BIGNet = Beam Instrumentation Global NETwork

A Common Web Portal for Beam Instrumentalists

IBIC2012 – 02/10/2012

J-J Gras, CERN-BE-BI

Presentation Overview

- This talk will present the status and plan of a project aimed to define and deliver a Common Web Portal for Beam Instrumentation:

The **BIGNet**

Beam Instrumentation Global Network

- Introduction
- Initial Objectives and Plan
- Current Status of BIGNet
- Key Roles within the Project
- Next Steps
- Conclusions

Introduction

- On regular occasions over the past years, user requirements have put increasing demands on the our accelerator complex beam instrumentation.
- These requests are most of the time easy to summarize as “improve the performance” and “quantify precisely the uncertainty” of a given instrument.
- Implementation on the other hand often turns out to be a difficult and challenging task and it was quickly realized during this process that **there was no easy way to share issues, questions and progress with people probably facing similar kinds of problems in other laboratories**.

Initial Objectives and Plans

- We were missing ‘something’ that would allow any beam instrumentalist to:
  - Easily find the laboratories with accelerators producing beams with similar characteristics (particle type, total beam intensity, bunch intensity, energy…)
  - Easily find the experts working at these institutes on the different beam observables (i.e. beam position, loss, intensity, transverse or longitudinal profile, tune…) and how to contact them.
  - Launch (or participate in) discussion forums with the right people
  - Advertise events such as workshops on specific instrumentation technologies and beam instrumentation related conferences.
  - Provide links towards documents describing system designs and performance assessments
  - …

Initial Objectives and Plans

- We discussed the subject with BI colleagues during last IPAC and the proposed solution was to develop a web site providing all the relevant features.
- Each participating laboratory would nominate a local administrator to maintain the information related to their laboratory (i.e. machine and beam parameters, instrument and expert lists, local events…).
- Once this was in place, any beam instrumentation expert could then use the site content and create or participate to discussions

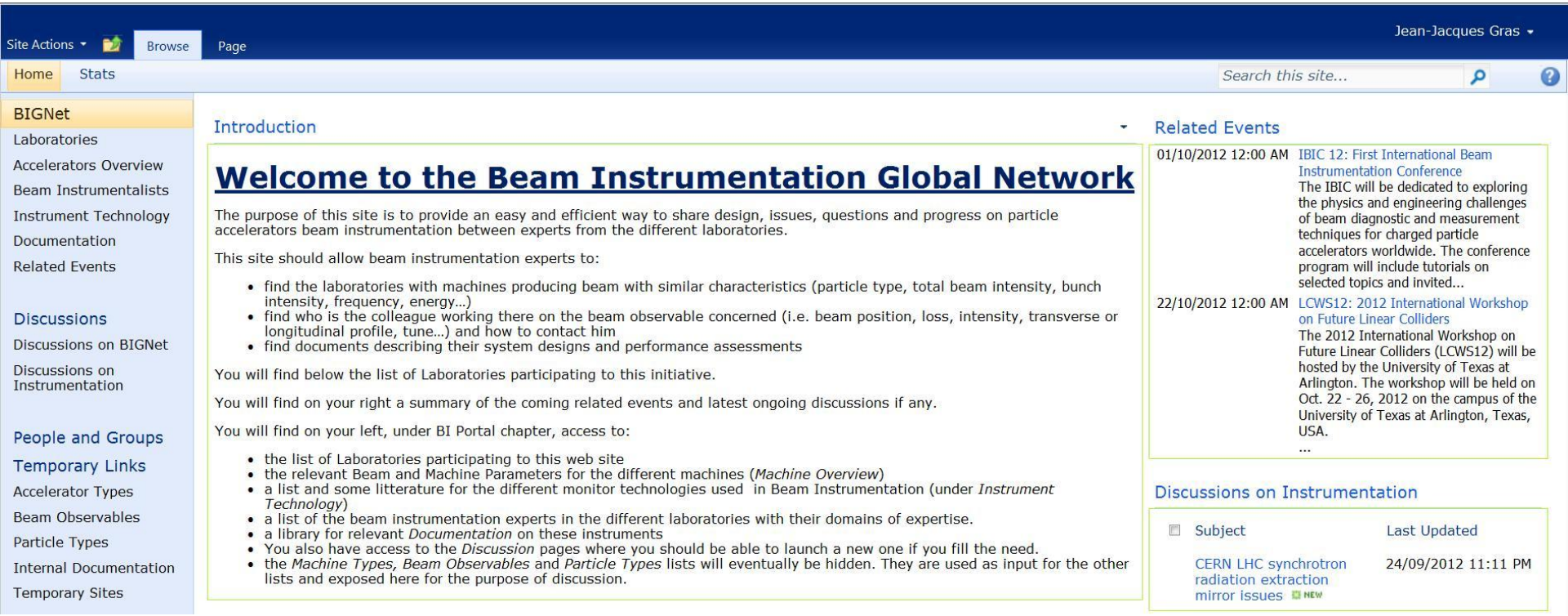
Initial Objectives and Plans

The plan was to:

- develop and assess a prototype of this web site during 2012 in collaboration with some volunteer local administrators in other laboratories
- propose it to a wider audience during IBIC2012.

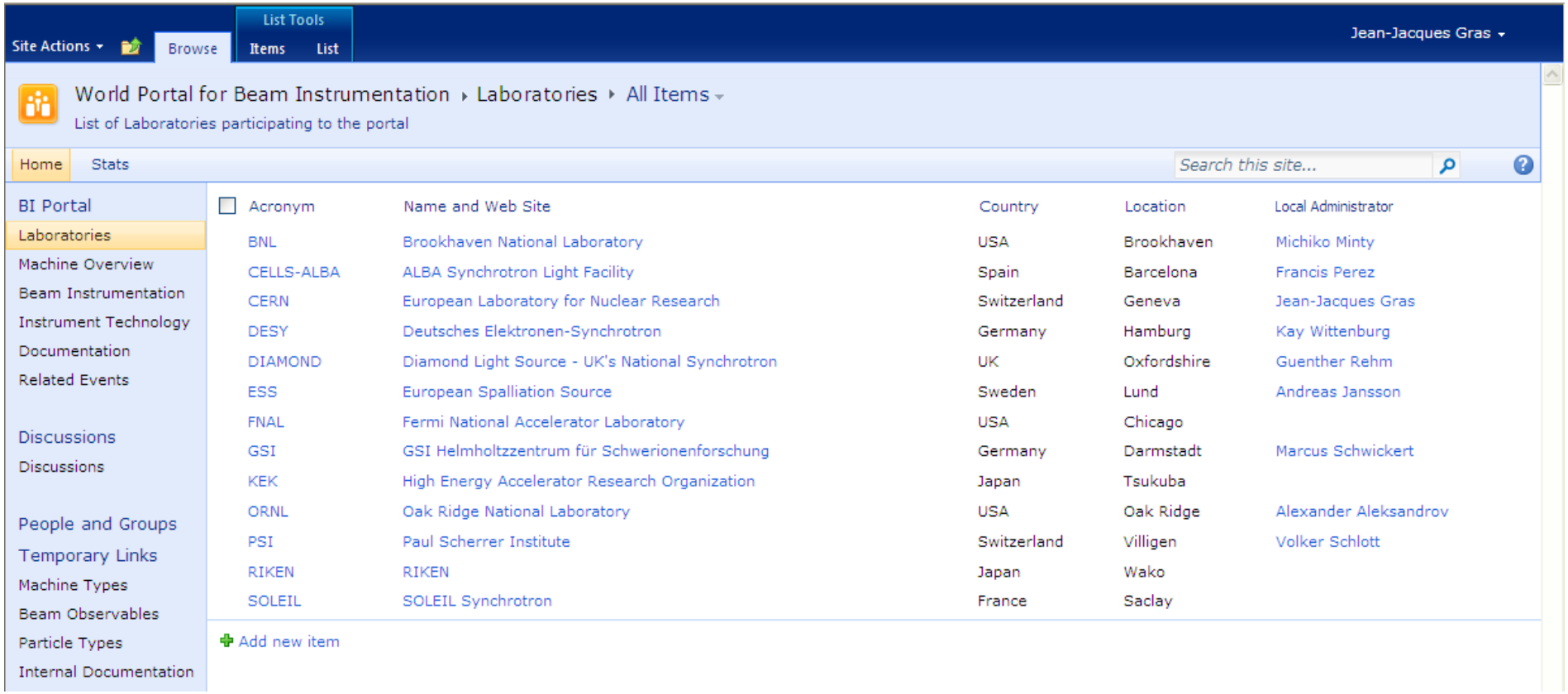
That is where we stand today

The Current Status of BIGNet



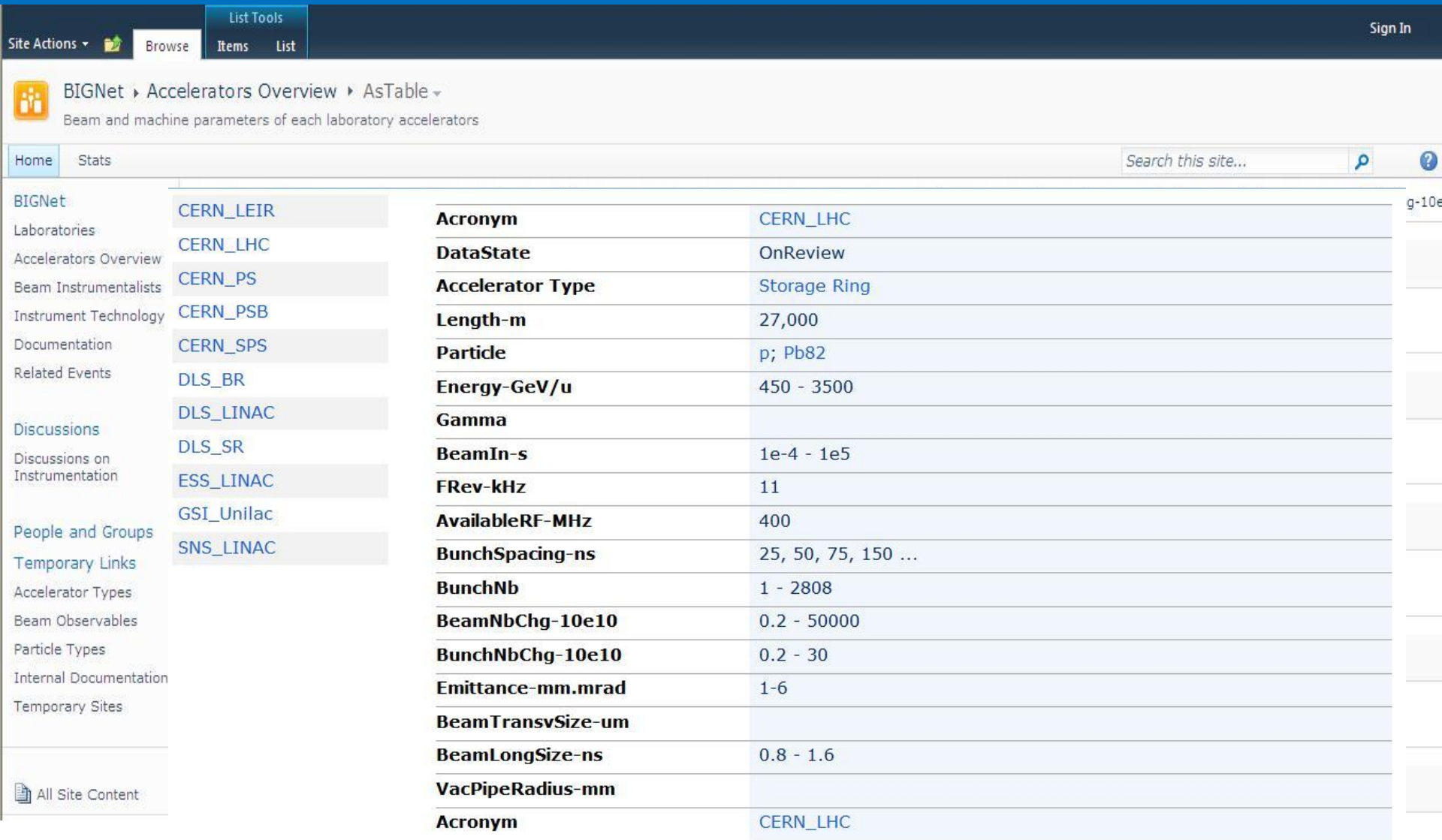
BIGNet entry page at https://espace.cern.ch/info-bi-portal/default.aspx provides a short introduction to the site and its contents with an overview of upcoming events and latest discussion forums, as well as providing access to its different subpages.

The Current Prototype: The Participating Laboratories

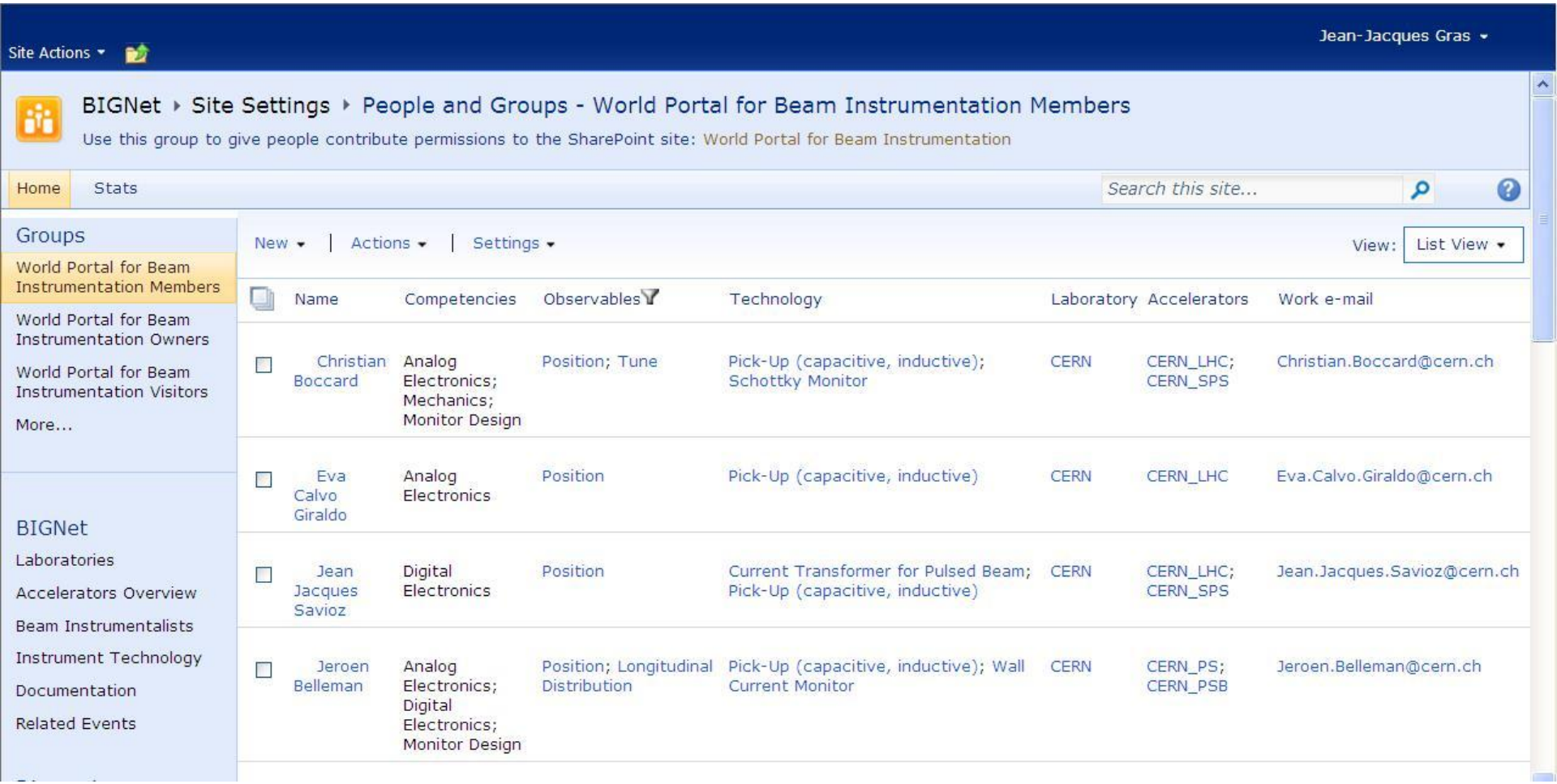


Acronym	Name and Web Site	Country	Location	Local Administrator
BNL	Brookhaven National Laboratory	USA	Brookhaven	Michiko Minty
CELLS-ALBA	ALBA Synchrotron Light Facility	Spain	Barcelona	Francis Perez
CERN	European Laboratory for Nuclear Research	Switzerland	Geneva	Jean-Jacques Gras
DESY	Deutsches Elektronen-Synchrotron	Germany	Hamburg	Kay Wittenburg
DIAMOND	Diamond Light Source - UK's National Synchrotron	UK	Oxfordshire	Guenther Rehm
ESS	European Spalliation Source	Sweden	Lund	Andreas Jansson
FNAL	Fermi National Accelerator Laboratory	USA	Chicago	
GSI	GSI Helmholtzzentrum für Schwerionenforschung	Germany	Darmstadt	Marcus Schwickert
KEK	High Energy Accelerator Research Organization	Japan	Tsukuba	
ORNL	Oak Ridge National Laboratory	USA	Oak Ridge	Alexander Aleksandrov
PSI	Paul Scherrer Institute	Switzerland	Villigen	Volker Schlott
RIKEN	RIKEN	Japan	Wako	
SOLEIL	SOLEIL Synchrotron	France	Saclay	

The Current Prototype: The Accelerators Overview

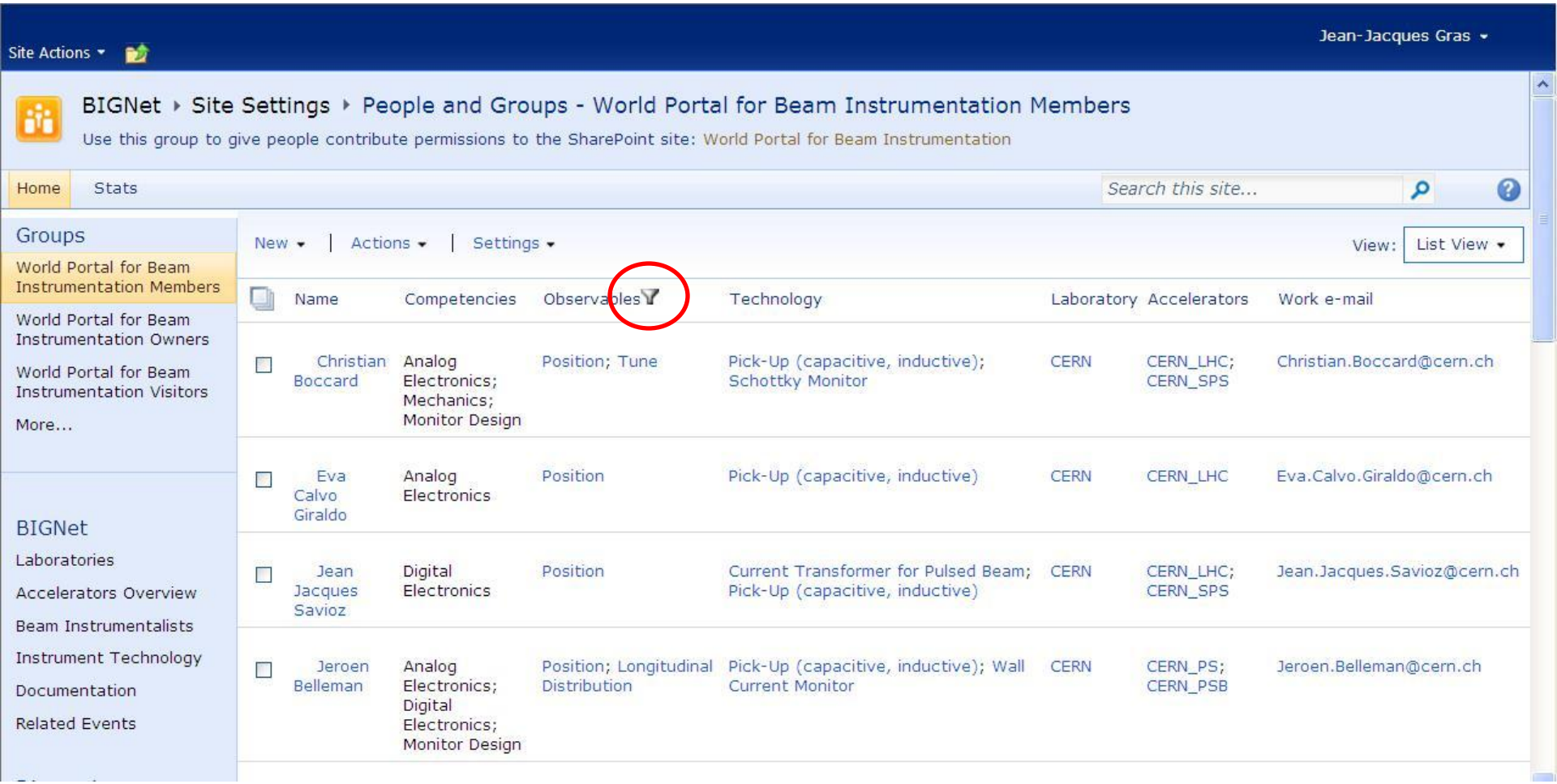


The Current Prototype: The Beam Instrumentalists



Name	Competencies	Observables	Technology	Laboratory	Accelerators	Work e-mail
Christian Boccard	Analog Electronics; Mechanics; Monitor Design	Position; Tune	Pick-Up (capacitive, inductive); Schottky Monitor	CERN	CERN_LHC; CERN_SPS	Christian.Boccard@cern.ch
Eva Calvo Giraldo	Analog Electronics	Position	Pick-Up (capacitive, inductive)	CERN	CERN_LHC	Eva.Calvo.Giraldo@cern.ch
Jean Jacques Savioz	Digital Electronics	Position	Current Transformer for Pulsed Beam; Pick-Up (capacitive, inductive)	CERN	CERN_LHC; CERN_SPS	Jean.Jacques.Savioz@cern.ch
Jeroen Belleman	Analog Electronics; Digital Electronics; Monitor Design	Position; Longitudinal Distribution	Pick-Up (capacitive, inductive); Wall Current Monitor	CERN	CERN_PS; CERN_PSB	Jeroen.Belleman@cern.ch

The Current Prototype: The Beam Instrumentalists



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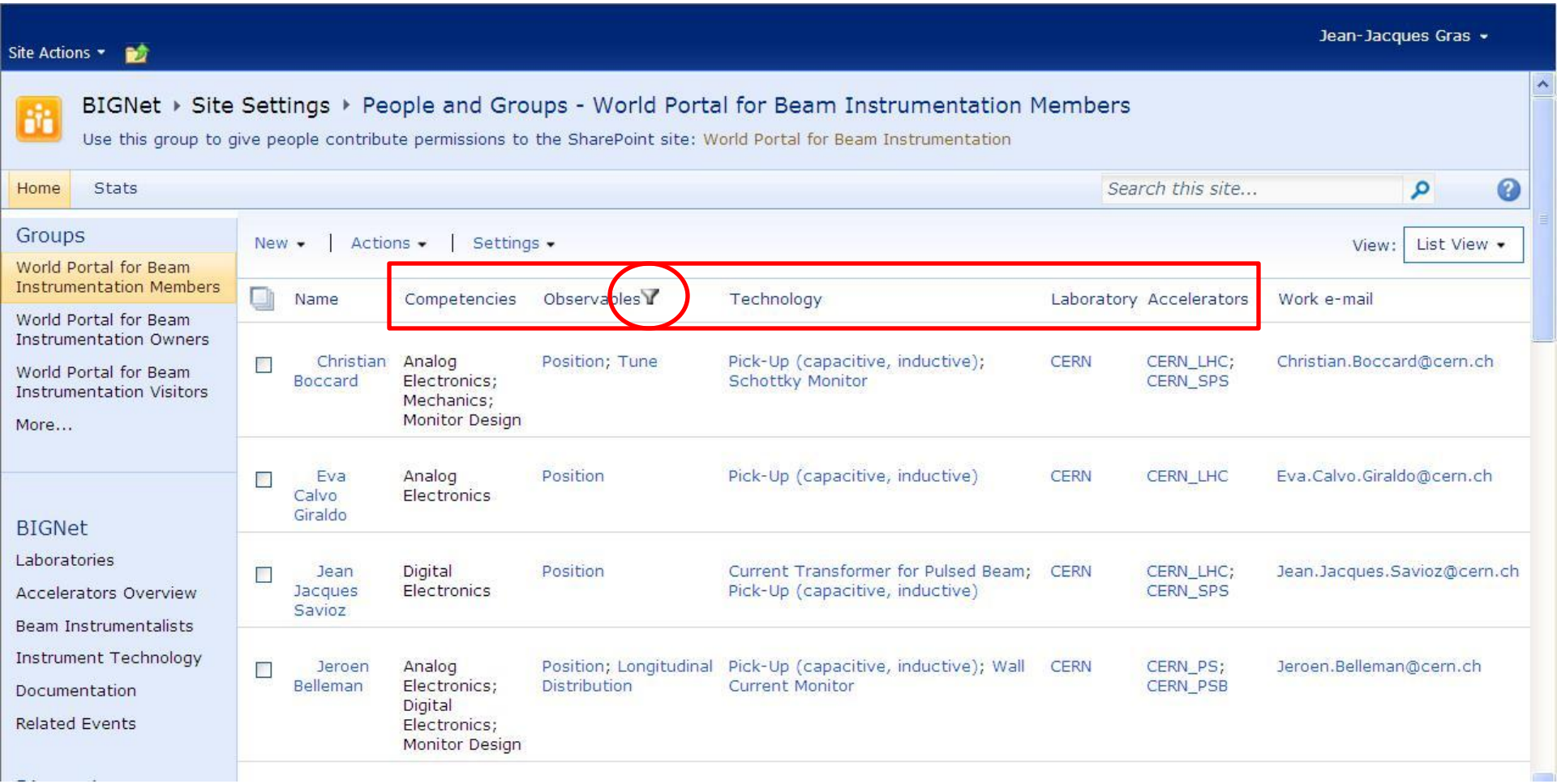

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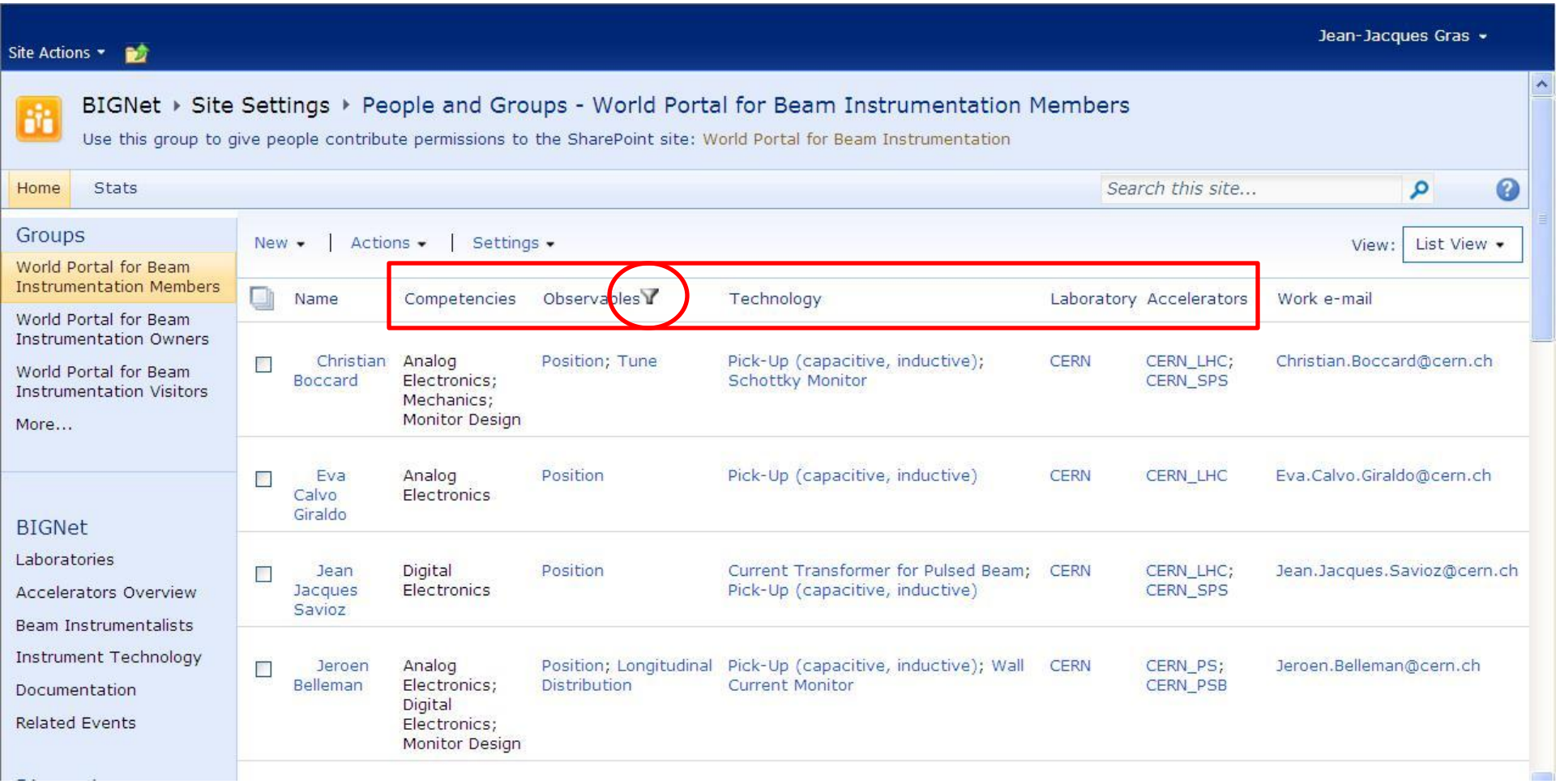
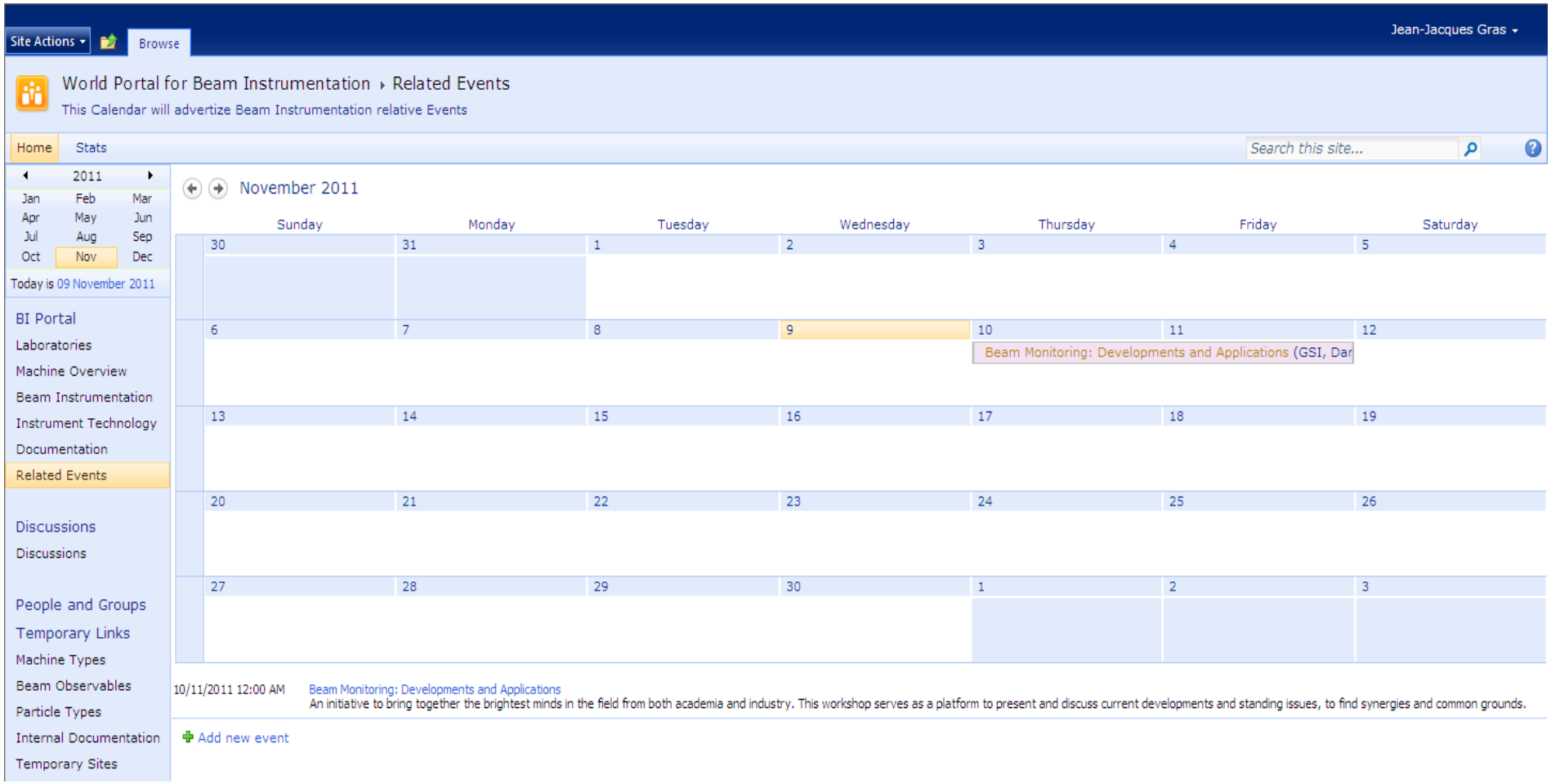


Email addresses are only accessible to people identified as member of the Network .
Same for access to forum discussions

The Current Prototype: Related Event Calendar



Major conferences such as IBIC are well publicised throughout the community but smaller workshops with more focussed scopes often go unnoticed. This part of the web site will allow the organizers to advertise such events and reach a wider audience.

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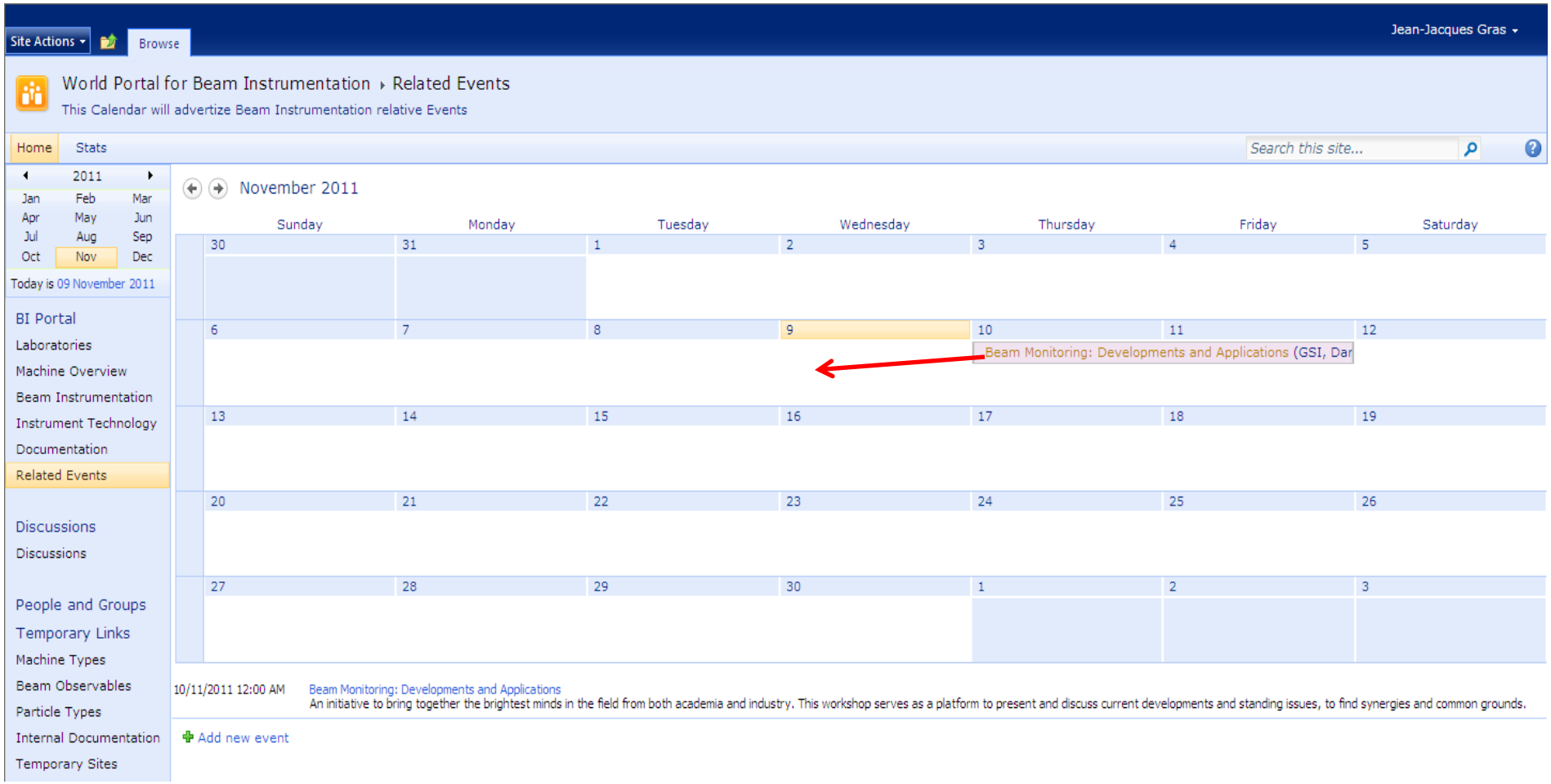

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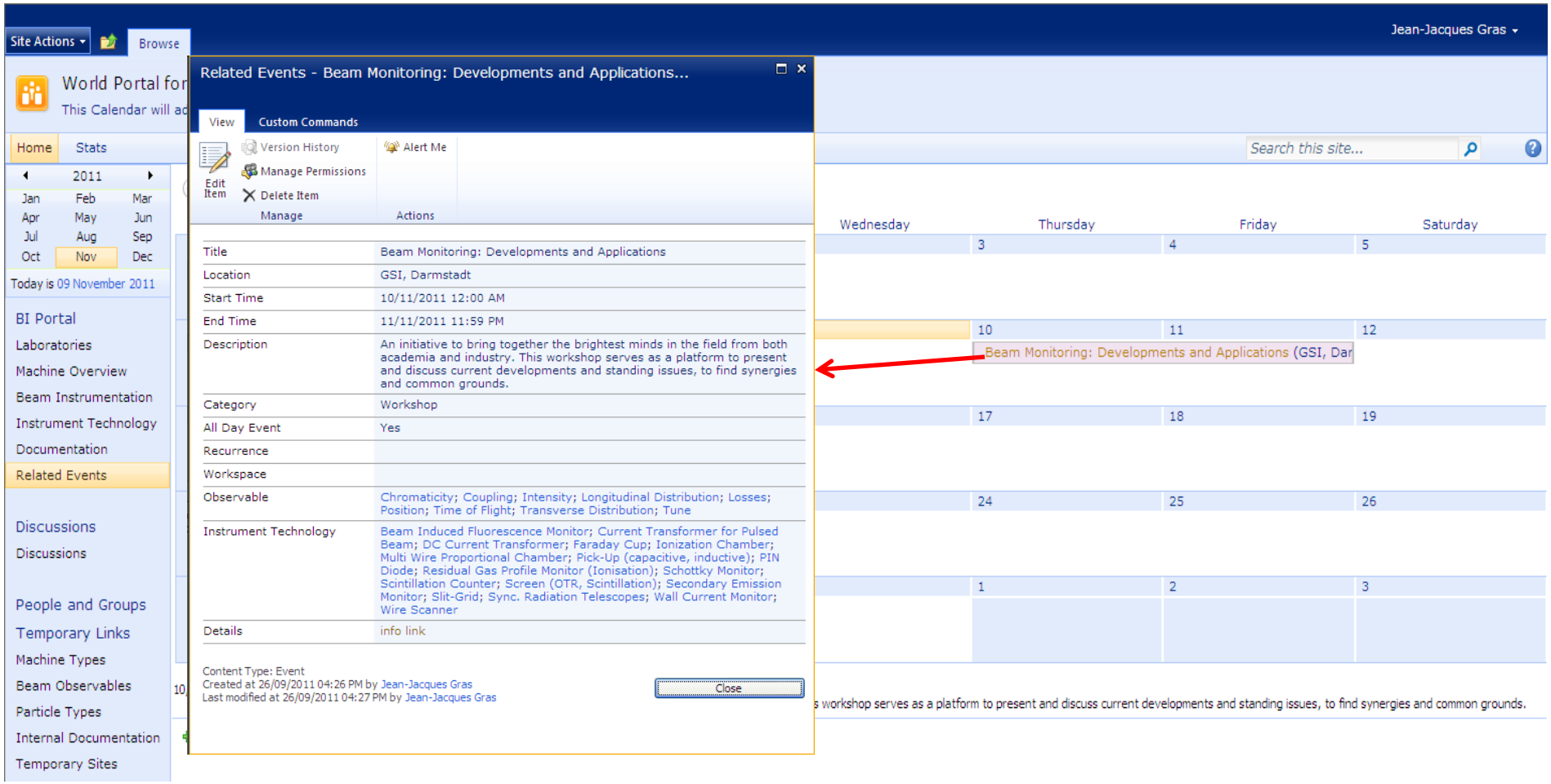

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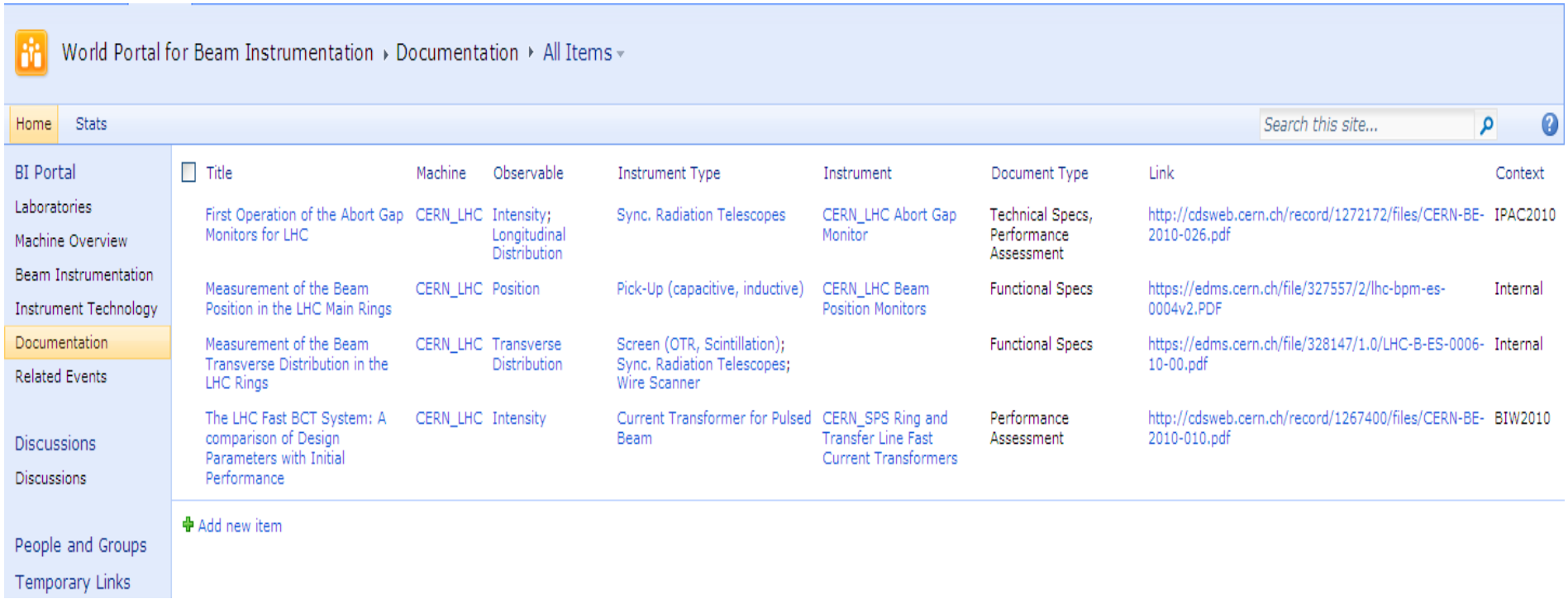
The Current Prototype: The Relevant Documentation



Title	Machine	Observable	Instrument Type	Instrument	Document Type	Link	Context
First Operation of the Abort Gap Monitors for LHC	CERN_LHC	Intensity; Longitudinal Distribution	Sync. Radiation Telescopes	CERN_LHC Abort Gap Monitor	Technical Specs, Performance Assessment	http://cdsweb.cern.ch/record/1272172/files/CERN-BE-2010-026.pdf	IPAC2010
Measurement of the Beam Position in the LHC Main Rings	CERN_LHC	Position	Pick-Up (capacitive, inductive)	CERN_LHC Beam Position Monitors	Functional Specs	https://edms.cern.ch/file/327557/2/lhc-bpm-es-0004v2.PDF	Internal
Measurement of the Beam Transverse Distribution in the LHC Rings	CERN_LHC	Transverse Distribution	Screen (OTR, Scintillation); Sync. Radiation Telescopes; Wire Scanner		Functional Specs	https://edms.cern.ch/file/328147/1.0/LHC-B-ES-0006-10-00.pdf	Internal
The LHC Fast BCT System: A comparison of Design Parameters with Initial Performance	CERN_LHC	Intensity	Current Transformer for Pulsed Beam	CERN_SPS Ring and Transfer Line Fast Current Transformers	Performance Assessment	http://cdsweb.cern.ch/record/1267400/files/CERN-BE-2010-010.pdf	BIW2010

Papers and notes describing system designs and performance assessments are scattered in many different places and it is often difficult to find them unless they are known to exist, or there is some knowledge of the storage location, author or part of the title. The purpose of this library is not to store the document or a copy of it but just refer to them with some attached attributes that will ease their access by relevant filtering.

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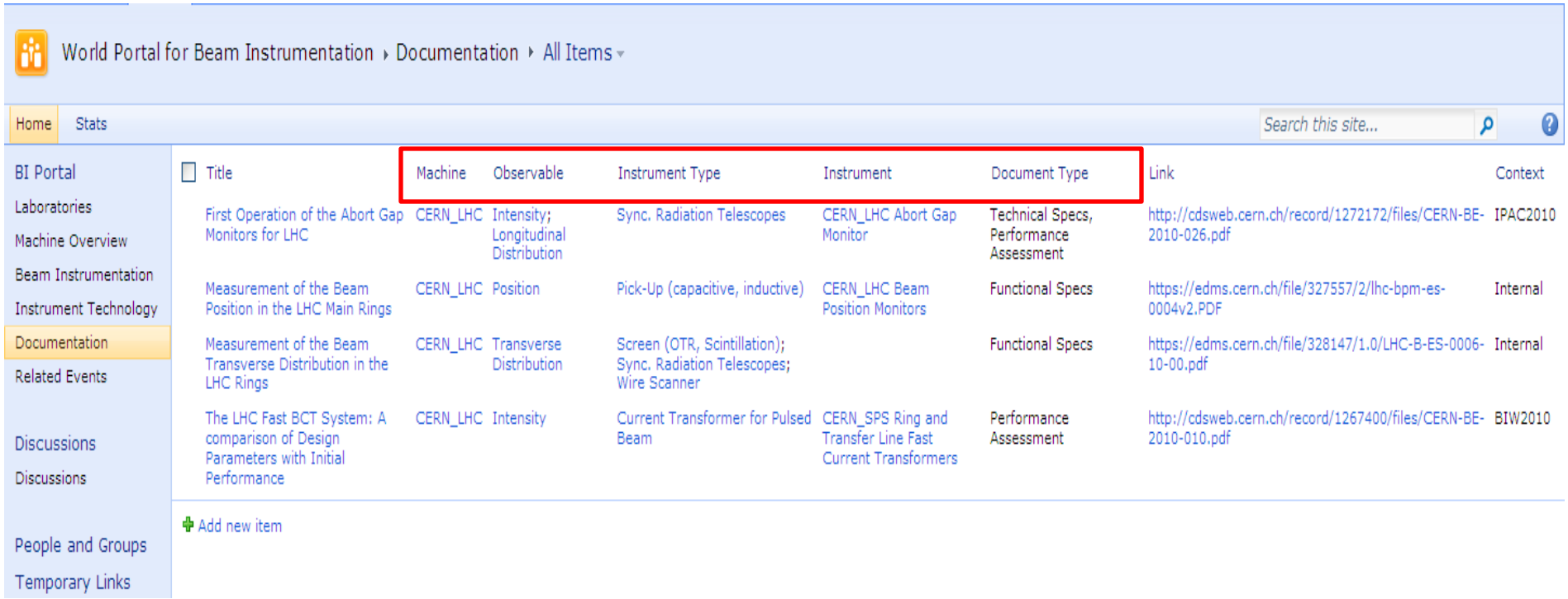

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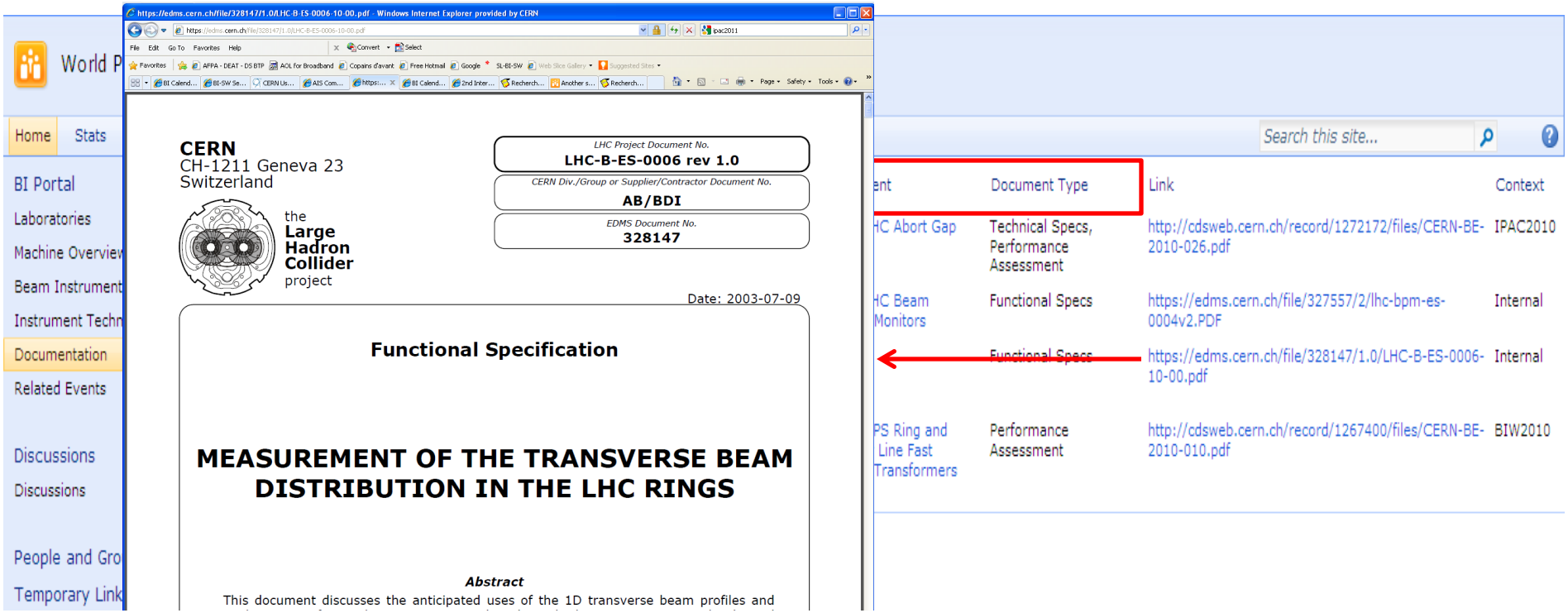

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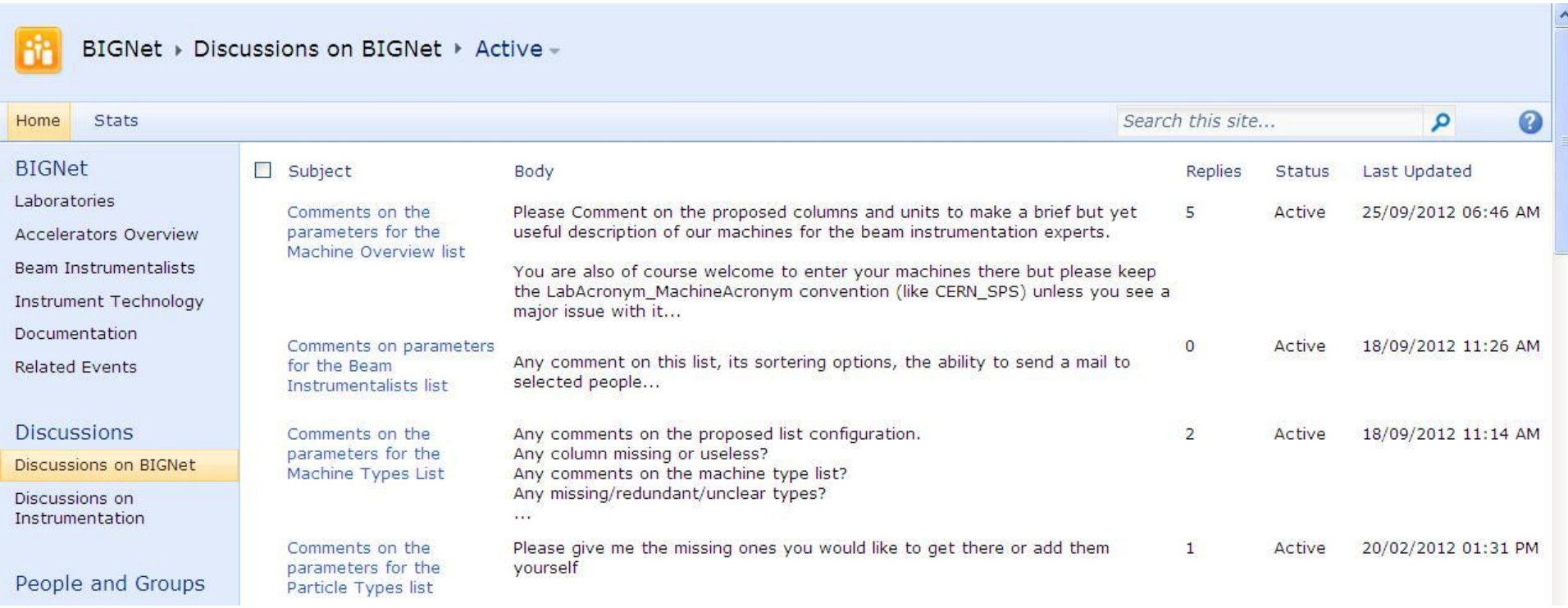
The Current Prototype: The Discussion Forums



Two main discussion forums are currently in place. The first one is dedicated to discussions on beam instrumentation, the second will be dedicated to discussions on the BIGNet itself. Every member of the network can participate and will receive a **daily** email gathering all the last day activity in these forums. A quick look at the headers will allow users to see if some topics could be of interest to them and links to participate will also be given in the email.

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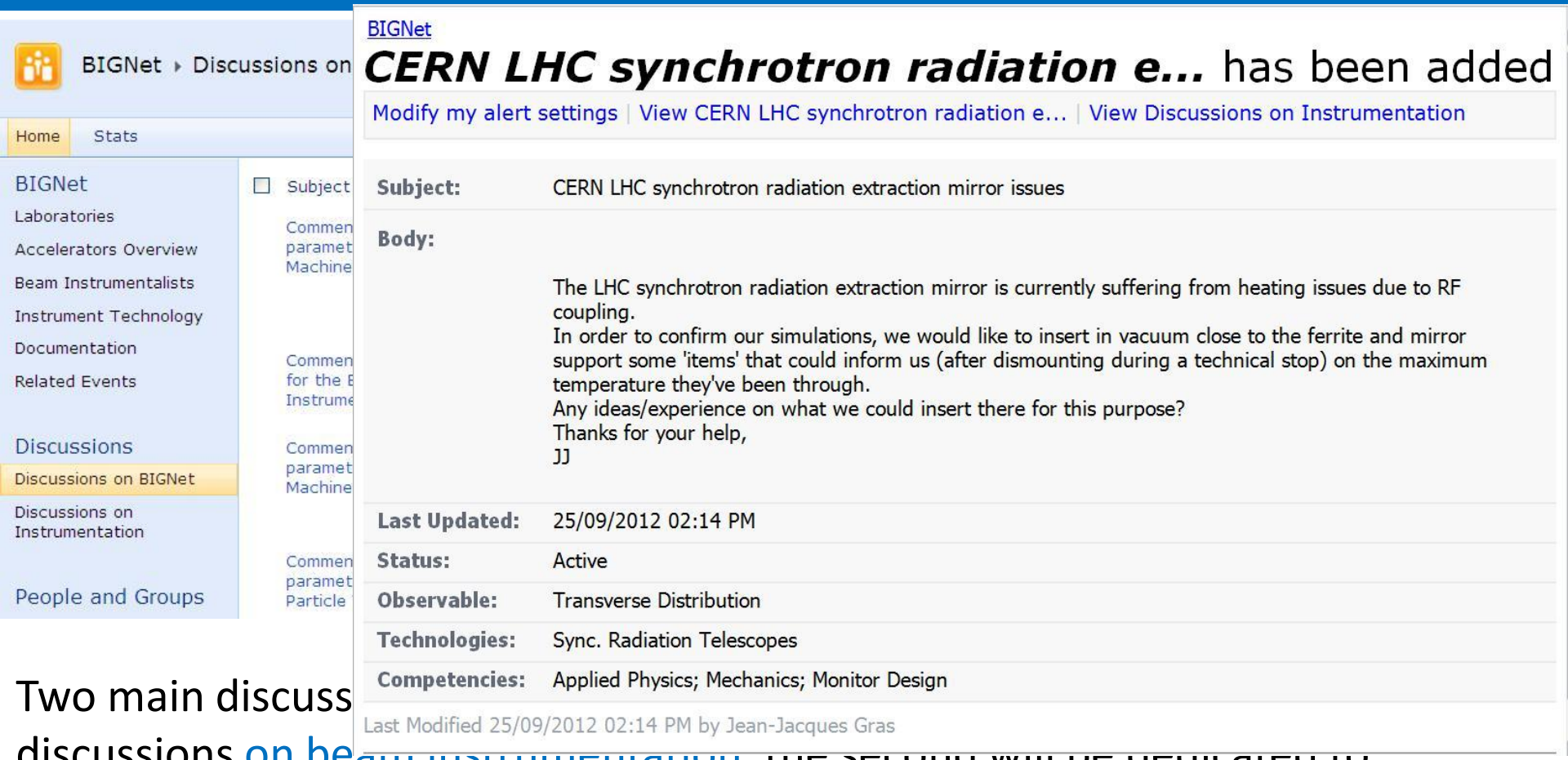

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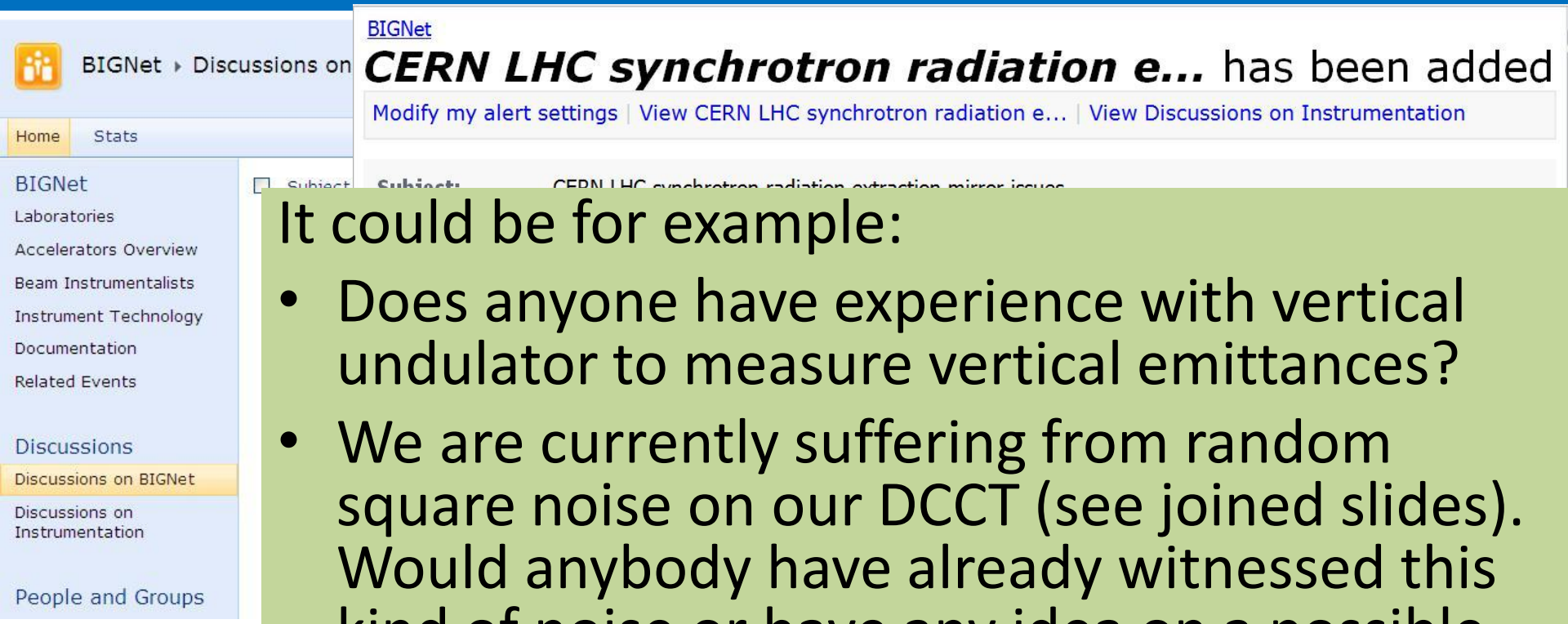

It could be for example:

- Does anyone have experience with vertical undulator to measure vertical emittances?
- We are currently suffering from random square noise on our DCCT (see joined slides). Would anybody have already witnessed this kind of noise or have any idea on a possible source?
- …

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Key Roles within the Project

- **General Public**, i.e. users who cannot (or did not) sign in
  - Can consult the list of the participating laboratories, the accelerators views and the event pages
  - Will not have access to the details on beam instrumentalists or the discussion pages.
- **Network Members**:
  - Will appear in the Beam Instrumentalists page
  - Will have access (once signed in) to all the information on the site.
  - Will have the right to launch a discussion or participate to an existing one.

  The site will be configured in such a way that they **will receive up to 2 emails per day** gathering the activity on the site, one for new events added in the calendar and one for new items in the discussion forum on beam instrumentation.

Key Roles within the Project

- **Network Local Administrators**

  They take the responsibility of entering and keeping up-to-date the data related to their home institute (see next slide)

- **Steering Board Members**

  The most motivated local administrators are welcome to join the BIGNet steering board that will be in charge of discussing this feedback and deciding on what should be implemented, when and how.

- **Web Site Administrators**

  They will be in charge of implementing agreed modifications at least for the current version. It is worth noticing that any local administrator could become a site administrator with a fairly basic training on SharePoint

Key Roles within the Project

BIGNet local administrators are the most important piece of the puzzle. They take the responsibility of entering and keeping up-to-date the data related to their home institute. In particular, they are responsible for:

1. Adding the accelerators hosted in their laboratory to the Accelerators Overview page.
2. Registering their beam instrumentalists onto the site and training them on how to use it.
3. Adding the beam instrumentation related events that may be organized by their laboratory.
4. **Promoting the network inside their team**.
5. **Contribute actively to the upgrade** of the tool with feedback on the functionality...

Key Roles within the Project

This might look heavy at first glance but it is certainly not so bad and probably worth the effort

Gathering and entering the initial set of data could be a non negligible (but always useful) effort

But maintenance effort afterwards should be pretty limited. Even a simple yearly (synchronized around IBIC for instance) update could probably be enough.

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But maintenance effort afterwards should be pretty limited. Even a simple yearly (synchronized around IBIC for instance) update could probably be enough.

Overall, it looks to be a good investment for any laboratory with respect to the potential return from the wider community

The Next Steps

- Now that this tool is in our hands, the next steps will be to:
  - invite other laboratories to join the adventure and motivate future local administrators. IBIC2012 being the ideal opportunity for that.
  - populate the Accelerators Overview and Beam Instrumentalist lists.
  - launch a few discussion forums and advertise upcoming events
  - put the Steering Board in place and react to experience and feedback and see how it flies.

Conclusions

- The current implementation of the BIGNet prototype proposes most of the features that were targeted at the start of the project.
- Even if this tool may not be perfect in terms of look and feel, it is ready to start working efficiently and demonstrate the usefulness of this initiative.
- It is now up to the community as a whole to make it grow
- Please join the adventure and click the 'How to join the BIGNet' button on https://espace.cern.ch/info-bi-portal/default.aspx.

Acknowledgments

I would like to acknowledge:

- all the people who contributed to the lively discussions to define this project and in particular the early volunteer local administrators: A. Alexander (ORNL), J-C. Denard (SOLEIL), A. Jansson (ESS), M. Minty (BNL), T. Mitsuhashi (KEK), F. Perez (CELLS-ALBA), G. Rehm (DIAMOND), M. Schwickert (GSI), H. Tanaka (Spring8), C. Welsch (Uni. of Liverpool) and K. Wittenburg (DESY).
- And T. Mitsuhashi (KEK) and Y.B. Leng (SINAP) for organizing and chairing **a dedicated satellite meeting this evening at 18h00 in room 403**.

Questions ?

Comments ?

Volunteers ?

Current Status of BIGNet

The current implementation of the BIGNet web site (see https://espace.cern.ch/info-bi-portal/default.aspx) is based on the SharePoint infrastructure available at CERN. This option was taken for the following reasons:

- The SharePoint infrastructure is extremely flexible and embeds all the functionalities to handle discussions, alerts, access rights etc.
- It allows the export of data into standard formats such as Excel tables, which would make migration to another platform possible if eventually required.
- It is widely used at CERN so an efficient support from the CERN-IT department can be relied upon.

Current Status of BIGNet

- This choice allowed the rapid development of a prototype web site.
- Despite the good flexibility and functionality of this architecture, the look and feel can in some cases remain clumsy.
- If this is felt to be too penalizing for the final implementation other options could be considered,
- but as it is this web site already allows assessment of the usefulness of such a tool and permits the type of services and interfaces it should provide to be defined.

Examples of Discussion Topics

- The LHC synchrotron radiation extraction mirror is currently suffering from heating issues due to RF coupling. In order to confirm our simulations, we would like to insert in vacuum close to the ferrite and mirror support some 'items' that could inform us (after dismounting during a technical stop) on the maximum temperature they've been through. Any ideas/experience on what we could insert there for this purpose?
- Do anyone have experience with vertical undulator to measure vertical emittances?
- We are currently developing a small faraday cup for HIE-ISOLDE (see joined sketch) and we would like to assess its performance. Do anyone have a facility with well known beam intensity of the order of uA where we could install such a device for a test?
- We are currently suffering from random square noise on our DCCT (see joined slides). Would anybody have already witnessed these kind of noise or have any idea on a possible source?