



# Beams Department

Issue 28

NEWSLETTER

September 2019

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### Next issue

The next issue will be published in November 2019 and contributions for this should be received before the end of October 2019.

Suggestions for contributions are always most welcome: simply contact your correspondent (see last page of this newsletter).



### Editorial:

Dear readers of the BE Newsletter.

The articles in this September edition describe 1) a structured approach for request fire detection systems, 2) news from the BE central secretariat, 3) how much a summer student enjoyed the experience in BE-BI and 4) results from a collaboration between CERN and Fermilab. The final article covers the first 'BE activity day' that took place at the end of August.

I hope that you find the material interesting and it motivates you to contribute during 2019 with an article in either French or English. In order to do so please contact your respective group contacts.

Lars Jensen, BE Newsletter editor-in-chief

## ITIL techniques applied to automatic fire detection

The Alarm Systems (BE-ICS-AS) section is responsible for the installation, maintenance, and renewal of safety alarm systems at CERN. This includes automatic fire and gas detection systems, emergency telephones and the alarm transmission systems to CERN main control rooms. There are currently 9,687 automatic smoke detectors, 659 automatic gas detectors, 2173 manual break-the-glass devices and 413 red telephones installed all over CERN sites.

Alarm systems trigger automatic and local safety actions needed to protect personnel before the arrival of the fire brigade, which could take up to 30 min. Health & Safety Inspectors define the required safety actions according to risk analysis, such as electrical cut, ventilation stop, emergency evacuation, etc.

Information Technology Infrastructure Library (ITIL) is a set of detailed practices for IT service management that focuses on aligning IT services with the needs of business. The business, in this particular application, is the installation of automatic fire detection systems dedicated to detect products resulting from fire. The request process provided by the Alarm System service, also referred in ITIL as Request Fulfilment Process, is the series of project steps required to install a fire detection system.

### Motivation & Benefits

Installed automatic fire detection systems have significantly increased over the past ten years. Today's requests continue to grow at a high speed, with projects like HL-LHC and Science Gateway. Global vision on this incoming demand is essential to adapt resources accordingly. In parallel, since service capacity is subject to cuts and loss of expertise, resource optimisation is also needed.

Furthermore, traceability of risk analysis and safety decisions needed to be better formalised. The request process workflow and the responsibilities of the different actors involved needed clarification to be fully efficient.

In order to address these issues, it was decided to redesign the Request Fulfilment Process. The existing process could be enhanced by integrating ITIL best practices over traditional methodology of safety project management ([IEC 61511](#)). CERN's ServiceNow ([SNOW](#)) already integrates many ITIL best practice concepts, and we applied them to the alarm systems service. As ServiceNow is already used by several safety project contributors (EN/EL and IT/CS), it improves project coordination by allowing an integrated tracking of multiple requests related to a global project.

### Process design

Although the Alarm Systems service is in charge of the execution of alarm system projects, it is HSE at CERN that provides the safety recommendations to BE and the final safe exploitation clearance to the requestor. A common definition between HSE and BE of the **request process workflow** enabled each party to assume their role and understand where the limits of responsibility are.

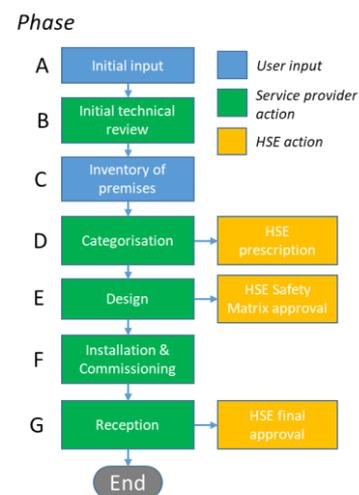


Figure 1: request process workflow

To provide a **global vision on the incoming demand**, all requests are gathered together with a unique entry point in this ticketing system: new requests, modification to existing systems, extensions, big renewals, big projects, cost estimates for future projects.

To **optimise resources** the requestor provides the initial input (see Figure 1) to the request by filling

in the ‘Inventory of Premises’ (see Figure 2) and uploading it to the ticket. The inventory is a table containing the exact location where detection is requested, completed by information on areas, volumes, activity performed, and ventilation of the premises to enable a preliminary risk analysis. The Inventory of Premises is then used by BE-ICS-AS to involve the corresponding HSE experts and trigger a first visit on site.

Référence GIS	Désignation	Activité	LOCALS A SURVEILLER			Risques particuliers	Commentaires	STOCKAGE		RENOUVELLEMENT VENTILATION	
			Surface (m <sup>2</sup> )	Hauteur (m)	Volume (m <sup>3</sup> )			Nature	Quantité (kg)	Debit d'air extrait (m <sup>3</sup> /h)	
771 8 001	hall principal	Laboratoire	211.30			Produits chimiques					
771 8 005		Laboratoire	24.70			Produits chimiques					
771 8 007		local technique	10.80			Electronique					
771 8 009		Laboratoire	21.00			Produits chimiques					
771 8 011		Laboratoire	11.80			Produits chimiques					
771 8 013		Laboratoire	15.20			Produits chimiques					
771 8 015		Stockage	24.40								
771 8 017	local extérieur ATER	Stockage	12.20			Zone Atex					
771 8 021		Postes/salitraines	14.00								
771 8 022		Postes/salitraines	11.20								
771 8 024		Conduits/déplacement ou circulation	1.50								
771 8 025		local technique CV	8.00			Electronique					
771 1 201	Mezzanine sur hall	Stockage	154.50			Stockage matière ou					
771 1 401	Mécanisme	local technique CV	15.70			Electronique					
771 1 402		local technique EI	17.00			Electronique					

Figure 2: Inventory of premises

Furthermore, ticket information is shared across teams automatically facilitating exchanges and providing transparency, and actors are notified when an action is needed from their side. Workload reporting helps to evaluate team availability and to reassign work as necessary.

#### Process implementation

A joint strategy was developed to implement a flexible process workflow allowing to adapt the current process with future needs, to reduce interdependency of sub-tasks, and to complement this new process with a detailed documentation and advanced trainings.

Using ITIL as a common language increased greatly the efficiency of interactions between actors. During the initial phase, several specific forms were developed by the ServiceNow team. Many tools were also developed to automate recurrent actions to allow technical specialists to concentrate on their work.

#### Outcome and operation

This new methodology has reinforced the collaboration between AS and HSE teams. This new process was presented to the safety coordination committees (CSAP, DSOC) and received a very good feedback. After some tests with volunteer clients, it was put in production in November 2018.

Coming next

BE-ICS-AS is working on the extension of the process to **gas detection requests**. Requestors will also be informed of the approximate **maintenance** and **renewal costs** based on a % of the installation cost through the ticket, to advance financing discussions. To understand the motivation of the requests, it is traced whether the request concerns personnel, environment, equipment protection, or continuity of service. Finally, because resources might not be able to adapt to the high demand, BE-ICS-AS is working on the implementation of an **arbitration process** to be triggered when the demand exceeds the service capacity. This way management decides which projects have priority instead of first-arrive-first-served approach.

S. Grau, F. Chapron, T. Hakulinen (BE-ICS)

## BE central secretariat news

After having spent a lovely summer, let's go back to business refreshed and with fully loaded batteries, start the 2<sup>nd</sup> half of 2019.

Here are a few reminders:

Over the past weeks, we have received a few questions about the visit of Doctoral student professors. Please bear in mind that Doctoral Student professors are to be invited to CERN at the time of the 18 months and 30 months progress reports to enable both (and the CERN supervisor for sure) a face-to-face discussion about the students work progress and future outline. The costs of this visit shall be borne by the respective group.

The costs for short-term trainees have evolved to be 1510 CHF per month. A pro-rata for incomplete months is set to 50.33 CHF/day. If you are interested in hiring a trainee – either job shadowing or short-term – please contact your BE Central Secretariat.

Please bear in mind that the effective date of a resignation is always set to the last calendar day of a month. This means that the last day of contract may then differ from the last day of work

depending on the personal leave situation of the concerned member of personnel.

We would like to remind you that once a Home Leave request is entered and duly approved in EDH it can no longer be cancelled. There are situations when a Home Leave might need to be cancelled depending on your personal situation (illness and family event happening during the absence period for instance). So please feel free to contact us by email or come to see us in 774/1-013 before entering a Home Leave, or at the latest before signing the confirmation of return from Home Leave through EDH. Better safe than sorry!

We would also like to remind you to contact us for any of the following absence type needs: paternity, maternity, personal schedules, accidents, career transition measures, civic duties, family event & first removal. Please also note that any absence for training has to be justified (even for training on-site) with the link to the EDH training request.

Official travel absences have to be justified with the link to the TREQ or relevant information. In other words, no Official Travel absence should be entered and approved in EDH without having an approved TREQ linked to the given absence.

A [key request form](#) through EDH is now in use. When necessary the document will be directed to the supervisor for approval and then to the key responsible for signature. Once available, the requestor will be notified via email through EDH that the key can be collected from the Locks & Keys office in building 56.

Thank you for your attention and do not hesitate to contact us for questions.

Your dedicated BE Central Secretariat Team:  
Anaïs, Cassandra and Jeanette (BE-HDO)

## Summer student experience in BE-BI-EA

What is CERN? Who works there? Who will I meet there? What does the life in the mecca of physicists look like? I didn't know. My story

started a few years before, when I first visited CERN as a high school student in July 2012. By coincidence I've appeared at CERN just when the Higgs Boson discovery was announced (I even found a way to speak for a while with Fabiola Gianotti that day – don't ask how!) I was fascinated by the place and its atmosphere. "It might be interesting to work here" - I thought. Since that time, I have kept up to date with CERN's news.

It's now 2019, I study Particle Physics in Rome and my dream of becoming a summer student at CERN pushed me to resign from lots of activities and focus on study. I wrote my application form and eventually I got confirmation that I was accepted. CERN – I AM COMING!

I take a part in probably the most exciting and the best organized summer student program I could ever imagine. Daily routine includes morning lectures (with experts from around the world), lunches with 300+ Summer Students, interesting workshops, visits, and finally the summer project - our contribution.

My project was the measurement of Cherenkov Light in Silica Fibers as a feasibility study of the new Beam Profile Monitor for North Area's slowly extracted beams. My supervisor Inaki Ortega, the project leader for the design of new detectors for the North Area.

All section members, led by Gerard Tranquille, created helpful and friendly atmosphere that helped me to work and learn new things without fear of making mistakes. I am very grateful to have placed in the BE-BI-EA section - thank you all!



*(Caption)BE-BI-EA team, our last coffee break.*

Apart from official working hours, there is some free time. During this free time, for me CERN = PEOPLE. This is an incredible chance, given for free here: meeting people from all places in the world. What would be better than being at such awesome place, doing a job that you like and being accompanied by fantastic friendly people? That was an amazing experience and it opened my mind unchangeably. All shared stories, endless hours of laughing and discussions, travels and adventures, made me feel that I am not alone anymore. I don't have to add that we all could not stop crying at the end and our calendars are filled to the brim with future travels to visit each other. Some of us will return to CERN, some of us will go elsewhere, but this amazing 2019 summer have connected us strongly, to not forget it too quickly.

Now, it is time to continue good habits, share memories and invest the energy into new tasks. My dream here checked out and I hope to find a way to come back here again someday!

Karolina Maria Kmiec (BE-BI)

## Fermilab Booster Experiment

In June 2018, during a collaboration meeting at Fermilab on space charge code development, the idea was brought up to organize beam studies at the Fermilab booster with guests from various laboratories around the world and even software companies. At the end of 2018, a preliminary experimental program had been worked out that had been presented at the Accelerator Advisory Committee Review at Fermilab including CERN delegates. The committee strongly endorsed and encouraged such a beam development program for the Booster at the end of the run period in July 2019. The committee also suggested that such machine development studies should be performed on a regular basis in view of the PIP II upgrade program.

The original program from 2018 consisted of 11 types of experiments. In internal discussions at Fermilab these have been reduced to the 6 most relevant ones for operation and reported at the

Capstone event available on <https://indico.fnal.gov/event/21000>

Following the agreement between CERN and Fermilab, CERN paid for flights, while the local costs for three colleagues were covered by Fermilab. Local expenses for three CERN colleagues were generously supported by [ARIES](#). A pleasant side effect of the limited financial support has been that we operated as a team sharing the effort for the transport to and from the airport and the various housing locations.

Starting on Monday 17th of June there was one week of parasitic experiments, followed by a full week of dedicated beam time and the final 2 days of Booster running on the 1st & 2nd of July in parasitic mode again.

It is safe to say that in all experiments important results were obtained. We agreed to publish notes for each experiments and several papers are in preparation.

In this article, we can only highlight two of them that might be particularly interesting and conclusive.

The S.03 experiment is concerned with "Lattice Periodicity & Emittance Growth" and in particular in presence of space charge (SC). One of the central results can be seen in Fig.1 where measurements were done for 6, 10 and 14 turns injection respectively which should lead to the equivalent rise in intensities.

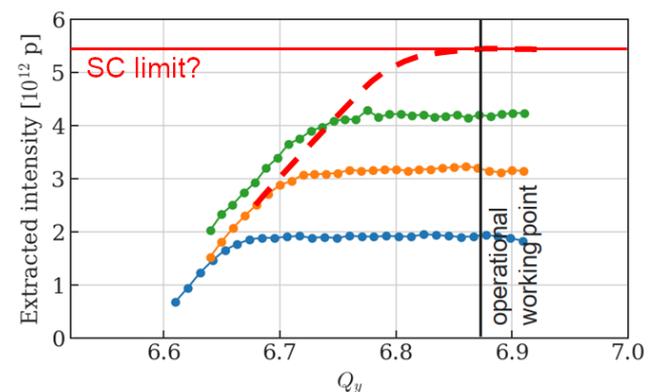


Figure 1: Vertical Tune scan for different intensities: 6 blue, 10 orange and 14 green turns injection.

In the graph, the extracted intensity (red dashed line) is plotted as a function of the vertical tune. Apparently, one can fit the tune when losses start as a function of beam intensity. Therefore, at the operational working point, space charge limits the beam current to below  $5.5E12$  protons. These results indicate that an improvement of the Booster intensity might be achievable by compensating the half integer resonance, which has been successfully applied at the CERN PSB.

The S.07 experiment on "Determination of the 3rd order resonance driving terms from turn-by-turn spectra" had been performed as in the original program thanks to the presence of the CERN experts who have made a thorough similar analysis in the CERN SPS.

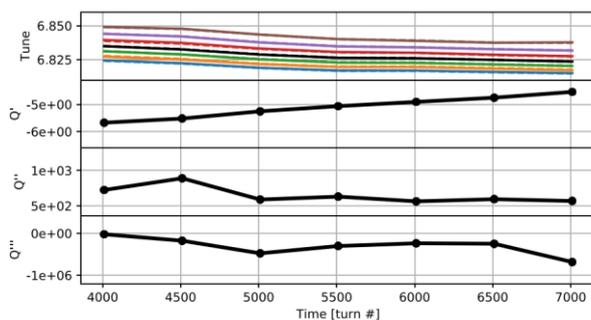


Figure 2: Higher Order Chromaticity Measurement at the Fermilab Booster

The preliminary analysis allows determining the measured  $Qy'$ ,  $Qy''$  and  $Qy'''$  values for the Fermilab Booster. It is interesting to note that the bare Fermilab MAD-X Booster model cannot reproduce the measured chromaticity values. It will be therefore worthwhile to find the non-linearities that may cause these large chromaticity values in the Fermilab Booster.

On Monday the 5th and Wednesday the 7th of August, the so-called "Capstone Event" took place to discuss preliminary results in a ZOOM video conference between Fermilab, CERN & GSI: overall Fermilab and CERN gave five presentation each and one was given from GSI.

Last, there has been a general discussion on the outcome and the following three items have been proposed for the continuation of the studies in 2020 again at the end of the Fermilab Booster run:

- Review and testing of the "Flat Optics" or fully optimized optics for the Fermilab Booster
- Compensation of the half integer resonance to boost the Fermilab Booster performance.
- Optimization and calibration of the IPM system.

The last item, in particular, is of high interest for the CERN LEIR machine where similar IPM devices are presents and calibration procedures are needed to account for the space charge effects.

Frank Schmidt BE-ABP

## BE activity day

For the first time since its creation, the BE department sponsored an afternoon of sports activities for its members on Thursday 29<sup>th</sup> of August 2019.

Some 120 persons signed up for friendly, yet competitive Dragon-boat racing, table-tennis tournaments and petanque shoot-out followed by a BBQ by the lake in Divonne-les-Bains.



Four dragon boats were available, and so eight groups of 15 people were formed, racing each other in two heats. The two best teams from each heat then competed for a place on the podium.



Dragon-boats crossing the line in the final race

In parallel, those not on the water competed individually in table tennis or in teams of two for petanque. Both competitions followed a standard pyramid and direct elimination game structure. After about an hour, the groups swapped activities.



Table tennis



Petanque

Paddleboards and kayaks were also available for individual testing.



Paddleboard



Kayak

After the competitions, P. Collier presented eco-friendly chocolate medals to the proud winners of each activity.



All in all a superb outing with great weather (including a 10-minute refreshing rain shower), good fun and new relations established.



A big thanks to the BE management for making this happen.

Photos are available in Cernbox: <https://cernbox.cern.ch/index.php/apps/files/?dir=/myshares/Dragon+Boat+29-8-19+%28id%3A199870%29>

Steen Jensen (BI) and Olivier Barriere (CO)

## Reminder of deadlines:

### ASSOCIATES AND FELLOWS COMMITTEE

<b>Deadline for applications:</b>	
Fellows,	2 September 2019
Associates	13 September 2019
<b>CERN internal deadlines:</b>	
Sharing eligible candidates pool with Departments	8 October 2019
AFC meeting	19 November 2019

### TTE-2019-3 committee

<b>Deadline for applications:</b>	
TTE	30 September 2019
<b>CERN internal deadlines:</b>	
Sharing eligible candidates pool with Departments	30 September 2019
TTE Meeting	15 October 2019

### TECHNICAL STUDENTS COMMITTEE (TECH, DOCT, ADMI)

<b>Deadline for applications:</b>	
DOCT, TECH, ADMIN	21 October 2019
<b>CERN internal deadlines:</b>	
Sharing eligible candidates pool with Departments	6 November 2019
TSC meeting	3 December 2019

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