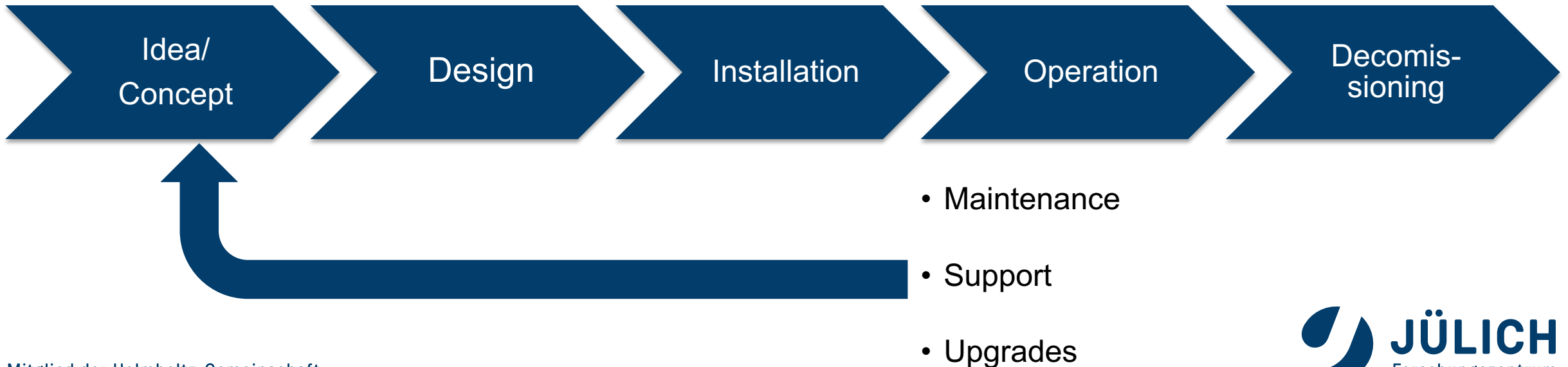


WHAT DOES THE INSTRUMENT TECHNOLOGY DO?

10.3.2022 | JÖRG VOIGT

Our Mission: “Best Instruments at Best Sources”

Continuous Effort to serve users and our science



Developing and building Instruments and Methods

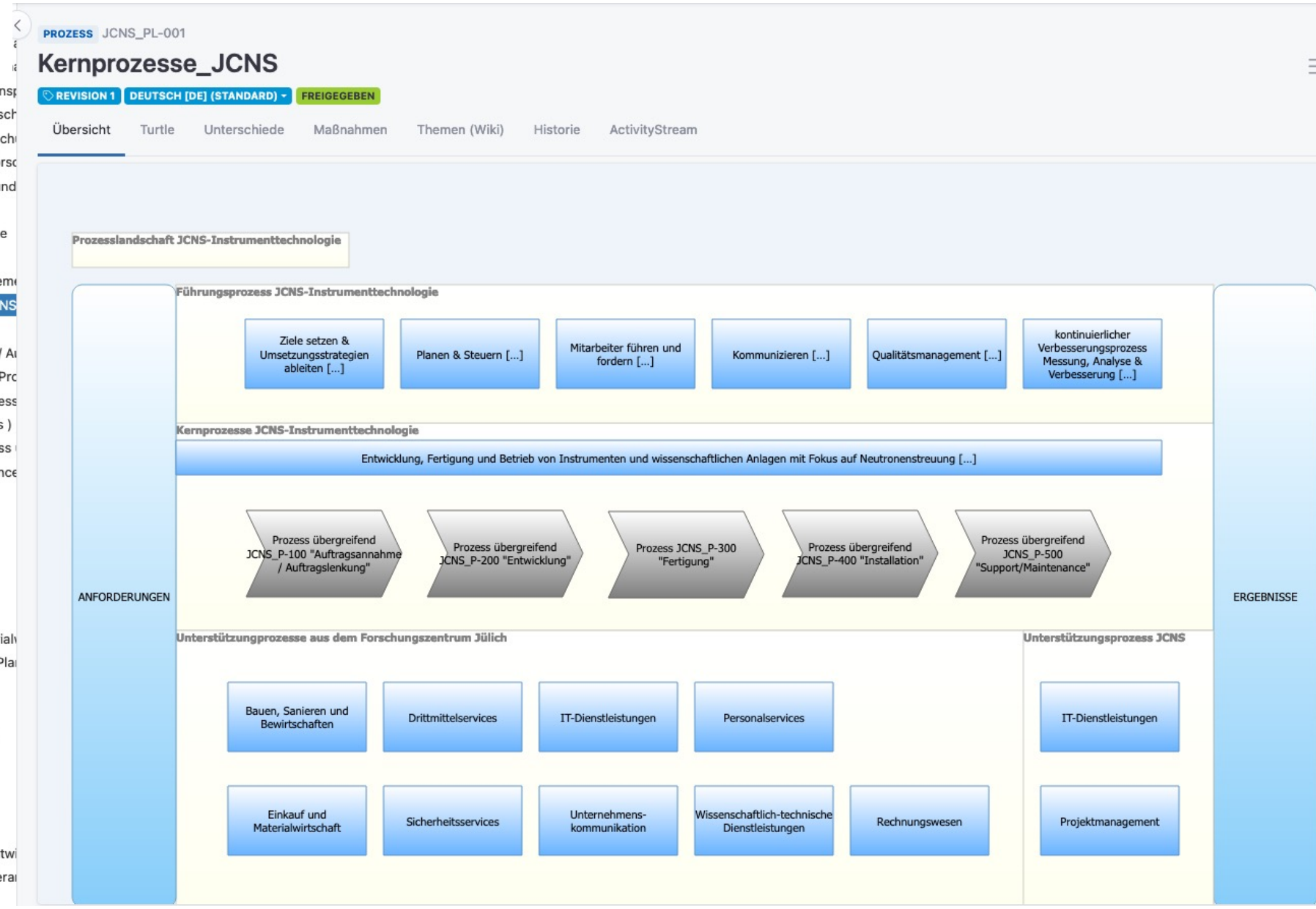
- Instrument Simulation
- Instrument Design
- Motion control and automation
- Control systems for neutron instrumentation
- Neutron detection and data acquisition
- Neutron polarization handling
- Sample Environment
- Instrument operation
- Data tools

Developing and building Instruments and Methods

- Instrument Simulation
- Motion control and automation
- Control systems for neutron instrumentation
- (Data tools)

The short answer: Look at QMS

- > IBI-7: Institut für Biologische Informationsverarbeitung
- > IEK-1: Institut für Energie- und Klimaforschung
- > IEK-3: Institut für Energie und Klimaforschung
- > IEK-14: Institut für Energie- und Klimaforschung
- > INM: Institut für Neurowissenschaften und Medizin
- > ITS: Geschäftsbereich IT-Services
- ▼ JCNS: Jülich Centre for Neutron Science
 - ▼ 01. QMH JCNS
 - JCNS_QMH-001 Qualitätsmanagement
 - JCNS_PL-001 Kernprozesse_JCNS
 - ▼ 02. Prozesse JCNS
 - JCNS_P-100 Auftragsannahme / Auftragslenkung
 - JCNS_P-101 Ticket System (Prozess)
 - JCNS_P-200 Entwicklung (Prozess)
 - JCNS_P-300 Fertigung (Prozess)
 - JCNS_P-400 Installation (Prozess)
 - JCNS_P-500 Support/Maintenance
 - 03. QM-Prozesse JCNS
 - > 04. VA JCNS
 - > 05. SOP JCNS
 - > 20. JCNS-2 AMS
 - > 99. ungültige Dokumente JCNS
- > M: Geschäftsbereich Einkauf und Materialwirtschaft
- > O: Geschäftsbereich Organisation und Personal
- > P: Geschäftsbereich Personal
- > PTJ: Projektträger Jülich
- > R: Geschäftsbereich Recht und Patente
- > REV: Revision
- > S: Sicherheit und Strahlenschutz
- > SL: Schülerlabor
- > TB: Technischer Bereich
- > UE: Geschäftsbereich Unternehmensentwicklung
- > UK-M: Unternehmenskommunikation Verwaltung
- > VB: Vorstandsbüro



Simulation tools

- Instrument simulation
 - Concept evaluation
 - Education
 - Digital Twins: Interface to NICOS
- Neutronic simulation
 - Source performance
 - Radiological layout
 - Input for Instrument simulation

Neutron SimLab

Xcontrol C:/Programs/Vitess3-4

File Edit Plot Configure Tools Options Help

Instrument Dream_new VITESS 3.4 Click parameter names for help!

input file Browse BrowseN Fresh

output file no_file Browse BrowseN

parameter directory Y:/ESS/DREAM-2/DRS-13_FinalRuns Browse NewDir

random seed 1 random number generator ran3 min. neutron weight 1.0e-25 gravity on helper threads 0 Exit

1 source_ESS_2012

2 frame

3 mon2_pos

4 mon2_div

5 mon1_y

6 mon1_y

7 mon_brilliance

8 mon_brilliance

9 spacewindow_multiple

10 mon2_pos

11 mon1_div

12 sm_ensemble Inpile11-21

13 spacewindow Exit_Inp21

14 mon1_div

15 frame

16 slit Entr_Inp22

Module 1 source_ESS_2012

moderator description file EssButterfly1_color.mod Browse BrowseN Edit

source power [MW] 5.0 pulse repetition rate [Hz] 14.0 proton pulse length [ms] 2.857

source name ESS data base 2016_Butterfly1

Restriction of sampling trajectories

number of trajectories 9000000

min. wave-length [Å] 0.5 min. time [ms] 0 max. divergence x <-> y [deg]

max. wave-length [Å] 4.1 max. time [ms] 4.8 max. divergence x <-> z [deg]

direction defined by virtual window

Propagation

distance to window [cm] 190.6 window width [cm] 11.4 window height [cm] 2.3

beamline

declination [deg] -48.12

Time window

> Simulation of long pulse spallation source ESS <

pulse length : 2.857 ms

pulse frequency : 14.000 Hz

average power : 5.000 MW

data base version : 6

Big

Clear

Save

colour 1 spatial order 1

coupled moderator

moderator temperature : 325.000 K

performance factor : 1.000

total neutron flux (in 2*pi) : 1.6557e+14 n/(cm^2s)

moderator position : (0.000 4.795 0.000) cm

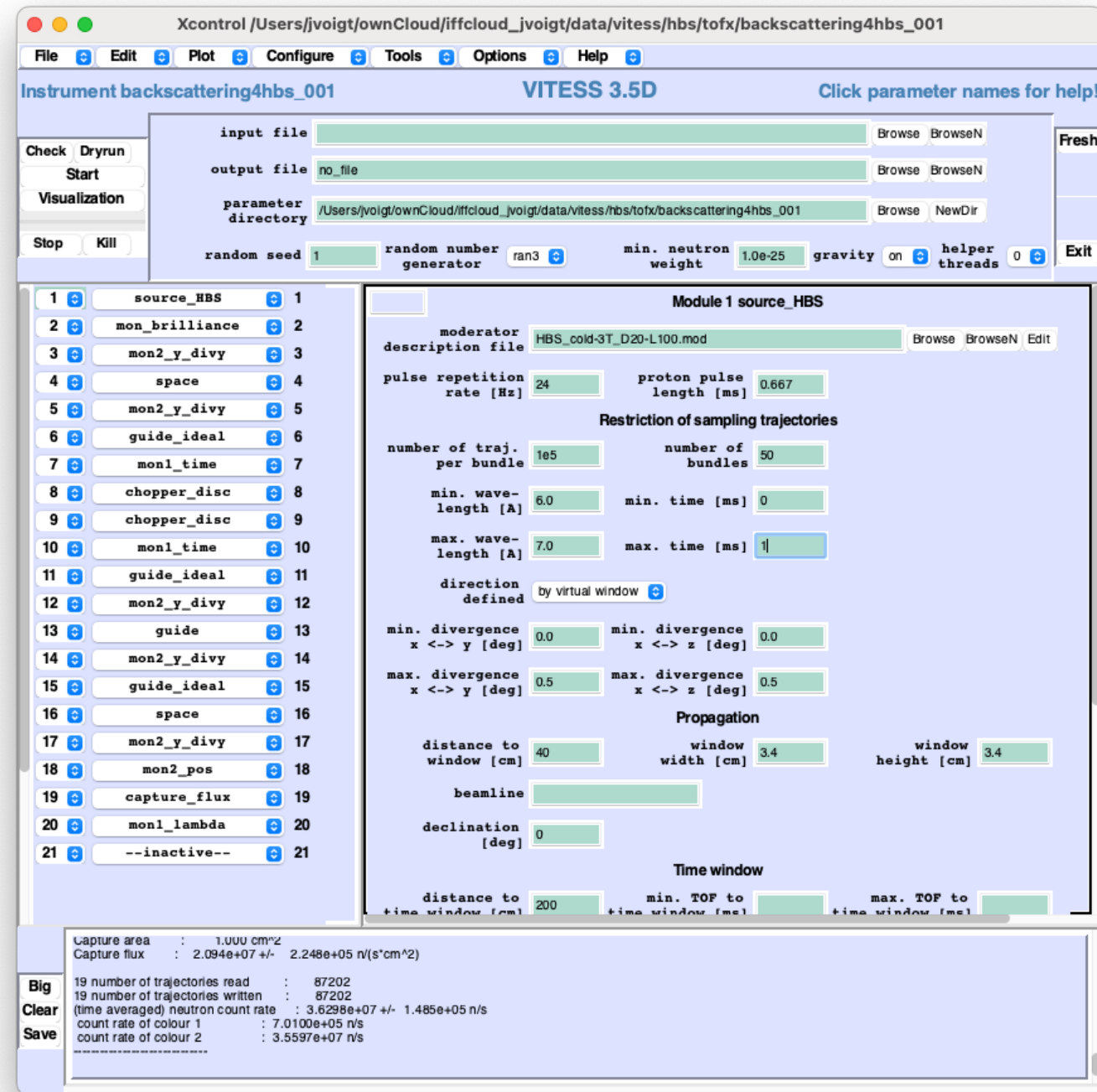
moderator size (W x H) : 11.507 cm x 3.000 cm

time averaged neutron current: 4.3805e+11 n/s in 0.000721 str

wavelength band used : 0.500 Ang - 4.100 Ang

Vitess Development

- Including HBS moderators
- New components
- Neutron bundles
- Preparations for digital twins
- 4.0
 - New GUI
 - New file format (.yaml)



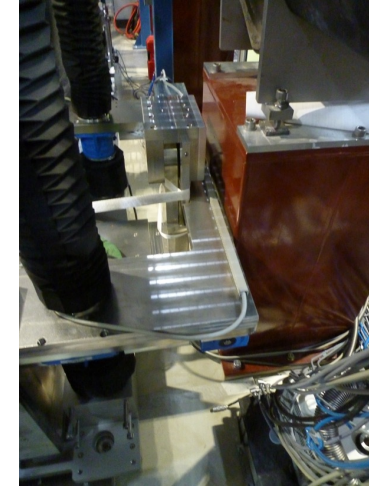
Interface to Mechanics

Recent project: KWS3 Upgrade

- New construction and manufacturing of new sample- and detector tables (ZEA-1)
- Renewal of electronic racks and new E-Drawings (JCNS-Insttech, -Garching, -TA)
- Renewal of the vacuum software (JCNS-Insttech)
- E-construction of additional electronic racks (JCNS-TA)
- Mechanical tests in Jülich with preliminary motion control (ZEA-1/ T-ELI / JCNS)
- Demounting existing racks in Garching (JCNS-Garching), transport to Jülich
- Building and adaption of all racks (T-ELI)
- Commissioning of the racks in Jülich (JCNS)
- Installation of new mechanics in Garching (ZEA-1)
- Installation of the racks and re-wiring in Garching (T-ELI)
- On-site commissioning (JCNS-Insttech and Garching)
 - 40+ automated axes
 - Safety system
 - Vacuum system
- Unlisted work at the detector and PC system (JCNS-Garching)

UPDATE 2. SAMPLE STAGE KWS3

MECHANICAL ASSEMBLY IN GARCHING 04.10-14.10.21 BY ZEA-1 AND JCNS-GARCHING



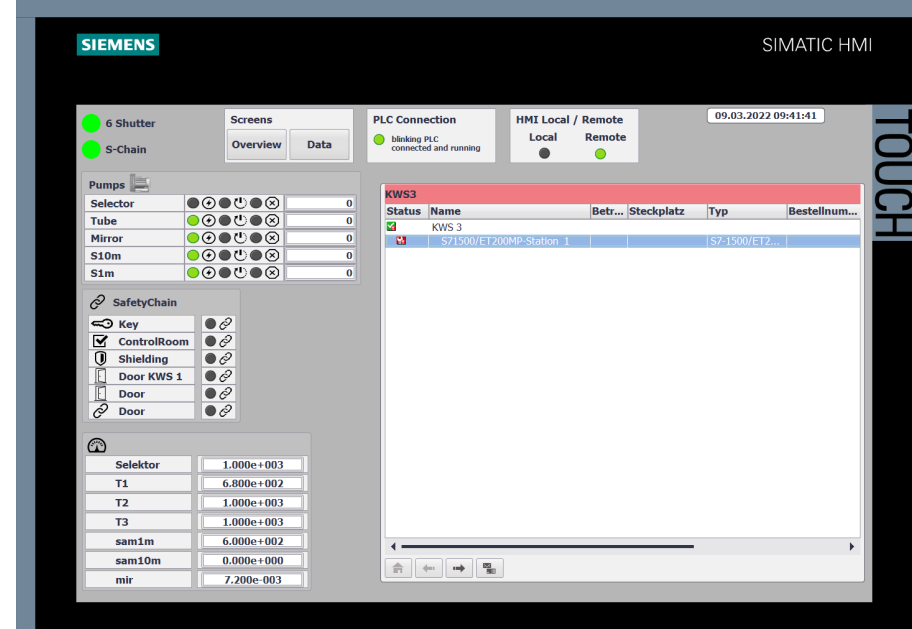
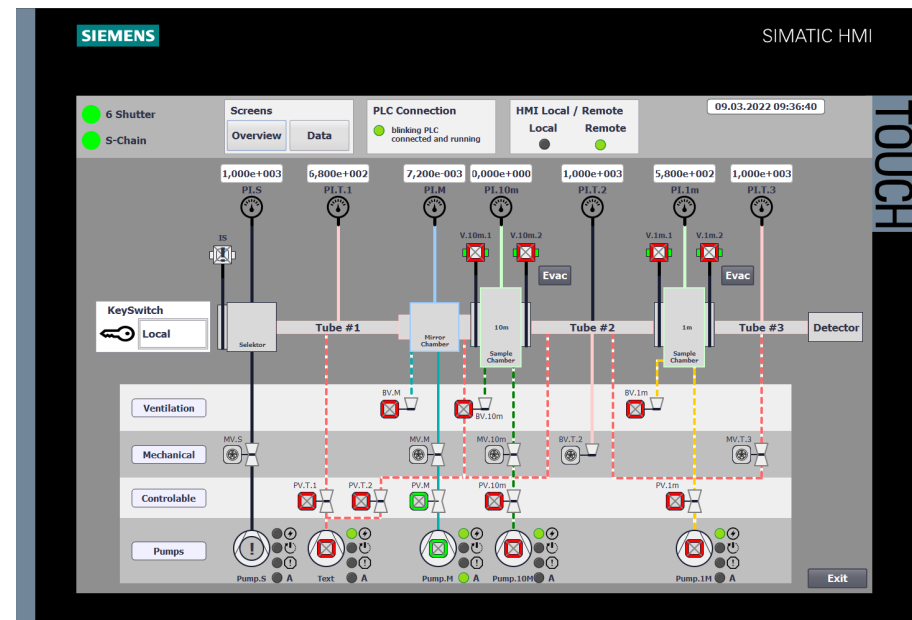
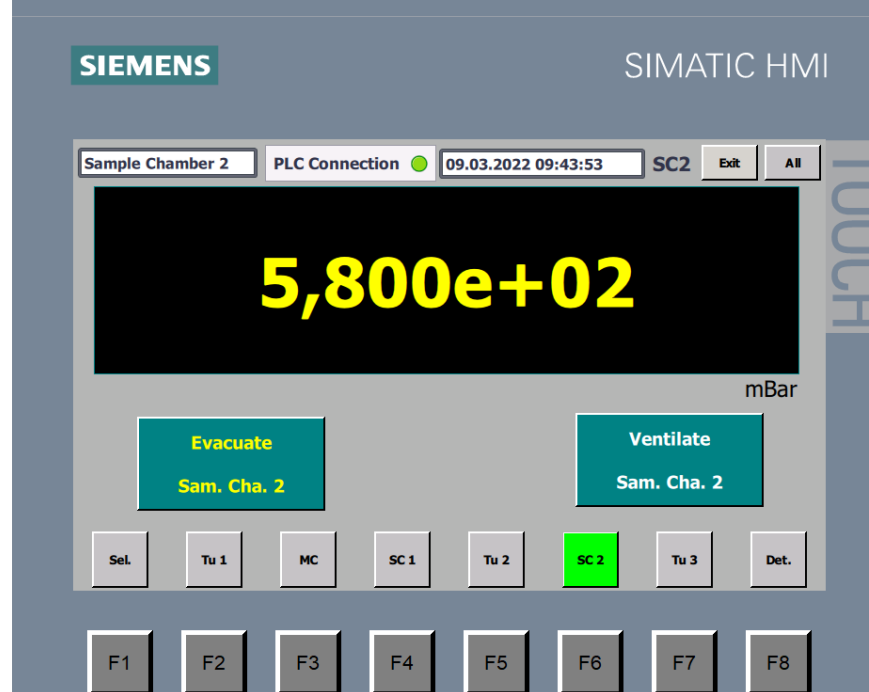
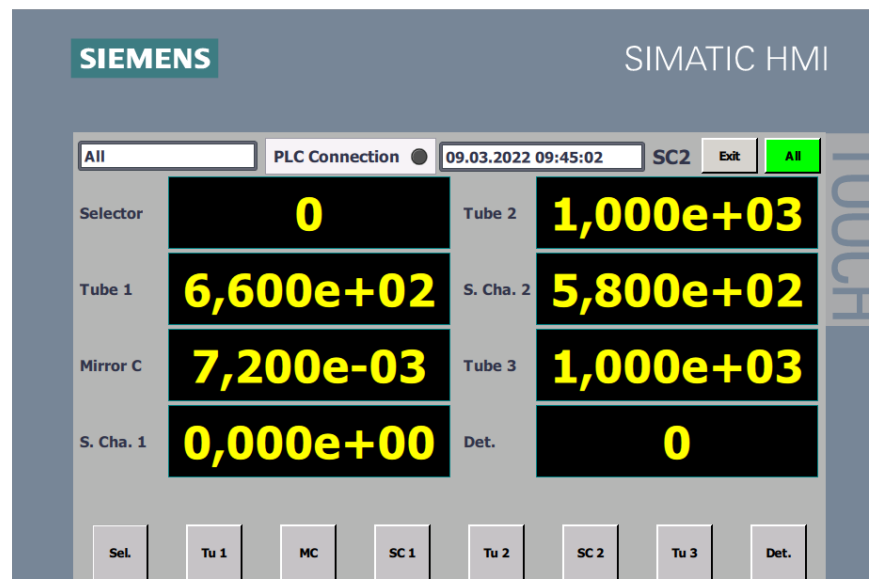
- New electronics
- New vacuum control software
- On-site commissioning

- 40+ axes

- 2+ weeks by

JCNS Insttech+Garching

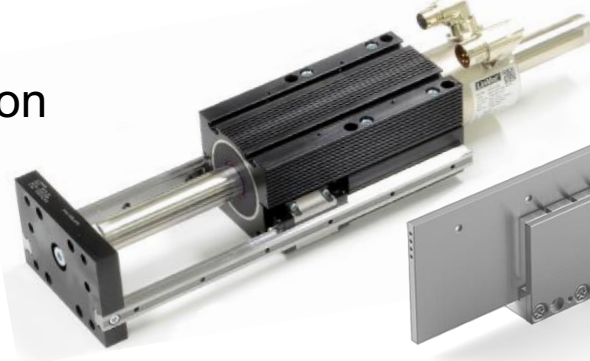
Mitglied der Helmholtz-Gemeinschaft



ESS collaboration

- Linear and rotative motion
- Template cabinets
- Heavy Shutter control
- Robotics

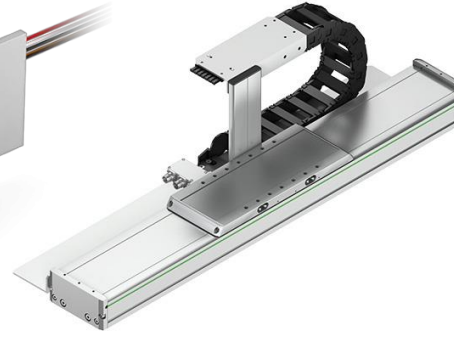
LinMot PS10-70x80U;



Tecnotion UVM12, S-Winding;



HIWIN HT150-L;



SmarAct SLLV42-600-S-HV



H2W LSS-016-04-006-01A-ME



Jenny Science ELAX EX110F20

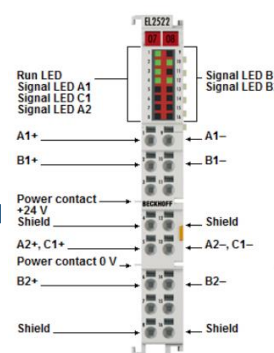


SmarAct SDC2

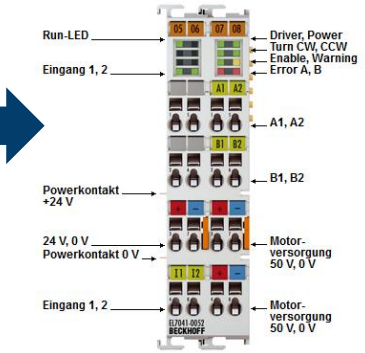


SDC2-1C-OEM

Beckhoff EL2522



Beckhoff EL7041-0052

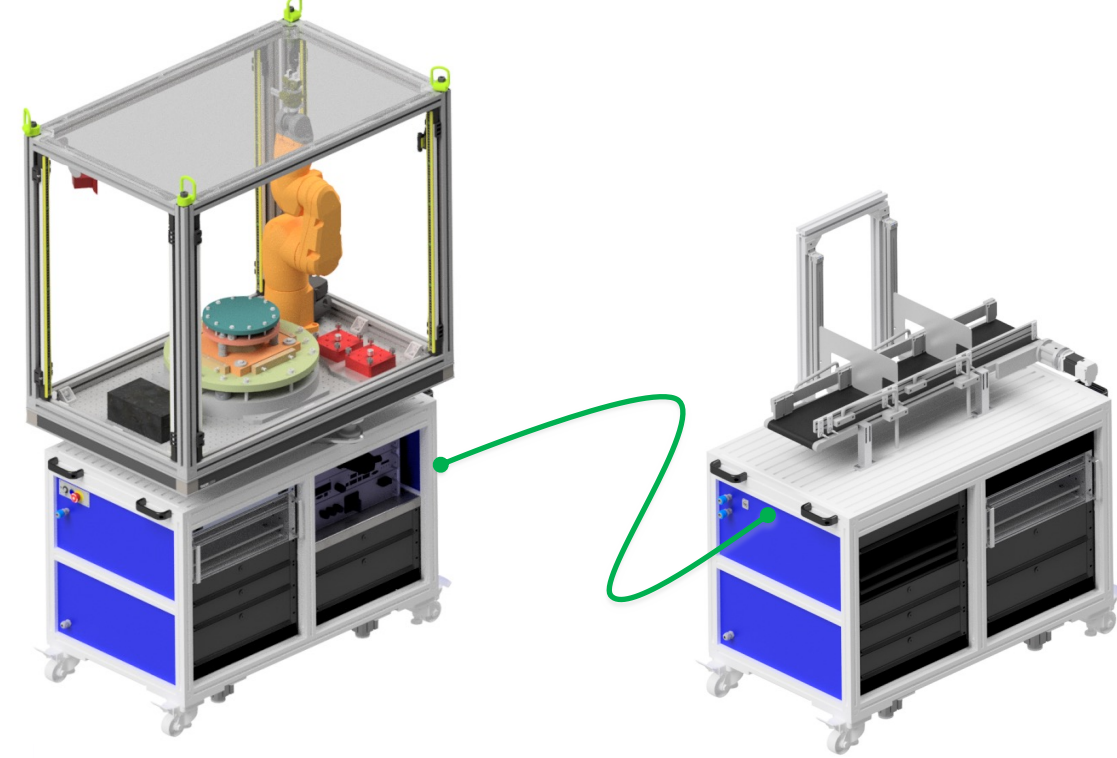
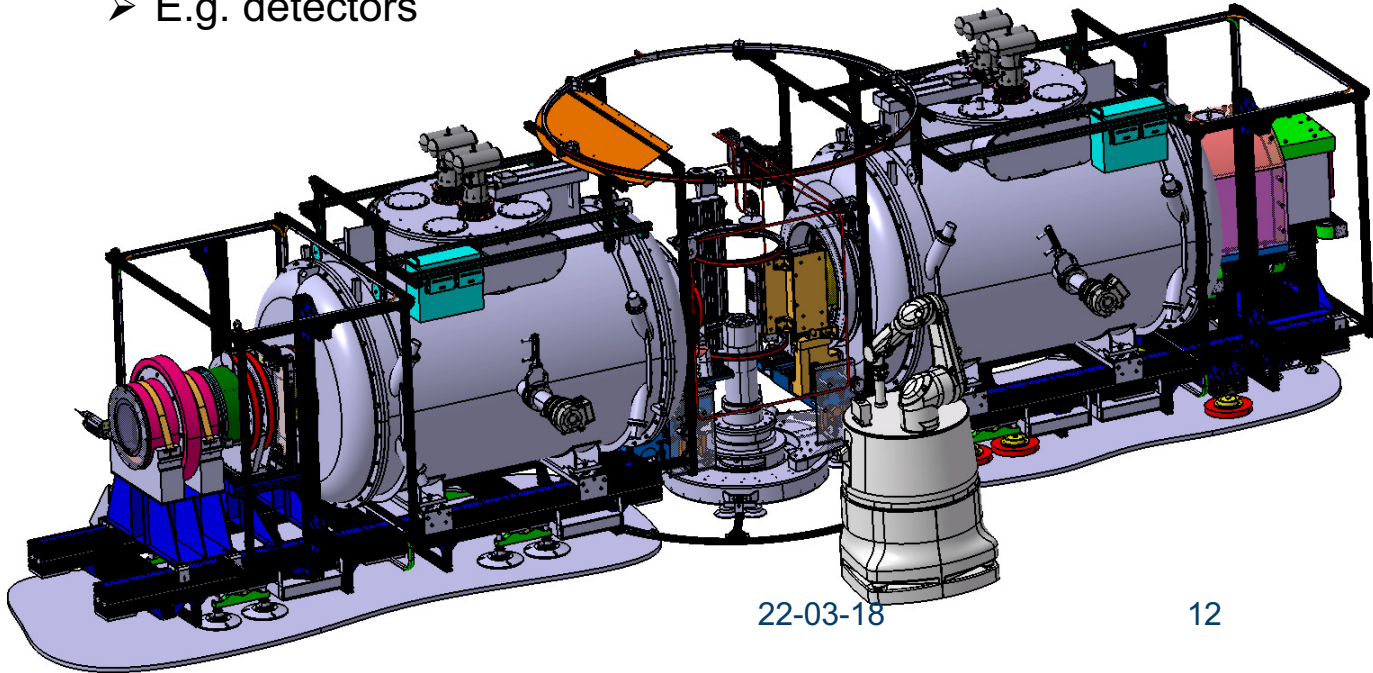


EtherCAT

Jenny Science XENAX Xvi 75V8

New Opportunities: Robotics

- 24/7 sample proliferation
 - Put sample in sample environment
 - Manipulate sample in the beam
- Flexibility
- Move heavy equipment
 - E.g. detectors



Addressed questions:

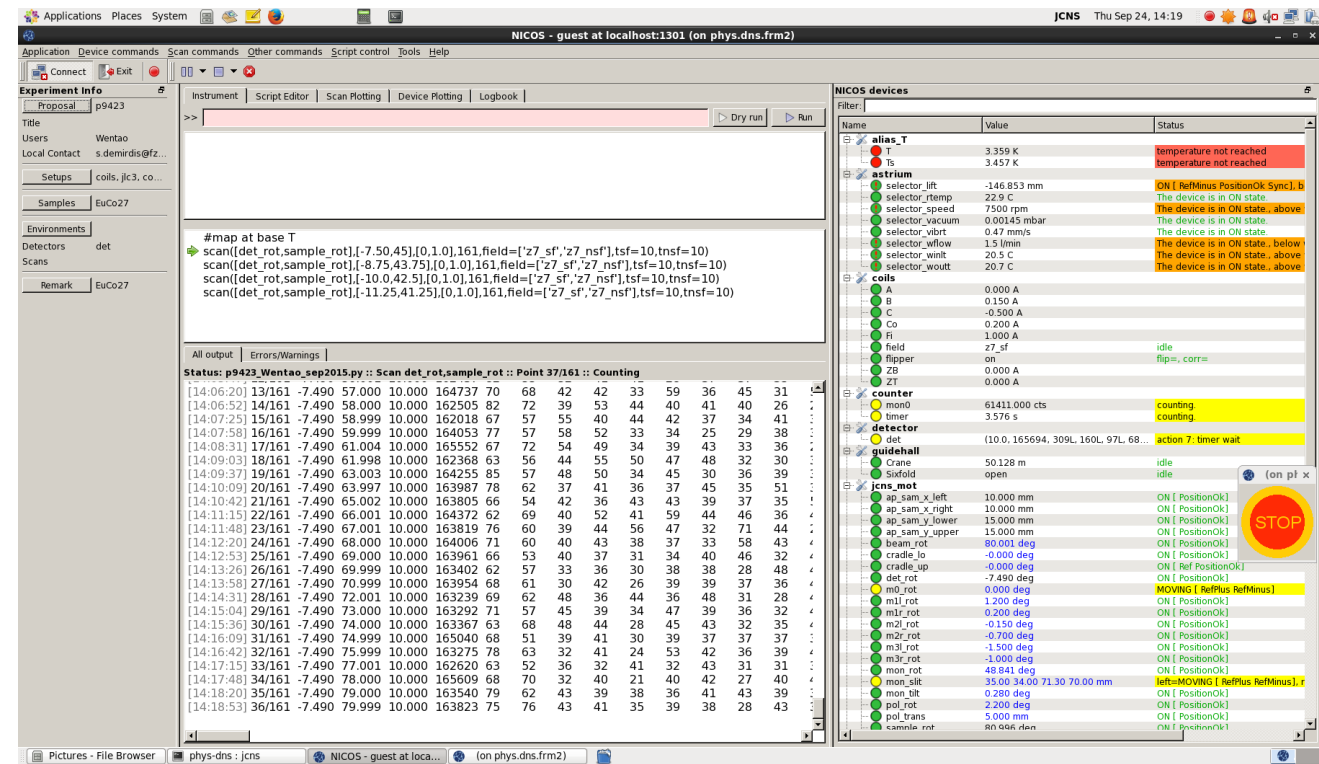
- Precision in position and angle
- Safety (Person and machine)
- Development effort

NICOS

Developed at MLZ, Adapted at PSI, ESS

Communication with

- users
- sample environment
- instrument drives and encoders
- detectors and monitors



- Taking care of instrument network and PC infrastructure
- Tango-control extensions
- EPICS (Experimental Physics and Industrial Control System) software for ESS instruments (and COSY)

Issues

New issue ...

Filters

Status

open

Add filter

Options

Apply Clear Save

<input type="checkbox"/>	#	Subject	Tracker	Priority	Status	Assignee	Author	Updated	Related issues	Project	
<input type="checkbox"/>	4458	Bau Schaltschränke (extern)	Bug	Normal	New		Harald Kleines	26 Jan 2022 16:38		Target+L-Rohr	...
<input type="checkbox"/>	4457	Erstellung Schaltpläne (ZEA-1)	Bug	Normal	New		Harald Kleines	26 Jan 2022 16:37		Target+L-Rohr	...
<input type="checkbox"/>	4456	Bau Schaltschränke (extern)	Bug	Normal	New		Harald Kleines	26 Jan 2022 16:13		Verfahrbare Abschirmung	...
<input type="checkbox"/>	4455	Erstellung Schaltpläne (ZEA-1)	Bug	Normal	New		Harald Kleines	26 Jan 2022 16:12		Verfahrbare Abschirmung	...
<input type="checkbox"/>	4454	Bau Schaltschränke (extern)	Bug	Normal	New		Harald Kleines	26 Jan 2022 15:45		Target-Handling Tool	...
<input type="checkbox"/>	4453	Erstellung Schaltpläne (ZEA-1)	Task	Normal	New		Harald Kleines	26 Jan 2022 15:43		Target-Handling Tool	...
<input type="checkbox"/>	4449	Tango/NICOS – Implementierung	Task	Normal	New	Alexander Steffens	Harald Kleines	26 Jan 2022 15:38		Tango-/Nicos-System	...
<input type="checkbox"/>	4448	Aufbau von Netzwerk und Rechnerinstallation	Task	Normal	New	Peter Kaemmerling	Harald Kleines	09 Feb 2022 10:42		Tango-/Nicos-System	...
<input type="checkbox"/>	4447	Inbetriebnahme	Task	Normal	New	Andreas Moeller	Harald Kleines	26 Jan 2022 16:43		Target+L-Rohr	...
<input type="checkbox"/>	4446	SPS Software	Task	Normal	New	Andreas Moeller	Harald Kleines	26 Jan 2022 16:41		Target+L-Rohr	...
<input type="checkbox"/>	4445	Inbetriebnahme	Task	Normal	New	Harald Kleines	Harald Kleines	26 Jan 2022 16:22		Verfahrbare Abschirmung	...
<input type="checkbox"/>	4444	Sicherheits Software	Task	Normal	New	Sven Janaschke	Harald Kleines	26 Jan 2022 16:24		Verfahrbare Abschirmung	...
<input type="checkbox"/>	4443	Motion Software	Task	Normal	New	Harald Kleines	Harald Kleines	26 Jan 2022 16:24		Verfahrbare Abschirmung	...
<input type="checkbox"/>	4442	Implementierung Tango/NICOS-System	Task	Normal	New	Alexander Steffens	Harald Kleines	26 Jan 2022 16:02		Target-Handling Tool	...
<input type="checkbox"/>	4441	Inbetriebnahme	Task	Normal	New	Harald Kleines	Harald Kleines	26 Jan 2022 16:00		Target-Handling Tool	...
<input type="checkbox"/>	4440	Sicherheits Software	Task	Normal	New	Sven Janaschke	Harald Kleines	26 Jan 2022 16:02		Target-Handling Tool	...
<input type="checkbox"/>	4439	Motion Software / Parker Zylinder	Task	Normal	New	Harald Kleines	Harald Kleines	26 Jan 2022 16:01		Target-Handling Tool	...
<input type="checkbox"/>	4438	Verkabelung	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 15:59		Target-Handling Tool	...
<input type="checkbox"/>	4437	Verkabelung	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 16:25		Verfahrbare Abschirmung	...
<input type="checkbox"/>	4436	Verkabelung	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 16:42		Target+L-Rohr	...
<input type="checkbox"/>	4435	Inbetriebnahme	Task	Normal	New	Frank Suxdorf	Harald Kleines	26 Jan 2022 15:23		LH2-Moderator	...
<input type="checkbox"/>	4434	Implementierung Tango/NICOS-System	Task	Normal	New	Alexander Steffens	Harald Kleines	26 Jan 2022 15:23		LH2-Moderator	...
<input type="checkbox"/>	4433	SPS-Software	Task	Normal	New	Frank Suxdorf	Harald Kleines	26 Jan 2022 15:21		LH2-Moderator	...
<input type="checkbox"/>	4432	Inbetriebnahme	Task	Normal	New	Frank Suxdorf	Harald Kleines	26 Jan 2022 15:29		Methan Moderator	...
<input type="checkbox"/>	4431	Labview/Profinet-Schnittstelle	Task	Normal	New	Harald Kleines	Harald Kleines	26 Jan 2022 15:30		Methan Moderator	...
<input type="checkbox"/>	4430	SPS-Software	Task	Normal	New	Frank Suxdorf	Harald Kleines	26 Jan 2022 15:31		Methan Moderator	...
<input type="checkbox"/>	4429	Verkabelung	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 15:32		Methan Moderator	...
<input type="checkbox"/>	4428	Bau des Schaltschranks	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 15:33		Methan Moderator	...
<input type="checkbox"/>	4427	Verkabelung	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 15:19		LH2-Moderator	...
<input type="checkbox"/>	4426	Bau des Schaltschranks	Task	Normal	New	Michael Heinzler	Harald Kleines	26 Jan 2022 15:18		LH2-Moderator	...
<input type="checkbox"/>	4425	Erstellung Schaltplan	Task	Normal	New	Michael Glum	Harald Kleines	26 Jan 2022 15:35		Methan Moderator	...
<input type="checkbox"/>	4424	Erstellung Schaltplan	Task	Normal	New	Michael Glum	Harald Kleines	26 Jan 2022 15:15		LH2-Moderator	...

From Instrument control to facility control?

