The roles of the SCAB Nominations and Activities systems in the ATLAS-CERN speakers selection

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Abstract. Considering CERN's prosperous environment, developing groundbreaking research in physics, and pushing technology's barriers, CERN members participate in many talks and conferences every year. However, given that the ATLAS experiment has around 6000 members and more than one could be qualified to present the same talk, the experiment developed metrics to prioritize them. Currently, ATLAS is organized in a tree structure with groups and subgroups, called Activities. Each Activity has responsible members such as the conveners or sub-conveners, project leaders, and activity coordinators. Because of the hierarchy mentioned, the member's nomination will work its way up the branches, providing the upper levels with input from the lower ones. Previously, this process was not automated and happened through the exchange of spreadsheets, not providing these conveners and coordinators with the big picture of the nominations' priorities and reasons. To improve this process, two systems were developed by the ATLAS Glance team: Activities and SCAB Nominations. The Activities interface provides a user-friendly view to manage the activities tree structure, the coordinators of each activity, and their allowed actions in the nomination process. The SCAB Nominations interface automates the nomination process of the ATLAS Speakers Committee Advisory Board, allowing all the coordinators to give their nominees priorities, and justify them in comments. These two systems contribute to a more holistic process for selecting collaboration members to present at a specific conference. This contribution delves into their specifications.

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1 General Context

The European Organization for Nuclear Research (CERN) is one of the most important physics laboratories in the world, home to the largest particle accelerator, the Large Hadron Collider (LHC). In this prosperous environment, the boundaries of knowledge are continually expanded by groundbreaking discoveries and the development of new technologies. One of the biggest experiments at CERN is ATLAS, where approximately 6000 members

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contribute to research in fundamental physics [1]. These physicists, engineers, and technicians are spread across approximately 40 countries [2], working collaboratively across many different timezones. To ensure effective communication and task completion between these members, the Glance project [3] was developed in 2003 to streamline the management of the experiment by centralizing information about people, activities, and roles, and automating key collaboration processes. Currently, the ATLAS Glance project has 9 systems that provide interfaces for many essential segments of the collaboration such as member information management, the publication workflow, and, as the primary focus of these proceedings, the selection of speakers for conferences.

2 Challenge

2.1 The Challenge for Multiple Groups

The ATLAS Collaboration is divided into working groups, called Activities, organized in a hierarchical structure. Figure 1 illustrates this organization. Considering that the Activities are present in different collaboration contexts, correctly managing this hierarchy is essential.

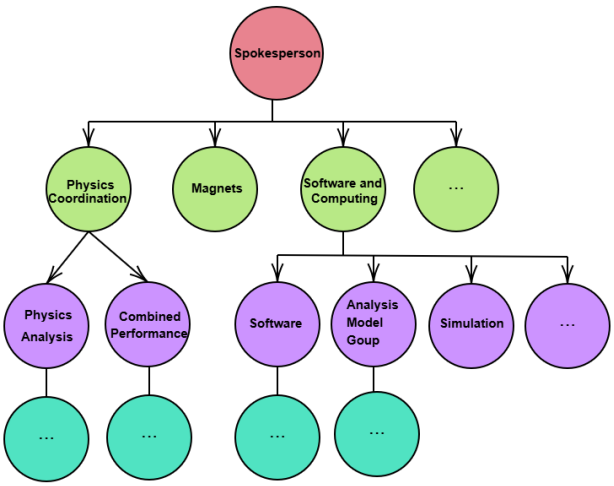


Figure 1: Schematic of the ATLAS activities tree structure with examples.

2.2 The Challenge for Conference Talks

As ATLAS is a very large collaboration producing hundreds of significant scientific results every year, there are frequent request for ATLAS results to be presented at international conferences. Since most ATLAS talks are required to cover results from many analyses, and most analyses are performed by several people or groups, finding the best presenter is often highly non-trivial. Thus, to guarantee that all those who have worked on the project are well represented in the conferences, the Speakers Committee Advisory Board (SCAB) is responsible for determining the criteria for deciding who should be given priority for talk assignments [4].

In this context, to have an equitable distribution of talks among the members of the collaboration, the candidate speakers will receive a SCAB Rank. This rank ranges from 1 (highest)

to 10 (lowest) and is determined by several criteria, including the weighted sum of priorities assigned during the SCAB nomination process. A nomination is an official suggestion for an ATLAS member to be given priority as a potential speaker and it can come from different sources such as Institute Representatives, Detector Activities Coordinators, Combined Performance Coordinators, and Physics Analysis Coordinators. Each member can receive multiple nominations and each nomination consists of a priority ranging from 1 (highest) to 5 (lowest) and a comment that can explain this ranking.

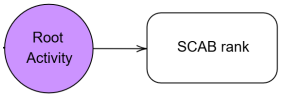
2.2.1 The path of a Nomination

As illustrated in figure 2, the nomination process can start at various levels within the hierarchy of Activities:

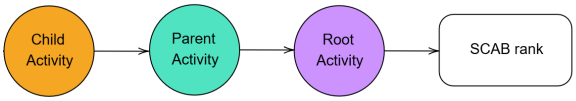
a) The Root Activity level, which represents an Activity authorized to submit to the official SCAB Rank;

b) A Child Activity level, which can be either the lowest or an intermediate level;

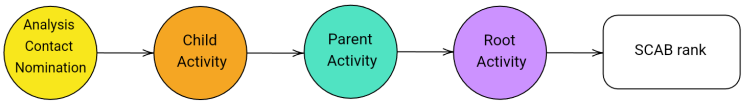
c) As an Analysis Contact Nomination, which is related to a specific publication. In this case, the nominees are the Analysis Team - the members responsible for developing and completing the analysis described in the publication.



(a) Start at root Activity level.



(b) Start at the lowest Activity level.



(c) Start as an Analysis Contact Nomination.

Figure 2: Possibilities for starting the nomination process.

In the Analysis Contact Nomination case, the input provided at this level will serve as input for the Activity that is the leading subgroup of that publication. The nominations then progress through the hierarchical structure, moving upward until it reaches the Root Activity level for submission, the Physics Analysis Activity. To take a concrete example: nominations proposed by the Analysis Contact for a publication led by the Higgs to ZZ Subgroup are considered at the Higgs to ZZ Subgroup level, then at the Higgs Group level, and finally submitted by the Physics Analysis Coordinator (the root for this particular tree).

A detail worth mentioning is that the Physics Analysis branch of the Activity tree is treated as hierarchically equivalent to one Detector Subsystem branch. This means that a member contributing to many publications simultaneously receives a single merged nomination reflecting all their analysis work, increasing the complexity of this process.

Until 2020, this process was not automated, relying on the exchange of spreadsheets between the responsible members and manual actions by the ATLAS Glance team. This approach did not allow a holistic view of the ranking process by the root Activities, nor did it provide a good user experience, while the manual nature of the process increased the likelihood of human errors. To address these issues, the ATLAS Glance team developed the Activities and the SCAB Nominations Systems.

3 The SCAB Nominations System

In order to ensure the fair distribution of ATLAS talks, the *SCAB Nominations System* was developed to facilitate the ranking process of members by the SCAB. Within this system, only Draft Nominations are managed, enabling responsible members to adjust priorities without directly modifying a member's SCAB Rank. Once submitted to SCAB, these Draft Nominations are converted into Nominations, and used to calculate the SCAB Rank and influence the speaker selection process. The system also provides a range of functionalities designed to improve workflow efficiency. For example:

- Automatic propagation in the hierarchy: A Draft Nomination at any level below a Root Activity Level will automatically be propagated to its parent level. An example is presented in figure 3;
- Scabber Algorithm: Considering the large number of Activities and members, in the upper-level Activity it is possible to run an algorithm, called Scabber, that combines the priorities and comments a member has received in the lower levels in a well-defined way to become a single value. Human intervention is still possible after running this algorithm.
- Importing previous nominations: Instead of starting the ranking process from scratch at the start of each twice-yearly nomination round, it is possible to import the nominations at any level from the previous round, as these are likely to represent a good starting point for revising the priorities.

The system also includes tools for monitoring seeding activity statuses and generating comprehensive statistics, as shown in figure 4. These features offer a holistic view of the nomination and ranking process, further enhancing its efficiency and usability.

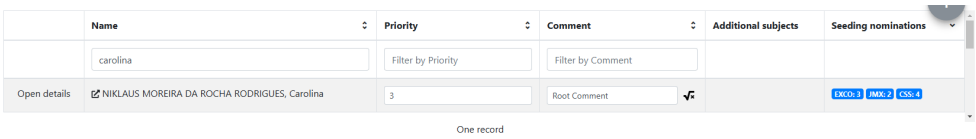
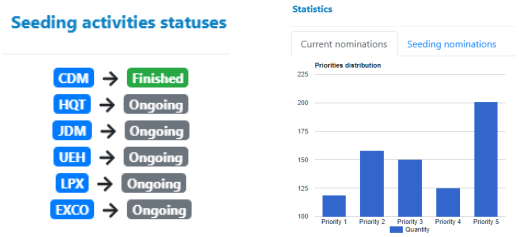


Figure 3: Example of how a nominee is presented at the Parent Activity level. The Seeding activity levels that the nominee is present and the corresponding priorities are highlighted using blue tags. The display also includes details such as the nominee's name, the priority received, and associated comments. The priority shown reflects a state prior to running the Scabber algorithm.



(a) Status of the activity's children

(b) Priority distribution from the current activity

Figure 4: Examples of functionalities in the SCAB Nomination System.

3.1 Integration with other ATLAS-Glance systems

As mentioned in section 1, the ATLAS Glance project maintains different systems to help manage different aspects of the collaboration. The SCAB Nominations System is integrated with these other systems for a seamless operation.

As mentioned in section 2.2, one of the lowest levels of the tree can be an Analysis Contact Nomination, which is linked to a publication. Instead of requiring Analysis Contacts to identify the Analysis team manually, the system automatically imports all team members from the Analysis System, allowing the responsible Contact to simply rank their contributions. This automation helps guarantee the inclusion of all contributing members in the ranking process.

Another display of this integration is the possibility of nominating members directly at the Activity or Detector Subsystem level. Members can be added in three ways:

1. By their name, integrating with the Membership System database;
2. By the working group of one or more physics analyses, performing a search in the ATLAS Analysis System database. This will automatically import their Analysis Team members given the analysis reference code;
3. By choosing an Operational Task and selecting its contributors, performing a search in the ATLAS OTP (Operational Task Planner) [5] database, a database not maintained by the Glance Team, that saves each member's contributions to the operation of the experiment.

4 The Activities System

The ATLAS Glance *Activities System* was developed to centralize Activity information and simplify the management of the organizational hierarchy.

Previously, each Activity was tied to a specific appointment— an official ATLAS role that was not easily transferable. As a result, the responsibility for assigning nominations for large subsystems with hundreds of contributing members often fell to a single convener. With the new system, other appointments or even individual members can now be designated to share these responsibilities. This enables the original appointment holder to delegate all or part of their work, ensuring a smoother and more efficient nomination process, even in their absence.

Moreover, any modifications to the Activity hierarchy or Activity information previously required manual database updates by the ATLAS Glance developers. With the new system,

Activity and sub-Activity coordinators can now make these updates themselves through a dedicated interface, eliminating the need to contact the Glance team.

As displayed in figure 5, other aspects of the system include:

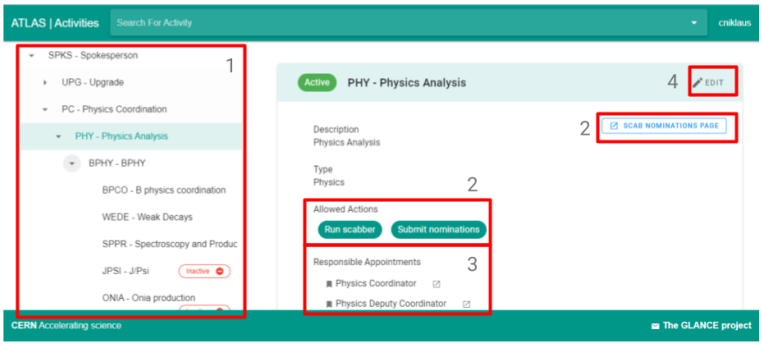


Figure 5: Activities System Main Page.

1. Visualization of the Activity hierarchy;
2. Integration with the SCAB Nominations System: the interface displays allowed actions associated with an Activity; for example, conveners of root-level Activities can submit nominations and run the Scabber algorithm described in section 3
3. The appointments responsible for the Activity, and its members, are displayed;
4. The Activity information is easily edited through the interface.

Together, these features align with the system's primary objectives of centralizing activity information and simplifying the management of the organizational hierarchy.

5 Technical Details

5.1 Backend Technical Context

For the development of these systems, it was important to have an architecture that was easy to maintain, thoroughly tested, and seamlessly extended with new functionalities. To achieve this, the Glance team adopted the Domain Driven Design (DDD), a design approach where the main objective is to divide the code into bounded contexts and structure the software around its domain [6]. With that, the backend is divided into:

- Domain layer: core business logic and domain rules;
- Infrastructure layer: communication with external services and database;
- Application layer: receives the interface commands, coordinating the interaction between the domain and infrastructure layer.

The well-defined layers enhance testability by allowing functionalities to be tested within their specific contexts. This reduces test complexity, minimizes the risk of bugs, and ensures the interface presents accurate information. Furthermore, this approach simplifies the implementation of new functionalities without disrupting existing code, as it only requires adding or updating a specific bounded context. The separation of responsibilities also improves maintainability by making the code clearer, which facilitates faster bug resolution.

5.2 Backend and Frontend Communication

For the SCAB Nominations and Activities System, the frontend relies on REST API using the HTTPS protocol to interact with web resources. As discussed in [7], one of its key aspects is the concept of stateless communication, where all the information necessary to complete the request is transmitted, making each interaction independent. This helps to achieve scalability. Another important aspect of this architecture is that the set of methods involved is fixed - GET, PUT, POST, DELETE.

To illustrate the operation of the system, consider the example in figure 6:
An Activity has completed its ranking process and requires a status update. Within the SCAB Nominations interface, the responsible member clicks the "Finish" button to initiate this update. This triggers an HTTPS PATCH request containing the necessary information: the Activity ID and the desired status (e.g., "finished"). Upon receiving the request, the Application layer processes it and invokes the Domain layer to enforce business rules, such as verifying whether all members have been assigned a priority. Once these rules are satisfied, the Infrastructure layer executes the necessary changes in the database. Finally, a response is returned, signaling to the interface that the action was successfully done. The UI will update the state of the button accordingly.

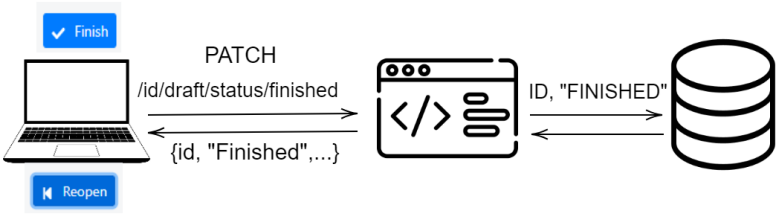


Figure 6: Illustration of the communication between frontend and backend using REST.

6 Next Steps

A portion of the SCAB Nominations system still relies on technologies from an older framework, particularly for database communication. As the data volume has exceeded the original design capacity, performance challenges have arisen. To address this issue, the ATLAS Glance team plans to migrate from the legacy framework to specialized SQL repositories, similar to those already implemented in the Activities System. This transition is expected to provide greater control over query execution, improving performance.

The Activities System, as discussed in Section 4, is currently integrated with the SCAB Nominations System. Looking ahead, the goal is to extend this integration to encompass other ATLAS Glance systems.

7 Conclusion

7.1 SCAB Nominations System

In the four years since the implementation of the SCAB Nominations system, it has proven to be a valuable asset in the ATLAS speaker selection process, although improvements still need to be made.

- Instead of the information being spread into different spreadsheets, it is now centralized in a single platform;
- Instead of doing this complex ranking process manually, it is now mostly automated;
- The system is designed to guarantee that all levels of coordination participate in the selection process.

7.2 Activities System

Meanwhile, following two years of operation, the Activities system has demonstrated stability and has enabled users to manage the activity tree independently, without requiring manual intervention from the ATLAS Glance Team.

These advances contribute to more streamlined processes, but continuous refinement will ensure that both systems continue to meet the evolving needs of the ATLAS collaboration.

Acknowledgments

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