MAXIV
STATUS

KITS, MAXIV
29th Tango meeting, Krakow

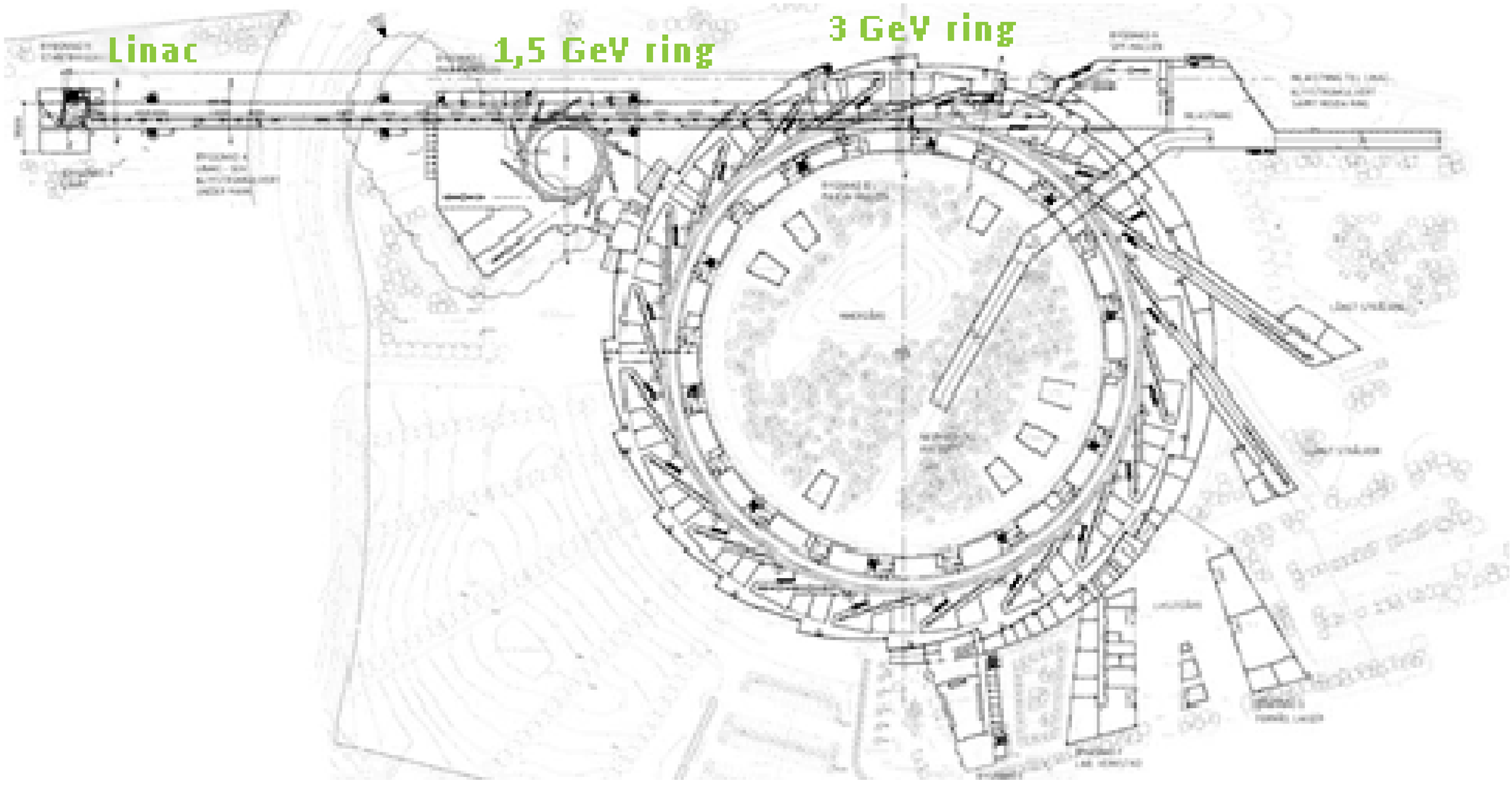
Agenda

WHAT'S NEW?

HOW DO WE WORK?

TANGO DEV and OPS

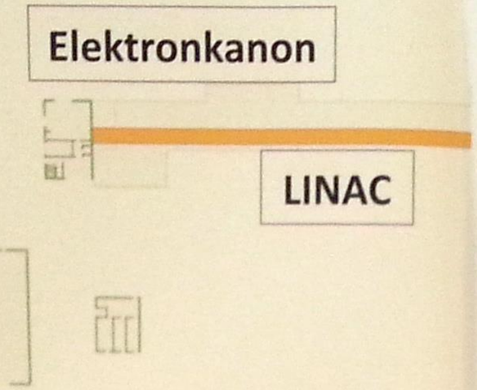
MAX IV Accelerators Perspective



MAX IV – en översikt

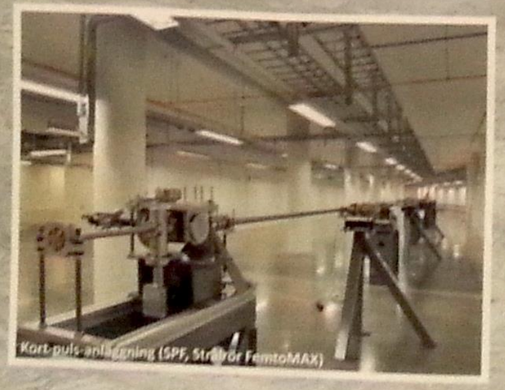
Beam lines Perspective

1. **FemtoMAX**
   Studies of ultra-fast processes in materials
2. **NanoMAX**
   Imaging, spectroscopic & scattering techniques with nanometer resolution
3. **BALDER**
   (Hard) X-ray absorption spectroscopy with emphasis on *in-situ* and time resolved studies.
4. **BioMAX**
   Macromolecular crystallography with a high degree of automation and remote access
5. **VERITAS**
   RIXS combining a unique resolving power with high spatial resolution.
6. **HIPPIE**
   High-pressure photoelectron spectroscopy
7. **ARPES**
   Angle resolved photoelectron spectroscopy for detailed studies of the electronic structure.
8. **FinEstBeaMS**
   Estonian-Finnish Beamline for Materials Science
9. **Species (Transfer)**
   VUV High-pressure photoelectron spectroscopy and RIXS
10. **FlexPES (Transfer)**
    Photoelectron Spectroscopy and NEXAFS
11. **MAXPeem (Transfer)**
12. **CoSAXS**
13. **SoftiMAX**
    Coherent Soft X-Ray Scattering, Holography




Elektronkanon


Linjäracceleratör (Linac)


Kort-puls-anläggning (SPF, Strålrör FemtoMAX)


Insättningselement (Undulator) för SPECIES strålröret.

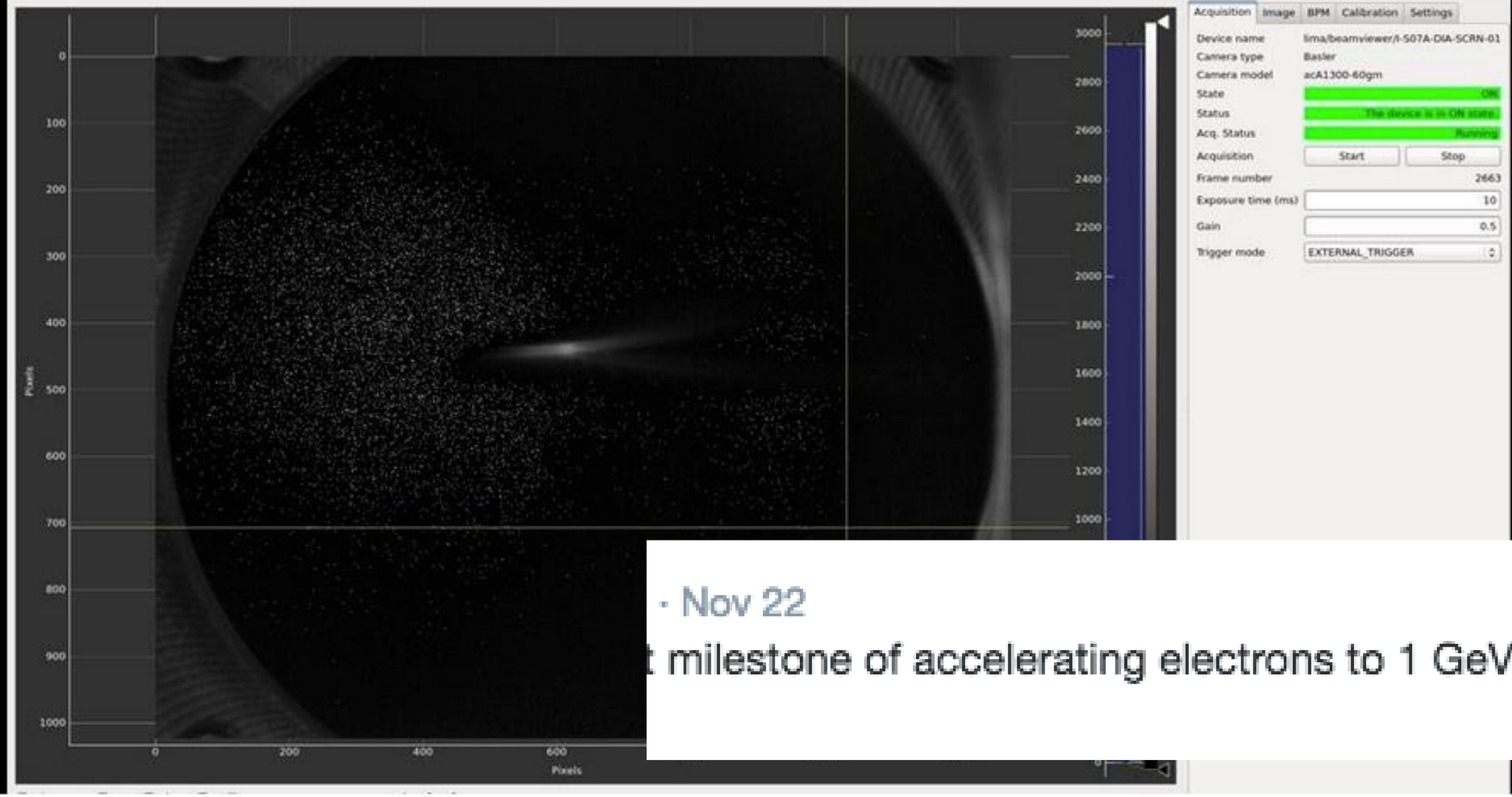

Gitter från Strålrör I3 på MAX-lab.


Experimentkammare (HP-XPS) för SPECIES strålröret.

What’s new?
@MAXIVLaboratory

MAX IV Laboratory @MAXIVLaboratory · Apr 28
We are looking for a Scientist - Soft X-ray Coherent X-ray Imaging to join us at #MAXIV lu.mynetworkglobal.com/en/what:job/jo…

7 3



· Nov 22

t milestone of accelerating electrons to 1 GeV.

MAX IV Laboratory @MAXIVLaboratory · Nov 22

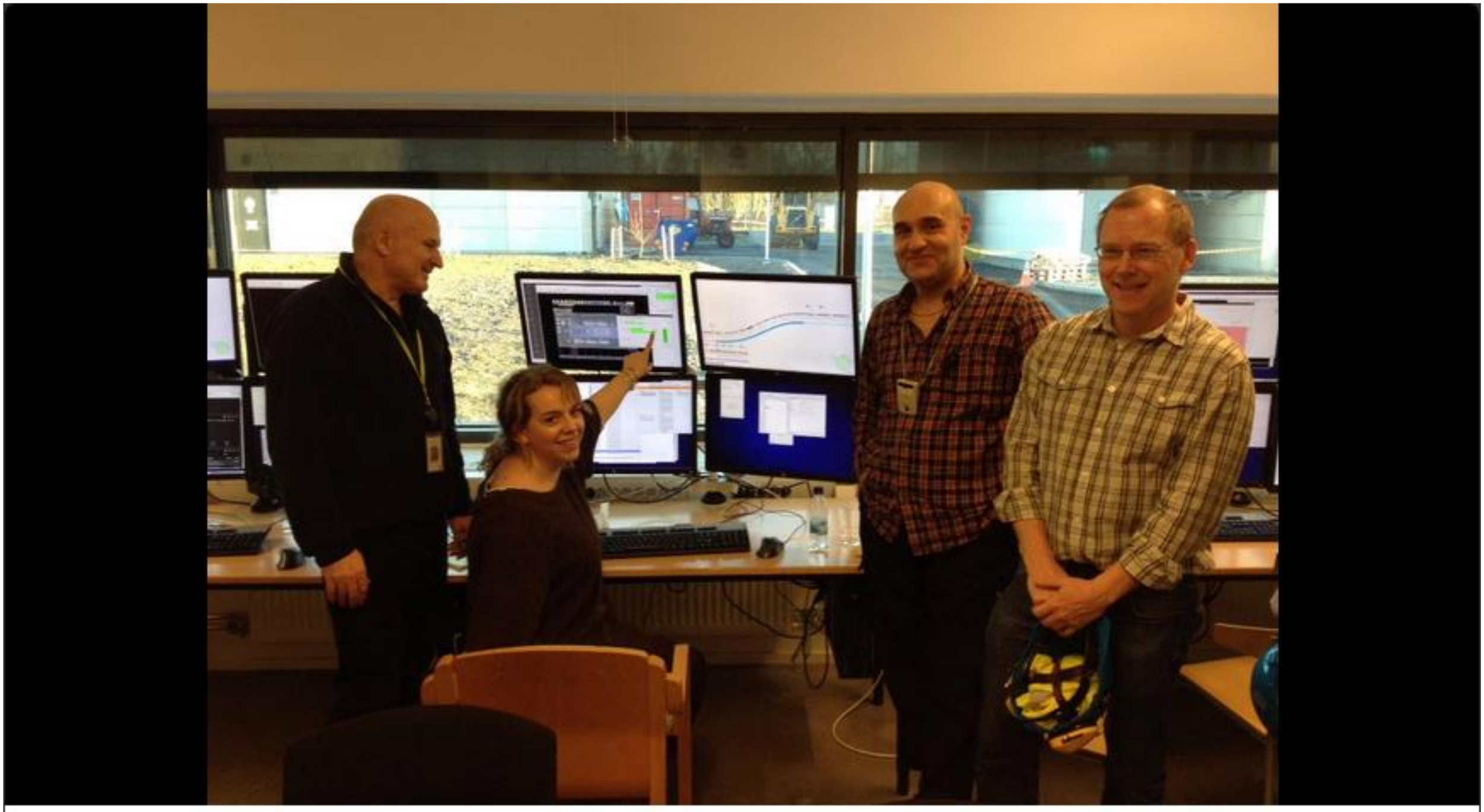
On Thursday we reached the important milestone of accelerating electrons to 1 GeV. That's 1/3 of full energy done!

6 1

MAX IV BioMAX @MAXIVbiomax · Nov 25

MXCuBE meeting in Lund: ALBA, BESSY, DESY, EMBL@PETRA III, ESRF, Global Phasing, MAX IV and SOLEIL collaborating.

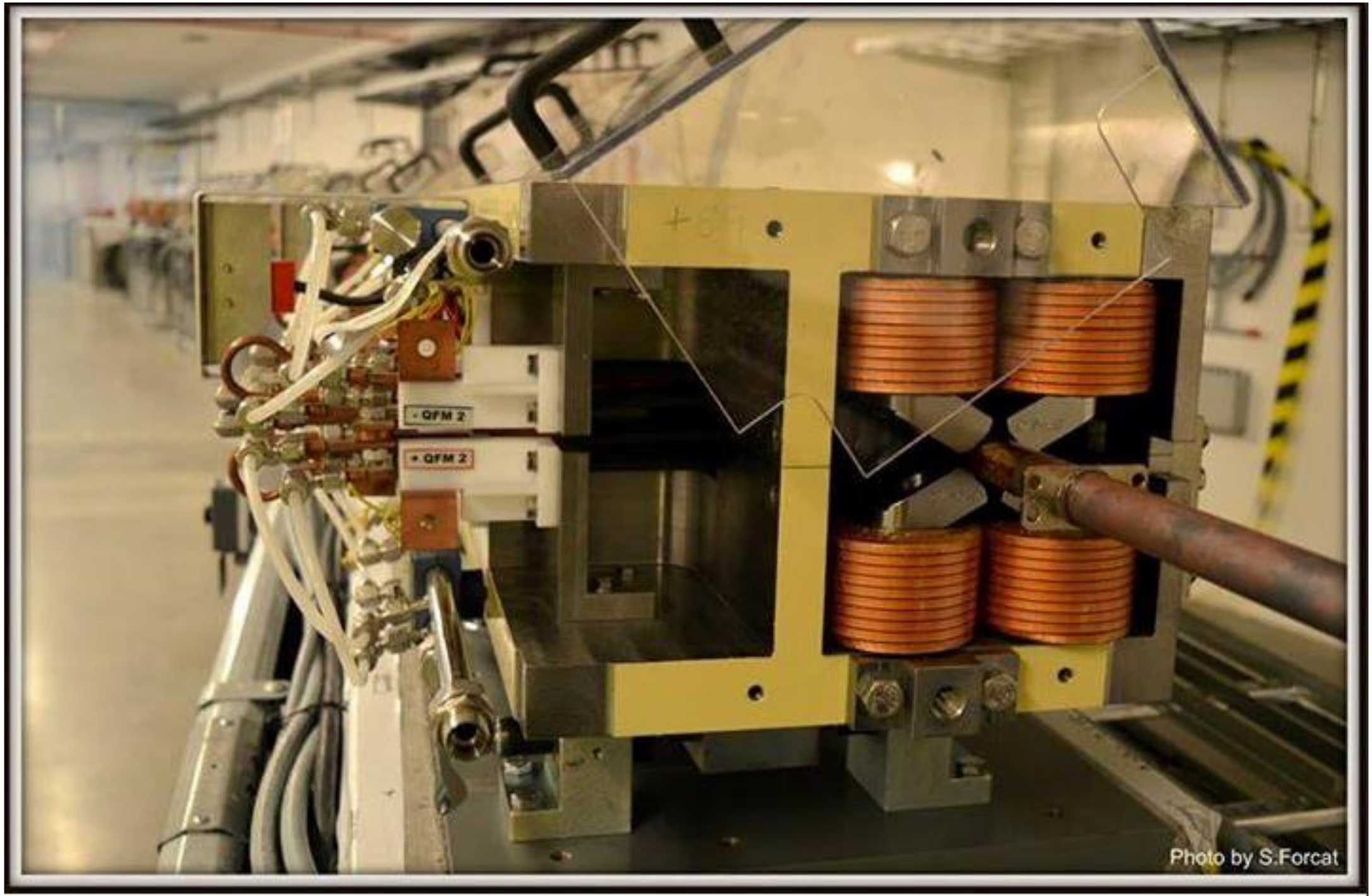
3 1



MAX IV Laboratory @MAXIVLaboratory · Feb 9

MAX IV linac just reached 1st design goal: 3 GeV for the first time! Celebrations are ongoing./CQ

2 1



MAX IV Laboratory @MAXIVLaboratory · Dec 11

Installing achromats in the 3GeV ring.

6 1

MAX IV Laboratory @MAXIVLaboratory · Apr 7

The installation work of the achromats in the storage ring at #MAXIV is ongoing. Eshraq Al Dmour tells us more. vimeo.com/123839938

Vimeo

Installation of achromats at MAX IV

Detaljer

Stadsbuss 20

Från -> Till	Läge	Tid
Lund C	K	05:38
Lund MAX IV	A	*05:51*

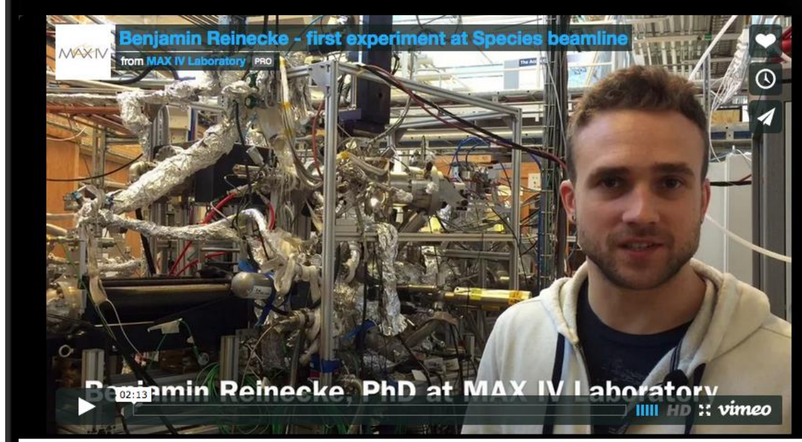
Riktning: Lundalänken ESS via MAX IV

Christian Stråhlman @cstrahlman
Nu om en stund går den första sta
@skanetrafiken

1 1

MAX IV Laboratory @MAXIVLaboratory · Feb 7
499 Days left till inauguration of MAX IV. Enough to get the job done, but no time to loose. /CQ

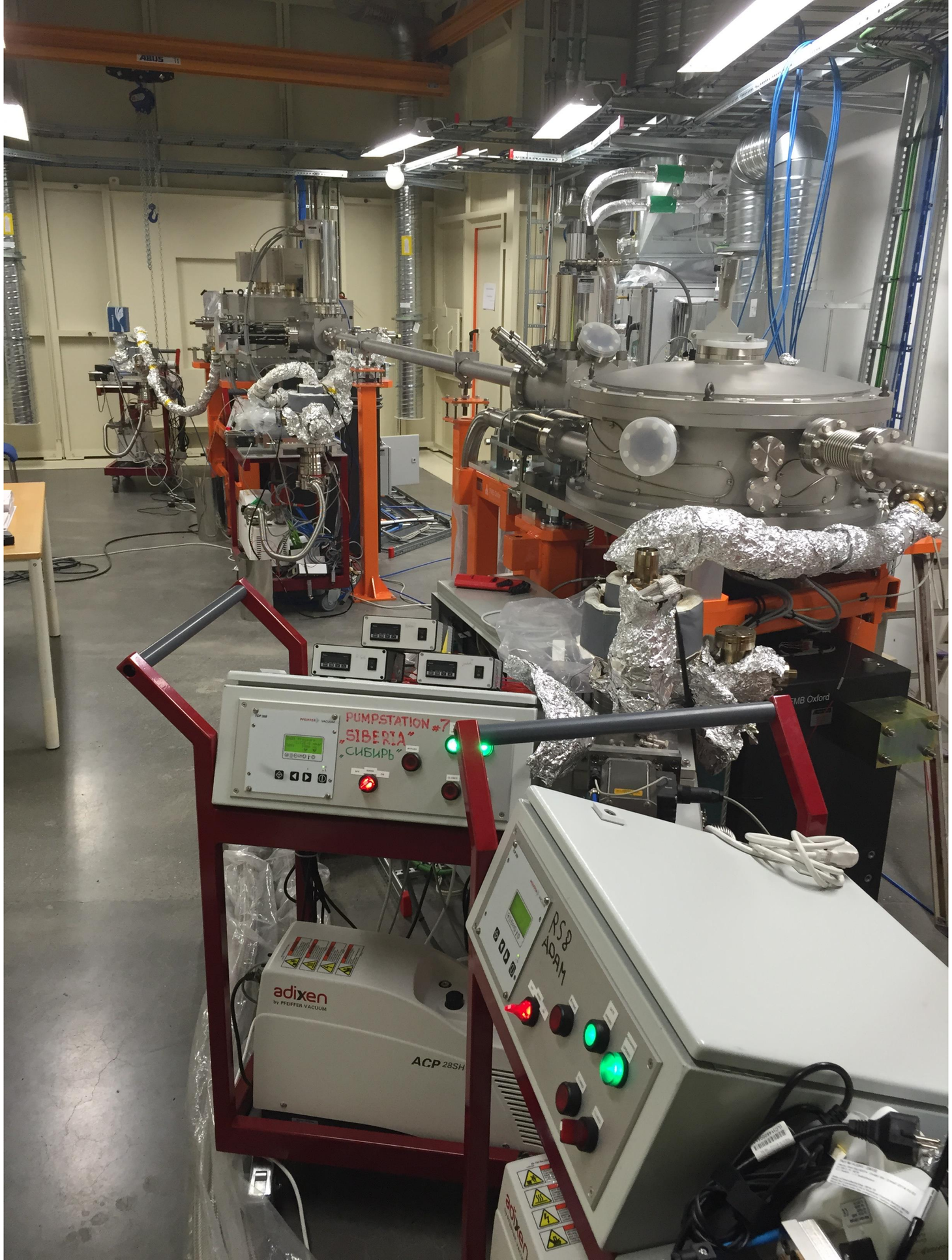
3 1



MAX IV Laboratory @MAXIVLaboratory · Apr 14
First experiment made at the SPECIES beamline. Benjamin Reinecke tells us all about it!
vimeo.com/124801402
2

MAX IV Laboratory @MAXIVLaboratory · Feb 18
We have had first light at the SPECIES HPXPS end station! #MAXIV #SPECIES
4

MAX IV Building Perspective


ABUS
PUMPSTATION #7
„SIBERIA"
„СИБИРЬ"
adixen
by PFEIFFER VACUUM
ACP 28SH
RS8
ADAM
MB Oxford

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Organisation

Present Controls & IT Group

Director: Christoph Quitmann

Life Science: Tomas Lundquist

Material Science Jesper Andersen

Machine Mikael Eriksson

Administration Peter Andersson

Group Head of Controls and IT
Darren Spruce

Control System Software
Vincent Hardion

Paul Bell
Mirjam Lindberg
Antonio Otero-Milan
Andreas Persson
Johan Forsberg
Vasileios Martos
(+1 recruitment)

Mikel Eguiraun (BioMAX)
*Eleni Mandilara (BioMAX)

Control System Hardware
Julio Lidon-Simon

Jerzy Jamroz
Peter Sjöblom
Gabriela Todorescu

Scientific and Information Management
Krister Larsson

Jason Brudvik
Alberto Nardella
Sudha Padmanabhan

System Engineering and Administration

Daniel Liikamaa
Andreas Mattson

Scientific Software Coordination
(+1)

Servers and Network Architecture

Maria Rosu*
Carl Cristian Arlock

IT Support

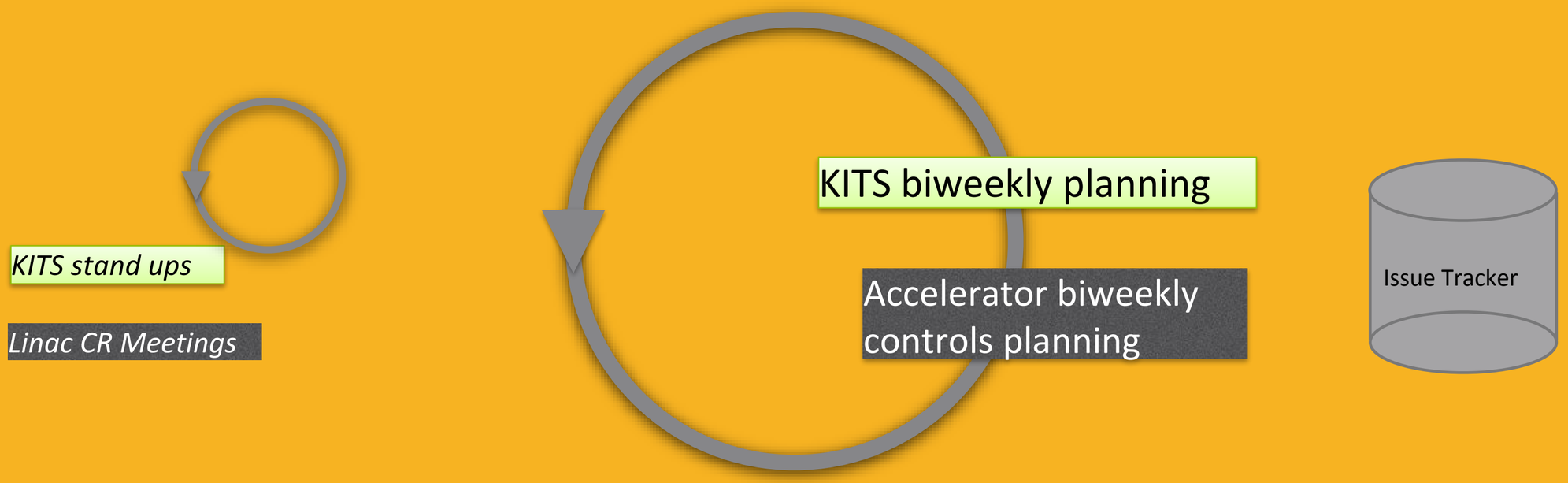
Anders Holmström
Henrik Jonsson

Vincent Michel: consultant
Sebastien Gara: consultant

Accelerator <-> CS Project: Planning

Short Term

Troubleshooting, unforeseen small tasks, informal meetings, brainstorming



Other Project Meetings (3-6 Months)

MAC

SR

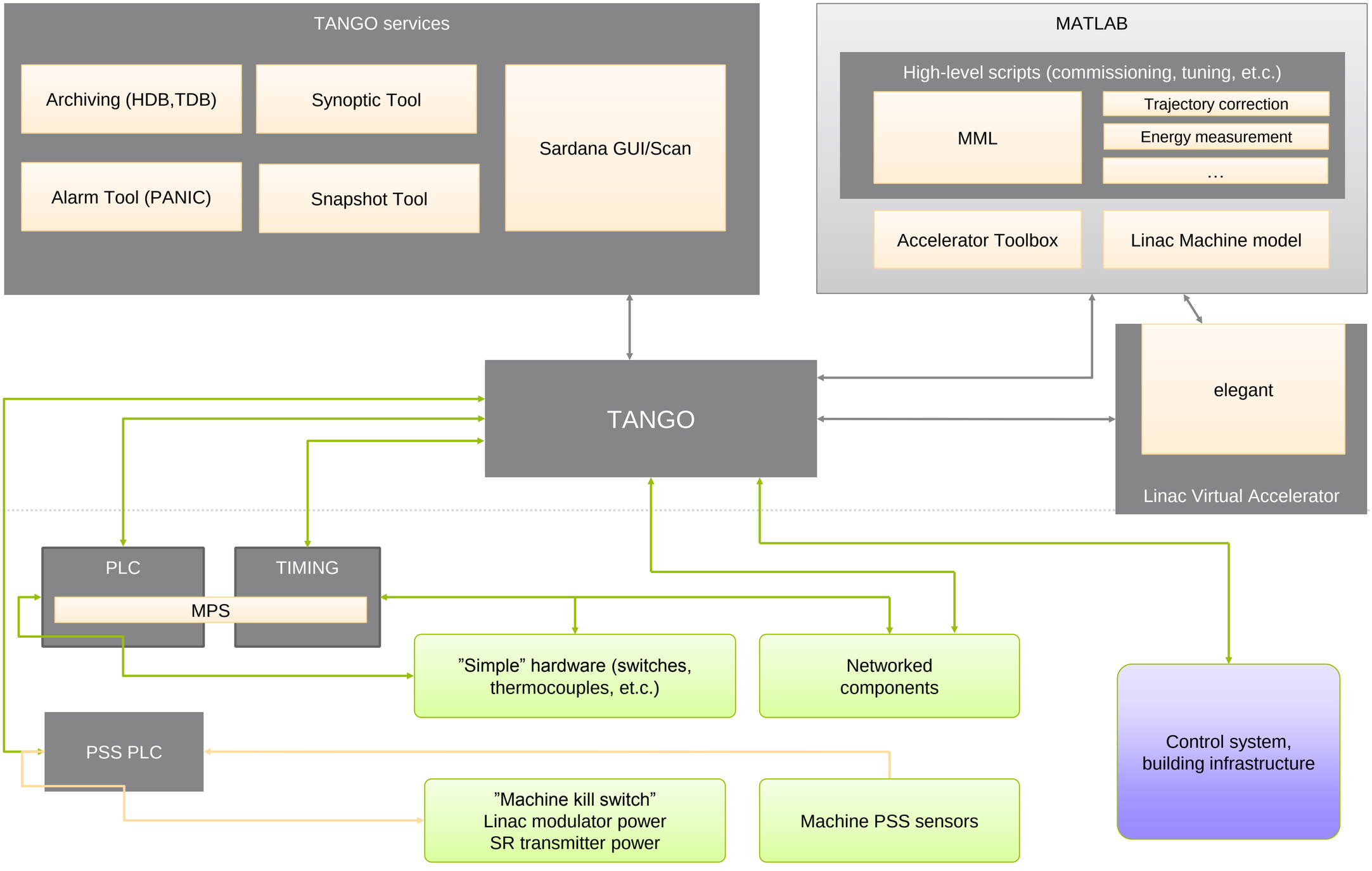
Long Term Planning (every 2 months)

LTP

Sub System Responsibles contact points

	KITS (10.5)	*Linac*	*Storage Rings*
Project Coordination	Julio + Vincent	Magnus S, Dieter	
		Sara, Erik	Pedro
Power Supplies	Mirjam	Claes, Pedro	
PLC + Vacuum	Mirjam	Johan T, Claes	
RF +LLRF	Antonio	Lars M	
Timing	Jerzy	Magnus S, Lars M, Pedro	
Magnets	Paul	Magnus S, Martin	
Motion Control	Julio	All	
PSS	Andreas	Magnus L	
Cooling	Andreas	Claes	
Control Room GUIs	Johan F.	Sara, Magnus, all	
Diagnostics	Paul	Erik M, Robert Nilsson, all	
High Level Physics	Jason Brudvik	Sara, Lennart	

Control System Stakeholders



Collaboration

Solaris: Budker pulse magnet, Danfysik PS, R&S RF Transmitter, Spectrum Analyser

Alba for all python software including Sardana and Taurus, Electrometer

ESRF Tango and Icepap

Soleil for the pulsed magnet, the nano probe, the wiggler and MxCube

ELI, ESS and others by sharing the experience (workshop)

Nexeya and **Cosylab**

Status

Yesterday, we did…

MAC Meeting - April 2014

Linac Installation - Doubt on the delivery (organisation, man-powers, competence, PERFORMANCE?…)

MAC Meeting - Sept 2014

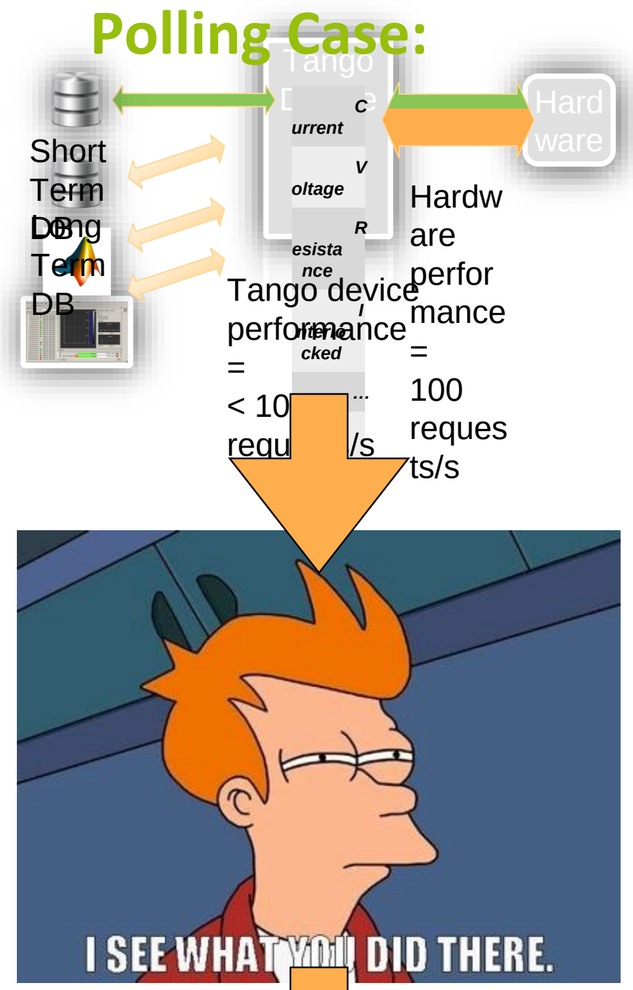
Linac Commissioning - Reinforce Reliability and High level feature

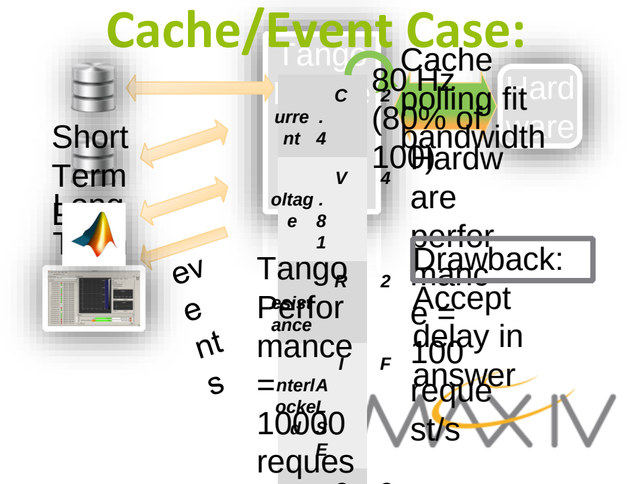
MAC Meeting - April 2015

R3 Installation and SST - Performance and Reliability Test

Beamline Winter 2015

Details specification and Project coordination





Today, we do…

Linac

Commissioning support

3 GeV Ring

Continue the Installation and SST - Performance and Reliability Test

Beamlines Installation and SST of Optics

Tomorrow

Short Term: August 2015

Ready for 3 GeV Ring Start of Commissioning

Mid Term: December 2015

Ready for Beamline Start of Commissioning

Start Installation of 1.5 GeV

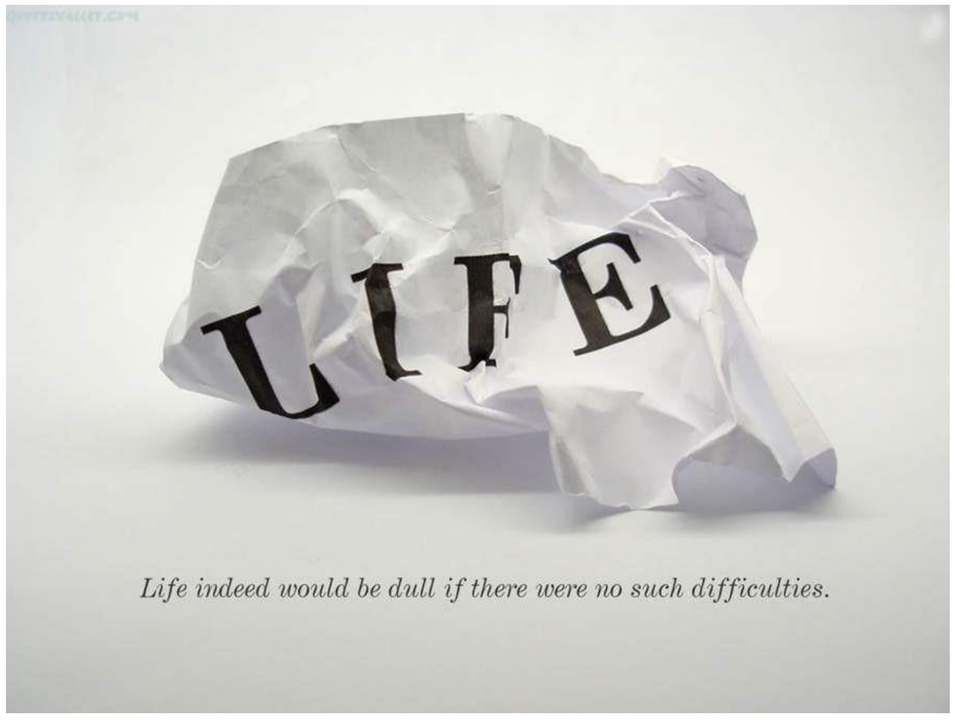
Long Term: June 2016 (Midsummer)

Ready for Operation

Difficulties

Bad UX in the Linac control room:
missing devices, contradiction, …

Configuration of the different subsystems difficult to estimate.



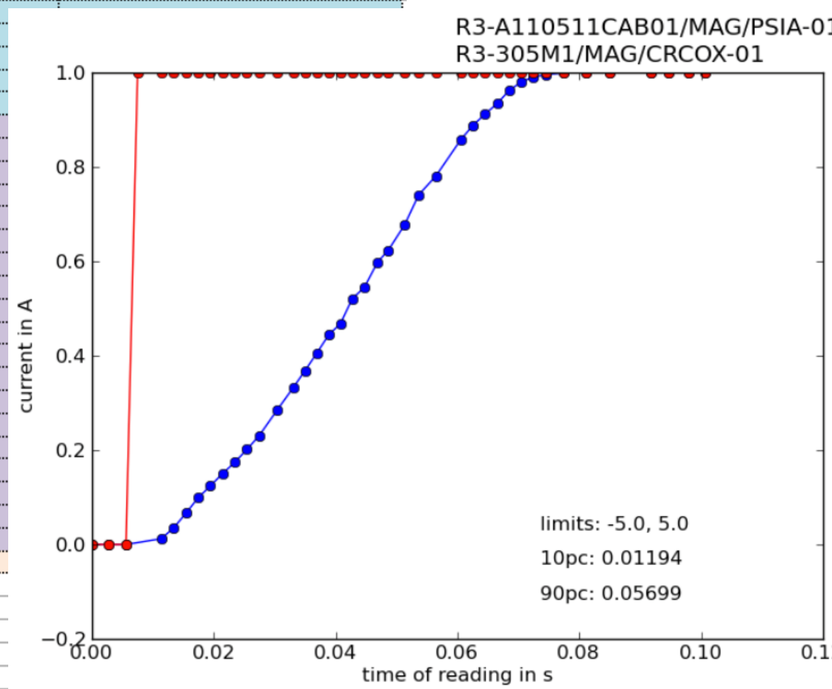
How we improved:

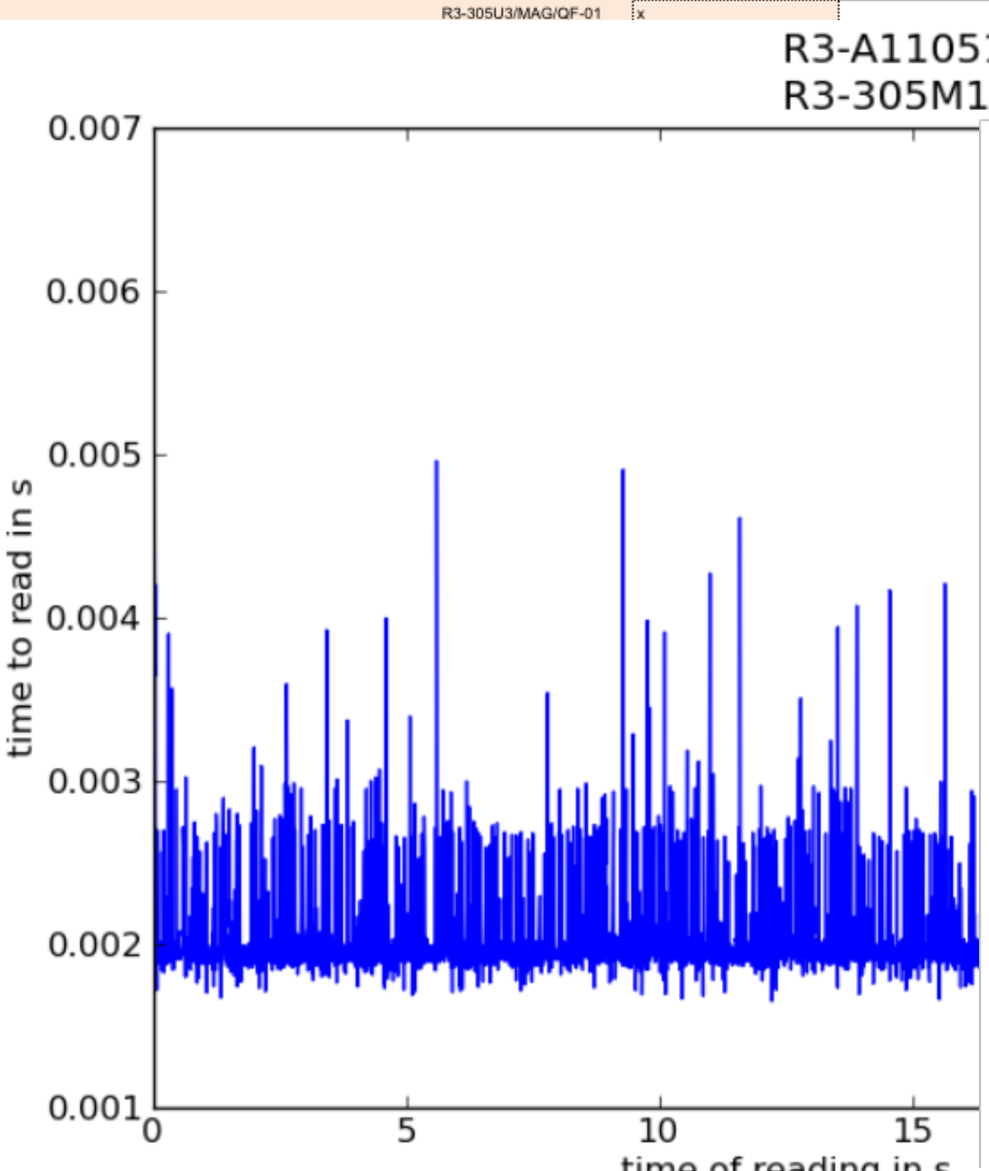
Deep test of each device, layer by layer for the 3 GeV Ring

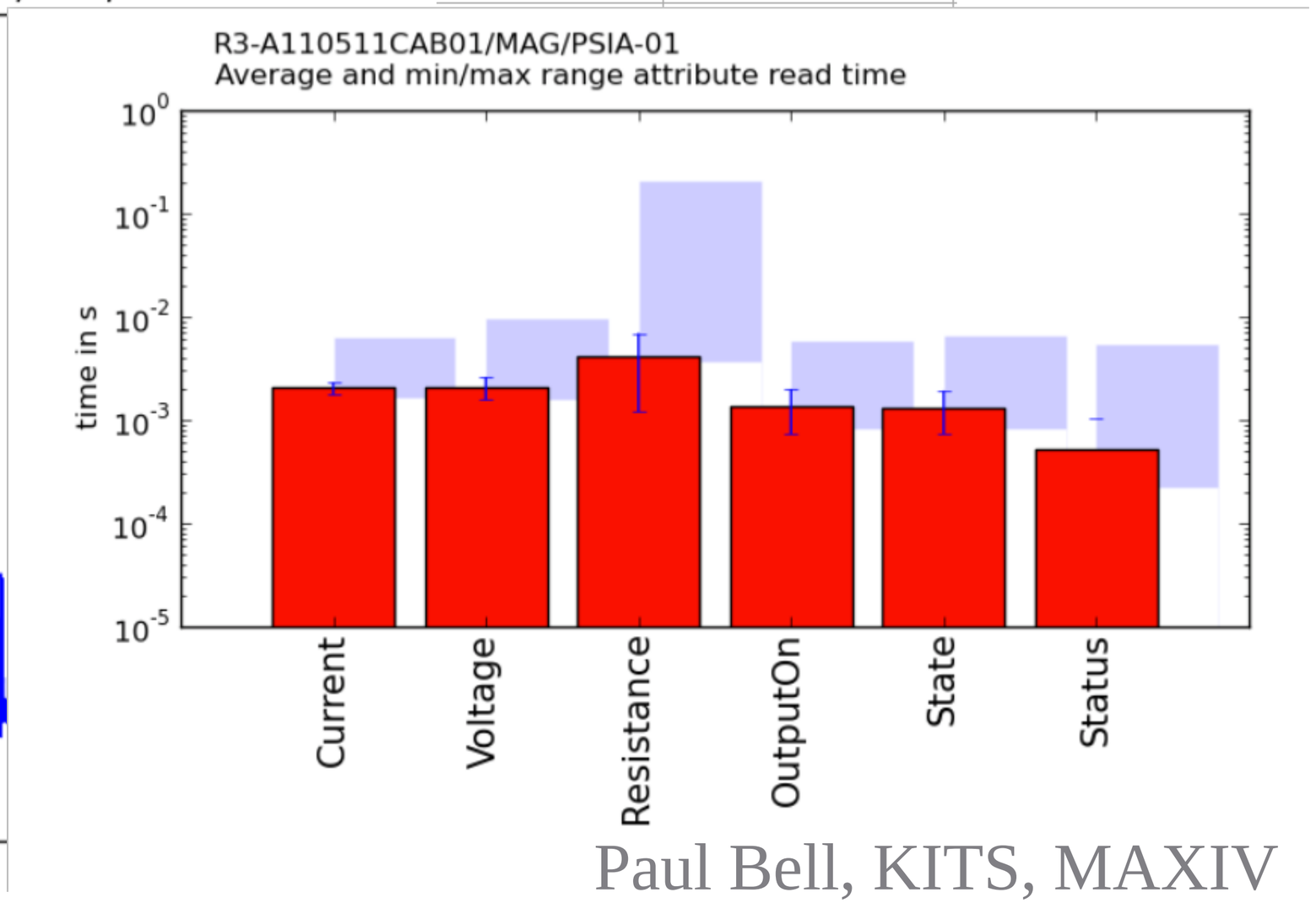
Define the source and format of information

Define the workflow between group

			Basic checks (script 1)			Rise time	Performance (timing) check (script 2)	Stability check
Power Supply Name	Circuit name	Magnet Name	check mag-PS association	check write current/read field attributes	check reconnection		check response time for 10,000 reads per attribute	Run archving for 24 hours minimum
R3-A110511CAB01/MAG/PSIC-01	R3-305M1/MAG/CRFCX-01	R3-305M1/MAG/COGX-01						
R3-A110511CAB01/MAG/PSIC-03	R3-305S1/MAG/CRFCX-01	R3-305S1/MAG/COGX-01						
R3-A110511CAB01/MAG/PSIC-05	R3-305S2/MAG/CRFCX-01	R3-305S2/MAG/COGX-01						
R3-A110511CAB01/MAG/PSIC-07	R3-305M2/MAG/CRFCX-01	R3-305M2/MAG/COGX-01						
R3-A110511CAB01/MAG/PSIC-02	R3-305M1/MAG/CRFCY-01	R3-305M1/MAG/COGY-01						
R3-A110511CAB01/MAG/PSIC-04	R3-305S1/MAG/CRFCY-01	R3-305S1/MAG/COGY-01						
R3-A110511CAB01/MAG/PSIC-06	R3-305S2/MAG/CRFCY-01	R3-305S2/MAG/COGY-01						
R3-A110511CAB01/MAG/PSIC-08	R3-305M2/MAG/CRFCY-01	R3-305M2/MAG/COGY-01						
R3-A110511CAB01/MAG/PSIA-01	R3-305M1/MAG/CRCOX-01	R3-305M1/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-03	R3-305M1/MAG/CRCOX-02	R3-305M1/MAG/COAX-02	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-04	R3-305U1/MAG/CRCOX-01	R3-305U1/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-06	R3-305U2/MAG/CRCOX-01	R3-305U2/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-08	R3-305U3/MAG/CRCOX-01	R3-305U3/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-10	R3-305U3/MAG/CRCOX-02	R3-305U3/MAG/COAX-02	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-12	R3-305U4/MAG/CRCOX-01	R3-305U4/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-14	R3-305U5/MAG/CRCOX-01	R3-305U5/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-16	R3-305M2/MAG/CRCOX-01	R3-305M2/MAG/COAX-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-18	R3-305M2/MAG/CRCOX-02	R3-305M2/MAG/COAX-02	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-02	R3-305M1/MAG/CRCOY-01	R3-305M1/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-05	R3-305U1/MAG/CRCOY-01	R3-305U1/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-07	R3-305U2/MAG/CRCOY-01	R3-305U2/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-09	R3-305U3/MAG/CRCOY-01	R3-305U3/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-11	R3-305U3/MAG/CRCOY-02	R3-305U3/MAG/COAY-02	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-13	R3-305U4/MAG/CRCOY-01	R3-305U4/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-15	R3-305U5/MAG/CRCOY-01	R3-305U5/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-17	R3-305M2/MAG/CRCOY-01	R3-305M2/MAG/COAY-01	x	x	x	x	x	
R3-A110511CAB01/MAG/PSIA-19	R3-305M2/MAG/CRCOY-02	R3-305M2/MAG/COAY-02	x	x	x	x	x	
R3-A110511CAB08/MAG/PSPH-01	R3-305/MAG/CRQF-01	R3-305U2/MAG/QF-01	x	x	x	x	x	
		R3-305U2/MAG/QF-02	x					
		R3-305U3/MAG/QF-01	x					







Tango Dev and Ops

Fast Archiving

Configuration management

Web Tools

And Other dev

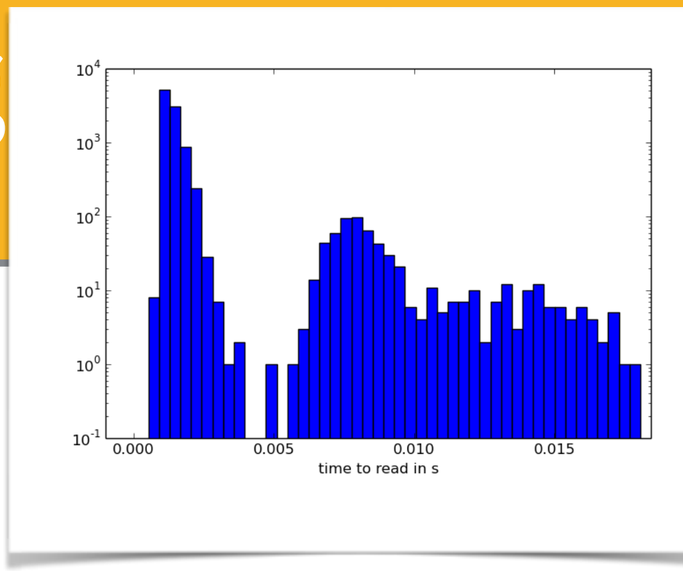
100 Hz Fast Archiving

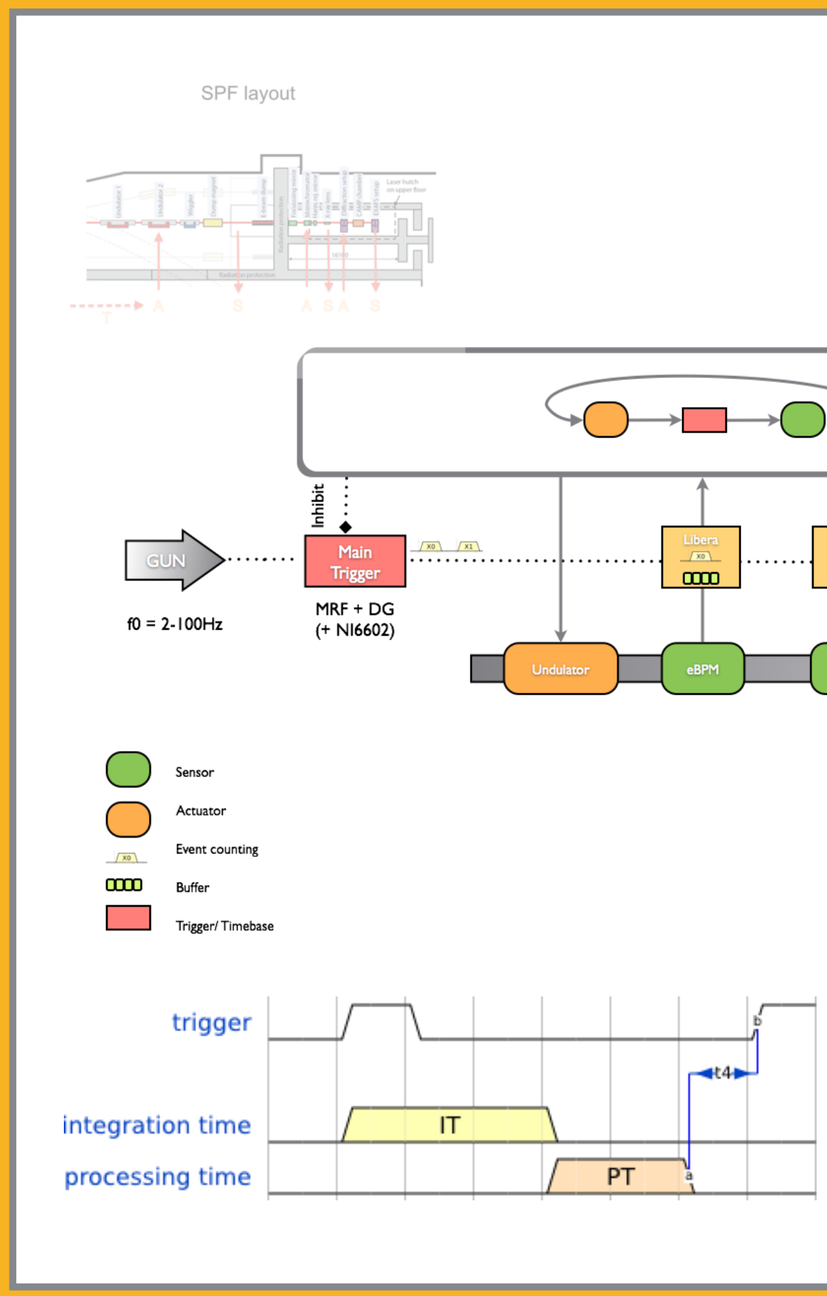
Based on trigger/event

Timing studies

Deployed: **Libera** and R&S Scope (99.9%) Events at 100 Hz

“Synchroniser” Devices produces HDF5 file (500GB/week)





Hardware	100 Hz	Tango communication	Grouped request	Synchro. Trigger and signal	Timestamp	Buffer
Libera Single Pass	yes, reliable	1 ms	yes	yes by hw	Trigger number (software), OS, Internal precised timestamp	no but possible
Basler	no, limited to 50 Hz					no
Raptor	yes, under condition					
Scope R&S RTO1024	yes but with 99.9% (not confirmed with the current firmware)	30 ms (1 waveform ~ 5000 pts) But don’t know yet the performance to read one measurement (ex: Integration of the waveform)	no	external trigger but not available in the remote access (only acquisition number)	TO BE CONFIRM: yes but with another command (reducing the bandwidth) and not in the same buffer (historic)	yes but depends on the sampling, duration, size of memory
Scope Lecroy WR640Zi	yes should be	not known now	not known now	not known now	not known now	not known now
Rayonix	yes but with binning 8x8					

Configuration Management

Complete Tango CS + services (5 VMs) in 20 mn with PXE & Ansible

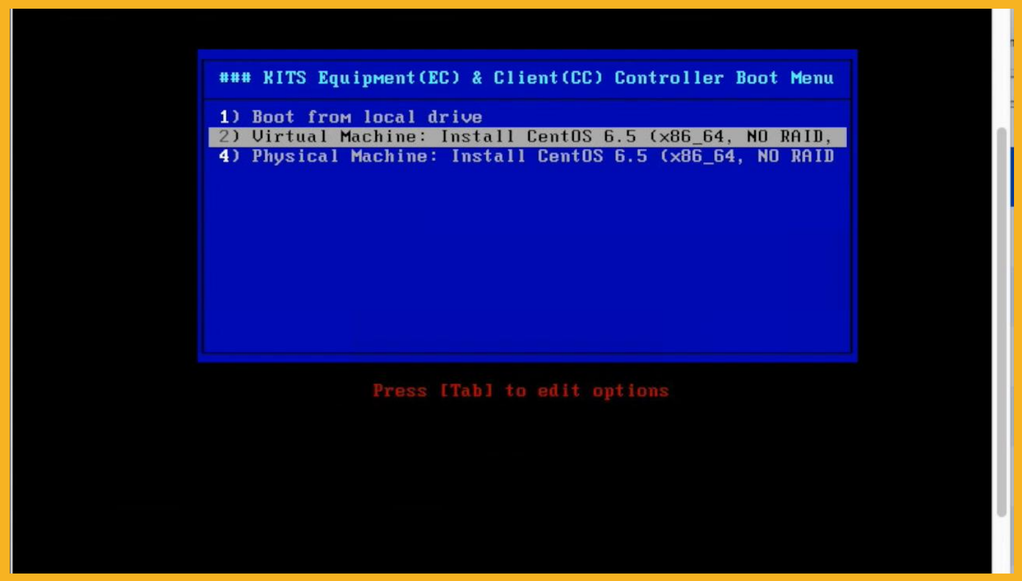
Semi automation of the other Tango devices: cover ~80%

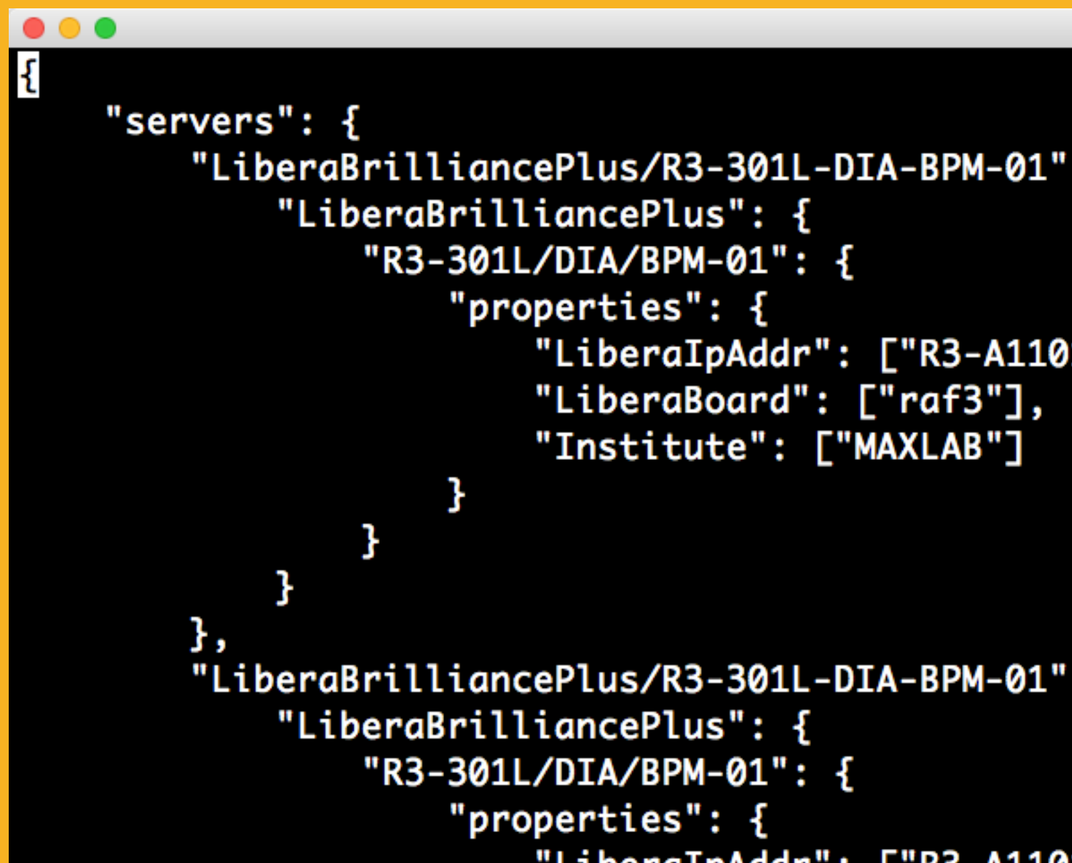
DsConfig: Json2Tango

Different source of information: XLS, Cable DB, ~~oral~~

Good candidate for Continuous Delivery: Only deploy where it is necessary

=> Revealed important for the perception of our flexibility and reactivity





and the Web so?

In Ops

Alarm log with PyAlarm, Kibana and Elastic Search

Synoptic via web server (still with Qt client)

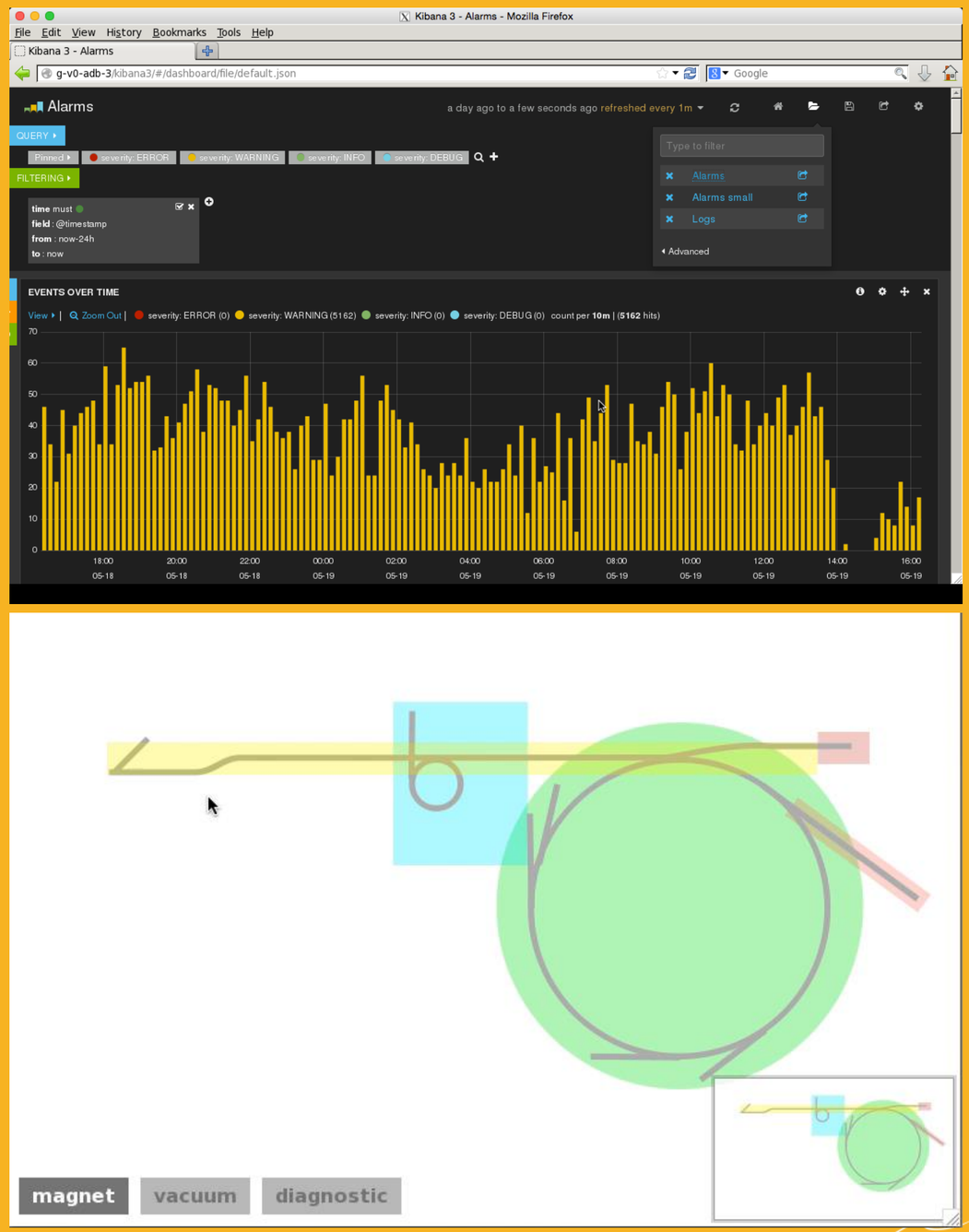
Archive viewer

Maxlab BPM app with Tango REST api

In Dev

Synoptic full web

MxCube: 3 people (MAXIV and Soleil) on Web and Sardana



Other dev

(Real) Unit test for Tango device: Don’t miss the presentation of Vincent Michel

Sphinx Documentation for Python Tango device

Pogo template for the Python HL

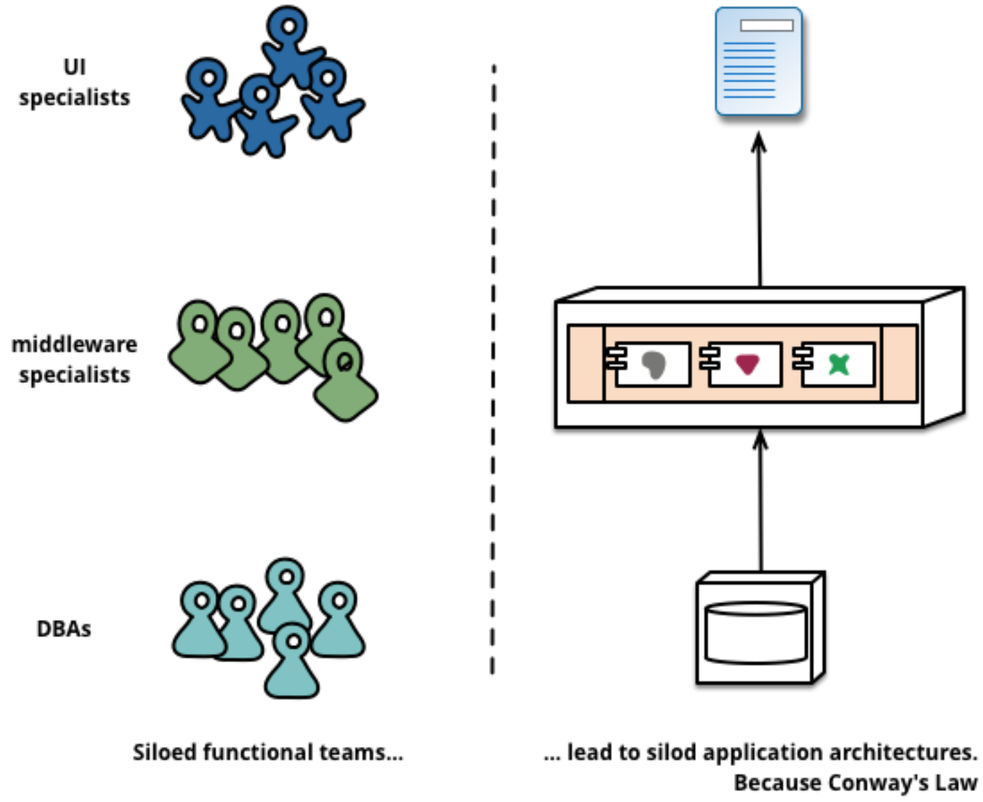
Lesson Learned

Tango has never been so good.

More Event

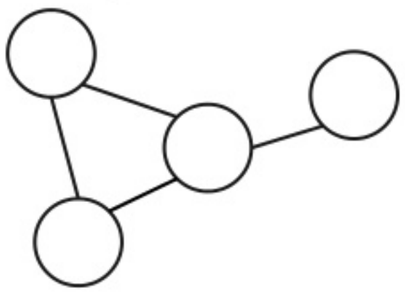
Time to streamline a higher level.

Conway’s law

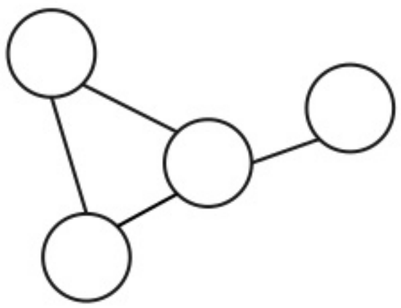


conway’s law

new system:



organization:



devops theory

- silo destruction
- infrastructure as code
- continuous integration
- empathy
- blameless post-mortems
- measure all the things
- chatops

Lessons Learned

Agile is efficient but you need the mandate from the system owners

the control system is affected by ALL the stakeholders

- the suppliers
- the other groups in the organisation
- the user community
- hosting organisation (Lund University)

Tools will never solve any organisational communication issue

Conway's Law

organisations which design systems ... are constrained to produce designs which are copies of the communication structures of these organisations