

EUROPEAN SPALLATION SOURCE

Controlling the ESS Testbeamline at HZB

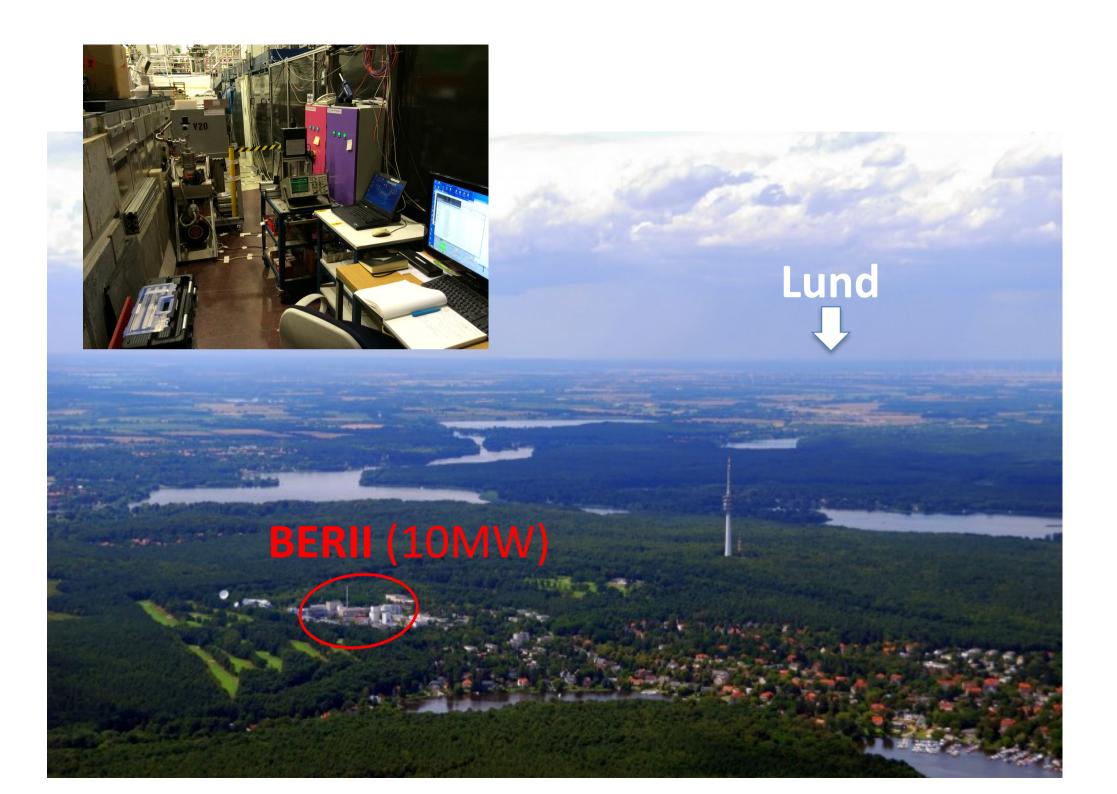
Michael Wedel DMSC, Instrument Data Group

www.europeanspallationsource.se 7 April, 2017

Outline



- Introduction
- Equipment and controls
- DMSC Instrument Data Group Activities
 - Installations
 - Supported experiments
- Conclusion & outlook



Introduction



EUROPEAN SPALLATION SOURCE

- Testbeamline V20 at HZB
- Chopper cascade models ESS pulse structure
- Main purpose: Method development, Integration
- Responsible on site: Robin Woracek

DMSC Instrument Data Group

- Development of high level control interface
- V20 provides full beamline with user operations
- Very good opportunity to gain experience

Equipment I

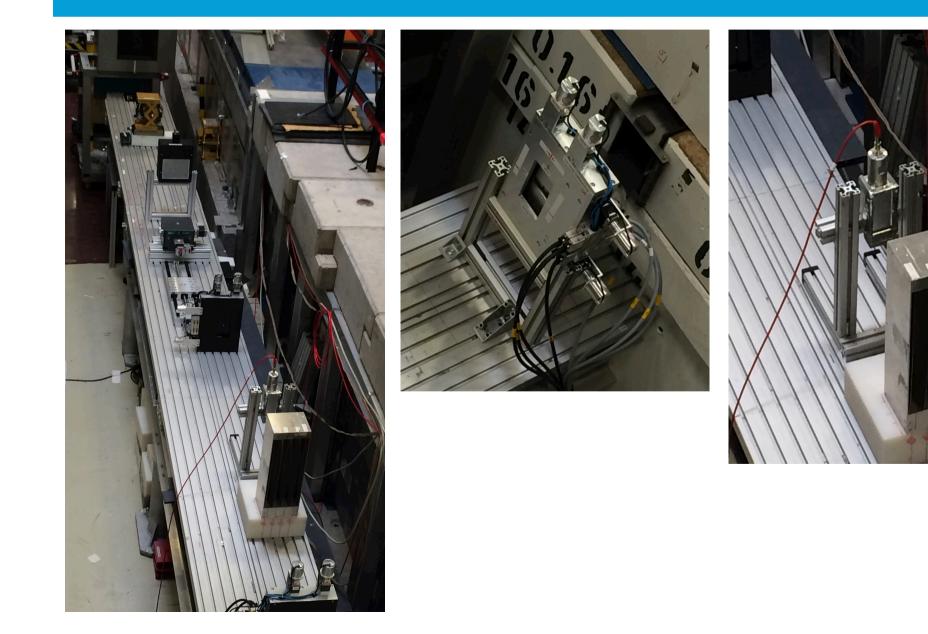


- Base configuration:
 - 2 Airbus choppers (generating "ESS-Pulse")
 - 4 JCNS choppers mounted on motion stages (WFM)
 - 2 four-blade slit systems
 - 2 linear motion stages
 - Beckhoff BK9000 with many DAC modules
- Optional components:
 - 3 axes goniometer
 - Detectors, monitors, high voltage power supplies
 - Very large quantities of user equipment

Equipment II



EUROPEAN SPALLATION SOURCE



6



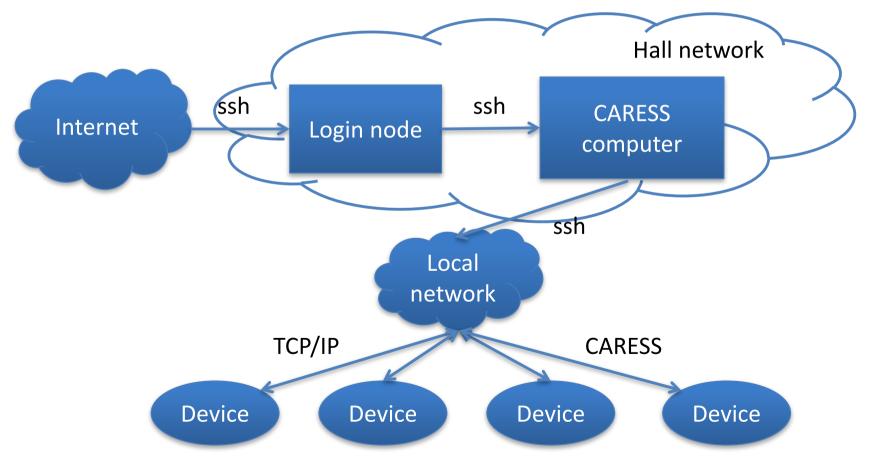
Control system

										Photos Activity
\odot	CARESS V20 - Basics - Set Value				CARESS V20 A2, ADET, POWD				MONICAR SS-Honitoring	\odot \odot
	current	target		Setup Scans	<u>Basics</u> Specials <u>P</u> refe	V20: idle		UNKE		Wed Feb 3 18:20:16 201
MTUS	-33.993		MANUAL SET MB2VB=	0.09		MTUS	-33,9	93 MB3H	x ?	
MTDS	33.996		MANUAL SET MB2VB=).18		MTDS CHOP_DS	-33.9 33.9 67.9 -24.9	96 MB3V 89 MB3V 97 POL_R0	Υ?	
CHOP_DS	67.989		MANUAL SET MB2VB=).27		MB1HL MB1HR MB1HW	-24.9 24.9 49.9	198 HVDE'	T 0,000	
MB1HL	-24.997		MANUAL SET MB2VB=	0.36		MB1HX MB1VB	0.0 -49.9	00 HVMO 194	N 1350.000	
MB1HR	24.998		MANUAL SET MB2VB=	0.45		MB1VT MB1VH	2159.2 2209.2	99 CHOP1 92 CHOP2	0 S 0, 0,00	
MB1VB	-49.994		MANUAL SET MB2VB=).54		MB1VY MB2HL	1054.6 -22.5 26.7	CHOP3 : 99 CHOP4 :	S 0, 0,00 S 0, 0,00	
MB1VT	2159.299		MANUAL SET MB2VB=	0.63		MB2HR MB2HW MB2HX	49.3	88 MAT	T 0	
MB1HW	49.995		MANUAL SET MB2VB=).72		MB2VB MB2VT	2.0 0.8 19.3	63	- ·	
МВ1НХ	0.000		MANUAL SET MB2VB=	0.81		MB2VH MB2VY	18.5 10.0	53		
MB1VH	2209.292		MANUAL			MB3HW		?		
MB1VY	1054.653		CAR>							
MB2HL	-22.599			at started Wed N	ov 11 2015 12:15:43			last run 7		
MB2HR	26.789		C O	it started, wed in	CARESS V20 - Monica	r		$\odot \odot \otimes$		
X MB2VB	0.810	0.81	V20: idle		Wed Feb 3 18:2	0.16 2016				
MB2VT	19.363		v20. Iule		Wed 165 5 10.2	0.10 2010				
MB2HW	49.388									
МВ2НХ	2.095		MTUS	-33.993	MB2HR 2	5.789 HVDET		0.000		
MB2VH	18.553		MTDS	33.996		9.388 HVDET		0.000		
MB2VY	10.086		CHOP_DS	67.989		2.095 HVMON		1350.000		
POL_ROT	145.200		MB1HL MB1HR	-24.997 24.998		0.810 HVMON 9.363 CHOP1	0	0.000		
HVDET	0.000		MB1HW	49.995		B.553 CHOP2		0, 0.00		
HVMON	1350.000	1350	MB1HX	0.000		0.086 CHOP3		0, 0.00		
СНОР	offline		MB1VB	-49.994	мвзни	? CHOP4	S	0, 0.00		
TTHS	0		MB1VT	2159.299	мвзнх	? POL_RO	T_RES	0.000		
NYS	0		MB1VH	2209.292	MB3VH	?				
SD	900		MB1VY	1054.653	MB3VY	? WAIT		0		
			MB2HL	-22.599	POL_ROT 14	5.200 SCANT	ME	0		
Apply Check	Store Reset Halt Minim	nize <u>C</u> ancel								
loop error, too many	tries									

Networks



- Beamline-local network
- Hall network, accessible via HZB login node



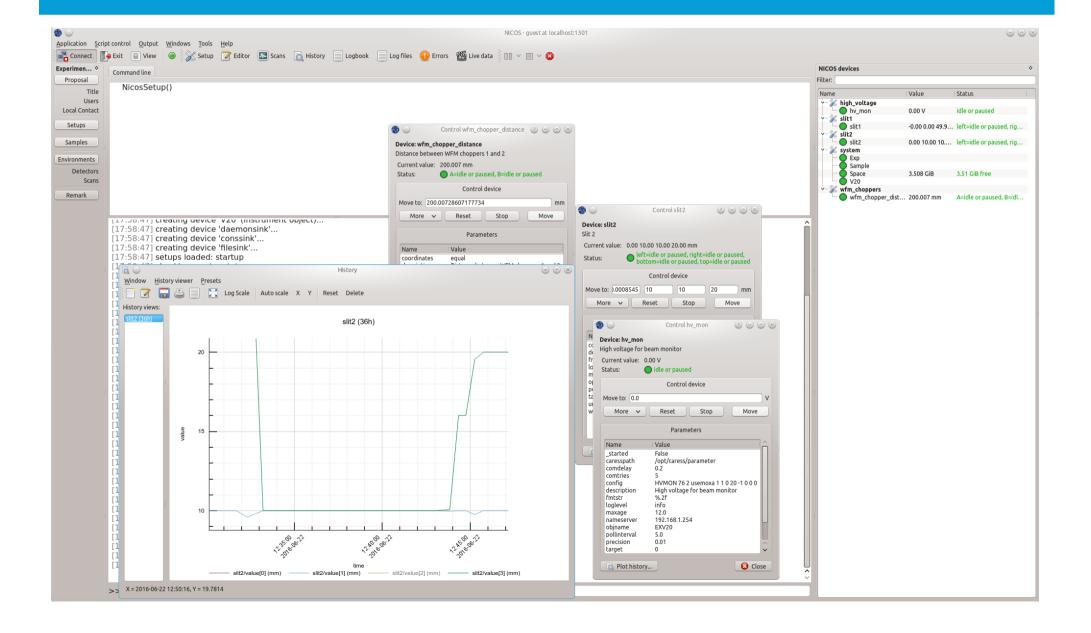
NICOS



- High level control software at MLZ/FRM-II/...
- Open source (GPL), written in Python
- Supports different protocol (EPICS, Tango, CARESS)
- Device abstractions (Readable, moveable, motor, ...)
- Pre-defined commands for scans (1D, 2D, ...)
- Fully scriptable (Python), GUI (Qt)



NICOS GUI



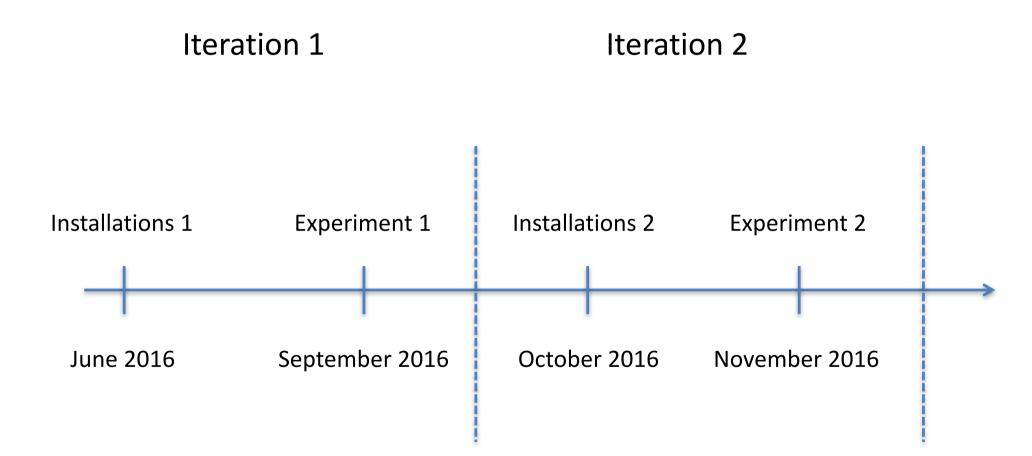
Developing a plan



- First visit in June 2016, with in-kind partners, ICS
- Initial activities
 - Use NICOS with existing CARESS infrastructure
 - Integrate other devices using their protocols
 - Support user operations
- Future activities
 - Slowly replace CARESS layer by EPICS layer
 - Follow CARESS to EPICS change in NICOS
 - Continue iteratively until ESS control architecture is implemented
- Iterative approach

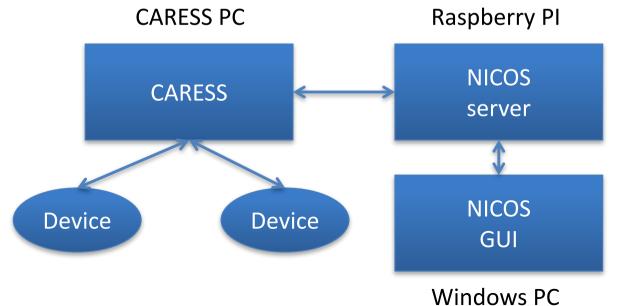
Iterations timeline





Installations 1

- Installed NICOS on Raspberry Pi
- Integrated some devices via CARESS:
 - Slit systems, linear stages, HV supplies, chopper stages
- Installed GUI on Windows PC

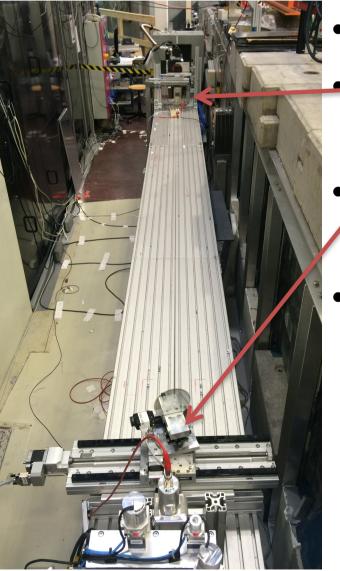




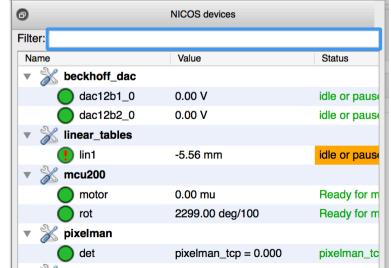


User experiment 1: NGI





- Grating interferometry experiment (PSI)
- Detector
 - Triggering via UDP service
- Motion stage from PSI
 - ASCII via RS232, network via MOXA box
- Integrated both devices



User experiment 1: NGI



- Scans were running fully automated
 - No full nightshifts necessary
 - Time spent analyzing data instead
 - Scan example: # Collect data at each motor position scan(motor, [672,784,896,1008,1120]) maw(lin1, 400) # Move linear stage scan(motor, 0, 112, 11) maw(lin1, 290)
 - GUI PC had hardware failure
 - Server continued running, scan finished properly
 - Command line client on NICOS computer instead of GUI
 - Communication with non-CARESS devices must improve

Installations 2

- Replaced Raspberry Pi (ARM) with a fitlet mini PC (x86_64)
- Installed GUI on CARESS PC
- Worked on CARESS support in NICOS with J. Krüger, L. Rossa
- Integration of more equipment (DAC modules)
- Raspberry Pi still connected and running





User experiment 2

- SEMSANS experiment (TU Delft)
- Lots and lots of equipment
- Integrated two most important devices:
 - Agilent 33521A function generator
 - TU Delft magnet controller for 4 magnetic fields





Lewis



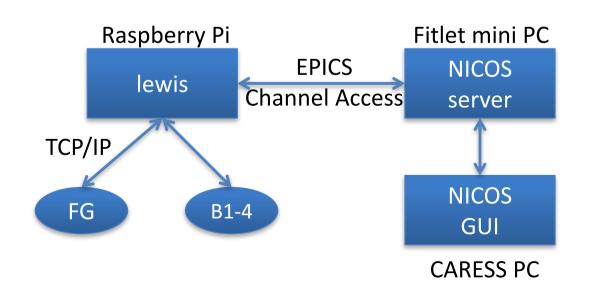
EUROPEAN SPALLATION SOURCE

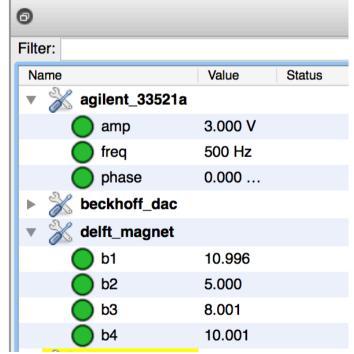
- Python based hardware simulation framework
- Cycle-based, non-threaded, completely deterministic
- Modeling complex devices using state machine
- Communication interfaces separate from simulation, multiple protocols supported (EPICS CA, TCP/IP stream, modbus*)
- Additional, unrestricted access to simulation and simulated device via control server (optional)
- Started to be used at RAL (ISIS, CLF)
- Resources:
 - <u>http://github.com/DMSC-Instrument-Data/lewis</u>
 - <u>http://lewis.readthedocs.io/</u>
 - <u>https://pypi.python.org/pypi/lewis</u>

pip install lewis[epics]

Ad-hoc EPICS devices

- Communication via MOXA-box difficult to manage
- Function generator kept losing connection
- Intermediate EPICS based solution using Lewis (communicate with hardware instead of simulation)
- Quick way to write and deploy simple "IOCs"





EUROPEAN SPALLATION

SOURCE

More devices...

renments maw(lin2,10) 0.00 V idle or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) dac12b2_1 0.00 V idle or paus maw(lin2,10) dac12b2_0 0.00 V idle or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) dac12b2_1 0.00 V idle or paus maw(lin2,10) maw(lin2,10) dac12b1_0 0.25 V idle or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin2,50) bal 18.236 twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) b4 36.553 554 twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) b4 36.556 565 twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) b4 36.556 565 twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) b4 36.556 565 twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) chi 0.00 deg moving or in status: SEMSANS_17_GraphiteFrequol.py :: Scan dac12b1_0 :: Point 1/2 :: Counting inlear_ttables inlear_ttables inlear_ttables [12:17:05] V Hz inlear_ttables inlear_ttables inlear_ttables [12:25:47] 1/2 0.00 554228		NICOS - user at 192.1	68.1.103:1301			\odot
Image NICOS devices posal max(lin1,0) max(lin2,10) NicoS adevices max(lin2,10) max(lin2,10) NicoS adevices NicoS adevices max(lin1,2,0) max(lin2,10) NicoS adevices NicoS adevices max(lin2,20) max(lin2,10) NicoS adevices NicoS adevices max(lin1,200) max(lin2,200) max(lin2,200) NicoS adevices NicoS adevices max(lin2,200) max(lin2,200) max(lin2,200) NicoS adevices NicoS adevices max(lin2,200) max(lin2,200) Mide capase NicoS adevices NicoS adevices max(lin1,400) max(lin2,10) NicoS adevices NicoS adevices NicoS adevices max(lin2,10) max(lin2,10) NicoS adevices NicoS adevices NicoS adevices max(lin2,10) max(lin2,10) NicoS adevices NicoS adevices NicoS adevices max(lin1,400) max(lin2,10) NicoS adevices NicoS adevices NicoS adevices max(lin2,20) max(lin2,20) NicoS adevices NicoS adevices NicoS adevices Max(lin1,400) max(lin2,10) NicoS adevices NicoS	ation <u>S</u> crip	ot control <u>O</u> utput <u>W</u> indows <u>T</u> ools <u>H</u> elp				
mem. NICOS devices posal max(ln1,0) max(ln2,10) Nucos can(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,10) max(ln2,10) Nucos can(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,200) max(ln2,10) max(ln2,10) 0.043 V max(ln2,10) max(ln2,10) 0.043 V max(ln2,10) max(ln2,10) 0.000 V idle or paus max(ln2,10) max(ln2,10) 0.000 V idle or paus max(ln2,10) max(ln2,10) 0.000 V idle or paus max(ln1,400) max(ln2,10) 0.000 V idle or paus max(ln2,10) max(ln2,10) 0.000 V idle or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,10) 0.000 V idle or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,10) 0.000 deg max(ln2,00) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,10) 0.000 deg max(ln2,00) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,10) 0.000 deg max(ln2,00) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(ln2,10) 0.000 deg max(ln2,00) twodscan	nnect 💽	🛊 Exit 📳 View 🛛 😑 🕅 💥 Setup 🍞 Editor 🔤 Scans 🛛 History 📃 Logbook	Log files	🕕 Errors 🛛 🎬 Live data 🕴 🕕 🗸	~	
peak max(lin1,0) max(lin2,10) max(lin2,10) Value Status voidscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,50) Name Value Status max(lin1,20) max(lin2,10) max(lin2,50) 0.043 V V max(lin2,10) max(lin2,50) 0.043 V V max(lin2,10) max(lin2,10) 0.00 V dide or paus max(lin2,10) max(lin2,10) 0.03 X dide or paus max(lin2,10) max(lin2,10) 0.3,2) dide or paus max(lin2,10) max(lin2,10) 0.3,2) dide or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3,2) dide or paus dide or paus twodscan(freg,554000,57,18, dac12b1_0, 0, 3,2) moxing or n dide or paus twodscan(freg,554000,57,18, dac12b1_0, 0, 3,2) moxing or n philo twodscan(freg,554000,57,18, dac12b1_0, 0, 3,2) moxing or n <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>						
max/lin1,0 max/lin2,10) Value Istatus prizes 0.43.V mov/lin2,10) 0.43.V mov/lin2,10) 0.43.V mov/lin2,200 0.43.V mov/lin2,200 max/lin2,200 max/lin2,200 0.00.V del or paus del or paus bodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max/lin1,200 max/lin2,200 0.00.V del or paus del or paus bodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max/lin2,200 max/lin2,200 0.00.V del or paus del 2b2_1 0.00.V wodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) mov/lin2,200 0.00.V del or paus del 2b2_1 0.00.V wodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) mov/lin2,200 mov/lin2,200 mov/lin2,200 12,17,051 Hz dac12b2_0 mov/lin2,0	posal			Filter:		
Intervalue, 210 // max(lin2, 200) 0, 0, 3, 2) max(lin1, 200) max(lin2, 10) max(lin2, 10) max(lin2, 10) max(lin2, 210) max(lin2, 210) max(lin2, 210) max(lin2, 210) max(lin2, 200) max(lin2, 210) max(lin2, 210) max(lin2, 254000, 57, 18, dac12b1_0, 0, 3, 2) max(lin2, 200) max(lin2, 200) max(lin2, 210) max(lin2, 200) max(lin2, 200) max(lin2, 200) max(lin2, 400) max(lin2, 400) twodscant(freq, 554000, 57, 18, dac12b1_0_0_0_3, 2)			Â	News	(Malua	1 Chatria
ontact amples amples amples amples amples amples 0.043 V max(lin2,20) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) beckhoff dac beckhoff dac beckhoff dac max(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) beckhoff dac 0.00 V idle or paus max(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,10) color of the or paus max(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,10) dac12b1_1 color of the or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,10) fdef or paus fdef or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,10) fdef or paus fdef or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,10) fdef or paus fdef or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,10) fdef or paus fdef or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) mox(lin2,10) fdef or paus fdef or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) mox(lin2,10) fdef or paus fdef or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) fdef					: value	status
tups max(in2,50) freq.554000,57,18, dac12b1_0, 0, 3, 2) max(in2,10) max(in2,10) ide or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) teckhoff dac dac12b1_0 max(in1,20) dac12b1_0 0.00 V ide or paus max(in2,10) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) teckhoff dac dac12b1_0 0.00 V ide or paus max(in2,10) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) teckhoff dac dac12b1_0 0.00 V ide or paus max(in2,10) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) teckhoff dac dac12b1_0 0.05 V ide or paus max(in2,10) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) teckhoff dac dac12b1_0 0.05 V ide or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) max(in2,50) teckhoff dac dac12b1_0 0.00 V ide or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) mowing or in twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) tech h 0.16 deg mowing or in mowing or in </td <td>ontact</td> <td></td> <td></td> <td></td> <td>0.042 V</td> <td></td>	ontact				0.042 V	
tupes twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin1,200) maw(lin2,50) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) tide or paus maw(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin2,10) maw(lin2,10) maw(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin2,10) maw(lin2,10) maw(lin2,10) tide or paus maw(lin2,10) maw(lin2,10) maw(lin2,10) tide or paus twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) tide or paus status: SEMSAMS 17 Graphite/regull.py :: Scan dac12b1_0 :: Point 1/2 :: Counting tide or paus [12:17:05] tide or paus [12:17:05] tide or paus [12:17:05] tide or paus [12:34:31] tide or paus [12:34:32] tide or paus	oncace	maw(lin2,50)				
max(lin1,200) max(lin2,10) 0.00 V (dle or paus (alc 2b2, 0) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) 0.00 V (dle or paus (alc 2b2, 0) max(lin2,30) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin1,400) max(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) b1 max(lin2,50) 0.00 V twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,50) max(lin2,50) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) max(lin2,50) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) status: stBMAMS 17 GraphiteFrequil, py :: Scan dac12b1_0 :: Point 1/2 :: Counting 12:17:05] # dac12b1_0 12:17:05] V Hz 12:17:05] 12:17:05] V Hz 12:17:05] 12:2:4:31] 2:300 12:3:4:32] Status 2016-11-26 12:34:31 12:3:4:32] Status 2016-11-26 12:34:32 12:3:4:32] Status 2016-11-26 12:34:32 12:3:4:32] Status 2016-11-26 12:34:32 12:3:4:32] Status 2016-11-26 12:34:32 12:3:4:32]<	tups	twodscan(freg,554000,57,18, dac12b1 0, 0, 3, 2)				
max(lin2,20) 0.00 V (de or paus) max(lin2,20) 0.00 V (de or paus) twodscar(freq,554000,57,18, dac12b1_0, 0, 3, 2) 0.00 V (de or paus) max(lin2,20) 0.00 V (de or paus) twodscar(freq,554000,57,18, dac12b1_0, 0, 3, 2) 0.00 V (de or paus) max(lin2,20) 0.03,2) 0.03,2) max(lin2,20) 0.03,2) 0.03,2) statis SMSMANS_17 Graphitefrequ01,py:: Scan dac12b1 0: Point 1/2:: Counting 0.00 deg moving or in two decar(free, 554000, 57, 18, dac12b1 0, 0; 3, 2) ide or paus statis SMSMS17 Graphitefrequ01, py:: Scan dac12b1 0; Point 1/2:: Counting ide or paus [12:17:05] dac12b1_0 freq pixelman_udp [12:17:05] V HZ [12:34:31] [12:34:32					0.000 Bog	
max(lin2.10) max(lin2.10) dac12b1_0 0.00 V idle or paus max(lin2.10) tvodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) dac12b2_0 0.00 V idle or paus max(lin2.10) tvodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) dac12b2_1 0.00 V idle or paus max(lin2.10) max(lin2.10) 0.00 V idle or paus dac12b2_1 0.00 V idle or paus max(lin2.10) max(lin2.10) 0.00, 3, 2) max(lin2.10) 0.00 V idle or paus max(lin2.10) max(lin2.10) max(lin2.10, 0, 3, 2) max(lin2.10, 0, 0, 3, 2) max(lin2.10, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0	nples	maw(lin1 200)			0.00 V	idle or paused
Internets twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus max(lin2,50) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus max(lin2,10) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus max(lin2,50) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus max(lin2,50) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus max(lin2,50) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) idle or paus twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2, freq) that the idle or paus ti12:34:32] tac12b1_2 0:558 <td></td> <td></td> <td></td> <td></td> <td>0.00 V</td> <td>idle or paused</td>					0.00 V	idle or paused
arrs ada12521 0.00 V idle or paus mark(in 20) twodscan(freq.554000.57,18, dac12b1_0, 0, 3, 2) ada1251_0 0.25 V idle or paus mark(in 1,400) maw(lin 2,10) twodscan(freq.554000.57,18, dac12b1_0, 0, 3, 2) b1 18.236 maw(lin 2,50) twodscan(freq.554000.57,18, dac12b1_0, 0, 3, 2) b2 18.193 ada1252 maw(lin 2,50) twodscan(freq.554000.57,18, dac12b1_0, 0, 3, 2) b3 36.553 ada1252 twodscan(freq.554000.57,18, dac12b1_0, 0, 3, 2) status: SEMSANS_17_GraphiteFragu01.py:: Scan dac12b1_0 :: Point 1/2:: Counting tine ar tables thin 2 0.000 deg tild or paus [12:17:05] ////////////////////////////////////	nments			- dac12b2 0	0.00 V	idle or paused
 twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) mark maw(lin1,400) maw(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) maw(lin2,50) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) Status: SEMSANS_17_GraphiteFrequ01.py :: Scan dac12b1_0 :: Point 1/2 :: Counting I2:17:05] I2:17:05]				dac12b2_1	0.00 V	idle or paused
mark mark(lin1,400) maw(lin2,10) b1 18.236 twodscan(fred,554000,57,18, dac12b1_0, 0, 3, 2) b3 36.553 twodscan(fred,554000,57,18, dac12b1_0, 0, 3, 2) b4 36.556 twodscan(fred,554000,57,18, dac12b1_0, 0, 3, 2) ch 0.16 deg moving or in omega status: StMSAbs_17_GraphiteFrequ01.py: Scan dac12b1_0:: point 1/2:: Counting ch 0.16 deg moving or in omega [12:17:05] dac12b1_0 freq_plxelman_udp ille2 50.00 mm idle or paus [12:17:05] v Hz aco deg idle or paus [12:17:05] v Hz aco deg idle or paus [12:27:7:05] v Hz aco deg idle or paus [12:27:7:05] v Hz aco deg idle or paus [12:27:431] file stitl -1442:62 0.00 2955:24 99.99 mm left-idle, big [12:34:31] stitl -1442:62 0.00 2955:24 99.99 mm left-idle, big [12:34:32] stitl -1442:62 0.00 2955:24 99.99 mm left-idle, big [12:34:32] stitl -1442:62 0.00 2955:24 99.99 mm left-idle, big [12:34:32]<	ors				0.25 V	idle or paused
max(lin1, 400) maw(lin2, 10) twodscan(freq, 554000, 57, 18, dac12b1, 0, 0, 3, 2) maw(lin2, 50) twodscan(freq, 554000, 57, 18, dac12b1, 0, 0, 3, 2) maw(lin2, 50) b2 18.193 Status: StMSNNS 17 GraphiteFrequ0.py:: Scan dac12b1, 0; Point 1/2:: Counting 0.00 deg moving or in omega 0.00 deg [12:17:05]		twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2)				
maw(lin1,400) maw(lin2,10) twodscan(freq,554000,57,18, dac12b1_0, 0, 3, 2) a6:553 acisse	and a second					
Imaw(III) bd 36.556 twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) oniometer 0.16 deg moving or in twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) oniometer 0.00 deg idle or paus status: SEMSANS_17_GraphiteFrequ01.py :: Scan dac12b1_0 :: Point 1/2 :: Counting 0.00 deg idle or paus [12:17:05] dac12b1_0 freq_pixelman_udp idle or paus [12:17:05] ////////////////////////////////////	nark	maw(lin1,400)				
twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) adv.556 maw(lin2,50) 0.00 deg moving or in twodscan(freq.554000,57,18, dac12b1_0, 0, 3, 2) oniometer 0.00 deg moving or in status: SEMSANS_17_GraphiteFrequ01.py:: Scan dac12b1_0:: Point 1/2:: Counting 0.00 deg idle or paus [12:17:05]		maw(lin2.10)				
maw(lin2,50) 0.16 deg moving or in twodscan(freq,554000,57,18, dac12b1 0, 0, 3, 2) 0.00 deg idle or paus status: SEMSANS_17_GraphiteFrequ01.py :: Scan dac12b1 0 :: Point 1/2 :: Counting 0.00 deg idle or paus [12:17:05]					36.556	
twodscan(freq.554000,57,18, dac12b1 0, 0, 3, 2) moving or in phi Status: SEMSANS_17 Graphite/requ01.py :: Scan dac12b1 0:: Point 1/2 :: Counting 0.00 deg idle or paus [12:17:05] idle or paus 0.00 deg idle or paus [12:17:05] incar_tables idle or paus [12:17:05] incar_tables idle or paus [12:17:05] moving or in phi 0.00 deg idle or paus [12:17:05] incar_tables idle or paus idle or paus [12:24:31] 0.00 554228 0.000 pixelman_udp idle or paus [12:34:31] 0.00 554228 0.000 silt1 -1442.62 0.00 2935.24 99.99 mm left=idle, big [12:34:31] 1/2 0.00 554228 0.000 silt2 -13.00 3.00 20.00 20.00 mm left=idle, hig [12:34:32]						
Status: SEMSANS_17_GraphiteFrequ01.py :: Scan dac12b1_0 :: Point 1/2 :: Counting 0.00 deg idle or paus [12:17:05] # dac12b1_0 freq pixelman_udp inta_ tables inta_ tables [12:17:05] # dac12b1_0 freq pixelman_udp inta_ tables inta_ tables [12:17:05] # dac12b1_0 freq pixelman_udp inta_ tables inta_ tables [12:17:05] # dac12b1_0 freq pixelman_udp inta_ tables inta_ tables [12:34:31] # 0.00 554228 0.000 silt1 -1442.62 0.00 2935.24 9.99 mm left=idle, be [12:34:31] # 12:34:32] ====================================			~			
12:17:05			~			
[12:17:05]					0.00 deg	idle or paused
[12:17:05] # dac12b1_0 freq pixelman_udp 50.00 mm idle or paus [12:17:05] V Hz idle or paus idle or paus [12:17:05] V Hz pixelman_udp = 0.000 pixelman_udp = 0.000 [12:25:47] 1/2 0.00 554228 0.000 slit1 -1442.62 0.00 2935.24 99.99 mm left=idle, be [12:34:31] slit2 -13.00 3.00 20.00 20.00 mm left=idle, rig [12:34:31] slit2 -13.00 3.00 20.00 20.00 mm left=idle, rig [12:34:32] slit2 -13.00 3.00 20.00 20.00 mm left=idle, rig [12:34:32] system sit2 [12:34:32] [12:34:32] [12:34:32] [12:34:32] [12:34:32]		[12:17:05]	<u>^</u>		200.00 mm	idle or naused
[12:17:05] V Hz [12:17:05] [12:25:47] 1/2 0.00 554228 0.000 [12:34:31] [12:34:31] [12:34:31] [12:34:31] [12:34:31] [12:34:32] [12:34:32]						
Image: 12:17:05] Image: 12:17:05] Image: 12:25:47] 1/2 0.00 554228 0.000 Image: 12:34:31] 2/2 3.00 554228 0.000 Image: 12:34:31] 2/2 3.00 554228 0.000 Image: 12:34:31] 2/1 3.00 554228 0.000 Image: 12:34:31] Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32] Starting scan: scan(dac12b1_0, 0, 3, 2, freq) Image: 12:34:32 Image: 12:34:32 Image: 12:34:32] Scan number: 447 447 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32] Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32] Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32 Image: 12:34:32						and or padded
[12:17/03] [12:25:47] 1/2 0.00 554228 0.000 [12:34:31] 2/2 3.00 554228 0.000 [12:34:31] 2/2 3.00 554228 0.000 [12:34:31] 2/2 3.00 554228 0.000 [12:34:31]					pixelman udp = 0.000	pixelman ud
112:34:31 2/2 3.00 554228 0.000 112:34:31				y- 💥 slit1	_	
[12:34:31]					-1442.62 0.00 2935.24 99.99 mm	left=idle, bel
[12:34:31] Finished at: 2016-11-26 12:34:31 [12:34:32] ====================================				y− 💥 slit2		
[12:34:31] ====================================					-13.00 3.00 20.00 20.00 mm	left=idle, rig
[12:34:32]		[12:34:31] Finished at: 2016-11-26 12:34:31				
[12:34:32] ====================================		[12:34:31] ====================================				
[12:34:32] Starting scan: scan(dac12b1_0, 0, 3, 2, freq) [12:34:32] Started at: 2016-11-26 12:34:32 [12:34:32] Scan number: 447 [12:34:32] Filename: _00000447.dat [12:34:32] # dac12b1_0 freq pixelman_udp [12:34:32] V Hz V [12:34:32]		[12:34:32] ====================================				
[12:34:32] Started at: 2016-11-26 12:34:32 [12:34:32] Scan number: 447 [12:34:32] Filename: _00000447.dat [12:34:32] # dac12b1_0 freq pixelman_udp [12:34:32] V Hz					77.906 GIB	77.91 GiB free
[12:34:32] Scan number: 447 [12:34:32] Filename: _00000447.dat [12:34:32]		[12:34:32] Starting Sean: 36an (add1251_0, 0, 5, 2, 11eq)				
[12:34:32] Filename: _00000447.dat [12:34:32]		[12:34:32] Started at. 2010-11-20 12:34:32			259.052 mm	A idle D idle
[12:34:32] [12:34:32] # dac12b1_0 freq pixelman_udp [12:34:32] ∨ Hz [12:34:32]				wim_chopper_distance	358.952 mm	A=Idle, B=Idle
[12:34:32] # dac12b1_0 freq pixelman_udp [12:34:32] ∨ Hz [12:34:32]						
[12:34:32] V Hz						
[12:34:32]						
		[12:34:32] V Hz	U			
		[12:34:32]	÷			
>>						



255

Lessons from user experiments 2



- Users ran several hundred scans in 10 days
- Extensive use of 2D-scan feature (Frequency, motor)
- Automation helped produce much more data than in earlier experiment at V20, no full night shifts
- Users generally happy with Python scripting interface, more examples requested
- "Ad-hoc EPICS devices" stable for two weeks of experiments (still running after over 2 months)

Summary



- Successful control of V20
- CARESS based equipment can be controlled
- Other devices can be controlled via Channel Access
- User experiments have been successfully supported
- Demonstrated V20 to be valuable tool for gaining integration experience for DMSC ID

Lessons learned



- Lessons learned:
 - Users bring equipment with little notice, little or no docs
 - Remote support is possible if access is sufficient
 - Remote/phone support makes integrating real hardware more complicated
 - People will unplug things if they think they need the cable/port
 - Computers break, have backup-solutions ready
 - Deployment on computers without access to internet, without physical access can be challenging
- Listen to user feedback

Outlook



- Integrate JCNS Choppers using ad-hoc EPICS approach via "Lewis"
- Improve detector integration so that useful information can be obtained
- Try to follow standard procedures for NICOS experiments more closely so that meta data is stored properly
- Switch to Docker-based deployment
- Eventually replace CARESS infrastructure with EPICS infrastructure (together with ICS)

Acknowledgements



- Robin Woracek (V20 beamline responsible)
- Jens Krüger (FRM-II NICOS team)
- Lutz Rossa (HZB controls group)
- Owen Arnold, Michael Hart, Freddie Akeroyd (STFC ISIS in-kind & controls)
- R. Harti, M.Morgano, J. Plomp (users at V20)
- Erik Dahlbäck (fitlet support)
- HZB IT group for providing access and support

Thank you for your attention



EUROPEAN SPALLATION SOURCE

Questions?