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A SUCCESSFUL EMERGENCY RESPONSE PLAN: LESSONS IN THE CONTROLS SECTION OF THE ALBA SYNCHROTRON

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Abstract

These are challenging times for research institutes in the field of software engineering. Our designs are becoming increasingly complex, and a software engineer needs years of experience to become productive. On the other hand, the software job market is very dynamic, and a computer engineer receives tens of offers from private companies with attractive salaries every year. Occasionally, the perfect storm can occur, and in a short period of time, several key people in a group with years of experience leave. The situation is even more critical when the institute is plunged into a high growth rate with several new instruments under way. Naturally, engaged teams will resist reducing operational service quality, but, on the other hand, the new installations milestones dates will approach quickly. This article outlines the decision-making process and the measures taken to cope with this situation in the ALBA Synchroton's Controls Section. The plan included reorganizing teamwork, but more importantly, redefining the relationship with our clients and prioritization processes. As a result, the team was restructured and new roles were created. In addition, effective coordination was vital, and new communication channels were established to ensure smooth workflows. The emergency peak period is over in our case, but we have learned a lot of lessons and implemented many changes that will stay with us. They have made us more efficient and more resilient in case of future emergencies.

TRIGGER

This story starts in October 2021, when four people of the Controls Section had recently left and there were three more people in different temporary leaves (i.e. sick leaves and paternity leave). In total, the group's manpower was reduced by 7 people. With an effecive reduction of 7 Full-Time Equivalent (FTE) in a group of 16 people, there was a call to the Management Board for a critical ad hoc review and prioritization of the objectives and current developments for the Controls Section. By October 2021 there was a meeting with the Management Board presenting the current situation and developments, making visible the impossibility to do everything that was already started and going on, and start the next foreseen tasks. With a graphical visualization of people's main tasks and "orphaned tasks" as well as the big backlogs waiting to enter into the development cycle, it was clear that there was a need to do a thoughtful exercise at a facility level to plan and execute the most important tasks, hence, minimizing the risk of such situation. During December 2021 and January 2022 we held several meetings with the three Division Heads affected (i.e. Accelerators, Experiments, and Engineering) to highlight the most important developments required.

COORDINATION OFFICE CONTROLS CONTINGENCY PLAN FOR 2022

By February 2022 the Coordination Office Controls Contingency Plan was announced by our Director, and in March 2022 we held a kick-off meeting between Controls and the Coordination Office. One of the first tasks done was the creation of a Public Confluence Page where all the activities were highlighted so it was transparent on which developments there will be focus, and, as well, stating which activities were officially paused and stalled. The announcement of the Contingency Plan contained these clear messages:

- Work only on:
  - Incidents to assure operation
  - Activities to assure the progress of the New Beamlines Program (i.e. Beamlines in design, construction, and commissioning phases)
  - Few selected activities related to specific projects from Accelerators, Experiments, and Computing
- Assumptions:
  - Urgent tasks treated as exceptions
  - Internal activities self-managed (e.g. maintenance, critical bugs fixing, etc.)
  - Services reduced (i.e. no requests for changes or new features)
  - duration until December 2022
- Exclusions:
  - PLC Team activities (none of the staff that left was from the PLC Team, so productivity not affected)
  - Activities related to International Collaborations, Students, Newcomers, etc.

Staff Evolution

Unfortunately, the situation worsened in the following months with four more leavers. In Fig. 1 you can see the evolution of the Controls Section Staff from three years prior the Contingency Plan where there are a standard rate of leavers and newcomers, until one year after the Contingency Plan. As a reference, there are some markers indicating the years of experience of the people leaving; the duration of the Contingency Plan (extended until the end of January 2023); the staff recovery progress from February 2022 to July 2023. Since ALBA is still building new beamlines, we were able to increase the Controls Section Staff size with two more positions, one person is expected to join us in November 2023 and the other position is expected to be opened during

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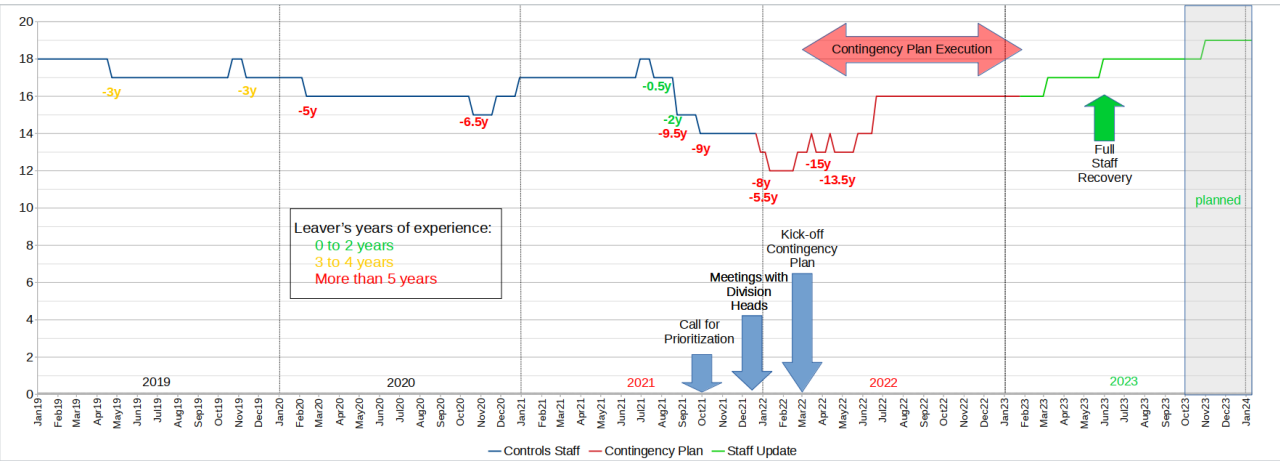

Figure 1: Evolution of the Controls Staff from three years prior the Contingency Plan to one year after.

2024.

ORGANIZATION

As published in ICALEPCS 2015 [1], since 2014 the ALBA Controls Section has embraced Agile Development principles and methodologies in order to manage the work to be delivered. Basically, we are organized in teams, each of them with a set of *Customer Units* backlogs with a prioritized list of activities to be developed. This sharing knowledge culture, together with the unique tool set for Service Support and Development implemented in 2017 [2] and the experience and ability of the staff to adapt to this critical situation resulted in the successful deployment and execution of the Contingency Plan. There were some areas of knowledge deeply affected because of the specific individuals leaving, and others without any impact since people were still available. The strict plan caused a change in the way we worked by, first, removing the direct contacts links with Customer Units.

Newcomers

One of the most important aspects in welcoming newcomers is the effort dedicated in mentoring and training activities required in the long on-boarding period that involves several team members. These activities has the highest priority in order to let the newcomer get enough skills as soon as possible, enabling to start contributing as any other colleague as soon as possible while still learning. There is plenty of real tasks in the field that can be completed without deep/expert knowledge, those are good candidates for this transition. As you can see in Fig. 1, we had 6 newcomers in 4 months while executing the Contingency Plan in 2022. We also took the opportunity to improve our user and technical guides as well as our how-to documents in order to prepare the Service Support interventions for those newcomers.

TOOLS

Types of Activities

An adequate classification of activities is key for a good coordination and communication. The development team will always appreciate very clear rules than can be applied in order to determine the priority and relation of a particular effort with the global planning and how it fits with the current Contingency Plan execution. For that reason, all the activities related to the work done by the Controls Section were categorized in four different types:

- Type 1: Service Support Incidents
- Type 2: Assure Operation, Installation, and Commissioning
- Type 3: Coordination Office Contingency Plan Activities
- Type 4: Other activities (e.g. Maintenance, Newcomers, Students, etc)

For each Type of activities, there was an associated JIRA filter that could group all the efforts related with that type of activity. On top of that, for the Type 3 activities, there was a specific JIRA Epic for better grouping and tracking, and a public Confluence page with (a) a description of the work to be done; (b) a list with the people committed to that development; (c) a list of monthly goals; (d) a table with all the executive summary reports; and (e) a table with the meeting notes for reference. With this classification of activities it was very clear on one side which activities were subject to follow up by the Coordination Office, and, on the other side which were mandatory activities that had to be done, regardless of the priorities on the developments.

Service Support Role

Since we had to ensure Operation while focusing on some specific developments, we created a Service Support Role that would rotate among all the Controls Section members, one day each, so enabling the rest of the people keep the focus on the high priority developments agreed with the Coordination Office. Having improved documents and how-

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tos helped also newcomers to perform this role. We were all aware that, the better documented procedures, the less interruptions we would get. This role had specific tasks to be done:

- Triage: gather basic information of the Service Desk new requests, and set priority with a predefined list of questions to the requesters
- Monitor: check all subsystems and take proactive actions if needed
- Mentor/train: some interventions were very good opportunities for newcomers to learn
- Document: proactively improve documentation to increase the efficiency in similar future interventions

Service Support Calendar

We also set up a public Confluence calendar so, with one month in advance, we had assigned the role of service support to one person, and also a backup was registered just in case an unexpected event happened. This role was assigned just on normal operation days, not during Machine Days, Warm Days, or Shutdowns. In Fig. 2 there is a capture of this calendar for July 2022. One of the lessons learned regarding the calendar scheduling is that Machine days, should be treated as Operation days so one of the Controls Section member is aware of the needs of the Control Room.

Figure 2: Service Support Calendar for July 2022.

Kanban Boards

The visualization of the work is crucial for an efficient group coordination, so a transversal Kanban Board for the service support requests was created. It contained 4 different swim lanes for categorization which enabled to provide the best support possible with the current section capacity. These categories were: (a) expedite; (b) fixed date; (c) standard; and (d) maintenance issues. All these different swimlanes had then the transversal columns that the issues will move along: (a) triage; (b) ready; (c) in progress; (d) stalled; and (e) waiting for verification. For the Coordination Office prioritized developments we also set up a similar Kanban Board that together with specific filters allowed everyone to manage individually the current on-going tasks as well as collectively plan the next steps.

REPORTING AND FOLLOW-UP

The reporting was possible because all the developers were registering their worklogs, so we simply set up specific filters for each set of information to be properly categorized and presented. With those filters we configured several Dataplane Reports with which we could download all data as CSV files, and finally these files were imported as data sources in PowerBI that was used for the creation of the visualization dashboards to be used in our monthly follow-ups. These dashboards were used to track, review, and take corrective actions if needed to guarantee the progress and evolution of the different activities. The first information presented was the amount of issues and the amount of time dedicated for each type of activity. The time dedicated to incidents and maintenance was also critical information in these periodic reviews. With this information, we were able to ensure that at least 30 - 35% of the time could be dedicated to the developments with highest priority for the whole facility. Figures 3 and 4 show this basic information that was reported and reviewed in order check and warrant the Contingency Plan was running as designed.

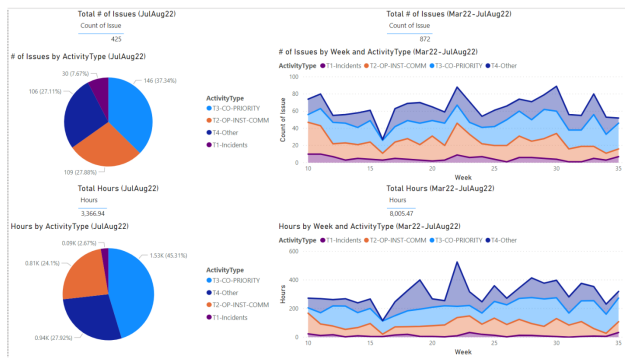

Figure 3: July and August 2022 report summary.

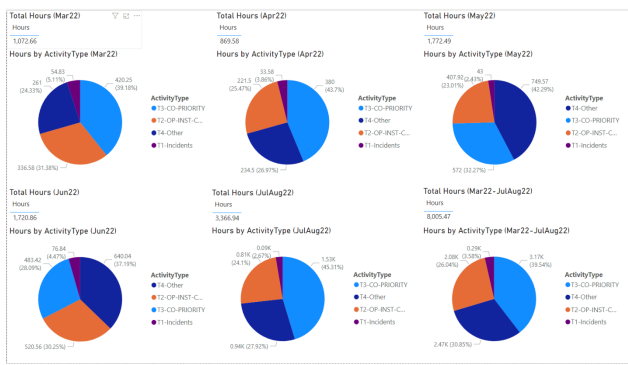

Figure 4: Monthly distribution of effort based on Activity Type.

In this reports we also had a look at the effort grouped by our Customer Units (i.e. specialized groups in Accelerators

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and Beamlines teams) so we could check if some customers where getting more or less support. We also payed attention to the accumulated running totals of hours dedicated to the activities at weekly intervals which helped identify stalled progress and react rapidly and on time. One of keys for the success of this story was the discussion about when to consider the activities as finished. It seems obvious but our developments need iterations with the users, and there is always something else that could be added. On top of that, since this plan was strict in what was developed, considering an activity closed meant really removing resources to that product. Hence, it was very important to declare an activity as finished from the management point of view, so the next developments in the list could enter.

4-Months Review

After 4 months of running the software developments of the Controls Section in this rigid mode, in July 2023 we had a first reporting meeting with the Management Board. One of the most relevant detected benefits was that having considerably less context switching had increased the team's productivity. Another topic was the difficulty in closing developments due to the open functional requirements of our physicists and scientists requests. Incidents and P1 requests were kept below 5% of our time, but we still had direct calls to the Developers without following the strict rules about using the JIRA Service Desk which created some interruptions. We stressed the need to continue highlighting the importance of sticking to the plan to guarantee its success. A non-negligible side effect highlighted in this review was that our development backlogs were increasing, hence a feeling of pressure was starting to be present in some direct conversations with our users. A very important aspect discussed in this review was the necessity of the on-boarding of the newcomers that had to be kept at the highest priority because it was an investment that would sooner improve the situation, and was already visible and demonstrated after four months of running this Contingency Plan. In addition, we also tackled that a significant effort was dedicated in collecting data for the specific reporting and coordination, which proved to be indispensable for these first months, but some manual processes should be automatized when possible. Finally, an important insight presented was that reviewing the alignment with the Divisions' priorities monthly allowed all of us to adapt with our current capabilities, and for this reason, making all this information and decisions publicly available allowed the staff to be updated, recognize the utility of the Contingency Plan, and acknowledging the progress pace.

CONCLUSIONS AND LESSONS LEARNED

To sum up, the objective was to increase the time spent on significant developments as much as possible. Limiting the rest of the interventions to only incidents and requests with the highest priority. But if we had been such strict, there would have been a handful of tasks that did not pass this filter, but would better be treated as exceptions and accepted based on their cost-benefit ratio. Some small one or two days developments may provide big value for our users. We decided to be aware of these exception candidates, discuss about them frequently, and select one or two when possible.

Coordination, planning, and frequent review was key for the performance and the efficiency of the Controls Software Developers. One of our conclusions was that once this Contingency Plan finishes there should be an extended coordination at the whole facility level in order to improve the organization and planning, including a conscious review of the dependencies and the appropriate scope of the work. We decided to start among all the Sections within the Computing Division, were all the staff is already registering the effort in the JIRA platform. This next step will help to address the customer priorities and improve the work efficiency. Moreover, we will be able to evaluate the overhead costs of the measures and reporting.

There were several roles directly affected by the Contingency Plan. Here we highlight some of the main feedback received from each of them. From the Controls Development Team point of view, what went really well was that the whole exercise helped to be focused in few selected projects. For the Controls Section head was very positive making decisions with proper information and a previous agreed priority with the Coordination Office and the Division Heads. On the counterpart, there was an overhead in preparing the reports which was of course necessary, and that needed to be automatized at some point. From the point of view of the clients, what went really well was the focus obtained when the project has been prioritized. On the other side, daily support reduced only to incidents and high priority issues and the approval path length for new developments and new features was quite long. This was accepted because of having the team reduced in size and with newcomers that had to learn during their on-boarding process. For the Coordination Office it was really good to have a visibility of what was happening in the Controls Section, noticing, for example, the costs of some tasks related to the software life cycle (e.g. testing, documentation, CI/CD, etc) . Also, was really helpful to be able to verify that there was an efficient use of the resources with the right developments in the expected time at the facility level.

The section was almost complete again by June 2022 and the Contingency Plan ended in January 2023, so even though some newcomers were still in the learning phase, by the end of 2022 we were able to finish most of the developments in queue. For 2023 there was no need to continue with the Contingency Plan because we were nearly fully staffed again. We reviewed the lessons of the whole process, and the Objectives for 2023 were taking into account the same types of activities, guaranteeing that we can dedicate time to incidents; that we can give support to operation installation and commissioning activities; that we have some room for the development of projects for accelerators and experiments; and that we have also time for our internal developments as well as maintenance and helping our students, and reserving some time to contribute in our International Collaborations.

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As of now, 2023Q3, we are really happy to have applied this Lessons Learned for our normal operation and coordination of activities done by the Control System Section of the ALBA Synchrotron.

Lessons Learned

- Putting so much effort in reporting in a team that was understaffed with many missing people and newcomers was too much overload, There is a difficult balance between reporting organically the progress and minimizing disturbances to agile developers' teams. So, reporting was perceived as an overload. Some dedicated role on compiling this information was a good decision to lower the pressure.
- It is very important that the description of the activities clearly state when we would consider the development finished or accepted with a proper definition of done. The concept of "Conditions of Satisfaction" should be embraced because in order to gauge the success of the delivered product, a criteria for the targets and goals with respect to the schedule, the scope, and resources used is appreciated.
- The Service Support Role rotating among all the developers helps the transfer of knowledge and avoids context switching or direct call interruptions.
- Newcomers on-boarding is a high priority investment
- Machine days are quite support-demanding, so they should be treated as operation days with a Service Support Role assignment to avoid interruptions of the rest of software developers
- Less context switching is good for the Development Team, and it is good for the quality of the developments.
- Make planning and reports publicly available helps dealing with users requests that can not fit with the team's capacity.
- Automatic processes for compiling information and Reporting is important, the culture of registering the worklogs for all the efforts including documentation and maintenance is key.
- Periodically aligning the Developers' efforts with the priorities of the facility-wide Divisions is always well-paid off.

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