MCHF applied for in materials. For manpower, some 11.5 FTE have been made available by external parties, and an additional 17 FTE applied for.
Competitiveness	The scientific demand for low-energy antiprotons at the AD continues to grow. By now there are four experiments running at the AD, a fifth one is approved, and further proposals are under consideration. CERN's current Antiproton Decelerator can no longer provide the number of antiprotons needed. As antihydrogen studies evolve into antihydrogen spectroscopy and gravitational measurements, the shortage will become even more acute. This capability after the ELENA upgrade will be unique world-wide.
Risks	Delays to the physics programme if ELENA installation/commissioning is prolonged. The construction of Elena implies a longer lifetime for the AD machine itself (previously approved until 2016). An assessment of the consolidation needs will be required to extend its life by at least 10 years. In the budget announced for ELENA, the cost of cooling, ventilation, electricity distribution and cabling was not evaluated by the groups in charge of the infrastructure systems. Also, it is assumed that that some existing (and ageing) installations (where there should be excess cooling power following the shutdown of AA) will be sufficient for ELENA.
2012 targets	Set-up of the project. Design, specifications and invitations to tender of various systems and components.
Future prospects & longer term	Installation and commissioning of the ELENA ring while using the existing beamlines for delivery of pbars at 100MeV/c. With a start of the project in early 2012, this part will be finished by mid-2016.
Specific Health and Safety issues	New shielding will be installed around ELENA.
CERN contribution	Project fully controlled by CERN, integrating external contributions from institutions from Member and non-Member States.
CERN budget for 2012	Personnel: 1.5 MCHF; Materials: 4.9 MCHF.

26. R&D accelerators (including HP-SPL)

Goal	Generic High Power SPL R&D for a proton driver.
Start date	June 2010, based on the work done for the Low Power SPL in the context of the SLHC
Costs	2 MCHF/year materials budget plus contributions from the ESS project and in-kind contributions by France, combined with the support of the EU and laboratories involved in European Programmes (EuCARD, CRISP).
Running conditions	R & D partly integrated in EU Programmes (EuCARD, CRISP) in partnership with other European laboratories. Direct in-kind contributions by France and collaboration with ESS, Project-X and institutes in non-Member States.
Competitiveness	Superconducting RF technology is used in the present CERN accelerators (LHC, HIE-ISOLDE), and probably more extensively in future projects. State-of-the-art competence in design construction and testing of superconducting RF cavities and their cryomodules is essential for preparing potential new projects.
Organisation	Along the lines of the CERN department structure with the project leader managing contributions from most CERN departments and external laboratories world-wide. Overall organization under the Directorate for Accelerators and Technology.
Risks	Technical and financial: quality and completeness of the R&D will directly impact on the options for CERN's scientific programmes and facility update strategy. Relations with ESS: delays would disrupt the ESS Project.
2012 targets	Build and test 4 elliptical superconducting cavities. Build the cryomodule components. Upgrade the SM18 test place.
Future prospects & longer term	R&D for a high-power SPL has started, with a view to preparing the option of a high-power proton driver at CERN or in another laboratory. A prototype cryomodule equipped with 4 superconducting cavities and their auxiliary equipment has to be built and tested before the end of 2014. Cryogenics in the SM18 test place will 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 will be installed. A report shall be published at the end of 2014 summarizing the achievements and complementing the LP-SPL Conceptual Design Report for high-beam power. The objectives of the SPL R&D after 2014 will be decided as a function of the scientific strategy of the Organization, taking into account the achievements at that date.
CERN budget for 2012	Personnel: 2.5 MCHF; Materials: 2.9 MCHF.

27. Other R&D

27.a EU projects

Activities	On-going projects OpenAIRE, D4Science-II, EnviroGrids, EGI-InSPIRE, eScienceTalk, EMI. BlogForever project expected to start during 2011. Further proposals submitted to start in last quarter of 2011 and 2012 if selected for funding.
Goals	Ensure the distributed computing infrastructure deployed by the LCG project can continue to support the increasing data quantities and processing needs of the Laboratory's physics programme. Expand CERN's influence in a range of scientific disciplines through distributed computing, exascale data management and open access digital repositories
Future prospects & longer term	- IT is engaged in a series of EC project proposals that, if funded, will expand CERN's relationship with other scientific disciplines for computing aspects such as data management and open access repositories. - Prepare for a LHC luminosity upgrade in line with the LHC machine upgrade schedule and for future generation of detector systems.
CERN budget for 2012	Personnel: 3.9 MCHF; Materials: 1.2 MCHF.

27.b R&D for detectors

Activities	Seed funding and support for generic R&D activities on gas, solid state, silicon, fiber and crystal detectors. Operation of R&D facilities. General development of detector components.
Goals	Generic R&D for future generation of detectors.
Future prospects & longer term	Prepare for future generation of detector systems.
CERN budget for 2012	Personnel: 0.7 MCHF, Materials: 0.2 MCHF.

28. LINAC4

Goal	Build a 160 MeV H- linear accelerator to inject particles into the PS Booster and improve the PSB beam brightness.
Approval	CERN Council June 2007
Start date	January 2008
Costs	Cost-to-completion presently being revised, previous estimate: 90 MCHF (without the PSB injection, from 2011 in the LIU project).
Running conditions	Funding essentially by CERN. Contributions from non-Member States and external organizations of 1.5 MCHF (1.2 MCHF contribution signed, 0.3 MCHF in preparation). In-kind contribution from France (special White Paper contribution) of 1.75 MEUR and 3 FTE.
Competitiveness	State-of-the-art linear accelerator to improve performance of the CERN accelerator complex.
Organisation	Project composed of 37 work packages assigned to CERN Groups. Management by Project Manager supported by 5 sub-managers and a Technical Coordinator. Progress controlled via an EVM tool. Project baseline updated yearly. Overall organisation under the LHC Injector Upgrade Project and the Directorate for Accelerators and Technology.
Risks	Technical: risks on the accelerating structures are lower after the successful testing 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 award of the main contracts, and is now limited to the need for repair programmes in the event of problems with new components. The LINAC4 risk register will be revised in 2011.
2012 targets	Complete the beam measurements on the 3 MeV test stand. Complete the construction of the DTL and CCDTL accelerating structures and of the first batches of PIMS structures. Install RF equipment, power supplies and electronics in the building. Install a first part of the accelerating structures in the tunnel.
Future prospects & longer term	Completion of the accelerator in 2014 and connection to the LHC injector chain (PSB-PS-SPS) during the second long LHC shut-down. The option of an early connection during the first shut-down will be analysed in 2011.
Specific Health and Safety issues	Standard health and safety issues for accelerators. A Project Safety Officer is nominated to deal with specific safety issues relating to the project.
CERN contribution	Project fully controlled by CERN, integrating in-kind contributions from Member and non-Member States.
CERN budget for 2012	Personnel: 11.5 MCHF; Materials: 25.5 MCHF.

29. LHC injectors upgrade

Goal	The LHC Injectors Upgrade Project is aimed at preparing the LHC injectors (Linac4, PSB, PS, SPS as well as the heavy ion chain) for reaching the goals of the High Luminosity LHC (HL-LHC).
Approval	Council approval of the proposed MTP for the LHC injectors upgrade.
Start date	This programme, named LIU has been defined in October 2010
Costs	The baseline scenario assumes the increase of transfer energy from PSB to PS to 2 GeV, and the upgrade of PSB, PS and SPS to allow the acceleration of the high-brightness beams required by the HL-LHC. Consolidation is assumed to proceed in synchronism. The Cost to Completion for protons until the end of commissioning after the second long LHC shutdown (2019) is presently estimated between 140-160 MCHF. A more accurate figure will be announced after the pre-study phase at the end of 2012. The upgrade for the heavy-ion programme has not yet been estimated.
Competitiveness	In order to maintain and subsequently to significantly improve the discovery potential of the LHC until the end of its estimated lifetime (~2035), the injector chain must be upgraded.
Organisation	The project has been organized, with sub-projects in charge of each accelerator in the proton accelerator complex and nominating responsible persons. A Work Breakdown Structure has been established and project management tools have been implemented.
Risks	Technical: the upgraded LHC will not reach its goal and deliver the expected integrated luminosity if the injectors do not reliably deliver beams of proper characteristics.
2012 targets	Beam studies and tests in the PSB, PS and SPS with a view to refining the needs and specifying the required equipment.
Future prospects & longer term	The existing injectors (including Linac4) are scheduled to be in use until the end of the LHC lifetime. The upgrades that they require are under the responsibility of the newly created "LHC Injectors Upgrade" (LIU) project. This includes Linac4, the PS Booster, the PS, the SPS, as well as the heavy-ion chain. The implementation of the hardware upgrades is planned for the second long LHC shutdown in ~ 2018.
Specific Health and Safety issues	A Safety Officer will be nominated for the LIU Project. The health and safety issues resulting from the work and installations managed by the LIU Project will be treated taking into account the applicable rules and the ALARA principle.
CERN budget for 2012	Personnel: 5.8 MCHF; Materials: 12.1 MCHF.

30. High luminosity LHC upgrade

Goal	The main objective of HL-LHC is to implement a hardware configuration and a set of beam parameters that will allow the LHC to reach the following targets: A peak luminosity of 5×10^{34} $cm^{-2}s^{-1}$ with luminosity levelling, allowing: an integrated luminosity of 250 fb^{-1} per year, enabling the goal of 3000 fb^{-1} twelve years after the upgrade. This luminosity is more than ten times the luminosity reach of the first 10 years of LHC operation. This heading also contains: 1) the development of high field magnets (HFM) for the LHC luminosity upgrade and subsequent high energy proton collider; 2) the collimation project, which comprises actions already defined to reach nominal and then ultimate intensity, and a specific new collimation system for the upgrade; 3) the project for an LHC 11T dipole (to be used later for new collimation in the DS regions); 4) the SC link that is necessary for the cold powering of HL-LHC will also be an essential feature of the R2E programme. 5) crab cavities for luminosity levelling.
Approval	The HFM plan was approved by the Council in the White Paper in June 2007 and reviewed in 2008. A new re-inforced HFM plan is included in this MTP pending approval by Council of the MTP. The HL-LHC as a whole has been approved in 2010 with the new MTP, following the closing of the Phase 1 upgrade.
Start date	HFM: Following Council approval of the proposed MTP FP7-EuCARD-WP7 start date 1 April 2009. France's in-kind contributions start date: 1 January 2009. The HL-LHC project was defined in September 2010 including the Inner Triplet project, rescoping the deliverables.
Costs	The total cost for construction of the HL-LHC project is roughly estimated today at around 700 MCHF, of which around 200 MCHF could come from external contributions. The figures will be revised later in the design phase.
Running conditions	HL-LHC is a project that relies heavily on external collaboration (see Organisation below). The main links to other internal CERN projects are: 1) link to the LHC Injectors Upgrade (LIU) project for the obvious need to assure the best beam from the injector chain; 2) link to the consolidation project through super conducting (SC) links development, that are necessary for HL-LHC, which contain all R&D, and that will also be used for R2E.
Competitiveness	On the time-scale, 2022-2035, HL-LHC will be a UNIQUE facility with no competitor and will constitute the big leap forward for HEP.
Organisation	As a major CERN project with important external contributions, the organisation is subdivided into work packages. Each WP has a leader from CERN and a co-leader from a collaborating institute.
Risks	The analysis of the risks of the new HL-LHC programme is underway.
2012 targets	Machine Development to understand the present LHC intensity limitations (at different bunch spacings) and optics studies. Final qualification of Nb3Sn superconductor with a small model coil (SMC). Construction of large aperture high gradient quadrupole (HQ). Possible construction of the cold-warm transition necessary for DS collimators in 2013. Test of the first long SC link and of the first 11 T short model dipole.
Future prospects & longer term	A peak luminosity of 5×10^{34} $cm^{-2}s^{-1}$ with levelling, allowing: An integrated luminosity of 250 fb^{-1} per year, enabling the goal of 3000 fb^{-1} twelve years after the upgrade.
Specific Health and Safety issues	The LHC insertions will be dismantled and new ones will be reinstalled after about 200-300 fb^{-1} of luminosity. The ALARA principle will be used to dismantle and design the components.
CERN budget for 2012	Personnel: 9.7 MCHF; Materials: 8.5 MCHF.

31. LHC detectors improvement and R&D for HL-LHC detectors

Goal	The overall aim is to improve the performance of the detectors for the bulk LHC running (yielding typically 300 fb^{-1} at nominal energy) expected during the last 5 years of this decade as well as to prepare for the HL-LHC.
Approval	The upgrade programme of approved detectors is under continuous review by the LHCC.
Running conditions	This activity consists of many projects which will take place in the next 4 to 5 years. Thus the quantum is a sub-project, not the yearly budget. The requested budget corresponds to the CERN share of a large effort from all funding agencies. It does not include HL-LHC detector R&D (old phase 2 R&D).
Competitiveness	The high luminosity running at the nominal energy of 14 TeV will make it possible to fully exploit the discovery potential of the LHC accelerator.
Organisation	The projects include contributions from many different institutions. They are organized by the management of the experiments, reviewed by the LHCC committee and technically coordinated by the Project Office led by the Technical Coordinator of each experiment.
2012 targets	Continue R&D and in some cases start procurements and construction of components which will be installed during technical stops or the 2 shutdowns planned around 2013 or 2017 before the bulk LHC run. The planned CERN participation will mainly focus on: DAQ, TPC readout and its improvement for ALICE, insertable B layer (IBL) and trigger for ATLAS, new pixel detector, luminosity telescope, 4th RPC station and DAQ for CMS, new electronics for a 40 MHZ trigger for LHCb.
Future prospects	Prepare for a LHC luminosity upgrade in line with the LHC machine upgrade schedule.
CERN budget for 2012	Personnel: 10.9 MCHF; Materials: 6.7 MCHF.

32. Revenues

Assumptions and targets:

- In line with last year's revised MTP, the Member States' contributions were reduced by 15 MCHF in 2011 and will be reduced by 30 MCHF p.a. as of 2012.

- The cash-part of the heading "additional contributions from Host States" will stop at the end of 2011. It should be noted that the in-kind part of France's additional contribution has only been agreed up to a total of 17.1 MCHF.

- Romania became a Candidate for Accession and its contributions are added to the Budget.

- As a prudent approach, the MTP assumes ongoing support from the EU of about 8 MCHF p.a. (with the corresponding amount under expenses plus the additional CERN commitments).

- In-kind contributions are assumed to remain constant. This amount covers the theoretical interest of the FIPOI loan and other loans (advantage from free use of land). The heading is kept at the 2010 level for the future years.

- The revenues to cover personnel paid on team accounts and on detachment are aligned to the contractual end dates of the paid members of personnel concerned. These headings will be updated regularly with the contractual changes.

- Internal taxation is calculated for the book-closing every year and will be adjusted (no impact on balance due to the identical heading under expenses).

- Knowledge and technology transfer revenues (with corresponding activities under expenses) are assumed to return to their level of about 1.5 MCHF p.a. The previous 2.5 MCHF estimate was based on the single year 2008 in which revenues reached this level. As the years 2009 and 2010 have shown, 1.5 MCHF revised annual target is a more realistic whilst still challenging number.

- Other revenues:
  - OpenLab revenues will be adjusted regularly as a function of the contractual updates.
  - A prudent approach is maintained with regard to sales and miscellaneous. In the past this heading turned out to be significantly higher and this heading was therefore adjusted upwards to 4 MCHF per annum, which is still a prudent amount as it is less than the out-turn in 2008, 2009 and 2010.
  - Financial revenues will depend on when Member States' contributions are paid (the earlier they are settled, the higher this heading will be) and the market interest rates.
  - The housing fund revenues are assumed to remain constant over time.

33. Other expenses

This heading covers expenses not linked to the operating activities and covered by other revenues, and thus has no impact on the annual balance:

- Personnel paid on team accounts,

- In-kind expenses relating to the free use of land and the interest-free loans.

Furthermore it includes the amortization of staff benefits accruals amounting to 17 MCHF p.a.

The start of recapitalizing the Pension Fund is shown in a dedicated heading in Figure 6 with the amount of 60 MCHF p.a. as of 2011 as agreed in the first package of measures to restore the financial balance of the Pension Fund approved by the Council in December 2010.

III. Resources Plan for the years 2012 to 2016

1. Revenues plan

Figure 1: Anticipated revenues

(in kCHF, 2011 prices)	2011 Revised Budget	2012	2013	2014	2015	2016	Total 2012-2016
REVENUES	**1 203 040**	**1 162 945**	**1 156 117**	**1 155 038**	**1 153 850**	**1 153 030**	**5 780 980**
Member States' contributions	1 097 155	1 082 155	1 082 155	1 082 155	1 082 155	1 082 155	5 410 775
Additional contributions from Host States	25 590	1 865	60				1 925
Cash	*19 575*						
*In-kind **	*6 015*	*1 865*	*60*				*1 925*
Additional contribution from Romania as Candidate for Accession **	4 210	5 935	7 122	8 903	11 870	11 870	45 700
EU contributions	16 725	12 745	9 645	8 400	8 190	8 020	47 000
Additional contributions (for LINAC4, HIE-ISOLDE, ELENA)	1 985	4 605	5 340	5 650	2 530	2 515	20 640
Personnel paid on team accounts	13 295	9 890	6 330	4 550	3 465	2 720	26 955
Personnel on detachment	1 050	1 035	745	435	445	455	3 115
Internal taxation	26 500	28 510	28 590	28 815	29 065	29 165	144 145
Knowledge and technology transfer	1 265	1 500	1 500	1 500	1 500	1 500	7 500
Other revenues	15 265	14 705	14 630	14 630	14 630	14 630	73 225
Sales and miscellaneous	*4 000*	*4 000*	*4 000*	*4 000*	*4 000*	*4 000*	*20 000*
OpenLab revenues	*635*	*75*					*75*
Financial revenues	*200*	*200*	*200*	*200*	*200*	*200*	*1 000*
*In-kind ****	*4 265*	*4 265*	*4 265*	*4 265*	*4 265*	*4 265*	*21 325*
Housing fund	*6 165*	*6 165*	*6 165*	*6 165*	*6 165*	*6 165*	*30 825*

* The total 2011-2013 amount comprises the remaining in-kind contributions from France due in 2009 and 2010 (2,240 kCHF). The profile is based on the expected Linac4 in-kind contributions.

** Romania as Candidate for Accession will pay 35% of its calculated total contribution for 2011 (50% in 2012, 60% in 2013, 75% in 2014 and 100% as of 2015) as specified in Council Resolution CERN/2829 and updated by the Agreement signed by CERN and Romania on 11 February 2010.

*** Theoretical interest of the FIPOI loan and advantage from free use of land.

The overview of the various revenues headings is shown in Figure 1 in constant 2011 prices. The Member States' contributions are reduced for the period 2012-2016 by 15 MCHF per year with respect to 2011, i.e. 30 MCHF with respect to 2010. The additional contributions from the Host States will end in 2011 with some re-profiling of France's in-kind contributions linked to the LINAC4 construction.

The contributions from Romania as a Candidate for Accession are added and the other headings are updated based on the latest information available and the 2010 budget out-turn.

2. Resources allocations and expenses

Figure 2: LHC Programme

Fact sheet	(in MCHF, 2011 prices, rounded off)	2011 Revised Budget	2012	2013	2014	2015	2016	2012-2016 Total
	LHC programme (incl. projects)	**324.4**	**307.6**	**307.6**	**282.0**	**288.1**	**288.6**	**1,473.9**
1	**LHC machine and injectors**	**136.8**	**126.9**	**118.1**	**120.2**	**130.9**	**132.9**	**629.1**
	LHC machine and experimental areas	**120.7**	**116.3**	**108.1**	**112.4**	**122.8**	**124.9**	**584.4**
	Personnel	69.1	66.6	60.2	67.6	72.9	73.9	341.2
	Materials	51.6	49.7	47.9	44.8	49.8	51.0	243.2
	Spares	**14.3**	**8.3**	**8.0**	**5.9**	**6.1**	**6.0**	**34.4**
	Personnel	1.7	1.1	0.2	0.4	0.5	0.4	2.6
	Materials	12.6	7.1	7.8	5.6	5.6	5.6	31.8
	LHC injectors (for heavy Ions)	**1.8**	**2.4**	**2.0**	**1.9**	**2.0**	**2.0**	**10.3**
	Personnel	0.9	1.9	1.8	1.7	1.8	1.8	9.0
	Materials	0.9	0.5	0.3	0.2	0.2	0.2	1.3
1	**LHC machine and areas reliability and consolidation**	**49.1**	**58.6**	**70.9**	**44.6**	**43.8**	**43.6**	**261.6**
	Personnel	13.0	17.6	28.5	18.3	15.7	14.3	94.3
	Materials	36.1	41.1	42.5	26.3	28.1	29.4	167.3
	LHC experiments	**85.7**	**76.1**	**74.4**	**73.5**	**71.9**	**70.4**	**366.2**
2	**ATLAS detector**	**24.6**	**23.6**	**21.8**	**21.4**	**20.4**	**19.6**	**106.7**
	Personnel	21.0	19.9	18.1	17.7	16.7	15.9	88.2
	Materials	3.6	3.7	3.7	3.7	3.7	3.7	18.5
3	**CMS detector**	**23.5**	**22.3**	**22.4**	**22.3**	**21.9**	**21.4**	**110.2**
	Personnel	20.0	18.9	19.0	18.9	18.5	18.0	93.2
	Materials	3.5	3.4	3.4	3.4	3.4	3.4	16.9
4	**ALICE detector**	**11.4**	**11.3**	**11.2**	**10.9**	**10.5**	**10.4**	**54.3**
	Personnel	9.5	9.4	9.3	9.0	8.6	8.5	44.8
	Materials	2.0	1.9	1.9	1.9	1.9	1.9	9.5
5	**LHCb detector**	**11.7**	**11.1**	**11.3**	**11.6**	**11.5**	**11.4**	**56.9**
	Personnel	10.1	9.4	9.6	9.9	9.8	9.7	48.5
	Materials	1.6	1.7	1.7	1.7	1.7	1.7	8.5
6	**Common items, other experiments (inc. Totem, LHCf)**	**8.3**	**7.5**	**7.1**	**7.2**	**7.5**	**7.5**	**36.9**
	Personnel	5.2	6.0	5.5	5.3	5.6	5.5	27.9
	Materials	3.1	1.5	1.6	2.0	2.0	2.0	9.0
	Detectors re-scoping	**6.2**	**0.4**	**0.6**	**0.1**	**0.1**	**0.1**	**1.3**
	Personnel	4.8	0.1	0.1	0.1	0.1	0.1	0.6
	Materials	1.5	0.3	0.5				0.7
7	**LHC detectors consolidation**	**6.8**	**5.3**	**0.9**				**6.2**
	Personnel		0.4	0.6				1.0
	Materials	6.8	4.9	0.3				5.2
8	**LHC computing**	**46.0**	**40.5**	**43.3**	**43.7**	**41.5**	**41.6**	**210.7**
	Personnel	17.8	19.6	19.8	20.3	20.3	20.4	100.3
	Materials	28.2	20.9	23.6	23.4	21.2	21.2	110.4
	% of total revenues	26.96%	26.45%	26.61%	24.41%	24.97%	25.03%	

Explanations to Figure 2:

Figure 2 shows the costs directly related to the LHC programme.

Overall, the ongoing operation and maintenance of the LHC programme in the period 2012-2016 results in very similar amounts for the exploitation headings, as it includes both operation as well as regular maintenance which is performed more intensively during shutdowns (deferred maintenance items). Concerning the consolidation headings, higher expenses are foreseen until the end of the planned shutdown in 2014.

In addition to the direct costs shown in Figure 2, the LHC programme has indirect costs that are included in Figure 3 ("Other Scientific programmes" as for Scientific Support, the PS and SPS complexes and the accelerator technical services) as well as the largest part of Figure 4 (Infrastructure, services and investments). The impact of the decision on the multi-annual schedule is mainly visible under central expenses for energy in Figure 4.

The resources for exploiting the **LHC machine** are essentially stable since the normal luminosity runs started. Some variations are linked to the phasing-in of the spares initiative that started in 2009 in relation to the long shutdown starting in 2013. During this period major overhauling will be carried out and there is an increased activity in various domains such as survey and radiation control. A large part of the manpower not involved in the maintenance activities in 2013-2014 will in fact be deployed for consolidation activities as the accelerator complex will not be running. **LHC reliability and consolidation** contains the machine consolidation including the splice consolidation, measures to protect radiation damage to electronics and work on the collimation system. This results in peak expenses between 2012 and 2014 as most of the work is concentrated in the shutdown. This heading benefits from the flexibility in between materials and personnel. The work on the collimation system after 2013 is part of the high-luminosity LHC upgrade.

With respect to the CERN share of contributions to **the LHC experiments**, the personnel strength reduces in Figure 2, since technical support staff is re-allocated from scientific support to the individual experiments in the course of the year for a particular task.

LHC detectors consolidation covers the necessary repairs and improvements for the LHC detectors and experimental areas which will be carried out so as to benefit from the long shutdown. As the shutdown is delayed to 2013, the experiments aim to bring forward some consolidation work from the previously planned second shutdown to the shutdown in 2013/2014.

LHC computing is in production with constant improvements. The materials expenses essentially include CERN's share of the expenses on the required additional equipment, renewal of computer and data services, software development, licenses and a Computer Centre capacity increase.

Figure 3: Other Scientific Programmes

Fact sheet	(in MCHF, 2011 prices, rounded off)	2011 Revised Budget	2012	2013	2014	2015	2016	2012-2016 Total
	Other programmes (LHC support and non-LHC programmes)	**205.1**	**198.4**	**188.7**	**192.1**	**197.0**	**196.1**	**972.3**
9	**Non-LHC physics**	**12.9**	**13.0**	**8.7**	**7.3**	**7.4**	**7.0**	**43.3**
	Personnel	4.4	7.5	6.2	5.7	5.8	5.5	30.7
	Materials	8.5	5.5	2.5	1.6	1.5	1.5	12.7
10	**Theory**	**12.0**	**12.9**	**12.2**	**10.8**	**9.7**	**9.6**	**55.1**
	Personnel	9.9	10.8	10.2	9.3	8.4	8.3	47.0
	Materials	2.1	2.1	1.9	1.5	1.3	1.3	8.1
11	**LHC physics centre**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.9**
	Materials	0.2	0.2	0.2	0.2	0.2	0.2	0.9
12	**Scientific support**	**38.7**	**30.9**	**31.5**	**33.3**	**35.3**	**38.8**	**169.7**
	Personnel	28.6	22.9	23.5	25.3	27.3	30.8	129.8
	Materials	10.1	8.0	8.0	8.0	8.0	8.0	39.9
13	**Low and medium energy accelerators**	**11.7**	**10.3**	**8.6**	**9.3**	**10.3**	**10.4**	**48.9**
	Personnel	6.6	6.9	5.0	6.4	7.3	7.4	33.1
	Materials	5.1	3.4	3.6	2.9	2.9	3.0	15.8
13	**PS and SPS complexes**	**62.2**	**61.7**	**54.0**	**63.1**	**66.1**	**66.8**	**311.7**
	Personnel	37.9	38.5	29.8	38.9	42.7	43.0	192.8
	Materials	24.2	23.2	24.2	24.2	23.4	23.9	118.9
13	**Accelerator technical services**	**32.3**	**27.4**	**28.2**	**28.7**	**28.2**	**28.7**	**141.2**
	Personnel	16.5	16.3	16.6	17.2	16.9	17.4	84.5
	Materials	15.8	11.1	11.5	11.5	11.3	11.3	56.7
13	**Accelerator consolidation**	**35.1**	**42.1**	**45.5**	**39.5**	**39.8**	**34.6**	**201.5**
	Personnel	10.2	14.6	18.0	12.7	12.1	10.6	68.0
	Materials	25.0	27.5	27.4	26.8	27.7	24.0	133.5
	% of total revenues	17.05%	17.06%	16.33%	16.63%	17.07%	17.01%	

Explanations to Figure 3:

Non-LHC physics: This heading (including the research allocation to AD, ISOLDE, COMPASS, CAST, NA62, etc.) is assumed to continue over time. The resources allocation earmarked for this programme is maintained following the diversification and neutrino workshops to allow CERN to contribute its share to future extensions of the already running experiments and newly approved experiments. The heading is higher in 2011 and 2012 due to the NA62 project.

The **Theory** allocation maintains a stable workforce in line with the current personnel commitments and constant materials funding. The reduction is due to ending EU funds for which CERN will actively submit new proposals so as to maintain the number of visitors (about 750 annually), fellows (around 40 per year) and scientific associates (around 15 per year). It should be noted that a large fraction of the personnel budget shown covers the fellows of the Theory Group whereas the materials budget pays for the visitors' subsistence. The scientific associates' budget for the research sector is handled centrally within the PH Department.

The heading for the **LHC physics centre** covers the personnel and materials allocation for the Physics Analysis Centre.

Scientific support: This heading stabilises to allow for constant support for detector technologies and data handling as well as general services for research from 2012 onwards. After the shutdown, the physics general services should be stabilised at a higher level in order to allow for the higher energy and luminosity.

Low- and medium-energy accelerators:

This heading comprises the AD, n-TOF and ISOLDE facilities and the allocations earmarked for their operation. During the shutdown some personnel resources will be redeployed to consolidation of the LHC and the injectors. It should be noted that the costs shown here are the direct costs, and do not include the share of the cost of proton cycles in the PS or SPS complexes. Including these would significantly increase the indirect costs charged to the low- and medium-energy facilities and hence reduce the indirect costs for the LHC.

PS and SPS complexes / Accelerator technical services: This constant heading includes all costs for the operation and technical groups linked to these complexes. The Management has decided to continue identifying the operation costs of the PS and SPS complexes instead of distributing these on a pro rata basis to the various facilities since the operation of these injectors and the associated accelerator technical services are unavoidable components of the cost of delivering beams to experimental areas.

The accelerator technical services mainly include the cost of accelerator controls in P+M, fluids for non-LHC operation, travel costs, temporary work and allocations for items that are common to all accelerators at CERN.

During the shutdown some personnel resources will be redeployed to consolidation of the LHC and the injectors.

Accelerator consolidation includes several projects (including the electrical distribution of the PS and SPS and the PS access system) with different profiles, which explains the variation over time. Due to the need to ensure reliability of the accelerator complex over a longer period, the materials heading is enhanced as from 2011 to reach a constant level from 2013 onwards. This heading benefits from the flexibility to move some activity related materials to personnel to cover some of the consolidation projects.

Figure 4: Infrastructure, services and investments – indirect costs to the scientific programme

Fact sheet	(in MCHF, 2011 prices, rounded off)	2011 Revised Budget	2012	2013	2014	2015	2016	2012-2016 Total
	Infrastructure and services	**423.0**	**427.4**	**385.4**	**396.3**	**405.3**	**398.7**	**2,013.0**
14	**Manufacturing facilities (workshops, etc.)**	**15.1**	**15.1**	**15.9**	**16.6**	**17.0**	**17.0**	**81.6**
	Personnel	12.1	12.2	12.2	13.4	14.1	14.1	65.8
	Materials	3.1	3.0	3.7	3.3	2.9	2.9	15.7
15	**General facilities & logistics (site maintenance, transport)**	**61.4**	**58.7**	**60.2**	**59.9**	**60.1**	**61.5**	**300.4**
	Personnel	23.8	23.2	24.3	24.1	24.5	25.8	122.0
	Materials	37.6	35.6	35.9	35.7	35.5	35.7	178.4
16	**Informatics**	**42.1**	**43.4**	**44.2**	**44.5**	**44.5**	**45.1**	**221.6**
	Personnel	26.7	27.9	28.1	28.4	28.3	29.1	141.8
	Materials	15.5	15.5	16.1	16.0	16.2	16.1	79.8
17	**Safety, health and environment**	**32.5**	**34.7**	**31.0**	**32.7**	**30.4**	**28.5**	**157.3**
	Personnel	20.3	20.5	20.9	21.1	21.2	21.4	105.0
	Materials	12.2	14.2	10.2	11.6	9.2	7.1	52.3
18	**Administration**	**46.3**	**46.4**	**45.6**	**44.4**	**43.8**	**43.8**	**224.0**
	Personnel	35.1	36.0	35.7	35.0	34.7	35.0	176.3
	Materials	11.2	10.5	10.0	9.5	9.0	8.9	47.7
19	**Outreach and KTT**	**22.9**	**22.6**	**21.5**	**20.8**	**21.6**	**20.9**	**107.4**
	Personnel	9.3	9.0	8.8	8.1	8.3	8.2	42.5
	Materials	13.6	13.6	12.7	12.7	13.3	12.7	64.9
20	**Infrastructure consolidation, buildings and renovation**	**35.7**	**40.2**	**34.1**	**15.8**	**15.1**	**14.8**	**120.0**
	Personnel	3.8	3.5	2.9	2.8	2.5	2.2	13.9
	Materials	32.0	36.7	31.2	12.9	12.6	12.6	106.1
21	**Centralised expenses**	**152.1**	**153.0**	**120.4**	**149.9**	**162.0**	**156.9**	**742.2**
	Centralised personnel expenses	**33.0**	**34.2**	**35.3**	**36.5**	**37.7**	**37.7**	**181.4**
	Internal taxation	**26.5**	**28.5**	**28.6**	**28.8**	**29.1**	**29.2**	**144.1**
	Personnel internal mobility	**0.7**	**0.5**	**0.8**	**0.9**	**1.0**	**1.0**	**4.1**
	Personnel on detachment	**1.1**	**1.0**	**0.7**	**0.4**	**0.4**	**0.5**	**3.1**
	Energy and water	**78.4**	**77.2**	**43.5**	**71.8**	**82.3**	**77.2**	**351.9**
	Insurances and postal charges	**7.3**	**7.3**	**7.3**	**7.3**	**7.3**	**7.3**	**36.4**
	Housing fund	**5.1**	**4.2**	**4.2**	**4.2**	**4.2**	**4.2**	**21.1**
21	**Interest and financial costs**	**14.8**	**13.3**	**12.5**	**11.7**	**10.9**	**10.1**	**58.5**
	% of total revenues	35.16%	36.75%	33.33%	34.31%	35.13%	34.58%	

Explanations to Figure 4:

Manufacturing facilities (engineering, workshops and fabrication, CAD and CAE support). This heading remains almost constant in beam operation years, peaking during the long shutdown work.

General facilities and logistics include site facility management and technical infrastructure (such as electrical distribution). This heading remains almost constant over time after the introduction of new and enhanced user services in 2009.

Informatics covers IT infrastructure and desktop computing as well as administrative computing. The heading highlights a constant efficiency gain given the increasing number of CERN users and visitors.

Safety health and environment covers the Fire Brigade, CERN-wide safety, safety training, the Medical Service as well as the part of the RP and safety inspections that cannot be allocated to the various programmes. Most of the resources linked to occupational health and safety have been re-allocated to the LHC operation. The effect of this reallocation is offset by a significant increase in the materials heading for radioactive waste management in order to establish a treatment facility as well as elimination in line with the Tripartite Agreement concerning protection against ionising radiation and the safety of CERN facilities concluded with the Host States.

Administration: The centralised administrative staff allocation (i.e. for the DG office and services, HR and FP Departments) was reduced to refinance some 170 FTEs over 2008 to 2011 for new initiatives. With the request to introduce and enhance services (ombudsman, diversity office, recruitment unit, international relations, etc) as well as an increasing number of collaborations to support outside CERN projects, this heading has increased with respect to last year.

Outreach and Knowledge & Technology Transfer (KTT): This heading covers outreach to the general public, education and knowledge & technology transfer. The core funding from the CERN budget is constant. The CERN Management has enhanced the role of these activities by including knowledge transfer as a dedicated item. The Management aims to further develop KTT activities with additional partnerships and revenues.

General infrastructure consolidation: The Management continues to enhance the programme to renovate the CERN site (technical and general items) in order to enhance efficiency, energy savings, reliability, and, last but not least, safety. The heading consists of many small items: roofs, windows, toilets, etc. Also some Cost to Completion projects have been defined for entire buildings, the main ones being: Building 867 (grouping together of all work relating to the handling of radioactive equipment), Building 107 for all surface treatment activities to comply with safety and environmental directives, the new Pavilion (renovation of Building 936) and the consolidation of the CERN Control Centre (enhancing the technical infrastructure).

Centralised personnel expenses: This mainly covers the CERN contribution to the health insurance premiums for pensioners, arrival and departure indemnities, and unemployment benefits, etc. With respect to the MTP presented in August, the 25 MCHF provision for the CERN share of the additional contributions for social security and for the Five-Yearly Review outcome are now included under the corresponding personnel headings.

Internal taxation: The estimate for 2011 and the following years in both revenues and expenses is in line with the actual staff numbers and their position in the salary grid.

Personnel internal mobility is a central fund to ease the transfer from one organic unit to another, the corresponding budget being transferred to the activity concerned.

Personnel on detachment relates to staff on detachment to other organisations. The expenses are covered by revenues.

Energy and water: The heading is dominated by the electricity consumption for the general infrastructure, running of the accelerator complex and the Computer Centre as well as the water and heating expenses. Currently, CERN is exempt from water taxes in the Canton of Geneva. The amount earmarked for electricity consumption is adjusted in constant prices to reflect the new running schedule. With respect to the MTP presented in August, the first long shutdown is now due to start at Christmas 2012 (i.e. shutdown in 2013 and 2014), which reduces the energy consumption in 2013 and 2014, but increases the consumption in 2012.

Insurances and postal charges: The budget estimates are constant (no significant increase of assets with respect to the LHC during the planning period).

Housing fund relates to expenses for the hostel and apartments (covered by revenues).

Interest and financial costs: This heading covers the remaining interest for short-term loans and the interest stemming from the long-term FORTIS loan, the latter being paid back with higher annual instalments as of 2011.

Figure 5: Projects

Fact sheet	(in MCHF, 2011 prices, rounded off)	2011 Revised Budget	2012	2013	2014	2015	2016	2012-2016 Total
	Projects	**130.4**	**153.5**	**144.8**	**152.5**	**140.1**	**130.8**	**721.7**
22	**CLIC / Linear collider studies**	**28.7**	**28.7**	**29.3**	**29.8**	**29.8**	**29.9**	**147.6**
	Personnel	14.6	12.9	12.0	12.1	12.2	12.3	61.5
	Materials	14.2	15.8	17.3	17.7	17.7	17.7	86.1
23	**Linear collider detector R&D**	**3.2**	**3.9**	**4.2**	**4.2**	**4.2**	**4.1**	**20.5**
	Personnel	2.7	3.4	3.7	3.7	3.7	3.6	18.1
	Materials	0.5	0.5	0.5	0.5	0.5	0.5	2.4
24	**HIE-ISOLDE**	**7.2**	**12.4**	**13.6**	**10.2**	**3.5**	**3.5**	**43.3**
	Personnel	4.0	5.0	4.0	2.0	1.0	1.0	12.9
	Materials	3.2	7.4	9.7	8.2	2.6	2.5	30.4
25	**ELENA**		**6.4**	**7.2**	**7.5**	**1.9**		**23.0**
	Personnel		1.5	2.4	2.7	1.9		8.5
	Materials		4.9	4.9	4.9			14.6
	R&D	**19.9**	**11.4**	**10.7**	**12.5**	**14.1**	**13.7**	**62.6**
26	**R&D accelerators (including HP-SPL)**	**11.7**	**5.4**	**4.2**	**4.3**	**4.2**	**3.8**	**21.9**
	Personnel	4.8	2.5	1.5	2.3	2.2	1.8	10.4
	Materials	6.9	2.9	2.7	1.9	1.9	1.9	11.4
27	**EU projects, R&D detectors**	**8.2**	**6.0**	**6.5**	**8.2**	**10.0**	**10.0**	**40.7**
	Personnel	6.5	4.6	1.8	0.7	0.4	0.4	7.9
	Materials	1.7	1.4	4.7	7.6	9.6	9.6	32.8
28	**LINAC 4**	**38.2**	**36.9**	**16.3**	**8.6**	**5.5**	**4.3**	**71.6**
	Personnel	10.5	11.5	9.8	7.5	4.8	3.7	37.3
	Materials	27.8	25.5	6.5	1.1	0.7	0.6	34.3
29	**LHC injectors upgrade**	**8.5**	**17.9**	**22.1**	**26.6**	**30.3**	**22.5**	**119.5**
	Personnel	2.8	5.8	10.2	8.9	9.0	10.4	44.3
	Materials	5.8	12.1	11.9	17.7	21.3	12.1	75.1
30	**High luminosity LHC upgrade**	**16.8**	**18.2**	**18.8**	**29.4**	**30.9**	**33.4**	**130.7**
	Personnel	7.1	9.7	9.8	12.5	12.5	14.0	58.4
	Materials	9.7	8.5	9.0	16.9	18.4	19.4	72.3
31	**LHC detectors improvement**	**2.1**	**8.2**	**13.7**	**15.6**	**11.7**	**11.2**	**60.4**
	Personnel		5.2	6.5	7.6	7.9	7.4	34.6
	Materials	2.1	3.0	7.2	7.9	3.8	3.8	25.8
31	**R&D for HL-LHC detectors**	**5.8**	**9.3**	**8.9**	**8.1**	**8.2**	**8.1**	**42.6**
	Personnel	1.7	5.7	5.3	4.6	4.7	4.6	24.9
	Materials	4.1	3.7	3.6	3.5	3.5	3.5	17.8
	% of total revenues	10.84%	13.20%	12.53%	13.20%	12.14%	11.34%	

Explanations to Figure 5:

CLIC/ILC: This heading includes the total funding for CTF3, the CLIC study and the CLIC/ILC collaboration. Since the MTP 2010 Rev. (CERN/FC/5450Rev), the foreseen additional resources have been taken out and the project has been stabilized around 30 MCHF per year. This leads to a postponement of the CLIC Technical Design Report (TDR) and its replacement by a CLIC Technical Implementation Report, unless the shortfall can be compensated by external resources

Linear collider detector: This represents CERN's participation to the specific detector R&D for a future linear collider with a constant heading for M and P.

HIE-ISOLDE: The heading includes the CERN share of the costs for the infrastructure relating to this project as well as the expenses for which in-kind and external cash revenues are received. Following a review in May, the schedule has changed, the overall CtC for materials remains unchanged, The heading for personnel has increased, however, the availability of manpower remains rather critical. The project is to be completed in 2016.

ELENA: This heading for manpower includes the CERN share of the costs for the AD upgrade. The materials heading also includes external contributions. The project will be submitted to the CERN Research Board in June 2011 and is due to start in 2012, with commissioning in 2015.

R&D:

Accelerator R&D: This heading includes the funds allocated to EUCARD and other EU-supported activities, most of which are linked to the LHC upgrade and thus explain the higher allocations until 2011. The heading also includes a small but constant part for CERN contributions to the ILC and some seed funding for neutrino factories. The radiation test facilities (HiRadMat) should be ready by the end of 2012. 1.9 MCHF materials p.a. towards a generic high power SPL initiative is also included.

EU projects, R&D detectors: This includes computing R&D focused on the EU-supported projects. The Management aims to secure continued EU support, which represents a strategic need for CERN (the anticipated future revenues from EU are allocated to corresponding expenses under this heading).

LINAC4: The project started in 2008, notably with the civil engineering. With respect to last year's plan, the project has a revised EVM baseline with the aim of connection during the 2017 shutdown. The work packages corresponding to the transfer line from Linac4 to PS Booster have been re-allocated to the LHC Injectors Upgrade project, thereby reducing the CtC for Linac4 to 90 MCHF.

LHC injectors upgrade: This heading covers the activities to upgrade the PS Booster, PS and SPS to allow the acceleration of beams required by the high-luminosity LHC (HL-LHC). The implementation of the hardware upgrades is planned for the 2017 shutdown when LINAC4 is connected. The total CtC is currently under study, but estimated at between some 140 and 160 MCHF until the end of commissioning after the long shutdown in 2017-2018. The expenses profile was reviewed with respect to last year's MTP.

High Luminosity LHC (HL-LHC) upgrade: This heading covers the overall framework for all studies and R&D to upgrade the luminosity of the LHC beyond its initial design. Construction is not due to start before the second long shutdown. This heading also includes the funds previously allocated to the Inner Triplets phase 1 project and High Field Magnets R&D.

LHC detectors improvement: This activity contains the detector enhancements foreseen to be installed until 2015 to benefit from the nominal luminosity.

R&D for HL-LHC detectors: This activity contains generic R&D for a future luminosity upgrade. The manpower for the detectors upgrade will derive from the allocations to the LHC detector operation.

3. Estimated budget balances

Figure 6: Estimated budget balances

[1] Romania as Candidate for Accession will pay 35% of its calculated total contribution for 2011 (50% in 2012, 60% in 2013, 75% in 2014 and 100% as of 2015) as specified in Council Resolution CERN/2829 and updated by the Agreement signed by CERN and Romania on 11 February 2010.

[2] These headings include personnel and materials needed for R&D and prototyping only. They do not contain the resources necessary for the start of HL-LHC construction, planned to be commissioned in the early 2020.

[3] The cumulative balance of -215.8 MCHF is the accumulated budget deficit as stated in the Annual Accounts for 2010, p.6. It does not contain 2010 open commitments and reprofiled projects of about 75 MCHF that were carried forward to 2011 budget.

(in MCHF, 2011 prices, rounded off)	2011 Revised Budget	2012	2013	2014	2015	2016	Total 2012-2016
REVENUES	**1 203.0**	**1 162.9**	**1 156.1**	**1 155.0**	**1 153.9**	**1 153.0**	**5 781.0**
Member States' contributions	1 097.2	1 082.2	1 082.2	1 082.2	1 082.2	1 082.2	5 410.8
Additional contributions from Host States	25.6	1.9	0.1				1.9
Additional contribution from Romania as Candidate for Accession [1]	4.2	5.9	7.1	8.9	11.9	11.9	45.7
EU contributions	16.7	12.7	9.6	8.4	8.2	8.0	47.0
Additional contributions (for LINAC 4, HIE-ISOLDE, ELENA)	2.0	4.6	5.3	5.7	2.5	2.5	20.6
Personnel paid on team accounts	13.3	9.9	6.3	4.6	3.5	2.7	27.0
Personnel on detachment	1.1	1.0	0.7	0.4	0.4	0.5	3.1
Internal taxation	26.5	28.5	28.6	28.8	29.1	29.2	144.1
Knowledge and technology transfer	1.3	1.5	1.5	1.5	1.5	1.5	7.5
Other revenues (including other in-kind, housing fund, sales)	15.3	14.7	14.6	14.6	14.6	14.6	73.2
OPERATING EXPENSES	**1 082.9**	**1 086.8**	**1 026.6**	**1 022.8**	**1 030.5**	**1 014.2**	**5 180.9**
Running of scientific programmes and support	**952.5**	**933.3**	**881.8**	**870.3**	**890.4**	**883.4**	**4 459.3**
Scientific programmes	**529.5**	**505.9**	**496.4**	**474.1**	**485.1**	**484.7**	**2 446.2**
LHC (including spares and new initiatives support to detectors)	*324.4*	*307.6*	*307.6*	*282.0*	*288.1*	*288.6*	*1 473.9*
Non-LHC physics and scientific support	*63.8*	*56.9*	*52.5*	*51.5*	*52.5*	*55.6*	*269.1*
Accelerators and areas	*141.3*	*141.4*	*136.2*	*140.6*	*144.5*	*140.5*	*703.3*
Infrastructure and services	**423.0**	**427.4**	**385.4**	**396.3**	**405.3**	**398.7**	**2 013.0**
General infrastructure and services	*220.4*	*220.9*	*218.4*	*218.9*	*217.3*	*216.8*	*1 092.3*
Infrastructure consolidation, buildings and renovation	*35.7*	*40.2*	*34.1*	*15.8*	*15.1*	*14.8*	*120.0*
Centralised personnel expenses	*33.0*	*34.2*	*35.3*	*36.5*	*37.7*	*37.7*	*181.4*
Internal taxation	*26.5*	*28.5*	*28.6*	*28.8*	*29.1*	*29.2*	*144.1*
Personnel internal mobility	*0.7*	*0.5*	*0.8*	*0.9*	*1.0*	*1.0*	*4.1*
Personnel on detachment	*1.1*	*1.0*	*0.7*	*0.4*	*0.4*	*0.5*	*3.1*
Insurances and postal charges, energy and water	*85.7*	*84.5*	*50.7*	*79.0*	*89.6*	*84.5*	*388.3*
Housing fund	*5.1*	*4.2*	*4.2*	*4.2*	*4.2*	*4.2*	*21.1*
Interest and financial costs	*14.8*	*13.3*	*12.5*	*11.7*	*10.9*	*10.1*	*58.5*
Projects and studies	**130.4**	**153.5**	**144.8**	**152.5**	**140.1**	**130.8**	**721.7**
CLIC / Linear collider studies	*28.7*	*28.7*	*29.3*	*29.8*	*29.8*	*29.9*	*147.6*
Linear collider detector R&D	*3.2*	*3.9*	*4.2*	*4.2*	*4.2*	*4.1*	*20.5*
HIE-ISOLDE	*7.2*	*12.4*	*13.6*	*10.2*	*3.5*	*3.5*	*43.3*
ELENA		*6.4*	*7.2*	*7.5*	*1.9*		*23.0*
EU projects, R&D accelerators (incl. HP-SPL), R&D detectors	*19.9*	*11.4*	*10.7*	*12.5*	*14.1*	*13.7*	*62.6*
LINAC4	*38.2*	*36.9*	*16.3*	*8.6*	*5.5*	*4.3*	*71.6*
LHC injectors upgrade [2]	*8.5*	*17.9*	*22.1*	*26.6*	*30.3*	*22.5*	*119.5*
High luminosity LHC upgrade [2]	*16.8*	*18.2*	*18.8*	*29.4*	*30.9*	*33.4*	*130.7*
LHC detectors improvement	*2.1*	*8.2*	*13.7*	*15.6*	*11.7*	*11.2*	*60.4*
R&D for HL-LHC detectors [2]	*5.8*	*9.3*	*8.9*	*8.1*	*8.2*	*8.1*	*42.6*
OTHER EXPENSES	**41.0**	**32.2**	**28.6**	**26.8**	**25.7**	**25.0**	**138.3**
Personnel paid on team accounts	13.3	9.9	6.3	4.6	3.5	2.7	27.0
Various	27.7	22.3	22.3	22.3	22.3	22.3	111.4
In-kind	*9.7*	*4.3*	*4.3*	*4.3*	*4.3*	*4.3*	*21.3*
Stores activity	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*0.2*	*1.0*
Miscellaneous (inc. schools, conferences)	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	*0.8*	*4.1*
Budget amortization of staff benefits accruals	*17.0*	*17.0*	*17.0*	*17.0*	*17.0*	*17.0*	*85.0*
TOTAL EXPENSES	**1 123.9**	**1 119.0**	**1 055.2**	**1 049.6**	**1 056.2**	**1 039.2**	**5 319.3**
BALANCE							
Annual balance	79.2	43.9	100.9	105.4	97.6	113.8	
Capital repayment allocated to the budget (Fortis, FIPOI 1 and 2)	-21.2	-21.9	-22.6	-23.3	-24.1	-24.9	
Recapitalization pension fund	-60.0	-60.0	-60.0	-60.0	-60.0	-60.0	
Annual balance allocated to budget deficit	-2.0	-37.9	18.3	22.1	13.6	28.9	
-Cumulative Balance [3]- - 215.8	**-217.8**	**-255.7**	**-237.4**	**-215.3**	**-201.8**	**-172.8**	
For information:							
Capital repayment to FIPOI 3	0.2	0.2	0.2	0.2	0.2	0.2	

Explanations to Figure 6:

Figure 6 compares the expected revenues with the estimated expenses for the years 2011 (including the carry-forward from 2010) until 2016. Expenses headings are shown in P+M. The indexation of the Member States' contributions by 0% and the application of the overall negative Cost-Variation Index to the expenses allow the cumulative budget deficit to be reduced from the previous -330 MCHF anticipated at the end of 2015 to about –200 MCHF with a continued reduction thereafter. The cumulative balance of -215.8 MCHF at the end of 2010 does not include the budget allocations subject to carry-forward, which correspond to about 75 MCHF.

The 2012 deficit increase is due to the combination of increased procurement to prepare the long-term shutdown, the reduced revenues (reduced contributions of all Member States as well as the end of the additional Host States' contributions) and the implementation of the 2nd phase of the approved outcome of the Five-Yearly Review. As can be seen, the cumulative balance improves, ending with a deficit of less than 200 MCHF by the end of the projection period. However, this financial plan does not include some important work packages as explained in the Observations of the Director General.

The cumulative budget deficit is not equal to the cash balance as it is based on accruals whereas the cash balance includes the fact that collaborations pay advances and that items delivered at the end of the year are often paid for after book closure.

The LHC programme is clearly accorded overall priority. Together with the indirect share and the approved running of the non-LHC physics programme, and other expenses, about 930 MCHF are allocated on average to this incompressible block of expenses. Adding the capital repayment and the recapitalisation of the Pension Fund, only 130 to 150 MCHF can be allocated annually to the projects studies. Otherwise, CERN would not be able to continuously reduce the cumulative budget deficit.

The non-LHC physics programme gets support from CERN to allow it to operate (mostly through interface with the infrastructure and accelerators), on the assumption that the cost of providing beams cannot be supported by and shared between the different experiments. Some of these experiments, such as ISOLDE, AD and n-TOF, need new investment, requested by their respective communities, which have long made use of CERN facilities.

As mentioned above, this MTP assumes the feasibility of the upgrades of the existing LHC injector complexes (PS Booster, PS and SPS), to enhance the accelerator consolidation and the general and technical infrastructure consolidation. It furthermore includes the HIE-ISOLDE project and the runs of NA61 and NA62. This MTP also includes the CERN share for the ELENA project but does not include HL-LHC machine construction costs or the CERN share to the enhancement of the detectors for HL-LHC, neither the neutrino PS beam-line project nor some consolidation work packages. These consolidation items aim to refurbish the uninterruptable power supplies, the East Hall and North Area to continue being able to provide test beams, and the replacement of CERN's heating system which has reached the end of its useful life. The Management is looking forward to welcoming new Member and Associate States whose contributions will make it possible to fund at least part of these important projects.

"Other expenses" covers the personnel charged to team accounts, the usual balance of the stores activity and the budget amortization of staff benefits accruals. This point is linked to the implementation of IPSAS; CERN charges as budgetary expenses only the hours actually worked.

IV. 2012 Draft Budget

1. Overview of Revenues and Expenses

Figure 7: Overview of Revenues and Expenses

(in MCHF, 2011 prices, rounded off)	2011 Revised Budget	2012 Draft Budget	Variations of 2012 Draft Budget with respect to 2011 Revised Budget
REVENUES	**1 203.0**	**1 162.9**	**-3.3%**
Member States' contributions	1 097.2	1 082.2	-1.4%
Additional contributions from Host States	25.6	1.9	-92.7%
Additional contribution from Romania as Candidate for Accession [1]	4.2	5.9	41.0%
EU contributions	16.7	12.7	-23.8%
Additional contributions (for LINAC4, HIE-ISOLDE, ELENA)	2.0	4.6	132.0%
Personnel paid on team accounts	13.3	9.9	-25.6%
Personnel on detachment	1.1	1.0	-1.4%
Internal taxation	26.5	28.5	7.6%
Knowledge and technology transfer	1.3	1.5	18.6%
Other revenues (including other in-kind, housing fund, sales)	15.3	14.7	-3.7%
OPERATING EXPENSES	**1 082.9**	**1 086.8**	**0.4%**
Running of scientific programmes and support	**952.5**	**933.3**	**-2.0%**
Scientific programmes	**529.5**	**505.9**	**-4.4%**
LHC (including spares and new initiatives support to detectors)	*324.4*	*307.6*	*-5.2%*
Non-LHC physics and scientific support	*63.8*	*56.9*	*-10.8%*
Accelerators and areas	*141.3*	*141.4*	*0.1%*
Infrastructure and services	**423.0**	**427.4**	**1.0%**
General infrastructure and services	*220.4*	*220.9*	*0.2%*
Infrastructure consolidation, buildings and renovation	*35.7*	*40.2*	*12.6%*
Centralised personnel expenses	*33.0*	*34.2*	*3.6%*
Internal taxation	*26.5*	*28.5*	*7.6%*
Personnel internal mobility	*0.7*	*0.5*	*-35.8%*
Personnel on detachment	*1.1*	*1.0*	*-1.4%*
Insurances and postal charges, energy and water	*85.7*	*84.5*	*-1.4%*
Housing fund	*5.1*	*4.2*	*-16.9%*
Interest and financial costs	*14.8*	*13.3*	*-10.1%*
Projects and studies	**130.4**	**153.5**	**17.7%**
CLIC / Linear collider studies	*28.7*	*28.7*	*-0.1%*
Linear collider detector R&D	*3.2*	*3.9*	*21.7%*
HIE-ISOLDE	*7.2*	*12.4*	*72.7%*
ELENA		*6.4*	
EU projects, R&D accelerators (incl. HP-SPL), R&D detectors	*19.9*	*11.4*	*-42.4%*
LINAC4	*38.2*	*36.9*	*-3.4%*
LHC injectors upgrade [2]	*8.5*	*17.9*	*109.4%*
High luminosity LHC upgrade [2]	*16.8*	*18.2*	*8.7%*
LHC detectors improvement	*2.1*	*8.2*	*290.7%*
R&D for HL-LHC detectors [2]	*5.8*	*9.3*	*61.6%*
OTHER EXPENSES	**41.0**	**32.2**	**-21.5%**
Personnel paid on team accounts	13.3	9.9	-25.6%
Various	27.7	22.3	-19.6%
In-kind	*9.7*	*4.3*	*-56.0%*
Stores activity	*0.2*	*0.2*	
Miscellaneous (inc. schools, conferences)	*0.8*	*0.8*	
Budget amortization of staff benefits accruals	*17.0*	*17.0*	
TOTAL EXPENSES	**1 123.9**	**1 119.0**	**-0.4%**
BALANCE			
Annual balance	79.2	43.9	-44.5%
Capital repayment allocated to the budget (Fortis, FIPOI 1 and 2)	-21.2	-21.9	3.3%
Recapitalization pension fund	-60.0	-60.0	
Annual balance allocated to budget deficit	-2.0	-37.9	1783.0%
-Cumulative Balance [3]- - 215.8	**-217.8**	**-255.7**	**17.4%**
For information:			
Capital repayment to FIPOI 3	0.2	0.2	

[1] Romania as Candidate for Accession will pay 35% of its calculated total contribution for 2011 (50% in 2012, 60% in 2013, 75% in 2014 and 100% as of 2015) as specified in Council Resolution CERN/2829 and updated by the Agreement signed by CERN and Romania on 11 February 2010.

[2] These headings include personnel and materials needed for R&D and prototyping only. They do not contain the resources necessary for the start of HL-LHC construction, planned to be commissioned in the early 2020.

[3] The cumulative balance of -215.8 MCHF is the accumulated budget deficit as stated in the Annual Accounts for 2010, p.6. It does not contain 2010 open commitments and reprofiled projects of about 75 MCHF that were carried forward to 2011 budget.

2. Revenues

The Member States' contributions reduce in line with the 15 MCHF reduction requested and approved by the Council in September 2010 and will reduce by a further 15 MCHF in 2012. Following the Council Resolution of December 2008, Romania's contribution as a Candidate for Accession is added to the budget.

Secured EU contributions are lower in 2012 with respect to 2011 but might increase due to ongoing efforts to obtain approval for support for new proposals.

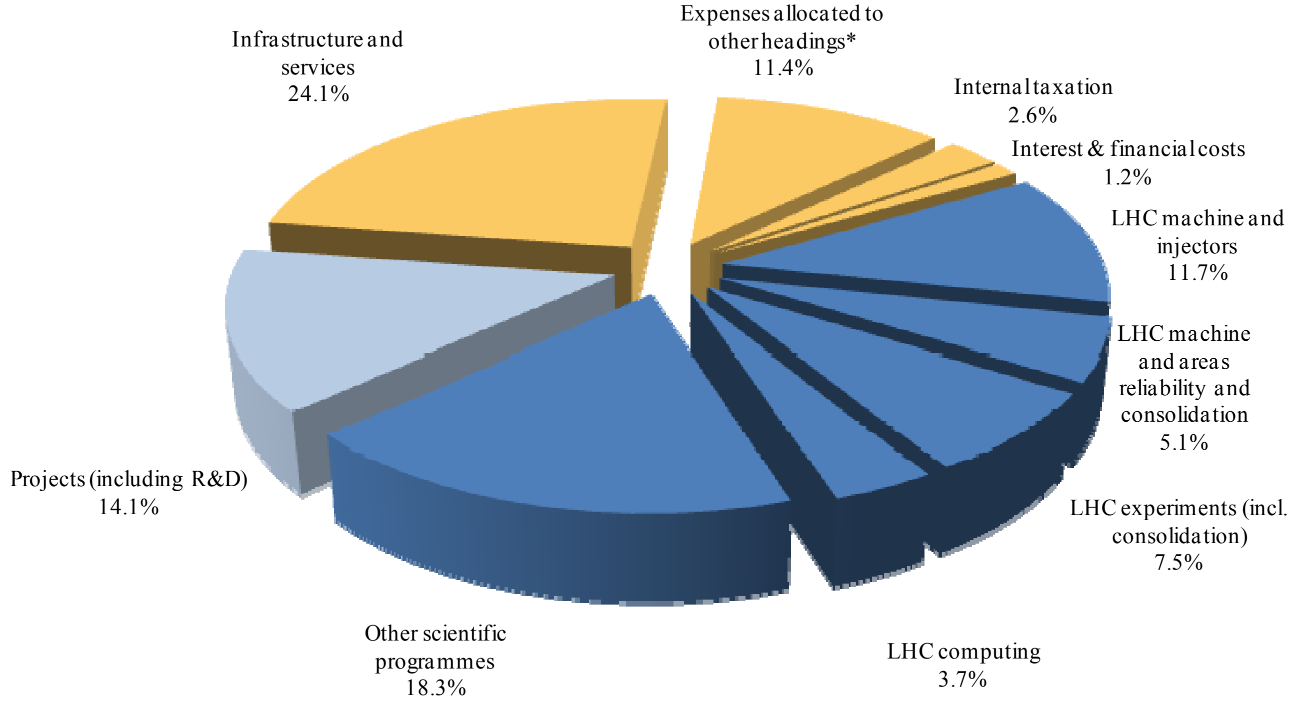
The heading "Other revenues" for 2012 corresponds to a conservative assumption based on the budget out-turn of the years 2009 and 2010 as explained above.

The headings 'Personnel paid on team accounts', 'Housing fund' and 'Personnel on detachment' have corresponding headings under the headings "Other expenses" and "Operating expenses" as shown in Figure 2. The OpenLab revenues in 2012 will be adjusted as a function of actual revenues as usual.

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

Figure 8: 2012 Budget (Personnel, Materials and Interest & financial costs)

* Including Centralised personnel expenses, Social security, Internal mobility, Personnel on detachment (3.3%), Energy and water (7%), Insurances and postal charges (0.7%), Housing Fund (0.4%)



[1] Please note that this Section only details the operating expenses. Other expenses are summarized in Figure 7.

Figure 9: Scientific Programme

2011 Revised Budget (2011 prices)				Fact sheet	Activity	2012 goals	2012 Draft Budget (2011 prices)				Variations of 2012 Draft Bud. with respect to 2011 Rev. Budget
FTE	kCHF						FTE	kCHF			
Personnel	Personnel	Materials	Total				Personnel	Personnel	Materials	Total	
969.8	**172,915**	**151,480**	**324,395**		**LHC programme (incl. projects)**		**934.1**	**170,895**	**136,670**	**307,565**	**-5.2%**
425.9	**71,700**	**65,095**	**136,795**	1	**LHC machine and injectors**		**409.4**	**69,650**	**57,290**	**126,940**	**-7.2%**
410.0	69,130	51,590	120,720		LHC machine and experimental areas	Beam operation of the LHC in 2012 with a target integrated luminosity of several fb-1.	391.9	66,625	49,670	116,295	-3.7%
9.6	1,685	12,580	14,265		Spares	Buy last spares to restore situation bef. sect 3-4 incident. Buy/manuf. Acc. to crit. list.	6.4	1,140	7,120	8,260	-42.1%
6.3	885	925	1,810		LHC injectors (for heavy Ions)	Reliable operation of LHC as Pb82+ collider.	11.1	1,885	500	2,385	31.8%
76.8	**12,975**	**36,095**	**49,070**	1	**LHC machine and areas reliability and consolidation**	Consol. of the old LEP infrast. Preparation splices and coll. system for shutdown	**100.1**	**17,565**	**41,070**	**58,635**	**19.5%**
375.6	**70,465**	**15,280**	**85,745**		**LHC experiments**		**326.5**	**63,675**	**12,450**	**76,125**	**-11.2%**
108.2	21,040	3,575	24,615	2	ATLAS detector	Data-taking with the complete detector at luminosities up to 1033 cm-2s-1 or higher	98.7	19,880	3,690	23,570	-4.2%
106.1	19,975	3,525	23,500	3	CMS detector	Physics run at 7 TeV and luminosities up to to 1033 cm-2s-1 or higher	97.3	18,875	3,420	22,295	-5.1%
49.3	9,465	1,965	11,430	4	ALICE detector	pp reference data-taking and 3rd Pb-Pb physics data-taking. Preparation of shutdown	47.7	9,415	1,895	11,310	-1.0%
53.1	10,085	1,625	11,710	5	LHCb detector	Normal data-taking with complete detector at close to nominal luminosity.	47.4	9,415	1,690	11,105	-5.2%
36.6	5,150	3,120	8,270	6	Common items, other experiments (inc. Totem, LHCf)	Carry out physics programme also at the reduced sqrt(s)=7TeV. Prepare shutdown	34.4	5,970	1,505	7,475	-9.6%
22.4	4,750	1,470	6,220		Detectors re-scoping		1.0	120	250	370	-94.1%
		6,790	**6,790**	7	**LHC detectors consolidation**	Procure necessary equipment for the cons. effort for 2013 shutdown and prepare for it	**2.4**	**425**	**4,915**	**5,340**	**-21.4%**
91.4	**17,775**	**28,220**	**45,995**	8	**LHC computing**	Transfer LHC data to tape at >2 GB/s (>5GB/s for Pb82+ run), export Tier 1 >2 GB/s	**95.7**	**19,580**	**20,945**	**40,525**	**-11.9%**
637.3	**114,075**	**91,015**	**205,090**		**Other programmes (LHC support and non-LHC program**		**667.8**	**117,525**	**80,855**	**198,380**	**-3.3%**
23.0	**4,445**	**8,500**	**12,945**	9	**Non-LHC physics**	Reach approved goals defined in the experiment proposals	**38.2**	**7,495**	**5,475**	**12,970**	**0.2%**
64.1	**9,865**	**2,130**	**11,995**	10	**Theory**	Support experiments and TH community	**70.0**	**10,795**	**2,070**	**12,865**	**7.3%**
		180	**180**	11	**LHC physics centre**	Provide resources needed to operate the Centre; organize scientific activities			**185**	**185**	**2.8%**
144.9	**28,585**	**10,135**	**38,720**	12	**Scientific support**	Assure safe, efficient and reliable operation of the experiments. Support to users	**132.6**	**22,940**	**7,975**	**30,915**	**-20.2%**
37.4	**6,585**	**5,075**	**11,660**	13	**Low and medium energy accelerators**	Delivery of beams to all users with the maximum overall efficiency. All of the	**39.3**	**6,930**	**3,400**	**10,330**	**-11.4%**
223.8	**37,940**	**24,230**	**62,170**	13	**PS and SPS complexes**	non-LHC physics programmes in parallel with operation for LHC injection	**223.8**	**38,475**	**23,185**	**61,660**	**-0.8%**
87.0	**16,475**	**15,815**	**32,290**	13	**Accelerator technical services**		**83.8**	**16,315**	**11,070**	**27,385**	**-15.2%**
57.1	**10,180**	**24,950**	**35,130**	13	**Accelerator consolidation**	Cont. of consol. to ensure reliable operation LHC and fixed-target experiments	**80.1**	**14,575**	**27,495**	**42,070**	**19.8%**
1,607.1	**286,990**	**242,495**	**529,485**		**Grand Total**		**1,601.9**	**288,420**	**217,525**	**505,945**	**-4.4%**
	23.86%	20.16%	44.01%		% of total revenues			24.80%	18.70%	43.51%	

Explanations to Figure 9:

The LHC machine and injectors expenses for spares operation will reduce from 2011 to 2012 as the level of spares before the sector 3-4 incident will have been reached in 2011. Expenses on spares nevertheless remain high and are based on a list of the most critical items. The materials heading of the consolidation heading increases significantly in 2012 due to preparation of the shutdown (splices, collimation, R2E).

The overall decrease on the LHC Programme stems from the LHC detectors consolidation, spares and detectors re-scoping activity.

Non-LHC physics is increased to allow CERN to contribute its share for projects such as NA61 and NA62.

Following the discussion in the SPC, the heading LHC Physics Centre includes only the allocations for the new centre whereas the previous White Paper manpower heading is now included under detector re-scoping.

The ongoing support activities, such as for Theory with its large fellowship and visiting scientists programme, the scientific support, low- and medium-energy accelerators and PS and SPS complexes are almost similar in 2011 and 2012. NB: Please note that associates are accounted for under materials from 2011 onwards.

Accelerator consolidation increases in 2012 with respect to 2011, notably due to ramping-up of the consolidation activities aimed at keeping the existing injector complex running for the next two decades.

Figure 10: Infrastructure and services

2011 Revised Budget (2011 prices) FTE Personnel	kCHF Personnel	Materials	Total	Fact sheet	Activity	2012 goals	2012 Draft Budget (2011 prices) FTE Personnel	kCHF Personnel	Materials	Total	Variations of 2012 Draft Bud. with respect to 2011 Rev. Budget
757.5	**192,525**	**230,465**	**422,990**		**Infrastructure and services**		**762.4**	**196,805**	**230,590**	**427,395**	**1.0%**
71.4	**12,085**	**3,060**	**15,145**	**14**	**Manufacturing facilities (workshops, etc.)**	Avoid any delays in projects where the design/production is on the critical path.	**70.7**	**12,150**	**2,980**	**15,130**	**-0.1%**
142.2	**23,810**	**37,635**	**61,445**	**15**	**General facilities & logistics (site maintenance, transport)**	Further improve the services . Operation & maintenance of sites and infrastructures	**136.3**	**23,155**	**35,550**	**58,705**	**-4.5%**
144.5	**26,650**	**15,455**	**42,105**	**16**	**Informatics**	Ensure adequate level of availability. Protect from and educate on risks.	**152.9**	**27,900**	**15,470**	**43,370**	**3.0%**
133.4	**20,255**	**12,240**	**32,495**	**17**	**Safety, health and environment**	Continuous impr. in risk prev, emergency preparedness and incident management	**134.6**	**20,500**	**14,155**	**34,655**	**6.6%**
196.7	**35,050**	**11,210**	**46,260**	**18**	**Administration**	Implementation 2nd phase 5 yearly review outcome, integration service portal	**199.7**	**35,990**	**10,450**	**46,440**	**0.4%**
39.7	**9,285**	**13,640**	**22,925**	**19**	**Outreach and KTT**	Promoting CERN achievements and possibilities even further in all areas	**40.6**	**9,030**	**13,555**	**22,585**	**-1.5%**
23.6	**3,750**	**31,955**	**35,705**	**20**	**Infrastructure consolidation, buildings and renovation**	Refurbishment of accelerator-related buildings and office buildings	**21.5**	**3,505**	**36,710**	**40,215**	**12.6%**
6.0	**61,640**	**90,425**	**152,065**	**21**	**Centralised expenses**		**6.1**	**64,575**	**88,375**	**152,950**	**0.6%**
	33,005		33,005		Centralised personnel expenses			34,205		34,205	3.6%
	26,500		26,500		Internal taxation			28,510		28,510	7.6%
	740		740		Personnel internal mobility			475		475	-35.8%
3.6	1,050		1,050		Personnel on detachment		3.6	1,035		1,035	-1.4%
		78,390	78,390		Energy and water				77,210	77,210	-1.5%
		7,275	7,275		Insurances and postal charges				7,275	7,275	
2.5	345	4,760	5,105		Housing fund		2.5	350	3,890	4,240	-16.9%
		14,845	**14,845**	**21**	**Interest and financial costs**				**13,345**	**13,345**	**-10.1%**
	16.00%	19.16%	35.16%		% of total revenues			16.92%	19.83%	36.75%	

Explanations to Figure 10:

The baseload of the ongoing infrastructure and services results in an overall constant budget allocation.

The increase in the materials heading safety, health and environment is due to the radioactive waste management activities, both the establishment of a waste treatment facility and elimination in line with the Tripartite Agreement.

The heading for Outreach and KTT revenues and expenses remains almost constant.

The heading for infrastructure consolidation is further enhanced. Apart from an increased heading to treat many smaller scale items such as roofs and toilets, 2012 will be marked by significant work on Building 107, the start of construction work for the CCC consolidation project, delocalisation of control rooms outside the AD hall and the start of the Pavilion renewal (Building 936) and completion of consolidation work on CMS site.

Figure 11: Projects

2011 Revised Budget (2011 prices)				Fact sheet	Activity	2012 goals	2012 Draft Budget (2011 prices)				Variations of 2012 Draft Bud. with respect to 2011 Rev. Budget
FTE	kCHF						FTE	kCHF			
Personnel	Personnel	Materials	Total				Personnel	Personnel	Materials	Total	
305.8	**54,595**	**75,825**	**130,420**		**Projects**		**362.2**	**67,910**	**85,595**	**153,505**	**17.7%**
85.7	**14,560**	**14,175**	**28,735**	**22**	**CLIC / Linear collider studies**	Complete CLIC Test facility measurements, final version of Conceptual Design	**73.8**	**12,925**	**15,795**	**28,720**	**-0.1%**
16.8	**2,705**	**525**	**3,230**	**23**	**Linear collider detector R&D**	Provide input on Lin Coll physics and detec. Tune to incoming LHC results.	**19.9**	**3,445**	**485**	**3,930**	**21.7%**
22.6	**4,020**	**3,170**	**7,190**	**24**	**HIE-ISOLDE**	Compl CE work. Launch production RF cavities and SC solenoids. Start procurement	**26.2**	**5,010**	**7,410**	**12,420**	**72.7%**
				25	**ELENA**	Set-up of the project. Design, specif. and tender of various systems and components.	**8.8**	**1,535**	**4,850**	**6,385**	
61.5	**11,270**	**8,585**	**19,855**		**R&D**		**40.8**	**7,075**	**4,360**	**11,435**	**-42.4%**
28.3	4,775	6,910	11,685	**26**	R&D accelerators (including HP-SPL)	Build/test 4 ell. superc. cavities. Build cryomodule components. Upg SM18 test place.	15.1	2,485	2,925	5,410	-53.7%
33.2	6,495	1,675	8,170	**27**	EU projects, R&D detectors		25.7	4,590	1,435	6,025	-26.3%
54.1	**10,450**	**27,780**	**38,230**	**28**	**LINAC 4**	Compl beam measurem 3 MeV test stand and constr. DTL and CCDTL. Start installatio	**60.1**	**11,495**	**25,450**	**36,945**	**-3.4%**
15.6	**2,775**	**5,770**	**8,545**	**29**	**LHC injectors upgrade**	Beam studies and tests in the PSB, PS and SPS	**32.4**	**5,820**	**12,075**	**17,895**	**109.4%**
39.4	**7,085**	**9,665**	**16,750**	**30**	**High luminosity LHC upgrade**	Machine Development and optics studies. Qualification of Nb3Sn superconductor	**47.4**	**9,715**	**8,495**	**18,210**	**8.7%**
		2,105	**2,105**	**31**	**LHC detectors improvement**	Start procurements, construction of components to be installed during stop/shutdown	**21.8**	**5,240**	**2,985**	**8,225**	**290.7%**
10.1	**1,730**	**4,050**	**5,780**	**31**	**R&D for HL-LHC detectors**	Prepare for a LHC luminosity upgrade in line with the LHC machine upgrade schedule.	**31.0**	**5,650**	**3,690**	**9,340**	**61.6%**
	4.54%	6.30%	10.84%		% of total revenues			5.84%	7.36%	13.20%	

Explanations to Figure 11:

As approved in the MTP in September, the pace of the projects is reduced with respect to the original plan, such that the CLIC / linear collider studies decrease only slightly in 2012.

LINAC4 has a new EVM baseline, aimed at connecting the Linac4 during the second shutdown, beyond this MTP period. The connection from the Linac to the PS Booster has been re-allocated from the Linac4 project to the LHC injectors upgrade. The Cost-to-completion is therefore reduced to 90 MCHF.

The R&D activities decrease slightly, this is notably due to the end of the PS2 and LP-SPL studies and due to the ending of EU-supported IT R&D programmes.

Following the new baseline to upgrade the existing injectors instead of replacing them, the PS Booster and SPS upgrade start in 2011 with the amounts foreseen in the Final Budget.

Energy and water

Figure 12: Expenses – Energy and water

(in MCHF, rounded off)

Activity	2011 Revised Budget (2011 prices)	2012 Draft Budget (2011 prices)	Variations of 2012 Draft Budget with respect to 2011 Rev. Bud.
Energy and water (baseload)	**23.7**	**23.7**	
Electricity	12.3	12.3	
Heating oil and gas	4.0	4.0	
Water and miscellaneous	7.4	7.4	
Energy for basic programmes	**54.7**	**53.5**	**-2.1%**
Experimental areas*	11.7	12.6	8.1%
Data handling	1.4	1.4	
Accelerators:	20.9	19.5	-6.8%
AD	*0.9*	*1.1*	*11.9%*
PS	*4.4*	*4.2*	*-4.9%*
SPS (including CNGS)	*15.5*	*14.2*	*-8.4%*
LHC	20.7	20.0	-3.3%
Grand Total Energy programme	**78.4**	**77.2**	**-1.6%**

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

Explanations to Figure 12:

With respect to the Budget presented in December, the budget for the headings “Heating oil and gas” and “Water and miscellaneous” for 2011 have been revised downward based on the 2010 out-turn.

Fixed assets projects

Figure 13: Expenses – Details on projects included in the activity headings[2]

(in kCHF)

2011 Revised Budget * (2011 prices, rounded off)			Activity	Project	2012 Draft Budget * (2011 prices, rounded off)			Variations of 2012 Draft Bud. with respect to 2011 Rev. Budget
Personnel	Materials	Total			Personnel	Materials	Total	
70 630	**217 115**	**287 745**	**Programme**	**Projects**	**86 935**	**219 365**	**306 300**	**6.4%**
2 020	**13 505**	**15 525**		**LHC machine and injectors**	**845**	**7 510**	**8 355**	**-46.2%**
475	9 030	9 505		LHC spares	520	7 120	7 640	-19.6%
1 210	3 550	4 760		Rebuilding Spares Stock after 3-4 incident	0	0	0	-100.0%
335	925	1 260		LHC injectors	325	390	715	-43.3%
12 810	**35 815**	**48 625**		**LHC machine and areas reliability and consolidation**	**17 480**	**40 910**	**58 390**	**20.1%**
6 370	14 920	21 290		LHC consolidation	11 230	13 655	24 885	16.9%
140	960	1 100		Induced consolidation following 3-4 incident	195	1 640	1 835	66.8%
0	2 695	2 695	**LHC programme** Included in figure 9	Liquid helium additional storage tanks	0	0	0	-100.0%
3 640	9 545	13 185		Collimation system enhancements	3 205	12 210	15 415	16.9%
1 560	5 685	7 245		Radiation to electronics (R2E)	1 795	6 155	7 950	9.7%
1 100	2 010	3 110		Splice consolidation and repair	1 055	7 250	8 305	167.0%
4 750	**1 470**	**6 220**		**LHC experiments**	**120**	**250**	**370**	**-94.1%**
4 750	1 470	6 220		Detectors re-scoping	120	250	370	-94.1%
0	**6 790**	**6 790**		**LHC detectors consolidation**	**425**	**4 915**	**5 340**	**-21.4%**
0	**23 965**	**23 965**		**LHC computing**	**720**	**16 770**	**17 490**	**-27.0%**
0	23 965	23 965		LHC Computing Grid	720	16 770	17 490	-27.0%
120	**735**	**855**		**AEGIS**	**245**	**95**	**340**	**-60.2%**
205	**5 435**	**5 640**		**NA62**	**1 335**	**3 750**	**5 085**	**-9.8%**
95	**2 035**	**2 130**		**Isolde robots**	**100**	**605**	**705**	**-66.9%**
545	**2 515**	**3 060**		**Magnet rescue facility**	**0**	**0**	**0**	**-100.0%**
0	**1 050**	**1 050**	**Other programmes** Included in figure 9	**Helium infrastructure and distribution**	**0**	**0**	**0**	**-100.0%**
350	**1 730**	**2 080**		**AD consolidation**	**265**	**330**	**595**	**-71.4%**
0	**585**	**585**		**66/18 kV loop PS consolidation**	**0**	**1 000**	**1 000**	**70.9%**
0	**7 450**	**7 450**		**18 kV loop + substations SPS consolidation**	**0**	**5 500**	**5 500**	**-26.2%**
9 830	**15 185**	**25 015**		**Accelerator consolidation**	**14 310**	**20 665**	**34 975**	**39.8%**
0	**1 555**	**1 555**		**Extension building 40**	**0**	**0**	**0**	**-100.0%**
0	**260**	**260**		**Radio Infrastructure upgrade for firefighters**	**0**	**2 095**	**2 095**	**705.8%**
0	**600**	**600**		**Consolidation of calibration hall**	**0**	**1 500**	**1 500**	**150.0%**
60	**660**	**720**		**High radiation material test facility ****	**0**	**0**	**0**	**-100.0%**
115	**520**	**635**		**Isolde robots ****	**85**	**150**	**235**	**-63.0%**
0	**1 820**	**1 820**		**Ramses II light**	**0**	**500**	**500**	**-72.5%**
295	**1 230**	**1 525**		**Radioactive waste management**	**805**	**2 130**	**2 935**	**92.5%**
0	**1 075**	**1 075**		**Visitpoint**	**0**	**0**	**0**	**-100.0%**
3 735	**31 255**	**34 990**	**Infrastructure and services** Included in figure 10	**General and technical infrastructure consolidation**	**3 425**	**36 710**	**40 135**	**14.7%**
0	210	210		AD control rooms	0	475	**475**	**126.2%**
0	2 650	2 650		Renovation auditorium and ground floor main building	0	0	**0**	**-100.0%**
0	0	0		B936 pavilion replacement	0	3 000	**3 000**	
600	1 500	2 100		Building 107 (surface treatment)	690	16 200	**16 890**	**704.3%**
500	12 180	12 680		Building 867 (radiation workshop)	230	0	230	-98.2%
0	105	105		CMS site consolidation	0	1 500	1 500	1328.6%
155	1 310	1 465		AMS payload operations control centre	0	0	0	-100.0%
0	0	0		CERN control centre consolidation	865	3 000	3 865	
1 495	12 740	14 235		Surface infrastructure consolidation (roofs, facades, etc)	1 640	12 535	14 175	-0.4%
985	560	1 545		Technical infrastructure consolidation (heating, electricity, etc)	0	0	0	-100.0%
13 850	**14 005**	**27 855**		**CLIC**	**12 435**	**15 725**	**28 160**	**1.1%**
2 655	**335**	**2 990**		**Linear collider detector R&D**	**3 310**	**260**	**3 570**	**19.4%**
4 020	**3 170**	**7 190**		**HIE-ISOLDE**	**5 010**	**7 410**	**12 420**	**72.7%**
0	**0**	**0**		**ELENA**	**1 535**	**4 850**	**6 385**	
730	**2 575**	**3 305**	**Projects** Included in figure 11	**High radiation material test facility**	**0**	**0**	**0**	**-100.0%**
10 300	**27 780**	**38 080**		**LINAC4**	**11 365**	**25 450**	**36 815**	**-3.3%**
190	**2 165**	**2 355**		**RF 200 MHz system**	**0**	**220**	**220**	**-90.7%**
2 585	**3 605**	**6 190**		**LHC injectors upgrade**	**5 820**	**11 855**	**17 675**	**185.5%**
1 370	**4 135**	**5 505**		**High field magnets (HFM)**	**2 060**	**5 225**	**7 285**	**32.3%**
0	**2 105**	**2 105**		**LHC detectors upgrade**	**5 240**	**2 985**	**8 225**	**290.7%**

* Excluding EU projects.

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

The strategy towards a new computing centre is still under discussion, the Management will report on the progress. The strategy for radioactive waste management was reviewed. The future profile was adjusted for the construction of the new waste treatment centre at CERN and the actual waste disposal.

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[2] Upon completion the amounts of these projects will be activated as fixed assets in the financial position.

4. Summary of Expenses by Nature

Figure 14: Materials expenses by nature (including interest and financial costs)

(in kCHF)

Nature	2011 Revised Budget (2011 prices)	2012 Draft Budget (2011 prices)	Variations of 2012 Draft Budget with respect to 2011 Rev. Bud.
Materials expenses [1]	**542,790**	**523,795**	**-3.50%**
Goods, consumables and supplies	285,395	266,295	-6.69%
Electricity, heating gas and water [2]	78,490	77,310	-1.50%
Industrial services (service contracts)	62,315	61,700	-0.99%
Repair and maintenance (other indus. services contracts)	44,590	48,490	8.75%
Third party payments and consultants	33,000	32,000	-3.03%
Other overheads [3]	39,000	38,000	-2.56%
Interest and financial costs	**16,690**	**15,190**	**-8.99%**
Fortis bank	13,585	12,895	-5.08%
In-kind (FIPOI interest 0%) [4]	1,845	1,845	
Short-term interest	595		-100.00%
Ppbar indexation	415	200	-51.81%
Bank charges	250	250	
TOTAL MATERIALS	**559,480**	**538,985**	**-3.66%**

1) Previously this heading referred only to the operating expenses, excluding housing fund and stores activity. Since the 2009 Out-Turn (CERN/FC/5412), this heading includes housing fund, stores activity and reflects also the in-kind expenses.

2) This heading comprises also the expenses for Housing Fund whereas the line "Energy and water" in the figures 4, 10, 12 refers to the Energy programme.

3) Including insurances and postal charges, CERN contributions to collaborations.

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

Figure 15: Breakdown of materials expenses by nature

Materials expenses: 97.2%

Interest and financial costs: 2.8%

* Total of industrial services: 11.4% + 9% = 20.4%

** Including insurances and postal charges, CERN contributions to collaborations.

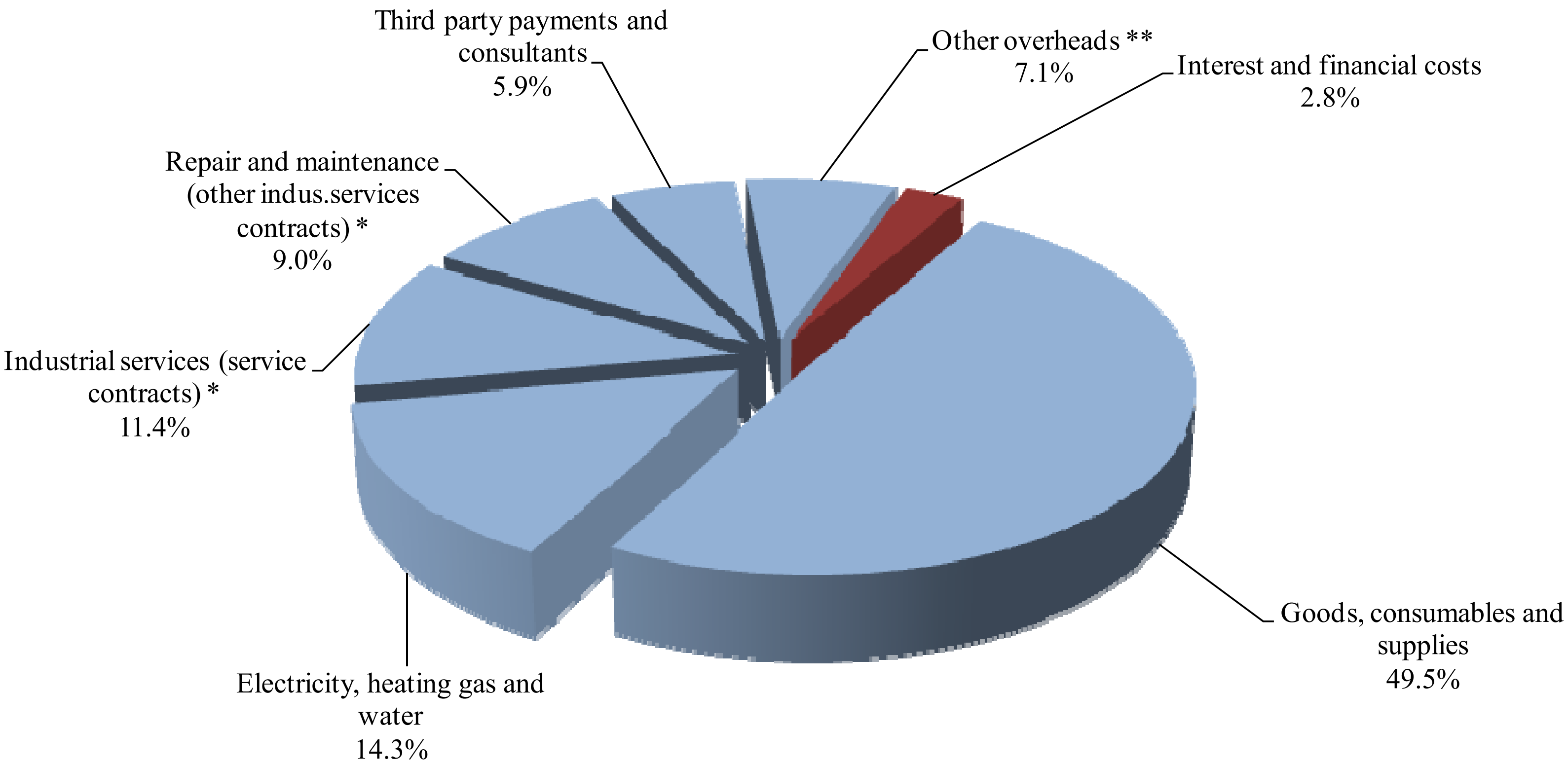


Figure 16: Personnel Expenses by Nature

(in kCHF)

Nature	2011 Revised Budget (2011 prices)	2012 Draft Budget (2011 prices)	Variations of 2012 Draft Budget with respect to 2011 Rev. Bud.
Staff members [1]	**495'400**	**518'170**	**4.60%**
Basic salaries [2]	***275'010***	***288'875***	***5.04%***
Allowances	***63'145***	***64'145***	***1.58%***
Non-residence	19'485	19'995	2.62%
Family allowances	22'920	23'740	3.58%
Special allowances	5'790	4'170	-27.98%
Overtime	3'965	4'860	22.58%
Various allowances	10'985	11'380	3.60%
Social contributions	***97'740***	***102'430***	***4.80%***
Pension Fund	77'135	80'835	4.80%
Health insurance	20'605	21'595	4.80%
Centralised personnel expenses	***33'005***	***34'210***	***3.65%***
Installation, recruitment and termination of contracts	7'355	7'710	4.83%
Additional periods of membership in the Pension Fund for shift work	680	560	-17.65%
Contribution to health insurance for pensioners	24'970	25'940	3.88%
Internal taxation	***26'500***	***28'510***	***7.58%***
Fellows (including overhead for students) [3]	**51'575**	**44'425**	**-13.86%**
Apprentices	**430**	**430**	
TOTAL PERSONNEL	**547'405**	**563'025**	**2.85%**
Budget Amortization of staff benefit accruals	17'000	17'000	
TOTAL PERSONNEL incl bud. amort. of staff benefit accruals	**564'405**	**580'025**	**2.77%**

1) Including staff paid on team accounts. For 2011 staff paid on Team Accounts is estimated at 10.44 MCHF, for 2012 at 8.6 MCHF.

2) Including the withheld salary for short-term SLS participations.

3) Including fellows paid on team accounts. For 2011 fellows paid on Team Accounts is 2.9 MCHF, for 2012 1.3 MCHF.

Overall complement: The 2012 personnel budget benefits from materials to personnel transfers to increase the number of FTAs. It will cover 2,425 FTEs staff (2,356 FTEs on CERN's core budget, 18 FTEs on EU projects, 51 FTEs on team accounts) and 363 FTEs fellows (291 FTEs on CERN's core budget, 60 FTEs on EU projects, 0.7 FTEs on OpenLab and 0.6 on TT activities and 11 FTEs on team accounts).

Explanations to Figure 16:

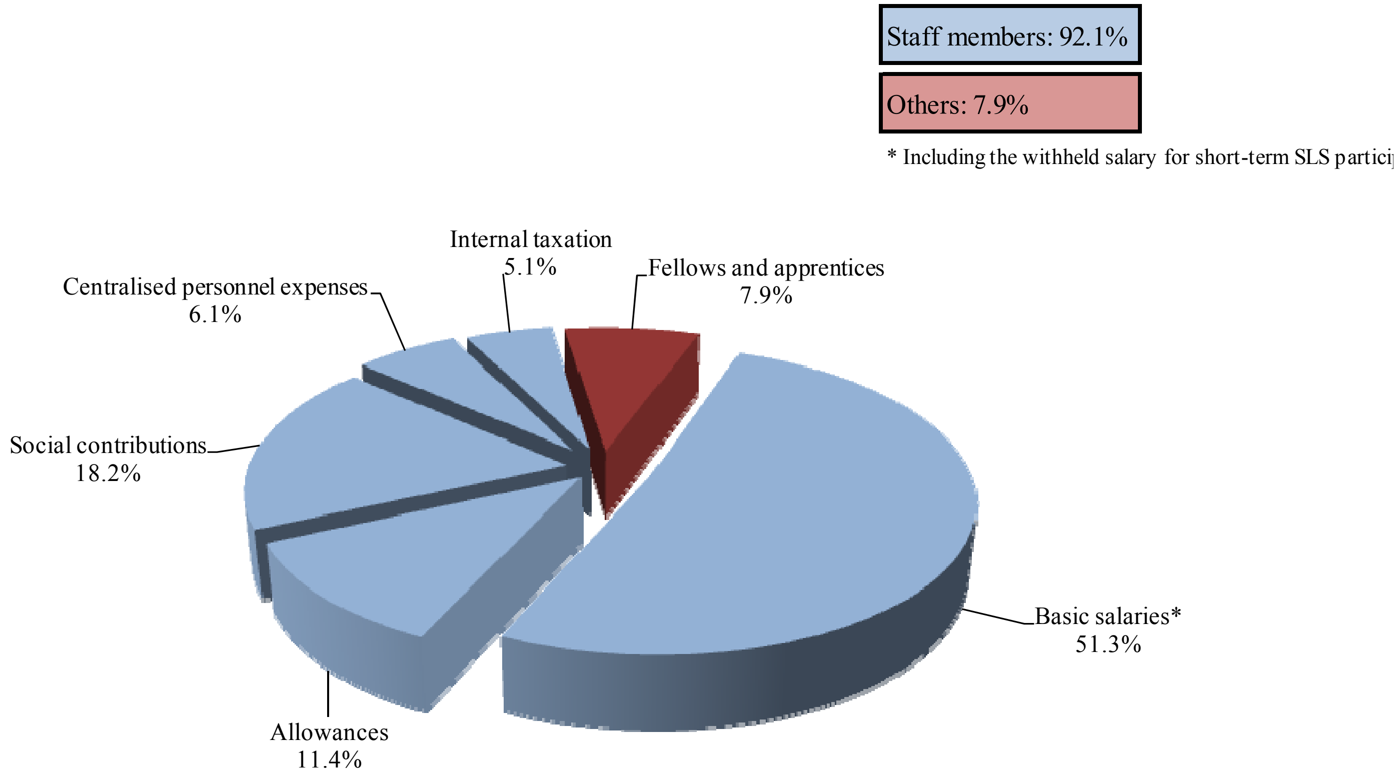
The total CERN Personnel Budget for 2012 amounts to 563 MCHF. This includes 9.9 MCHF for staff and fellows paid on team accounts.

The budget (including centralized expenses) for staff members totals 518.2 MCHF. With respect to the 2011 Revised Budget the increase is due to more staff and the implementation of the second adjustment of the basic salaries as of January 2012 following the Council' approval in December 2010 of the Five-Yearly Review proposals by the management (CERN/FC/5497), which consists of a 1% basic salary increase for career path D and 2% increase for career path E, F, G and H staff.

The Centralized Personnel Expenses totals 34.2 MCHF. Removal and installation expenses are expected to amount to about 7.7 MCHF, which is related to the increase in staff members. Additional periods of membership in the Pension Fund for shift work should amount to some 0.6 MCHF as the number of staff members entitled to this indemnity has quite decreased. The contributions to pensioners' health insurance should amount to 25.9 MCHF, as the number of pensioners is growing.

Internal taxation is expected to amount to 28.5 MCHF and is also shown as revenues for the Organization, the amount depending on the staff positions in the salary grid.

Figure 17: Personnel expenses breakdown by nature



5. Estimated Financial Position of the Organization

Statement of Cash Flow

Figure 18: Estimated statement of Cash Flow for Financial Years 2011 and 2012

(in MCHF, rounded off, estimated as at 01/06/2011)	**2011** (2011 prices)	**2012** (2011 prices)
(A) START OF THE YEAR		
Liquid assets brought forward	37	* 80
Outstanding short-term loans	26	* 0
(1) CASH INFLOW	**1 285**	**1 244**
Contributions	1 108	1 088
Special cash contributions	20	0
Teams and collaborations	126	128
EU, KTT, other revenues	31	28
(2) CASH OUTFLOW	**1 216**	**1 239**
Expenses	1 020	1 044
Teams and collaborations	100	100
Interest and financial costs	15	13
Capital repayment Fortis + FIPOI	21	22
Recapitalisation of the Pension Fund	60	60
(3) VARIATION OF CASH POSITION	**69**	**5**
(B) END OF THE YEAR		
Estimated liquid assets	**80**	**85**
Estimated outstanding short-term loans	**0**	**0**

* For 2012, it is an estimated amount.

The Cash Flow statement is an estimate, the balance of short-term loans will depend on the actual carry-forward, the in- and outflows on team accounts and the inflow of the Member States’ contributions.

Loan from FORTIS bank

The outstanding amount to Fortis Bank amounts to 385.5 MCHF at the end of 2011 and will reduce to 364.5 MCHF by the end of 2012. The loan will be fully reimbursed by the end of June 2026.

Short-term bank loans and overdrafts

As mentioned in Figure 18, at the end of 2011 it is estimated that there will be no outstanding commercial short-term bank loans. The estimated bank charges in 2012 will amount to some 0.3 MCHF as shown in Figure 14.

Loan from FIPOI

The FIPOI loans are interest-free, the capital repayment for the existing two FIPOI loans amounts to 880 kCHF per year. In addition, a further FIPOI loan was granted for the Building 40 extension (building 42). By the end of 2010, a total of 10.5 MCHF was received. The last part of the loan (800 kCHF) is expected to be received at the beginning of 2011. The capital repayment of 226 kCHF per year for this new loan will start in 2011.

V. Appendix: List of acronyms

	Acronym	Meaning	Complementary information
A	ACT	Alice Configuration Tool	
	AD	Antiproton Decelerator	Decelerator in use since 2000, decelerating the antiproton beam from the Momentum of 3.57 GeV/c to 100 MeV/c
	ALARA	As Low As Reasonably Achievable	Concept or philosophy which assumes that there is no "safe" dose of radiation. Under this assumption, the probability for harmful biological effects increases with increased radiation dose, no matter how small. Therefore, it is important to keep radiation doses to affected populations (for example, radiation workers, minors, visitors, students, members of the general public, etc.) as low as is reasonably achievable.
	ALICE	A Large Ion Collider Experiment	Experiment at the LHC
	AMS POCC	Alpha Magnetic Spectrometer Experiment Payload Operations Control Centre	Control room for the AMS experiment
	ARCON	ARea CONtroller	Radiation Monitoring system been developed at CERN for LEP and has been in use since 1988
	ATLAS	A Toroidal LHC ApparatuS	Experiment at the LHC
B	β	Accelerator physics optics parameter referring to beam envelope.	
	Br	Branching ratio for decay.	$Br(B_s \rightarrow \mu^+\mu^-)$
	B_s	B-meson consisting of a bottom and a strange quark.	$Br(B_s \rightarrow \mu^+\mu^-)$
C	CAD	Computer-Aided Design	
	CAE	Computer-Aided Engineering	
	CAST	CERN Axion Solar Telescope	A solar axion search using a decommissioned LHC test magnet
	CASTOR	Centauro and STRange Object Research	Forward Cherenkov sampling calorimeter for the CMS experiment
	CB	Collaboration Board	
	CCC	Cern Control Centre	
	CCDTL	Cell-Coupled drift tube Linac	
	CDR	Conceptual Design Report	
	CERN	Conseil Européen pour la Recherche Nucléaire	European Organization for Particle physics
	CLOUD	Cosmics Leaving OUtdoor Droplets	A study of the link between cosmic rays and clouds with a cloud chamber at the CERN PS
	CMS	Compact Muon Solenoid	Experiment at the LHC
	CNGS	CERN Neutrino to Gran Sasso	Experiment aimed at investigating the neutrino oscillations

	COMPASS	Common Muon and Proton Apparatus for Structure and Spectroscopy	Experiment at the SPS to study quarks and gluons
	CP	Charge and Parity	
	C-RRB	(LHC) Computing Resources Review Board	
	C-RSG	Computing Resources Scrutiny Group	
	CSC	Cathode Strip Chambers	The Cathode Strip Chambers are part of the CMS experiment
	CtC	Cost to Completion	
	CTF3	CliC Test Facility	
D	DAQ	Data Acquisition System	
	Dcal (ALICE-Dcal)	ALICE Di-jet Calorimeter	
	DCS	Detector Control System	
	DG	Director-General	
	DN200	Pressure relief valves	Pressure relief valves in the cryostats which have a diameter of 200mm
	DTL	Drift Tube Linac	
E	ECAL	Electromagnetic CALorimeter	Calorimeter part of CMS
	ECS	Experiment Control System	
	ELENA	Extra Low Energy Antiprotons	Project to upgrade the AntiProton Decelerator
	EMCal	Electro-Magnetic Calorimeter	Component of ALICE electromagnetic calorimeter
	EN (MEF)	Engineering department, Machines & Experimental Facilities group	
	ESS	European Spallation Source	Project to realize a research centre in Lund Sweden for the study of materials using beams of slow neutrons
	EU	European Union	EU is used in this document as short form for EU commission supported project
	EVM	Earned Value Management	
F	fb	Femtobarn	A measure of the integrated luminosity
	FP	Finance and Procurement department	
	FIPOI	Fondation des Immeubles Pour Les Organisations Internationales	Non-profit organisation in Geneva to help International Organisations with office space via financing solutions, renting and consulting
	FTA	Active Full Time Equivalent	This includes everybody who is not unavailable due to leave entitlements built up in the past
	FTE	Full Time Equivalent	

G	GDB	Grid Deployment Board	Dedicated board for the Worldwide LHC Computing Grid
	GEM	Gas Electron Multiplier detector	Detector component of TOTEM T2 Telescope
	GeV	Giga-Electron Volt	
	GLIMOS	Group Leader In Matters Of Safety	
	GS (SIS)	General infrastructure Services department	Scientific Information Service group
H	HCAL	Hadron CALorimeter	Part of CMS
	HEP	High Energy Physics	
	HE-LHC	High Energy LHC	
	HF	Hadron Forward calorimeter	Part of CMS
	HFM	High Field Magnets	
	HIE-ISOLDE	High Intensity and Energy ISOLDE	
	HiRadMat	High Radiation Materials Test Facility	
	HL-LHC	High Luminosity LHC	
	HMPID	High Momentum Particle Identification Detector	Part of Alice
	HO	Hadron Outer calorimeter	Part of CMS
	HP-SPL	High Power Super Proton Linac	
	HR	Human Resources department	
	HSE	Health Safety Environment	
I	IBL	Insertable B-Layer	ATLAS upgrade sub-detector
	ICTP	International Centre for Theoretical Physics	
	ILC	International Linear Collider	
	ILD	International Large Detector	One of several detector concepts which are studied for the International Linear Collider
	INSPIRE		A new scientific information system for HEP (High-Energy Physics), successor of SPIRE (Spectral and Photometric Imaging Receiver)
	INTC	Isolde and Neutron Time-of-flight experiments Committee	
	IP	Intellectual Property	
	IR	Interaction Regions	
	ISGTW	International Science Grid This Week	

	ISOLDE	On-Line Isotope Mass Separator	Facility dedicated to the production of a large variety of radioactive ion beams for many different experiments in the fields of nuclear and atomic physics, solid-state physics, materials science and life sciences. The facility is located at the Proton-Synchrotron Booster (PSB)
	IT	Information Technology services department	
	ITS	Inner Tracking System	
K	KTT	Knowledge and Technology Transfer	
L	LAGUNA-LBNO	Large Apparatus studying Grand Unification, Neutrino Astrophysics and Long Baseline Neutrino Oscillations	Inititative for a giant underground observatory to search for rare events and study terrestrial and astrophysical neutrinos.
	Lar Calorimeter	Liquid Argon Calorimeter	
	LC	Linear Collider	
	LCG	LHC computing Grid	Global collaboration linking grid infrastructures and computer centres worldwide
	LEIR	Low Energy Ion Ring	LEIR turns low-intensity ion pulses injected from CERN's Linac3 into high-density bunches which are accelerated from 4.2 MeV/u to 72 MeV/u.
	LEP	Large Electron Positron (LEP) collider	Operational from 1989 to 2000.
	LHC	Large Hadron Collider	http://public.web.cern.ch/public/en/LHC/LHC-en.html
	LHCb	Large Hadron Collider beauty experiment	Experiment at the LHC
	LHCC	Large Hadron Collider Committee	
	LHCf	Large Hadron Collider forward detector	The LHCf experiment uses forward particles created inside the LHC as a source to simulate cosmic rays in laboratory conditions
	LheC	Large Hadron electron Collider	The LheC is a proposed colliding beam facility at CERN for electron-proton and electron-ion collisions.
	LINAC2	LINear Accelerator 2	50 MeV linear accelerator for protons in use since September 1978
	LINAC3	LINear Accelerator 3	4.2 MeV/u Heavy Ion Linac in use since 1994
	LINAC4	LINear Accelerator 4	160 MeV linear accelerator that is built to replace Linac2 as injector to the PS Booster
	LIU	LHC Injectors Upgrade project	
	LP-SPL	Low Power Super Proton Linac	
M	M&O	Maintenance and Operation	
	MB	Management Board	
	MCHF	Million Swiss Franc	
	MoEDAL	Monopole and Exotics Detector At the LHC	Detector of the LHC which searches for the massive stable (or pseudo-stable) particles, such as magnetic monopoles or dyons, produced at the LHC

	MTP	Medium Term Plan	
	MW	MegaWatt	
N	NA58	North Area 58 experiment or COMPASS	Common Muon and Proton Apparatus for Structure and Spectroscopy
	NA61	North Area 61 experiment	(SHINE) Study of Hadron Production in Hadron-Nucleus and Nucleus-Nucleus Collisions at the CERN SPS
	NA62	North Area 62 experiment	Experiment to measure the very rare kaon decay K+-> pi+ nu nubar
	n-TOF	neutron Time-Of-Flight facility	Facility in which neutrons are produced in a wide range of energies and in very intense beams. This allows precise measurements of neutron related processes that are relevant for several fields
O	OB	Overview Board	Dedicated board for LHC computing
	OSQAR	Optical Search of QED vacuum magnetic birefringence, Axion and photon Regeneration	
P	Pb82	Lead ion	
	PCB	Printed Circuit Board	
	PH (AGS, DT, ESE, SFT, TH)	Physics department (hosting also the users)	Administration & General Services group, Detector Technologies group, Electronics Systems for Experiments group, SoFTware design for experiments group, Theoretical physics group
	PHOS	PHOton Spectrometer	Part of the Alice detector
	pp	proton-proton	
	PS	Proton Synchrotron	
	PS212	PS 212 experiment or DIRAC	Lifetime Measurements of pi+ pi- and pi+- K-+ Atoms to Test Low-Energy QCD Predictions
	PS215	PS 215 experiment or CLOUD	A Study of the Link between Cosmic Rays and Clouds with a Cloud Chamber at the CERN PS
	PSB	Proton Synchrotron Booster	
Q	QED	Quantum Electro Dynamics	
	QGP	Quark Gluon Plasma	
R	R2E	Radiation to Electronics	The goal of the R2E Project is to study and propose mitigation actions (e.g relocation or redesign of equipment, shielding, etc.) with the aim of increasing the mean time between failures of the LHC machine to one week for failures of controls electronics caused by radiation at ultimate beam conditions
	R&D	Research and Development	
	RAMSES	RAdiation Monitoring System for the Environment and Safety	Radiation Monitoring system been developed for LHC based on current industry standards and has been in use since 2007
	RD51	R&D 51 collaboration	This collaboration aims to facilitate the development of advanced gas-avalanche detector technologies and associated electronic-readout systems

	REX(-ISOLDE)	Radioactive Beam Experiment	REX-ISOLDE is a post-accelerator for radioactive ions produced by ISOLDE to accelerate the 60 keV ions from ISOLDE up to 0.8 - 2.2 MeV/u
	RF	Radio Frequency	
	RFQ	Radio Frequency Quadrupole	
	RP	Radio Protection	
S	SAPOCO	Safety Policy Committee	Advisory body to the Director-General for defining Safety policy and for all other important matters which may arise in this field at CERN.
	SC	Super Conducting	
	SCOAP3	Sponsoring Consortium for Open Access Publishing in Particle Physics	
	SiD	Silicon Detector	One of several detector concepts which are studied for the International Linear Collider
	SM	Standard Model	
	SPC	Scientific Policy Committee	
	SPS	Super Proton Synchrotron	
	SPSC	Super Proton Synchrotron Committee	
T	TDR	Technical Design Report	
	TE (MPE)	TEchnology department	Machine Protection and Electrical integrity group
	TeV	Tera electron Volt	
	Tier-0	First layer of the computing grid	The first layer is the CERN Computing Centre
	Tier-1	Second layer of the computing grid	These are large computer centres with sufficient storage capacity and with round-the-clock support for the Grid, There are currently 11 of these centres.
	Tier-2	Third layer of the computing grid	The Tier 2s are typically universities and other scientific institutes, which can store sufficient data and provide adequate computing power for specific analysis tasks. There are currently 129 Tier 2 centres globally.
	TOTEM	TOTal cross section, Elastic scattering and diffraction dissociation Measurement at the LHC	Experiment at the LHC
	TPC	Time Projection Chamber	
	TRD	Transition Radiation Detector	
U	UNESCO	United Nations Educational Scientific and Cultural Organization	
	UPS	Uninterruptable Power Supply	

	UX85/3	Beampipe UX85/3	One of the sections of the beampipe of LHCb
V	VELO	VErtex Locator detector	Part of LHCb
Y	YE4	Yoke End cap 4	4th shielding disk to be installed in the future at CMS