



AGATA Phase 2 Management Plan

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1. Introduction

The governance of the AGATA project is defined in a Memorandum of Understanding that defines the construction and operation of the spectrometer. This requires that the collaboration develops, constructs, maintains, and operates the instrument and leads, performs, analyses and publishes both scientific and technical results. The AGATA spectrometer is being developed, constructed and upgraded in parallel to its operation for scientific exploitation following the technological progress in electronics, detector technology, data acquisition and analysis techniques. The AGATA spectrometer is a travelling detector, operating in scientific campaigns at different host laboratories across Europe. The host laboratory is selected by the collaboration based on scientific opportunity and facility developments and availability. The AGATA spectrometer is available to the entire AGATA user community at the host laboratory. The experiments proposed using AGATA, coupled to complementary detectors, are independently evaluated by the Program Advisory Committee of the host laboratory, which attributes the beam time to the spokesperson of the proposed experiment based on scientific merit and technical feasibility.

The AGATA Management plan reflects these constraints.

The AGATA organization and the governance bodies for the construction and operation of AGATA are described in Annex D of the MoU.

The organization for the construction and the operation of the AGATA project comprises the following bodies:

- The AGATA Steering Committee (ASC), acting on behalf of the Parties, is responsible for the Project coordination and the science policy of the collaboration.
- The AGATA Collaboration Council (ACC), representing all the institutions collaborating under the AGATA project, advises the ASC on scientific matters.
 - The AGATA Scientific Campaign Spokesperson is proposed by the ACC and elected by the ASC for a given host laboratory.
- The AGATA Project Manager (PM) and the AGATA Management Board (AMB) are responsible for the execution of the Project along the lines defined by the ASC and the ARRB.
 - The AGATA Local Project Manager (LPM) and the local host laboratory project are responsible for the local installation and operation of the spectrometer along the lines defined by the AGATA collaboration.
- The AGATA Resource Review Board (ARRB) provides financial scrutiny of the project and the contributions of all parties.

The terms of reference of each of these bodies is given in more detail below.

2. AGATA Steering Committee (ASC)

Members are nominated by the Parties of the MoU. The ASC nominates the AGATA Project Manager and chooses the AGATA Host Laboratory. It can decide on and/or extend the experimental campaign in a given host laboratory. The AGATA Project Manager reports to the ASC on technical achievement, progresses and difficulties in the project. The ASC is advised by the AGATA Collaboration Council Chairman on scientific matters.

The ASC is the decision-making body of the AGATA Collaboration and responsible for the allocation of resources supplied by the Parties and the collaborating institutions. The ASC ensures that the primary criterion for deployment of any equipment is based on scientific merit.

The tasks of the Steering Committee are as follows:

1. define the scientific policy of the AGATA Collaboration taking advice from the AGATA Collaboration Council;
2. elect a chair and vice-chair among its members who will each serve for a period of two years;
3. appoint a Project Manager and members of the AGATA Management Board;
4. monitor the Project based on reports received from the Project Manager;
5. reports on the Parties concerning the evolution and/or modifications of the Project proposed by the Project Manager;
6. decide on the experiment campaigns for AGATA and the timetable for the deployment of AGATA systems at various facilities;
7. appoint the Campaign Spokesperson for each experiment campaign;
8. review the scientific progress of each experimental campaign based on reports received from the Campaign Spokesperson;
9. review annually the capital investments, the running cost statements and allocations and the personnel work and allocation and therefore modify or amend if needed Annexes B and C by decision taken unanimously;
10. verify that Parties' financial contributions are consistent with this MoU and makes recommendations when required
11. inform the ARRB annually on all financial aspects of the projects including capital investment and operation costs;
12. make all effort to put in force an AGATA common account for investment enabling to gather funds, for mass purchases at reduced prices;

3. AGATA Project Manager (PM)

The AGATA Project Manager is appointed by the ASC to coordinate the execution and implementation of the project. For this purpose, the PM can create and dissolve working groups as needed and after acceptance of the ASC. The PM will nominate the chairpersons of these working groups.

The PM is responsible for the optimal use of the operation costs for the construction and maintenance of AGATA.

The PM together with the AMB members, prepares a written report and present the status of the project to the ASC.

It is in the PM's remit to coordinate the preparation and update of the AGATA Project Definition that contains the guidelines for the implementation of the project.

4. AGATA Management Board (AMB)

The AGATA Project Manager; Chairpersons of the working groups; Chairperson of ASC (ex-officio) attend the AMB. The AGATA Project Manager chairs the AMB.

The AMB executes and implements the project. The AMB reports to and be accountable to the ASC through the AGATA Project Manager. The AMB Working Group develop and construct and operate the instrument. They maintain and upgrade the different AGATA sub-systems during the experimental campaign. They join the effort of operation during the data taking in the host-laboratory.

The AMB is the construction-driving body of the AGATA Collaboration.

The tasks of the AMB are as follows:

1. lead the project in coordinating the efforts of the members of the collaboration through Working Group and Teams devoted to specific tasks
2. supervise the effective and efficient implementation of the Project.
3. collect information on the progress of the Project, examine that information to assess the compliance of the Project with the program decided by the ASC and, if necessary, propose modifications of the program to the ASC.
4. provide reports of the progress of the Project to the ASC including an annular planning and resource report.
5. advise the ASC on technical issues.
6. work with the Local Campaign Manager of each Host to ensure the successful operation of AGATA.
7. organize AGATA working group meetings as needed.
8. manage the Core Funds for the construction of the equipment, carry out its repair and maintenance and report to the ASC the Core money and running costs use
9. organise once a year the AGATA week workshop with reports of all the Working Groups and teams.

5. Local Project Manager (LPM)

The AGATA Local Project Manager is appointed by the host laboratory to lead the local project construction, coordinating the installation and to operate the spectrometer during its stay at the accelerator. For this purpose, the LPM follows the host laboratory project framework and join the AMB. He reports to the PM and host laboratory directorate. He collaborates with the Scientific Campaign Spokesperson.

The Host-Laboratory and its LPM are the operation-driving body of the AGATA Collaboration.

6. Scientific Campaign Spokesperson

The scientific campaign spokesperson is proposed by the ACC and elected by the ASC for a given campaign in a host laboratory. This person acts as a specific link between the ACC, the LPM and the host laboratory director on scientific matters. The spokesperson advises the host laboratory director on sub-campaigns and coordination of the user community during the proposal submission and evaluation.

7. AGATA Collaborating Council (ACC)

The ACC is the advisory body of the ASC on scientific matters concerning the AGATA project. The member of the ACC represents the scientific user community of AGATA. The user community proposes, performed, analyses and publishes the scientific programs. They collaborate closely in the operation and the analysis during the data taking (shifts).

The ACC and its chairman are the daily science-driving body of the AGATA Collaboration

The tasks of the ACC are as follows:

1. elect the AGATA Spokesperson who will serve for a period of two years. A body of five persons are nominated by the AGATA Spokesperson to organise the election of the next ACC chair.
2. advise the ASC on scientific matters concerning the AGATA project and the research programme through the AGATA Spokesperson.
3. nominate the Campaign Spokesperson for each experiment campaign to the ASC.
4. hold meetings, at least annually, to receive reports from the ASC and AMB on the progress of the Project and from the Campaign Spokespersons on the progress of the research programme.
5. hold an annual open meeting of the AGATA Collaboration to present the status of the Project and to discuss future experiment campaigns.

8. AGATA Resource Review Board

The AGATA Resource Review Board (ARRB) comprises the parties that are contributing to the AGATA project.

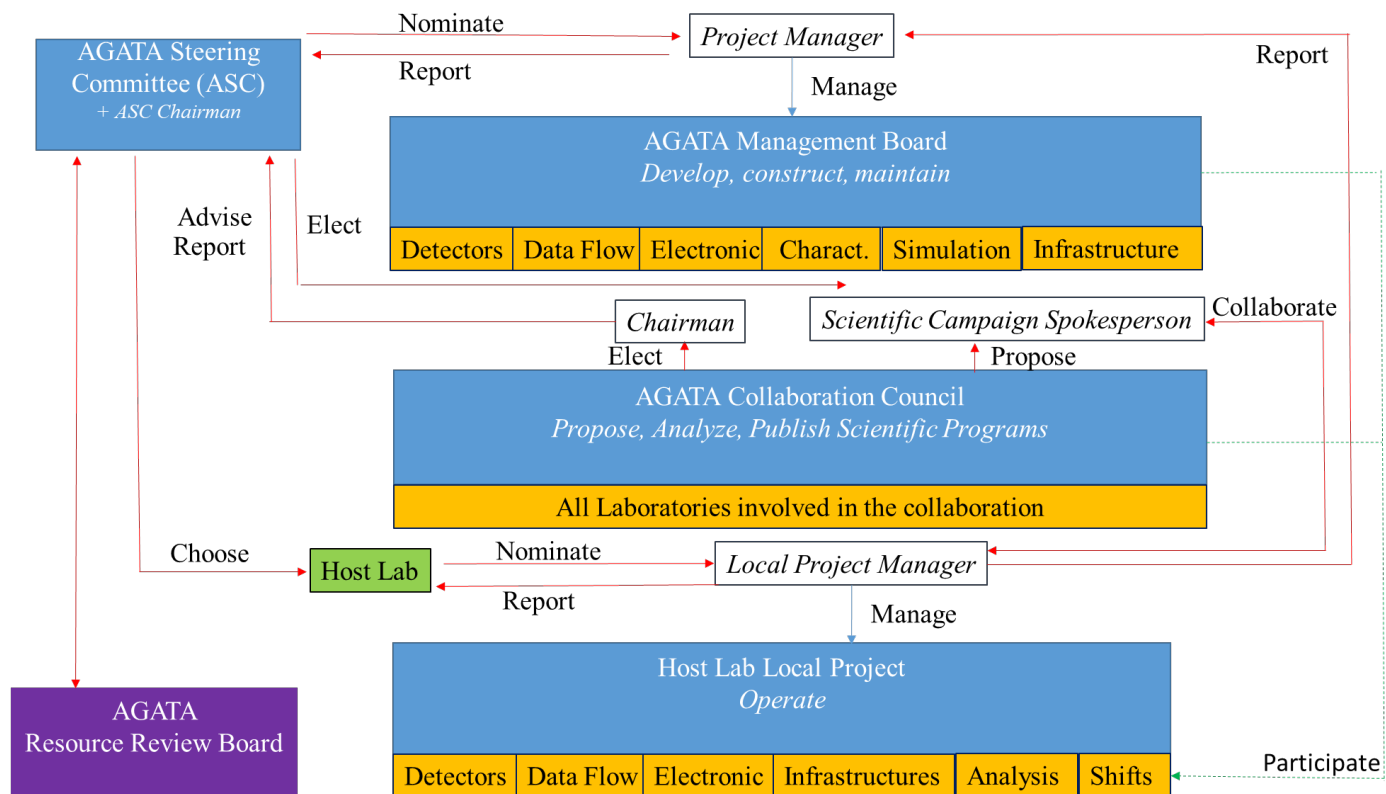
The meetings of the Resource Review Boards are the means to inform the parties about the overall financial status and technical progress of AGATA.

The role of the RRB includes:

- monitor the general financial and human resources supporting the AGATA project and its operation on the basis of regular reports from the ASC.
- advice on the prosecution and continuation of the Memorandum of Understanding
- endorse the annual construction and maintenance and operation budgets of the AGATA project and its exploitation.

The ASC informs the ARRB about funding plans and needs for further funding.

9. Summary





AGATA Phase 2 Management Board

Proposal for the new structure of the Management Board in the Phase 2 of AGATA

Working Document


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1. Introduction

The AGATA MANAGEMENT BOARD (AMB), is responsible for the execution of the project along the lines defined by the AGATA STEERING COMMITTEE (ASC). The goal of the AMB is to ensure that the AGATA project is implemented in the most satisfactory way, i.e. the project is completed on time, within budget, and according to the specifications. It is a body created by the AGATA ASC to coordinate the instrumental and technological efforts, in the R&D, construction and deployment phases. The AGATA project manager is the chairperson of the AGATA MANAGEMENT BOARD.

The AGATA Management process:

- Define the goals of the Project Phase along the lines defined by the ASC
 - Produce a project definition
 - Report and get approval of the project definition by the ASC.
 - Identify the Resources Available capital and efforts
 - Define the Timeline
 - Identify the Working Teams
 - Identify the Milestones
 - Define a plan with the Working Teams
 - Define and check Commitments
 - Adjust the Project Plan
 - Report and get approval of the project plan by the ASC
 - Monitor Progress
 - Report on Progress to the ASC
 - In case of milestone unreached adjust plan and identify extra resources if required.
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The construction of the first implementation of the AGATA array, i.e. the AGATA Demonstrator, has shown that the concept of the gamma tracking and in particular the way AGATA has implemented it, is feasible. The second phase consisting in the first experimental campaigns in LNL, GSI and GANIL with a nearly 1π array has shown the power and sensitivity of the array. The main goals for the implementation of the next phase are: to complete the project as defined in the Projection definition 2020, to increase reliability of robustness in the AGATA subsystems, as well as promote production quality control, to investigate possible improvements of subsystems where obsolescence or high production costs make it advisable, to promote the R&D to improve the AGATA subsystems for the following phases and finally to put all efforts to make successful the next ten years physics campaigns promoted by the ACC and ASC on behalf of the AGATA collaboration.

AGATA Phase 2 Management Board

The AGATA project is a challenge for our community, the interaction of the scientific working groups and engineering working groups is a fundamental issue in the project. The final goal of AGATA (the construction of a reliable gamma tracking array for the European Nuclear Structure community and its scientific exploitation) requires excellence in all aspects of the project and in particular in the technical ones. The AMB should promote and encourage excellence within the engineering and scientific working groups as well as to stimulate the dissemination of the knowhow within the collaboration. The deployment of personnel to acquire experience and support local teams is desirable. The deployment of scientific and technical personnel to perform the scientific campaign is responsibility of the collaboration.

To make effective the interaction of scientists and engineers working groups, it is fundamental to define an information flow scheme, with clear and detail specification written in the different development phases of the subsystem project, i.e. R&D specifications, prototyping specifications and production specifications. All the specifications have to be discussed and accepted by the working groups involved in their definition and will be the base of the daily work. Any revision of the specifications has to be approved and discussed in the working groups and finally by the AMB.

The fulfillment of the committed milestones is the fundamental priority of the full project and the willingness of groups to help, when the collaboration is facing unpredicted problems, has to be promoted.

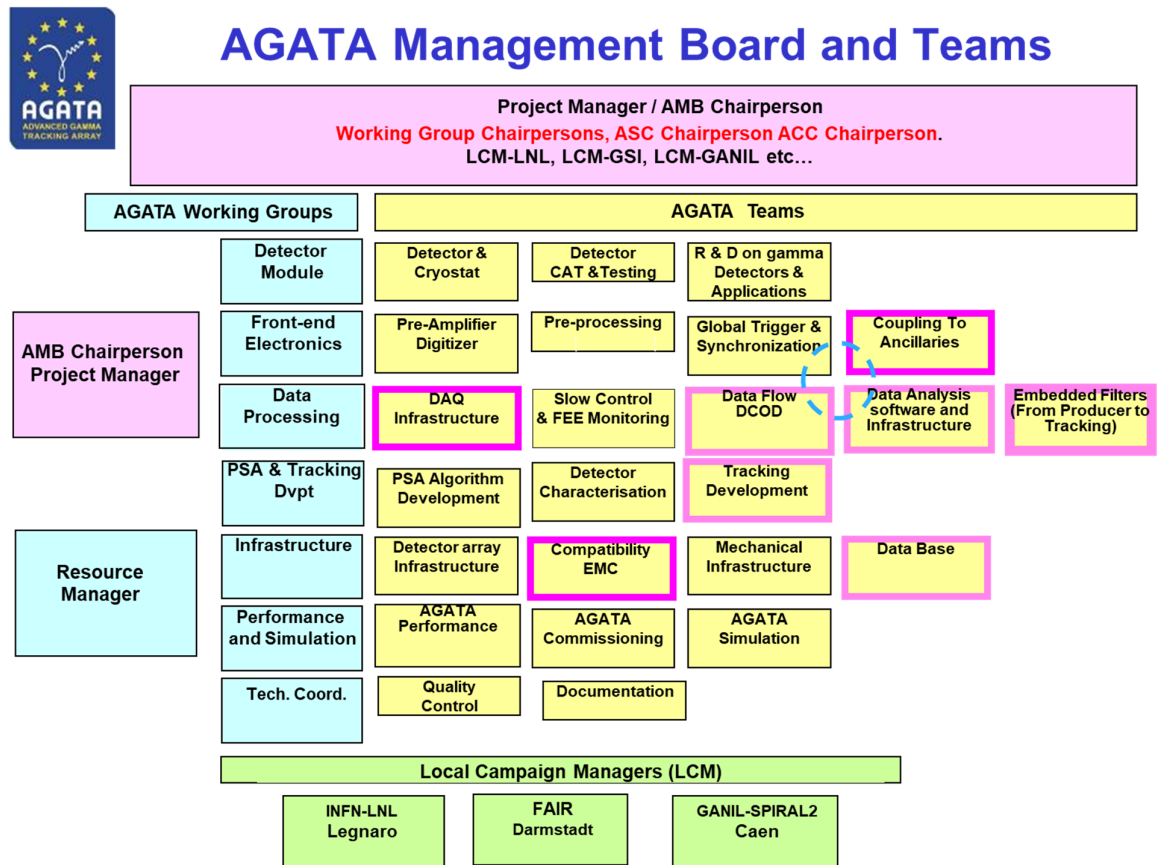
It is the task of the AMB to encourage the view of an AGATA instrument created and belonging to the AGATA community, scientists and engineers, wherever it is presently exploited and requiring the support and involvement of all the community scientists and engineers for the successful exploitation.

The collaboration, through the AGATA Teams, contributes to build and agrees to a project plan. The project plan has to be approved by the ASC. It is the responsibility of the AMB Project Manager together with the ASC to ensure that people/laboratories who take on a task/responsibility fulfil the milestones and deliver to the best of their capabilities.

2. Membership of the AMB and Adopted Organization

The membership of the AGATA Management Board has been determined by the expertise leadership in technical aspects of utmost relevance for the project. The present phase of the AGATA project requires a leadership able to cope with a new R&D phase in several aspects of the project as well as the completion of the construction of the AGATA full subsystems. The AMB will reflect, as it does now, the various subsystems/aspects of the AGATA project. The coordination of the project will be lead by the AMB chairmen and by the team/task chairpersons, which will cover the different sub aspects of the project. In general, the role of the team/task chairperson should be reinforced. Note that tasks are only proposals, the AMB members should define their W.G. tasks and they may change on view of a phase dominated by production.

The proposed new structure of the AMB is presented below and result from the experience of the past 10 years in the AGATA management project. Teams highlighted in pink square have been newly renamed, changed of working group or newly created.



As stated by the ASC, the Local Project Manager will be invited to join the AMB.

3. The AGATA Project Manager role.

The Project Manager activities and responsibilities are described below:

- Chair the management board and hold regular meetings: this requires setting up meetings; running meetings; revising approving and distributing meeting minutes.
- Set-up the working group structures to manage AGATA. The proposed AMB main working groups have been described in previous sections, the decision on the task/team working groups will be done within the AMB aiming to maximize the usefulness of each team.
- Appoint members of the AMB including the Local Project Manager and those responsible for other aspects of the AGATA operation as well as the leaders of any working groups to be set up for the future.
- Production and maintenance of a Project Definition for AGATA. This project definition has to include a description of the project and the responsibilities for each partner in terms of capital and effort and a budget estimate. The Project Definition is the basic working document for the collaboration. It will be prepared by the AMB and teams and all aspects will be discussed in a collaboration town meeting. The Project Definition will be submitted to the ASC for amendments and finally for approval. The commitments of the partners, including budget and efforts, will be collected and reported by the Project Manager and will be included in an addendum.
- Submission of a written report to the Steering Committee as required, typically every six months. Attendance at the Steering Committee meeting to present the report. The Project Manager as chairperson of the AMB will coordinate the preparation of a written report that will complement the technical documentation provided to the AGATA Steering Committee. The Project Manager, as well as any other member of the AMB, when required by the ASC, will attend and present the report to the AGATA Steering Committee Meetings.
- Collection of the capital spend figures and efforts from the partners and the production of an annual capital financial statement for the Steering Committee. As part of the project plan tracking the Project Manager or AMB member in charge will contact the national person responsible to collect the figures of the capital investment and, together with the AMB, will record and advice on the use of the capital. The efforts are part of the project plan and the AMB will track and advice on the use of the efforts within the collaboration.
- Following liaison with the Local Project Manager the production of an annual running cost statement for the Steering Committee. This should include a statement of the current position and a request for running costs for the next calendar year and an estimate for future years. This should be done at the last Steering Committee meeting each calendar year.

AGATA Phase 2 Management Board

The running costs will be discussed with the Local Project Manager as well as with the AGATA working groups involved in the maintenance of the AGATA equipment. Running cost report and plan for the future will be delivered for discussion to the AGATA Steering Committee

- To bring to the attention of the Steering Committee any other matters needing their attention. The Steering Committee will be informed of any adjustment of the project plan as well as of any other matters relevant for the execution of the project plan.
- Organizing the liaison with the Local Project Manager to ensure the smooth operation of AGATA. Coordinating the interaction of the AGATA AMB with the Local Project Manager and local persons in charge of different aspects of the deployment of AGATA in the local host. Aspects that have to be taken into account: the installation of the AGATA infrastructure subsystems and the interaction with the local infrastructure, the installation of the AGATA Processing subsystem, the DAQ subsystem, the analysis subsystem, infrastructures for detector support and maintenance and in general interfacing. Aspects related with the coupling of AGATA with the necessary complementary instrumentation provided by the host or by the AGATA collaborators. The AMB should coordinate effort on the Monte Carlo simulations of the AGATA setup installed in the host laboratory, using realistic event generators to provide performance figures to the AGATA community. The technical advisor in collaboration with the local technical staff will contribute to establish the protocol of the installation in a local host.
- To work with the appropriate Local Project Manager to organize the transfer of AGATA between host laboratories. The AGATA Project Manager and in general the AGATA Management Board will coordinate the task of the AGATA working groups, the interaction with the Local Project Manager as well as with the local working groups in charge, to organize, in an optimal way, the transfer of AGATA between host laboratories.
- Production of a rolling plan to ensure the sustained operation of AGATA over the next five years period. This plan should be updated each two years and should look ahead to determine what technical developments (if any) are needed.
- To have a technical overview of the various components of AGATA (e.g. detectors, electronics, data acquisition, data analysis, infrastructure etc.). To establish appropriate working groups to ensure that, those collaborators with the relevant expertise and those who have responsibility for the current components of AGATA, work together to ensure the technical capability to deliver the physics program.
- Organize with the Technical Coordinator a review of the AGATA phase 2.

4. AGATA Resource Manager

The dimension of the AGATA project and the fractionated financing scheme of the collaboration point both to the necessity of a figure in the management board supporting the Project Manager on the resource management issues. She will as well act as Deputy Project Manager -chairperson of the AMB- in case of absence of the Project Manager. The AGATA Resource Manager will assist the Project Manager on financial aspects in the execution and implementation of the project.

The AGATA Resource Manager reports to AMB the expenditure/financing issues and is responsible of bringing to the attention of the Management Board Committee any expenditure/financing issue needing their attention.

Tasks and duties of the Resource Manager

The tasks of the Resource Manager realised in agreement and collaboration with the Project Manager are as follows:

1. Produce an expenditure rolling plan to ensure the sustained construction and operation of AGATA over the next two years period. This plan should be updated each year,
2. Suggest to the AMB the distribution of the AGATA subsystem series production over the institutes or institutions forming the AGATA Collaboration in agreement with the available funds in each country.
3. Follow and facilitate funds transfers between countries when needed,
4. Suggest to the AMB an annual running cost statement performed with the Local Project Manager. This should include a statement of the current position and a request for running costs for the next calendar year and an estimate for future years. This should be done to enable a report at the last Steering Committee meeting each calendar year,
5. Collect and record the capital expenditure figures from the partners and the production of an annual capital financial statement.
6. The AMB will propose the ASC to appoint a member to work-out the conditions to fulfil to build a common AGATA financial platform in order to enable grouping of orders. The AGATA Resource Manager will be the liaison of the AMB on this task.
7. The AGATA Resource Manager, together with the relevant AGATA subsystem AMB member and when required by the Project Manager, will also be in charge to negotiate with the main providers of the AGATA project, the costs and purchasing order profile, in agreement with point 6.
8. Participate to the Project Definition on expenditure/financial aspects,

Expenditure management / organization

AGATA Phase 2 Management Board

The Demonstrator phase and phase 1 of AGATA have clearly shown expenditure problems, mainly related with the funding scheme of the collaboration, as well as difficulties to transfer funds between countries when needed. In addition, complex administrative procedures vary from one country to the other and some series items produced in one country and bought by another can raise problems with VAT and unfulfilled purchasing commitments, leading to troubles in the full production.

During this phase a common practice was that each country purchased items in such a way to be able to build a full detector-module chain from the detector to the disk. This organisation had as a consequence that many transfers of funds had to be organized between the countries. In addition, it required continuous reorganization of the expenditure profile to cope with even small financial changes in a country. Such an organization was almost unsustainable for the construction of this modest array, such as the AGATA Demonstrator, and cannot be kept for the full array for obvious managerial reasons.

In order to avoid similar problems in the construction phases of AGATA, the Resource Manager, knowing precisely the AMB financial constraints, will act as liaison with an ASC member appointed by the ASC, to perform the following tasks:

1. Determine the conditions to build a common AGATA financial platform,
2. Implement the platform,
3. Ensure the funds transfers from each participating country to the platform,
4. Organize a protocol for common AGATA orders
5. Suggest to the ASC, if it is necessary and in agreement with the AMB, possible improvements of the AGATA MoU related to financial issues for present or future phases.

Such an organisation should ensure the AGATA collaboration a smooth financial structure over the coming years.

5. AGATA Technical coordinator

The Technical coordinator/Advisor role, in the management structure of AGATA, has been proposed in order to provide guideline on engineering issues that are of paramount importance for the management of the project.

So far, this task could never be attributed. It is proposed to release from the technical coordinator the EMC responsibility and to **refocus the task on the quality control of the project**. Such task is today frequently requested by funding agencies in the global evaluation of the project.

The AGATA Technical Coordinator will assist the Project Manager on quality aspects in the execution and implementation of the project. The Technical Coordinator can create Task Groups included in the Technical Advisory Working Group with the agreement of the AMB.

The AGATA Technical Coordinator will chair the Technical Advisory Working Group and will hold regular meetings. The AGATA Technical Coordinator reports to AMB the work of the Technical Advisory W.G.

Tasks and duties of the Technical Coordinator

The tasks of the Technical Coordinator are the following:

1. Participate to the Project Definition on quality aspects
2. Check the Project Definition tasks lists and milestones
3. Advice on the adequacy of commitments and dedicated efforts
4. Manage and advice on quality control issues,
5. Suggest actions to increase the reliability and robustness of the AGATA subsystems
6. Recommend actions in case of delays on fulfilling milestones
7. Ensure that there is appropriate documentation on all subsystems,

The Technical Coordinator will be in charge to organise with the Project Manager a review of the AGATA Phase 1.

Tasks and milestones

The AGATA task list and milestones are to be defined by the AMB and, when applicable, by the Local Host Campaign Managers. The AGATA Technical Coordinator and his group follow the project plan and suggest modification of the task structure, the adequacy between commitments, knowhow and efforts, and in case of mismatch it proposes actions addressed to reach the milestones as defined in the project plan. The AGATA Technical Coordinator brings to the attention of the Management Board Committee any mismatch or issue that may have impact in the achievement of the project milestones.

It is the responsibility of the full AMB, including the Technical Coordinator, to find and implement actions addressed to solve the issues.

Compatibility of the Local Host and AGATA Installations

The compatibility between infrastructures, environment, electronics, data flow, data acquisition and data analysis framework between AGATA and the Local Host will be anticipated by the responsible of the ancillary detector team and studied by the working groups of AGATA and the Local Host Project Managers

Important issues in this aspect are:

- **The Electromagnetic compatibility**

The AGATA signal integrity protocol is to be defined by the AMB and the Local Host Project Manager. The AGATA infrastructure group will check the proper electromagnetic compatibility of the installation and if necessary will organise signal integrity tests. It is the responsibility of the AMB to propose and/or implement solutions if the issue endanger the AGATA performance.

- **Interfacing AGATA**

It is the responsibility of the AMB and the Local Host Campaign Managers to realise the interfacing of AGATA to the Local Host services, Electronics, Analysis framework and DAQ. The necessity of any kind of interfaces has to be anticipated by the ancillary detector team leader with the AMB and the Local Host Campaign Managers. The Mechanical structure team is in charge with the Local Host Project manager of the mechanical studies to implement AGATA in the host site.

Specification control

It is the responsibility of the AMB and in particular of the AGATA Technical Coordinator to organize the checking of all AGATA subsystems specification documents to analyze if all relevant information for the design and construction of the subsystems is contained with sufficient detail. This is of paramount importance to facilitate the interaction between the scientific and technical AGATA members working in the definition of a particular subsystem.

It is compulsory, for all responsible members of the AGATA collaboration developments (AMB members Team Leaders etc...), to notify to the AGATA Technical Coordinator any modification of the specifications. The AGATA Technical Coordinator is entitled to define the protocol, to organize the checking of dependencies and to organize the active notification of the Specification modifications to all members of the Working Groups involved.

Quality control

The complexity of the AGATA instrument requires all components to have a high standard in quality and robustness.

The AGATA quality control protocol will be defined by AMB with the suggestions of the AGATA Technical Coordinator.

Quality control basic tasks are:

1. Check specifications item per item for quality issues in all phases of the AGATA subsystem development,
2. Define prototype acceptance tests and suggest quality improvements if necessary
3. Organise a project review for each item before acceptance for series production,
4. Define series acceptance tests,
5. Check that production quality is in accordance with the specifications.

The AGATA Technical Coordinator is responsible of organizing the proper quality control along the whole project. The AGATA Technical Coordinator has the responsibility to bring to the attention of the Management Board any quality control issue and suggest solutions if required. It is the responsibility of the AMB to find and implement the solutions.

Documentation

The AGATA documentation is to be provided by the Working Groups and the Local Project Manager. The AGATA Technical Coordinator will check that clear, complete and stable documentation is produced and made available to the community.

It is the responsibility of the AGATA Technical Coordinator to bring to the attention of the AGATA Management Board of any documentation issue. It is the responsibility of the AMB to propose actions to produce proper documentation, if required.

6. Detector system Chairperson

The main task of the detector system chairperson within the AMB is the availability of AGATA cluster detectors for the experimental campaigns. A very detailed characterization of the individual AGATA HPGe detector is required for pulse shape analysis. The detector system chairperson is in charge of: coordination of AGATA cluster detector production, AGATA cluster detector test and delivery and characterization of the AGATA detector capsules. A related important task is the coordination of the AGATA detector acceptance test of the individual AGATA capsules, which is a specified part of the detector procurement. The AGATA collaboration will pursue own R&D projects on HPGe detectors. The new position sensitive AGATA detectors will allow for further applications like the imaging capability in related research fields. A research program with AGATA detectors will be coordinated and supervised by the detector system chairperson.

AGATA detector teams:

- AGATA Detector and Cryostat Module
- Detector Acceptance Test
- Applications and R&D on Ge Detectors

AGATA Detector and Cryostat Module

The detector and cryostat team takes care of the production of the AGATA cluster detector and cryostats in close collaboration with the manufacturer of detector capsules and cryostats with first priority. This includes the exchange and mounting of the detector elements in the AGATA cluster cryostats, repair and maintenance work during operation of the AGATA spectrometer. Together with the AGATA quality control group the team is in charge of improvements to increase the reliability of the AGATA cluster detector. In future the team is responsible to work out standardized procedures and their documentation related to AGATA detectors.

Developments aiming to adapt the electrical cooling to the AGATA Triple Cryostat and replacing the conventional electronics by cold VLSI (more likely ASIC) fast reset preamplifiers with warm digitizer in close proximity will required further developments of the AGATA cryostats.

The team is working in close collaboration with the AGATA infrastructure group.

Detector Acceptance Test

The detector acceptance test will be performed by a dedicated team which is responsible to measure the AGATA detector specifications as part of the customer acceptance test (CAT) after detector delivery. The qualification of a number of laboratories for the CAT will be promoted in the near future.

The CAT might be replaced by the Factory Acceptance Test (FAT) if the latter is

sufficiently complete and a qualified member of the AGATA Detector Module Group participates to the test.

Applications and R&D on Ge Detectors

The AGATA detectors are subject of future technological developments. The team will concentrate on innovative developments to preserve and increase the knowledge on detector production technologies within the AGATA collaboration. The following technological advances are of high interest: new materials for the construction of the detector housings like carbon fibers for reduced absorption properties, coating of the Ge crystals or a different encapsulation approach. The R&D projects are intended to be subject of joint future collaborations with other experiments which will be based on Ge detectors like other, new HPGe spectrometers for nuclear physics and fundamental research e.g. in the fields of neutrinoless double beta decay, coherent neutrino-nucleus scattering. Collaborations with partners from industry are envisaged. Moreover, applications of the novel position sensitive AGATA detectors are investigated and future developments will be initiated by the team.

The R&D on Position Sensitive Ge Detector technology in Europe, including for the AGATA detectors, has proceeded in the last years within the context of the ENSAR2 PSeGe JRA. The AGATA management will actively pursue when appropriate the implementation of the developed new technologies that will improve the performance and robustness of the AGATA detectors.

7. Front- End Electronics System Chairperson

Is the member of the AMB in charge of coordinating the R&D and production of all AGATA Front-End Electronics, from pre-amplifiers to the link to the DCOD DAQ system and coupling to ancillary detectors.

tasks/Teams:

- Pre-Amplifiers
- Digitizer
- Pre-Processing
- Global Trigger and Synchronization
- Coupling to ancillary detectors

It is a highly challenging system of the project and will always need a deep revision due to obsolescence of some major components and to the necessity to rationalize the costs.

Preamplifier team included: R&D on preamplifier should be kept open on two aspects, i.e. the higher integration of the preamplifiers functionality, reducing power consumption and the more challenging R&D for the “digital preamplifier”.

Digitizer: produce the new generation digitizers DIGOPT12. Evolution of the communication protocol including error checking. The task includes the maintenance coordination. The Team is as well in charge to develop boards replacing the DIGIOPT12 when necessary, including the Digital Pre-amplifier, whenever the development will be ready.

Front end Pre-Processing electronics: The team will face a major step of the project with the decommissioning of the ATCA electronic in~2022/2023, the production of the phase2 electronic (PACE) coupled to the phase1 (GGP) with the GTS protocol and a point to point readout to the farm, and later, >2025, a final configuration with 100% phase 2 electronic based on SMART and a distributed readout of DCOD.

Clock and Trigger: is a fundamental and highly challenging part of the system. Until ~2025, the clock and trigger system will remain the GTS system with a new trigger processor handling more than 40 leafs. After 2025, the SMART including clock and trigger distributions will be operational on AGATA. This is a major change in the AGATA system. Control and visualization at any step of the process with proper GUI is mandatory.

Coupling to ANCILLARIES will be also a major challenge of the project in particular with the FAIR campaign and its large instruments developed outside the AGATA collaboration. The AGATA Complementary Detectors team is in charge of coordinating the efforts to integrate and couple other subsystems developed by other collaborations to AGATA. Particular care has to be taken to the clock and trigger distribution via GTS and later SMART, common data analysis framework (software, infrastructure) and DAQ integration. The mechanical integration is of the Infrastructure working group.

8. Data Flow and data Analysis Chairperson

He is the member of the AMB in charge of coordinating the efforts of the collaboration on the Data Acquisition system, storage, on-line processing and on the Data Analysis. The use of a large scale infrastructure in storage as well as the on-line phase of the Data Analysis, from Producers to Tracking are tasks of this W.G.

The W.G. is in charge of

- Data Flow System (DCOD)

The Data Flow architecture must be continually upgraded taking benefit of the development of the ADA architecture, operating system and hardware. The phase2 pre-processing will offer new opportunity in the jobs distribution from higher performances of the point-to-point architecture to multi-distributed task architecture. **The team has in charge the development and maintenance of the Crystal Producer actor at the**

interface with the pre-processing team, DAQ infrastructure and administration team and Algorithm Implementation team.

▪ DAQ infrastructure and administration

The AGATA DAQ relies on important infrastructures with high power workstations, fast network, gateways, analysis infrastructure and large scale data storage. With the increased size of the array, a dedicated team must be settled to deal with the hardware and administration.

▪ Algorithm Implementation in the Data Flow (from Producer to Tracking)

The quality and performances of the on-line processing of the data is a delicate interplay between the data flow structure (DCOD) and the embedded filters (Crystal Producer, PreProcessing, PSA, Post-PSA, Builder, Merger, Ancillaries, Tracking and Consumers). This team is in charge of implementing, maintaining and coordinating the progresses made in any of these filters in the on-line DCOD data flow. The R&D on the filters for the PSA and Tracking is part of the PSA and Tracking Dvpt working group (see below). The team ensures that embedded filters reach the maximum level of performances for the on-line. Possible improvements in inputs files management, spy technologies and Threading or other technologies to improve the CPU time are part of the team tasks.

▪ Run Control, DAQ Monitoring

With the increase of the array, careful DAQ and Run Control monitoring is mandatory in a user-friendly approach. This include run control managing the DCOD jobs at a global level with proper monitoring to the users. It coordinates the run id and connection with the ancillaries. The Run Control could be part of a global product coordinating also the FEBEE slow control and ensures a global survey, control and monitoring of the system when data taking.

▪ Data Analysis software and infrastructure

The near-line and off-line analysis become a significant task in the last campaigns in LNL, GSI and GANIL. This team has in charge the development and operation of the on-line and near-line analysis software mandatory for the running of the experiment. It is in direct collaboration with the Algorithm implementation team in the common working group. In collaboration with the “Ancillary team”, it must provide a common data analysis framework with the ancillary detectors from in- or out-side the AGATA collaboration as well as the detectors of the host labs. It can request proper infrastructures to the DAQ infrastructure and administration team that belong to the same working group. Finally, it must provide software, documentation and support for the off-line analysis after the

experiment is completed until publication of the data. Data analysis school are of its responsibility.

- GRID or new big data archive system

Each AGATA campaign has produced hundreds of Tb of raw data. Their archives and access is of the responsibility of the team. GRID is the system so far used by the collaboration. New framework must be explored in collaboration with the Data Analysis software and infrastructure team.

- FEBEE Slow Control: The new Front-End electronics requires further development and secure global coordination with earlier phase. With the increase of the array, careful FEBEE monitoring, setting, archived and quality analysis are mandatory in a user-friendly approach. As mentioned before, the FEBEE slow control could be part of a global survey of the system including the data flow and data acquisition.

9. AGATA Infrastructure Chairperson

The Chairperson of the AGATA Infrastructure Working Group is the member of the AMB in charge of coordinating the efforts of the collaboration on the infrastructure issues of the AGATA array. This includes the mechanical structures needed to support the detectors, the tools to align and mount the detectors, the whole detector support system (LN2 autofill system, low voltage power supply for pre-amplifiers and front end electronics, HV modules and HV control system) and the specific on-site infrastructure such as cabling, optical fibres, cooling and UPS systems.

Tasks/Teams:

- Mechanical Infrastructure

The team has in charge the mechanical structures needed to support the detectors, install the detectors, the cable managements and the design of the tools to align them into the array and in the cave. The team must have a pragmatic approach minimizing cost and maximizing compatibility and flexibility for all possible host lab defined in the scientific strategy of AGATA.

- Detector Infrastructure

The team has in charge the development, construction and maintenance of all the Detector Support System (DSS); This includes High voltage crate and board, LN2 autofill automat and survey, low voltage for preamplifier and digitizers. The LN2 system and survey reliability must be one of the top priority of the team.

AGATA Phase 2 Management Board

- Complementary ancillary interface

Assist the Local Project Manager team and the ancillary team in the local mechanical implementation of AGATA in the host lab and with the coupling to any ancillaries.

- Data Base

The team has in charge the development and maintenance of the AGATA data base for travelling items.

- The Electromagnetic compatibility

The AGATA signal integrity protocol is to be defined by the AMB and the Local Host Project Manager. The AGATA infrastructure group will check the proper electromagnetic compatibility of the installation and if necessary will organise signal integrity tests. It is the responsibility of the AMB to propose and/or implement solutions if the issue endanger the AGATA performance.

10. Performance and Simulations Chairperson

Member of the AMB and in charge of coordinating the efforts of the AGATA community regarding simulations, including simulations of complementary devices coupled to AGATA. In charge of the coordination of procedures to check, track and evaluate the AGATA performance. This working group has also the task of defining and proposing commissioning experiments for every new experimental condition that requires it. The role of the working group is also to be the “physics” interface to the AMB.

Possible tasks/Teams:

- Simulations
- Experimental commissioning
- Performance evaluation

Description of the tasks:

- **Simulations.** Coordination of all simulation activities within the AGATA collaboration. Simulations of the physics (event generators), of realistic experimental conditions and of complementary instrumentation coupled to AGATA for past, present and future experimental campaigns. Comparisons with real experiments.
- **Experimental commissioning.** Coordination and planning of AGATA commissioning experiments needed for each major new experimental condition. Responsible for the evaluation and reporting of the results of the commissioning experiments.
- **Performance evaluation.** Coordination of the performance of AGATA along the scientific campaigns. Define goals for the performance numbers of AGATA for each experimental campaign. Evaluate and report the performance numbers on a regular basis.

11. PSA and Tracking development

The team has in charge the fundamental R&D on the Pulse Shape Analysis and Tracking technics. It involves detector characterization, realistic data base (calculated or experimental), new and faster algorithms and new approaches based on machine learning or others.

- Detector Characterization

The team has in charge the R&D on experimental characterization of the AGATA detectors using scanning tables or other in-situ methods. It has also the task of developing the simulated PSA basis. The detector characterization and the construction of a data base of position dependent pulses of the individual segmented is the common task of a dedicated team. The scanning program with various scanning tables and different scanning techniques will be pursued. The pulse shape data base of the new Ge detectors will be constructed from measurement of basic detector properties and will be validated by comparison with crucial data points from scanning or the quality of the date base will be determined by pulses from source and in-beam data. The adaption of the data base to different operation conditions is part of the work package. Especially the exploitation of the detectors over a long time period is necessary by adaption to new electronics and modified transfer functions, to degradation due to trapping centers, neutron and/or radiation damage. High priority is given to the creation of a calculated signal databases.

- PSA Team

The team has in charge the development of new PSA algorithms to improve the response function, the treatment of multiple hits interaction events, the processing time in point-to-point electronic and explore the new possibilities offered by the distributed task management of the phase2 electronic. The PSA team will interact strongly with implementation team for on-line processing. The team will also provide help in the offline analysis to reach the best sensitivity for given experimental conditions.

- Tracking Team

The Tracking team cannot be isolated in the data flow working group anymore. The team should work in close collaboration with the PSA team and detector characterization team. The team has in charge the permanent development of the tracking algorithm to reach the best sensitivity of the array from low to high energy and from low to high multiplicity. The team will also provide help in the offline analysis to reach the best sensitivity for given experimental conditions.