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ALICE Offline Personnel Planning

F.Carminati

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Modification Log

Version	Date	Modification
0.1	29/7/03	Initial version for public comment
0.2	30/7/03	Added paragraph on AliEn and on relations with LCG.
0.3	31/7/03	Small change in the organization chart New table of sub-detector personnel
0.4	23/8/3	Description of the offline project All the received comments introduced
1.0	27/8/3	Final version
1.1	30/8/3	HLT figures and text introduced
1.2	1/9/3	Added the pie chart of CERN share

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Executive summary

In 2001, the LHCC Computing Review has documented the lack of personnel in LHC Computing both for the experiments and for hardware and software infrastructure. The LCG project has fulfilled these needs on the infrastructural side but only indirectly and partially on the experiments side. Human resources remain, therefore, a critical issue in the ALICE computing projects.

The ALICE computing project is based on a lightweight Core Offline team located at CERN, while the outside institutes keep the charge of subdetector software developments and some common tasks under the responsibility of the Offline project. This approach fits best the resources and skills available within the Collaboration.

A single structure incorporates the people developing the offline code and the physics algorithms allowing an excellent integration of physicists and computer scientists with a sizeable scale-economy of personnel. No position requires a special profile, and we have considerable flexibility in employing both computer scientists and programming physicists.

Since the beginning, ALICE strategy in offline computing was to base on existing and reliable software, concentrating the resources on the missing components. This strategy led to a solid computing infrastructure, with a single line of development based on ROOT, and to an early and complete transition to OO/C++ already in 1998. Likewise, open source Grid components are integrated into AliEn. This strategy made possible to adapt the planning to the personnel constraints in such a way that, at present, the offline project is fulfilling its mandate.

The global situation of the personnel for ALICE Offline is presented in Table 1. The Core Offline project has, at this very moment, the appropriate staffing; however its situation is extremely fragile. Most of the resources are based on short-term CERN contracts (Fellows, students, Project Associates). Not all these positions may be renewed and it is difficult to cover key areas with people having appropriate profile. To ensure that this model will stay viable, two conditions are necessary starting from next year:

- Securing long-term staff positions for two area coordinators who are now under a limited duration contract is vital for the success of the project;

- Acquiring two medium-term staff (six years, LD-like) to replace two temporary members of the group;

This personnel can be hired in the experiment or *detached* to ALICE. For the medium-term position, it would be acceptable to have LCG personnel detached to ALICE. Failure to fulfil these two requests, in particular the first one, will jeopardise the success of the Offline project.

To alleviate the pressure on the core offline, well-identified common tasks are delegated to outside institutes, depending on the availability of a critical mass of personnel with the right skills in the collaborating institutes. We are actively pursuing this strategy trying to increase the external contributions for common offline tasks.

Activity	Item	2003	2004	2005	2006
Common software infrastructure	Needed	30.1	29.7	27.4	24.3
	Available	30.3	26.1	19.9	15.3
	Missing	0.2	3.7	7.5	9.0
Subdetector Software	Needed	46.3	48.6	48.2	48.2
	Available	37.7	35.3	33.8	33.8
	Missing	8.6	13.3	14.4	14.4
Analysis	Needed	52.0	54.0	58.0	61.0
	Available	50.7	51.2	48.3	45.4
	Missing	1.3	2.8	9.7	15.6
HLT	Needed	4.5	4.5	4.5	4.5
	Available	4.1	3.9	2.9	2.9
	Missing	0.4	0.6	1.6	1.6
Total	Needed	132.9	136.8	138.1	138.0
	Available	122.8	116.5	104.9	97.4
	Missing	10.1	20.4	33.2	40.6

Table 1: Personnel summary table

The sub-detector offline projects are generally understaffed, and we experience difficulties to find enough personnel devoted to offline in the collaborating institutions. We are making a constant effort within the collaboration to identify programming physicists, and we will try to work out solutions with the funding agencies on a case-by-case basis. Covering this deficit is mandatory to timely obtain high quality software and physics. For HLT, a part of the needed personnel will be provided via PhD students.

There is small deficit of people doing analysis. This problem ought to be solved, as people who are now busy with detector building will naturally move to analysis when their work with detector winds down.

In conclusion the offline project is slightly understaffed at the moment of writing. The whole structure is strongly relying on the central coordination performed by the Core Offline group, which has to be reinforced converting temporary positions into more long-term appointments as explained above in order to continue fulfilling its important role in difficult times. Reinforcement of the subdetector software groups is mandatory to have the right quality physics software in time.

Introduction

The present document presents the current plans for the Offline personnel in the ALICE collaboration. It covers the years from 2003 to 2006, just before LHC start, which is currently foreseen for 2007, when the ALICE Offline will have to be ready. Lack of personnel in the LHC computing experiments, as well as in the IT division, has been a constant problem over the last years, and this has been officially documented in the LHC Computing Review [1]. The LHC Computing Grid Project (LCG), born as a consequence of this, has well responded to the shortage in the common software and infrastructural side, but not to the specific needs of the experiments. A substantial influx of computer professionals from CERN member countries has helped the LCG project to compensate the shortage for the common and infrastructural activities. No such mechanism has been put in place for the experiments, and therefore the shortage of personnel is still very acute. In this situation we had to re-profile our planning and modify our strategy, adapting them to the external conditions. The situation presented in this document is therefore the result of a long work of optimisation, and the requests expressed are to be considered a *bare minimum* below which we will not be able to ensure the readiness of the experiment for data processing.

Throughout this document the word *personnel* will be used instead of the more common *manpower* to avoid any gender connotation.

ALICE Offline organisation

As in all the experiments, also in ALICE the Offline project has the mandate to prepare the software and the computing infrastructure to allow the processing of data coming from the experiment. This responsibility is partially shared with DAQ and HLT projects, with which the Offline project has very close links.

The peculiarity of the Offline project is that only a minority of the personnel who provides the software is working full time for the project itself (Core Offline Project), while the rest of the programmers are in the sub-detector projects, and share their time between the different activities necessary to the preparation of their apparatus.

It has been recognized since long that most of the computing infrastructure for the different experiments will be very similar. The same can be said, to a different degree and depending on the specific product, also of some of the software infrastructure. To leverage these similarities, improve the quality of the infrastructure and realize scale-economy, the LCG project has been launched to provide the common hardware and software infrastructure for LHC computing.

All these factors make the management and planning of the Offline project a specially challenging task. Different bodies and institutes have to be closely coordinated in a situation of constrained resources, avoiding as much as possible duplications and inefficiencies. This is all complicated by the fact that the Offline infrastructure is needed much in advance of the data taking, and indeed it is an essential part of the design of the detector. Therefore the Offline project has to develop the final computing infrastructure while providing and maintaining in working state a more or less complete simulation, reconstruction and analysis suite.

Management structure

The management structure of the project reflects all these factors with which it has to cope. ALICE has decided to adopt a lightweight management structure which has proved efficient in terms of personnel and well adapted to a situation of rapid change in the technology that impose frequent updates of the planning. A high-level view of the structure of the ALICE Offline project is shown in Figure 1Figure 1, which is explained in detail in the Core Offline section below.

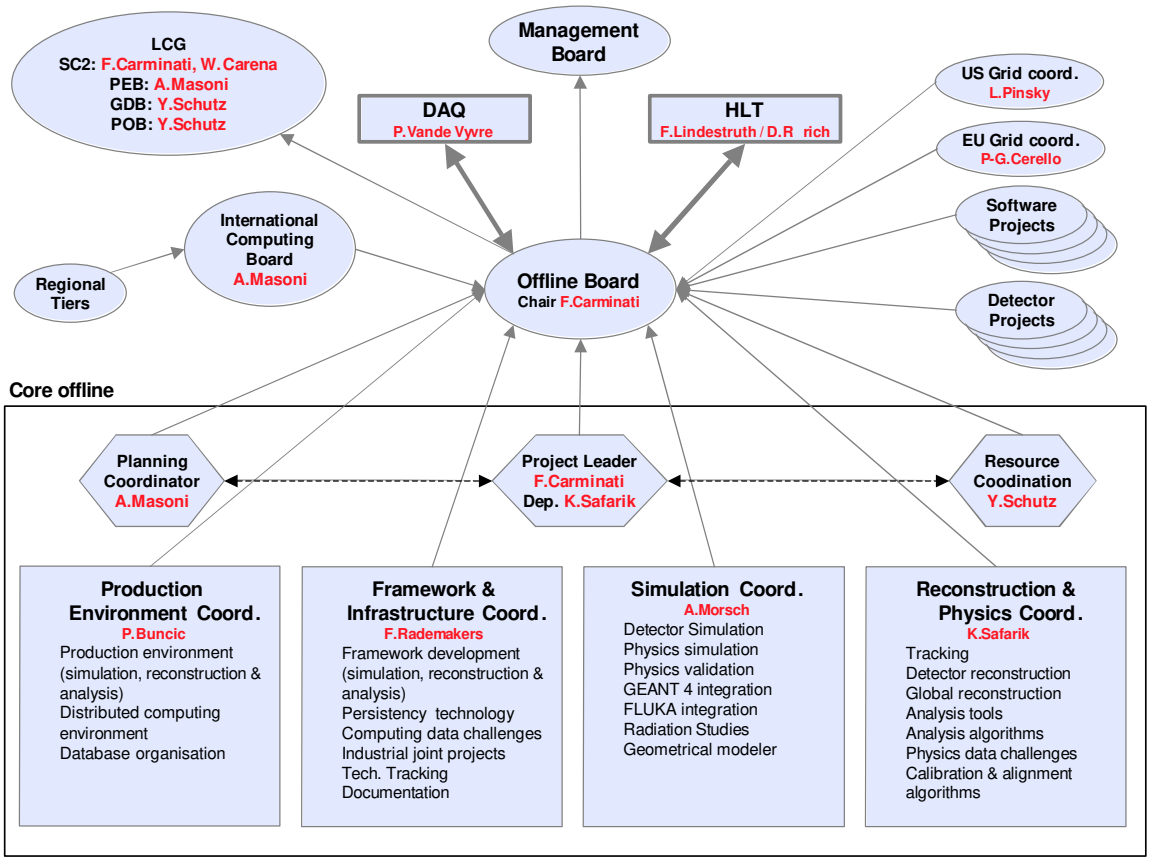

Figure 1: ALICE Offline organisation

In ALICE we have chosen to have a single structure including those who develop the Offline infrastructure and those who use it to evaluate the performance of the ALICE detector developing the physics algorithms. This has the advantage to dramatically improve the communication between “computer scientists” and “physicists” and to make a scale-economy of personnel, as software experts assume different roles according to the necessity of the moment. The other advantage is that those who develop the computing infrastructure are immediately aware of the requirements and needs of those who use this structure for physics studies. Thanks to this structure, the ALICE Offline project has been able to adopt a single line of development and perform an early and complete transition to OO/C++ in 1998. A positive side effect of this strategy is that there is no position in the ALICE Offline that requires a special profile, and this gives us considerable flexibility in employing computer scientists and programming physicists.

Such an organisation requires special skills from the developers, because they have to respond to the conflicting, and sometime even contradicting requirements posed by the development of a long-term software infrastructure and the need to maintain this infrastructure in a working state, during its evolution, for detector design and physics studies. This is achieved thanks to a very dynamic management of the work schedule, which will be explained below.

ALICE Planning Strategy

Planning in the ALICE Offline project has to be done taking into account several limiting factors:

a. Planning depends on a large number of projects outside ALICE control (LCG, European DataGrid – EDG, EGEE, national computing projects);
b. Even within ALICE, the Offline Project has direct control only on the people working for Core offline, while most of the programmers and physicists working on the detector software depend from their own project and institute;
c. The technological evolution is very fast in Information Technology, therefore any plan has to be ready to take advantage from the latest advances, particularly in a situation of constrained resources;
d. The Offline project has no contingency to hire professional planners or even to devote too much effort to planning activity, no matter how important this is, as the development of the offline framework takes all the available personnel;
e. Most of the personnel is hired on a short-term basis (students, fellows and associates) for periods going from one to three years. Even if all efforts are made to match the needed profile with the available candidates, often planning has to be altered because a special skill is missing, or conversely is suddenly available in the team.

In this situation we have decided to adopt a very lightweight strategy that can adapt to change and take advantage from the opportunities that arise. The only real long term milestones are the computing and physics data challenges. Planning is done toward these high-level milestones adapting timescales and, partially, scope as time goes. The whole procedure is inspired from modern Software Engineering methods [2], and is described in a recent paper [3] presented at the CHEP 2003 conference. An ALICE note [4] is in preparation on the data challenge schedule and scope.

Core Offline

The Core Offline group has the responsibility for offline coordination and planning, including planning and resource coordination for the LCG phase 1 and for the final system. This implies coordination of the relation between the ALICE Offline and LCG and of the relation between ALICE Offline and national and international Grid projects. Coordination of the computing and physics data challenges also falls under the responsibility of the Offline group, in collaboration with the DAQ and HLT projects for the computing data challenges.

The Core offline structure has four independent units that are responsible for the coordination and execution of the following activities:

- *Production Environment*. The responsibilities of this area include the development and deployment of middleware for the experiment physics production, the coordination of the distributed computing activities and the design and deployment of the database systems (condition database, detector construction database, geometry database). Production quality assurance tools and development of quality assurance tools for the production are also responsibilities of this area.
- *Framework and Infrastructure*. This area is responsible for the development of the general offline framework of the experiment, including simulation, reconstruction, analysis and persistency. This area is also responsible for the offline participation to the computing data challenges in collaboration with DAQ and HLT, technology tracking and industrial projects. Program library, software distribution and packaging, maintenance of the cvs server and of the nightly build and test procedures, software integration. Documentation, Web maintenance and front line support are also handled in this area.
- *Simulation*. This area is responsible for detector simulation, including physics validation, generators and radiation studies, consisting in the maintenance and operation of the simulation program for the estimation of radiation doses in the detector. One of the objectives of this area is the integration of transport Monte-Carlo, in particular FLUKA and GEANT4, into the ALICE framework.
- *Reconstruction*. The responsibility of this area, whose leader is also the ALICE physics coordinator, is the coordination of the development of the reconstruction algorithms. This section has also the responsibility to coordinate the development of the analysis tools and algorithms and the overall quality control of the physics code.

Another important role of Core Offline is to participate in the management and overview structure of LCG. It is evaluated that at least 2FTEs are employed in this task at CERN, where the LCG management sits. The chairperson of the Offline Board, with the help of the resource and planning coordinators, coordinates these four areas. He acts as project leader and represents the Offline project in the Management Board.

The Offline Board is the body where the decisions on the development of the ALICE Offline are taken. It has the following constituency:

- One or two representatives from each subdetector project;
- The coordinators of the four Core Offline areas, the resource and planning coordinators;
- Representatives from the HLT and DAQ projects;
- The ALICE representatives in the LHC Computing Grid Project (LCG) committees: Software and Computing Committee (SC2), Grid Deployment Board (GDB), Project Executive Board (PEB).
- The representatives of major software projects (ROOT, detector construction database project);

- The coordinators of Grid activities in US and Europe;
- The chair of the National Computing Board;

The representatives of the computing centres that provide computing resources to ALICE compose the National Computing Board. This body was formed shortly before the LCG project was launched, and its functions are now partly overtaken by the GDB, so its mandate will be revised.

The Core Offline group is CERN-resident. Although this is not a logical necessity, its role and function are much better performed being at CERN. This is due to the following reasons:

a. CERN, more than any other ALICE groups, has the critical mass of people with the right skills;
b. The Core Offline group has to coordinate activities in all the detector systems and in all the regional centres, performing in the computing area a role very similar to the one of the ALICE overall management for the construction of the detector. Being physically co-located with the ALICE management in the host laboratory facilitates this task;
c. The Core Offline has, by necessity and by construction, very close relations with the LCG project and its management, which is located at CERN;
d. The duties of the Core Offline group require very special skills, which are difficult to find. CERN maintains a strong attraction for young researchers, simplifying the task of recruiting a critical number of people with the right profile, in particular for the short-term posts.

The estimated needs in personnel for these activities are presented in Table 2.

Activity		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Off-line Coordination	Avail.	0.8	1.0	1.0	1.0	1.0	1.7	1.5	1.0	1.0	1.0	1.0	1.0
	Needed	1.0	1.0	1.0	1.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Missing	0.3	0.0	0.0	0.0	1.0	0.3	0.5	1.0	1.0	1.0	1.0	1.0
Database and distributed computing infrastructure	Avail.	0.6	2.2	1.6	1.5	1.8	2.0	2.0	2.0	2.0	0.8	0.0	0.0
	Needed	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Missing	1.5	0.2	0.4	0.5	0.3	0.0	0.0	0.0	0.0	1.2	2.0	2.0
Framework Development	Avail.	0.4	0.4	0.3	0.8	1.8	2.3	1.9	1.3	1.3	0.8	0.3	0.3
	Needed	1.0	1.0	1.5	1.5	1.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0
	Missing	0.6	0.6	1.2	0.7	0.3	0.3	0.1	0.7	0.7	1.2	1.7	1.7
Simulation framework	Avail.	1.9	2.0	2.8	3.0	3.3	3.0	2.8	2.0	1.5	1.0	1.0	1.0
	Needed	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	1.5	1.0	1.0
	Missing	1.1	1.0	0.3	0.0	0.3	0.0	0.3	0.0	0.5	0.5	0.0	0.0
Computing DC and data persistency	Avail.	0.4	1.2	1.2	1.4	2.6	2.5	1.4	0.7	0.0	0.0	0.0	0.0
	Needed	2.0	2.0	2.0	2.0	2.0	2.0	2.0	1.0	1.0	1.0	1.0	1.0
	Missing	1.7	0.8	0.8	0.6	0.6	0.5	0.6	0.3	1.0	1.0	1.0	1.0
Reconstruction	Avail.	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Needed	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	1.5
	Missing	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.5	0.5	0.5	0.5
Production	Avail.	0.3	0.0	0.3	0.8	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0

quality assurance	Needed	0.0	0.0	0.5	1.0	1.0	1.0	1.5	2.0	2.0	2.0	2.0	2.0
	Missing	0.3	0.0	0.3	0.3	0.5	0.5	1.0	2.0	2.0	2.0	2.0	2.0
Program librarian	Avail.	0.0	0.0	0.8	1.0	1.0	1.0	1.0	1.0	0.2	0.0	0.0	0.0
	Needed	0.0	0.0	0.7	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Missing			0.1	0.0	0.0	0.0	0.0	0.0	0.8	1.0	1.0	1.0
Documentation and Web	Avail.	0.0	0.0	0.3	0.3	0.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0
	Needed	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Missing	0.0	0.0	0.8	0.8	1.0	0.0	0.0	1.0	1.0	1.0	1.0	1.0
Radiation Studies	Avail.	0.5	0.3	0.8	1.0	1.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0
	Needed	0.5	0.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	0.5	0.5	0.5
	Missing	0.0	0.2	0.2	0.0	0.0	0.0	1.0	1.0	0.5	0.5	0.5	0.5
System support	Avail.	1.0	1.8	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Needed	1.0	1.0	1.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Missing	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Analysis tools	Avail.	0.0	0.0	0.3	1.0	1.2	1.4	0.8	0.0	0.0	0.0	0.0	0.0
	Needed	0.0	0.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
	Missing	0.0	0.0	0.2	0.0	0.2	0.4	0.2	1.0	1.0	1.0	1.0	1.0
Summary	Avail.	6.8	9.8	11.8	13.7	16.1	18.4	14.9	10.0	8.0	5.6	4.3	4.3
	Needed	11.5	11.5	15.7	16.5	17.5	18.0	18.5	17.5	17.0	16.5	16.0	16.0
	Missing	4.8	1.7	3.9	2.8	1.4	0.4	3.7	7.5	9.0	10.9	11.7	11.7

Table 2: Personnel planning for Core Offline

Given the large amount of tasks, the amount of effective development carried on by the Core Offline group is kept to a minimum by concentrating on tasks with a very high leverage potential, and choosing mature and well tested products that avoids costly R&D activities. Two important examples of this strategy can be given:

- The offline framework has been built directly on the ROOT system in a way similar to what almost all present HEP experiments have done. This has allowed ALICE to perform a complete migration to OO/C++ already in 1998 and to continue steadily developing the framework. We have no more “acceptation” milestones regarding elements of our framework and development can continue seamlessly.
- The ALICE distributed computing environment (AliEn) is built with well-established open source components based on open standards. This environment has been in full production since 2002. AliEn has been developed by 2 FTEs. Between 2002 and 2003 almost 30,000 jobs have been run in more than 30 locations on four continents with 0.5 FTE operator in charge of the whole production, plus generic, non ALICE-specific, system support at the remote centres.

These choices have greatly reduced the generic R&D effort allowing concentrating on the development of the ALICE-specific code.

Another important element to cope with the current staffing situation is to rely heavily on temporary personnel. Currently in the Core Offline there are four permanent staff (plus a technician providing software and hardware support), while all the rest of the personnel is temporary. At the moment of writing we have five project associates in the

group, which represents a sizable contribution from outside institutes that are currently employing them and have sent them to CERN, as well as a contribution from the CERN exploitation fund.

This situation is shown in Figure 2. The stacked histogram shows the needed personnel as reported before, while the red line shows the available personnel in the case where the personnel on short term positions presently working for the Core Offline should not be replaced.

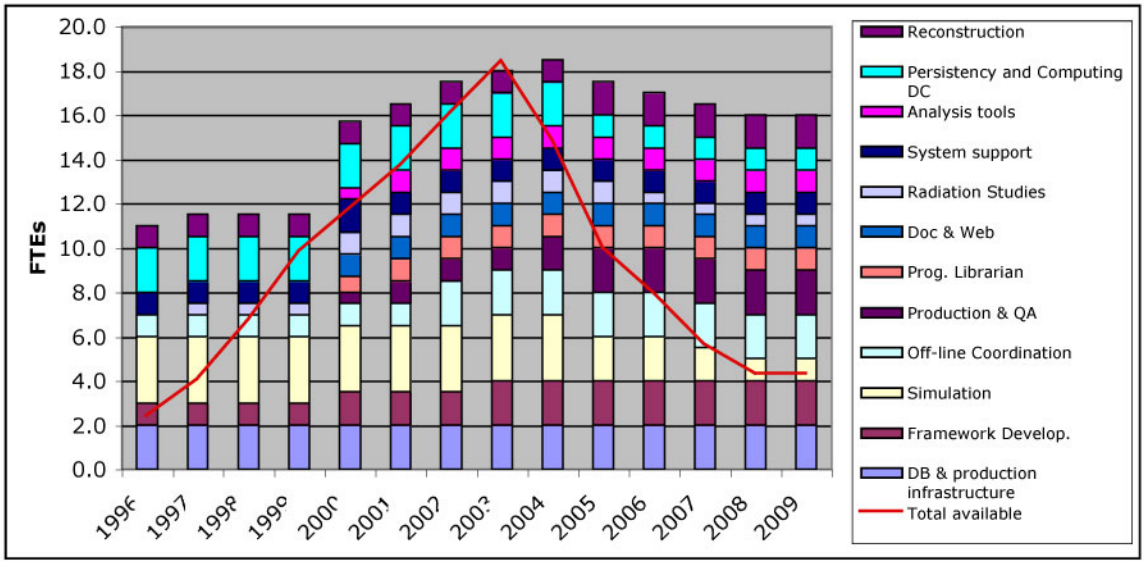

Figure 2: Available and needed positions in Core Offline

We expect most of these people to be replaced; however the situation is to some extend unpredictable and therefore fragile. These posts are not earmarked and have to compete, on a CERN wide basis (Fellows, students) or ALICE internal (PJAS). A constant attention has to be devoted to finding new candidates with the right profile to fill the positions.

To make this model viable, and therefore set the ALICE Core Offline group on a sound basis, two conditions are necessary starting from next year:

- Securing long-term staff positions for two area coordinators who are now under a limited duration contract is vital for the success of the project;
- Acquiring two medium-term staff (six years, LD-like) to replace two temporary members of the group;

It does not matter whether this personnel is hired in the ALICE experiment or whether it is *detached* to ALICE. In particular for the medium-term position, it would be acceptable to have two persons from LCG personnel detached to ALICE. This would bring the long-term outlook for Core Offline staff from the present situation, shown in Figure 3 to the one shown in Figure 4. The resulting situation would allow us to fill our quota more easily with temporary personnel.

As explained before, this organisation has required the adoption of a special and code development planning strategy.

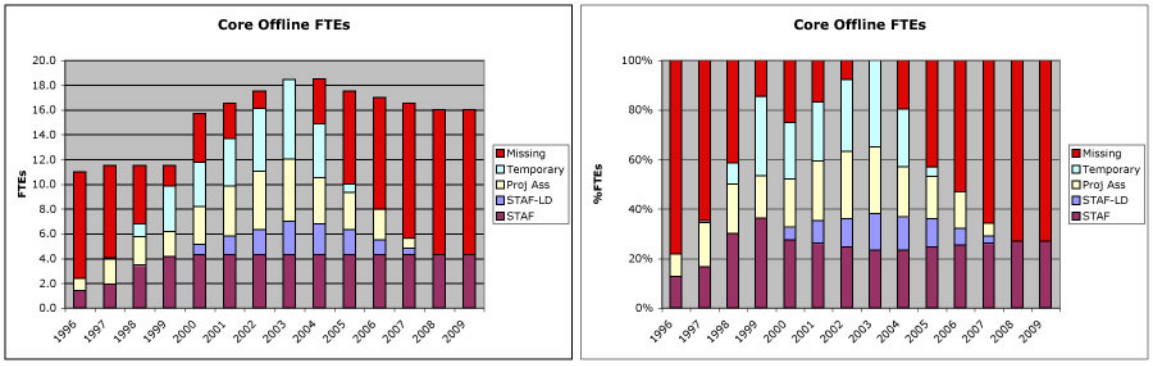

Figure 3: Composition of the Core Offline

Some of the common, non-detector specific tasks that fall under the responsibility of the Offline Project would require a substantial amount of personnel. If these tasks are well identified and modular, it is possible to delegate them to those participating institutes that have a special interest in performing development in the given area. Experience has showed that it is not easy to find the right conditions for this to happen. Apart from the identification of an institute that has a critical mass of available personnel to create a small team, it is rare that these people have the right skills. In ALICE we have been actively pursuing this solution, and we have been lucky to be able to find groups who have been able to assume three rather large common tasks that fall under the responsibility of Offline.

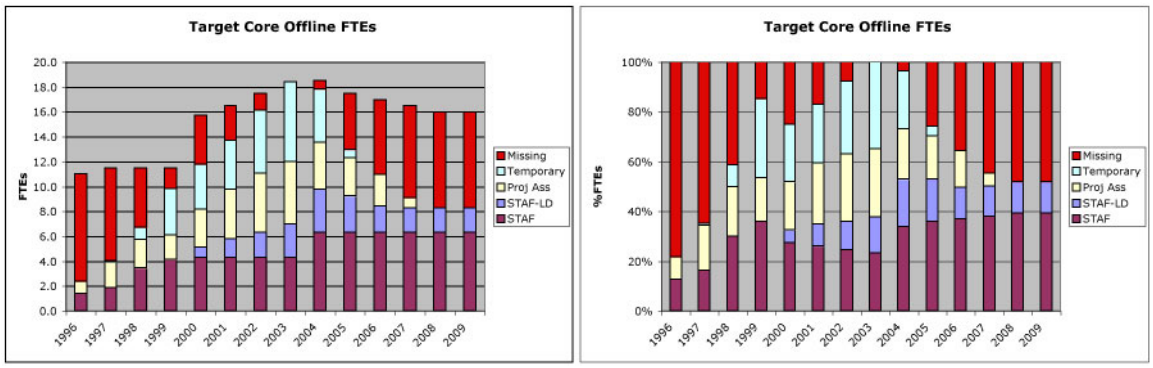

Figure 4: Target composition of the Core Offline

Detector Construction Database. It has been since long recognised in ALICE that a single detector construction database would introduce a great economy of personnel in the different detectors and would also simplify the derivation of the detector information for building the calibration database. The Physics Department of the Technical University of Warsaw together with the Computer Science Department has been able to take the responsibility for providing the detector construction database for all sub-detectors. The project has already delivered the first prototype and the product will undergo validation in September 2003. The personnel involved in this activity is shown in Table 3.

Name	2003	2004	2005	2006
Total	2.9	2.9	2.9	2.9

Table 3: Personnel for the Detector Database project

GRID testing and validation. Validation of the EDG testbed and more generally participation into various Grid project has required a substantial amount of personnel. ALICE/Italy, ALICE/US and the EDG/DataTAG project have essentially provided it, as is shown in Table 4. The same personnel will participate into the EGEE European project foreseen for 2004-2005 (with possible extension till 2007). The personnel involved in this activity is shown in Table 4.

Name	2003	2004	2005	2006
Total	4.1	4.1	3.1	3.1

Table 4: Personnel for Grid activities

Distributed computing infrastructure. The ALICE distributed computing infrastructure is based on the AliEn system [5]. The advanced and stable platform provided by the AliEn system to experiment with Grid middleware has attracted the attention of some researchers in the participating institutions. Due to the distributed nature of the software itself, isolated individuals can contribute from the participating institutions. The total contribution is shown in Table 5.

Name	2003	2004	2005	2006
Total	5.1	4.2	3.9	1.3

Table 5: Contributors to the ALICE distributed computing infrastructure

This leads to the distribution of personnel for common offline activities shown in Table 6, where it can be seen that, even for common software activities, about 40% of the work is distributed outside CERN.

Activity	2003		2004		2005		2006	
	FTE	%	FTE	%	FTE	%	FTE	%
Core Offline	18.0	59.8	18.5	62.3	17.5	63.9	17.0	70.0
GRID testing	4.1	13.6	4.1	13.8	3.1	11.3	3.1	12.8
Distributed comp inf	5.1	16.9	4.2	14.1	3.9	14.2	1.3	5.3
DCDB	2.9	9.6	2.9	9.8	2.9	10.6	2.9	11.9
Total	30.1	100.0	29.7	100.0	27.4	100.0	24.3	100.0

Table 6: Distribution of personnel for common offline activities

High Level Trigger

In ALICE Offline, High Level Trigger (HLT) and Data AcQuisition (DAQ) are three distinct projects. The Offline and HLT projects are closely collaborating in two main areas:

- HLT is using the common AliRoot framework to do perform simulation and obtain the simulated raw data for their further simulation of the performance of the HLT software;
- Some of the HLT algorithms have been integrated in the Offline framework for testing. It is therefore possible to use the offline reconstruction code and the HLT algorithms in the same framework for comparison;

Similarly to the Offline project, HLT coordinates the activities on high-level trigger algorithms of the different subdetector projects. The main thrust of the HLT project is to

define the common HLT architecture, both hardware and software. The HLT project is also involved in seminal work on algorithms and compression techniques. More subdetector specific work is done in collaboration with the subdetector projects.

The HLT project performs its own large-scale tests of architecture and algorithms. During ALICE Computing Data Challenges the integration of DAQ, Offline and HLT is realised, with increasingly realistic setups every year.

The Personnel situation of the HLT project is show in Table 7.

Activity	2003	2004	2005	2006
Needed	4.5	4.5	4.5	4.5
Available	4.1	3.9	2.9	2.9
Missing	0.4	0.6	1.6	1.6

Table 7: HLT personnel situation

This table reports the people working on algorithms (online and offline) and simulation in the HLT project. In particular this includes physics simulations, verification of the efficiency of the online code, calculation of the selectivity of trigger algorithms in comparison with offline algorithms and development of fast pattern recognition and fast event reconstruction. Not included in this table is the personnel for the online infrastructure, i.e. cluster management, process communication infrastructure, monitoring, FPGA coprocessor interface. A part of the missing personnel should come from PhD students.

Relation with LCG

Having made most of the fundamental choices for Offline, ALICE is not relying on most of the current projects of the LCG Application Area. ALICE is working with the ROOT team on projects of potential common interest particularly in the area of distributed analysis and MonteCarlo development. These personnel are presented in Table 8.

Item	Name	Task	2003	2004	2005	2006
ROOT						
	F.Rademakers	Root support and Proof development	0.3	0.3	0.3	0.3
	A.Gheata	Virtual MonteCarlo & Geometry Modeller	1.0	1.0	1.0	1.0
	M.Gheata	Virtual MonteCarlo & Geometry Modeller	0.5	0.5	0.5	0.5
	R.Brun	Root development	0.1	0.1	0.1	0.1
Virtual MonteCarlo	G.Ganis	Proof development	1.0	1.0	1.0	1.0
	E.Futo	Integration of FLUKA	1.0	0.5	0.0	0.0
	A.Fasso	Integration of FLUKA, FLUKA support	0.5	0.0	0.0	0.0
	I.Gonzalez	Verification of G4	0.1			
	A.Morsch	Integration of FLUKA & G4, Virtual MonteCarlo development	0.1	0.1	0.1	0.1
	F.Carminati	Virtual MonteCarlo	0.1	0.1	0.1	0.1
	I.Hrivnacova	Integration of G4 & Virtual MonteCarlo	0.2	0.2	0.2	0.2
Total			4.9	3.8	3.3	3.3

Table 8: ALICE contribution to ROOT/LCG

Recently the Simulation project of LCG has expressed a keen interest in the ALICE developments of the Virtual Monte-Carlo and collaboration will soon start on this subject.

In the context of the Software and Computing Committee (SC2) of LCG, a requirement technical assessment group has been launched to define an Architecture Roadmap for Distributed Analysis (ARDA) with representatives of the four experiments. At the moment of writing this work is still ongoing, however one of the working assumptions of the group is to use AliEn coupled with the Parallel Root Facility (PROOF) as the model Grid application to derive the blueprint of a generic architecture for interactive analysis. This should be used to inform future developments in this area, and the four experiments are strongly suggesting to the recently approved EGEE European project, where CERN is leading partner in charge of MiddleWare re-engineering, to start from this architecture. Should this suggestion be taken, it is very likely that ALICE will be called to provide its Grid expertise and resources to the benefit of the other experiments, which we will be very happy to do. It is however too early to try quantifying this contribution.

Sub-detector Offline

The planning of the sub-detector offline projects depends essentially on the global milestones of the Offline project, which, as explained before, are built around the Data Challenges. Part-time programmers write most of the sub-detector software, and they usually share their time between detector construction and software production. Planning therefore is more task-oriented than personnel-oriented. Figure 5 shows the relation between sub-detector software and core software.

A personnel oriented planning is also made difficult by the difficulty of collecting information from many institutions and to keep this information up to date. On a general level we can say that, although the personnel situation is very tight for detector offline development, the ALICE offline project has been able to meet its milestones till now.

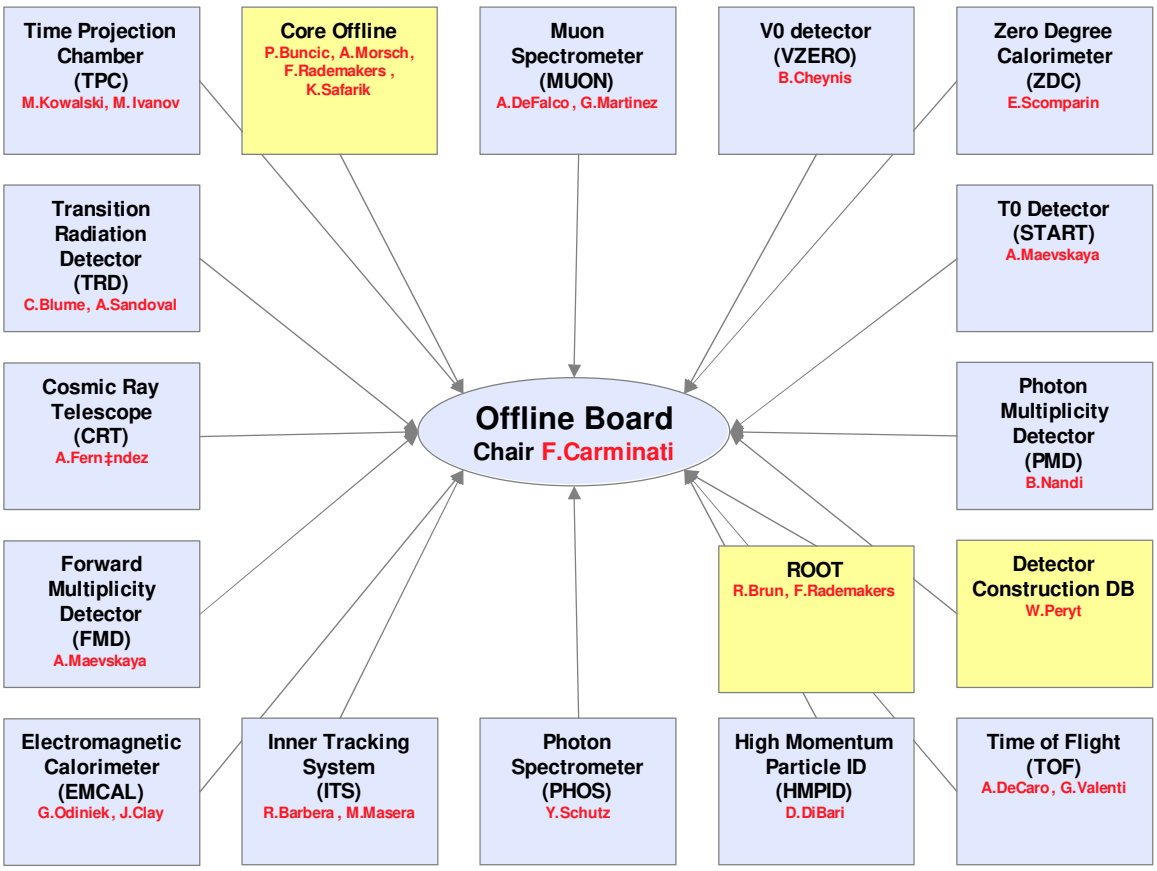

Figure 5: The Detector and Software projects

The current situation of the personnel in the different offline sub-detector projects at the best of our knowledge is shown in Table 9.

Alice Subdetector Planning V0.3 25/8/2003					
Activity	Name	2003	2004	2005	2006
TRD	Available	4.2	3.4	3.0	3.0
	Missing	0.3	1.3	1.5	1.5
PMD	Available	3.2	3.3	3.3	3.3
	Missing	0.5	0.5	1.0	1.0
T0/FMD	Available	1.4	1.4	1.4	1.4
	Missing	1.8	1.8	1.8	1.8
PHOS/EMCAL	Available	2.1	2.1	2.1	2.1
	Missing	1.6	1.6	1.6	1.6
ITS	Available	10.7	10.1	9.4	9.4
	Missing	0.5	3.0	3.0	3.0
ZDC	Available	1.0	1.0	1.0	1.0
	Missing	0.0	0.0	0.0	0.0
CRT	Available	1.6	1.6	1.6	1.6
	Missing	1.0	1.0	1.0	1.0
V0	Available	1.0	1.0	1.0	1.0
	Missing	0.0	0.0	0.0	0.0
Muon	Available	2.5	2.0	2.0	2.0
	Missing	1.0	1.5	1.5	1.5
TOF	Available	6.3	6.3	6.3	6.3
	Missing	0.0	0.0	0.0	0.0
TPC	Available	3.1	2.4	2.0	2.0
	Missing	0.9	1.6	2.0	2.0
RICH/HMPID	Available	2.7	2.7	2.7	2.7
	Missing	1.0	1.0	1.0	1.0
Summary	Available	39.7	37.3	35.8	35.8
	Missing	8.6	13.3	14.4	14.4

Table 9: Sub-detector personnel planning

Conclusions

The global situation of the personnel for ALICE Offline is presented in Table 10. The Core Offline project has at the moment the appropriate staffing. However the situation is very fragile as we depend on the availability of temporary positions at CERN and on a continuous influx of temporary personnel with the right profile. Neither of these is granted. If this mechanism breaks down, the situation can degrade very quickly and the readiness of the experiment for data taking can be at stake. Securing of two long-term staff positions for two persons who are now in under a limited duration contract and providing at least two medium term positions to replace more temporary personnel is instrumental for the success of the project.

The delegation of well-identified common tasks to outside institutes has shown to be a substantial help for the Core Offline group and an activity that is potentially very interesting for computing groups in the participating institutes. The global share between CERN and outside institutes is shown in Figure 6. These activities are usually very qualifying for the scientists taking part in them. This will have to be intensified and we

will do our best for that. Again this depends on the availability of personnel in the collaborating institutes and more generally from the funding agencies participating into ALICE.

Activity	Item	2003	2004	2005	2006
Common software infrastructure	Needed	30.1	29.7	27.4	24.3
	Available	30.3	26.1	19.9	15.3
	Missing	0.2	3.7	7.5	9.0
Subdetector Software	Needed	46.3	48.6	48.2	48.2
	Available	37.7	35.3	33.8	33.8
	Missing	8.6	13.3	14.4	14.4
Analysis	Needed	52.0	54.0	58.0	61.0
	Available	50.7	51.2	48.3	45.4
	Missing	1.3	2.8	9.7	15.6
HLT	Needed	4.5	4.5	4.5	4.5
	Available	4.1	3.9	2.9	2.9
	Missing	0.4	0.6	1.6	1.6
Total	Needed	132.9	136.8	138.1	138.0
	Available	122.8	116.5	104.9	97.4
	Missing	10.1	20.4	33.2	40.6

Table 10: Personnel summary table

The sub-detector offline projects are generally understaffed, and we experience difficulties to find enough personnel devoted to offline in the collaborating institutions. Thanks to the provision of a consistent and solid framework, we do not need computer specialists to work on the sub-detector software, and programming physicists have shown to be able to provide OO/C++ software of appropriate quality. We are making a constant effort within the collaboration to identify programming physicists, and we will try to work out solutions with the funding agencies on a case-by-case basis. Covering this deficit is mandatory to timely obtain high quality software and physics.

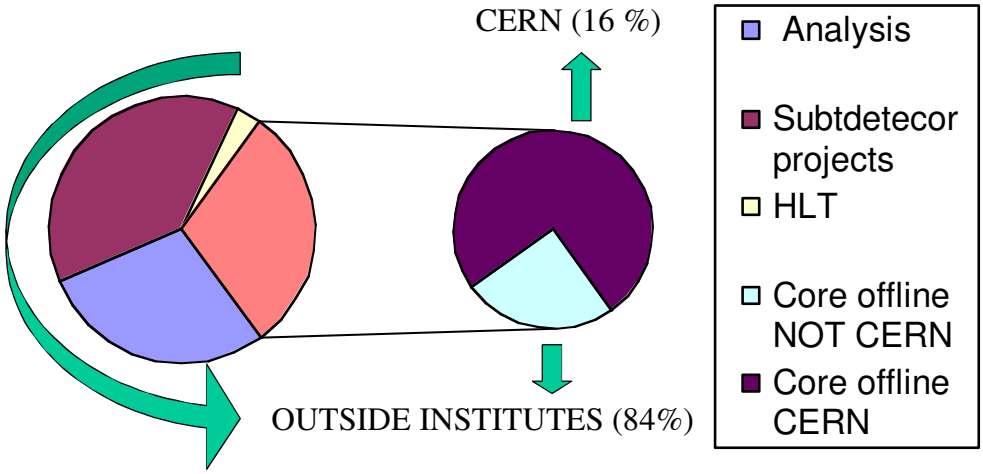

Figure 6: Share of offline personnel between CERN and outside institutes

There is small deficit of people doing analysis. This does not worry us, as people who are now busy with detector building will naturally move to analysis when their work with detector winds down.

In conclusion the offline project is slightly understaffed at the moment of writing. The whole structure is strongly relying on the central coordination performed by the Core Offline group, which has to be reinforced converting temporary positions into more long-term appointments as explained above in order to continue fulfilling its important role in difficult times. Reinforcement of the subdetector software groups is mandatory to have the right quality physics software in time.

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