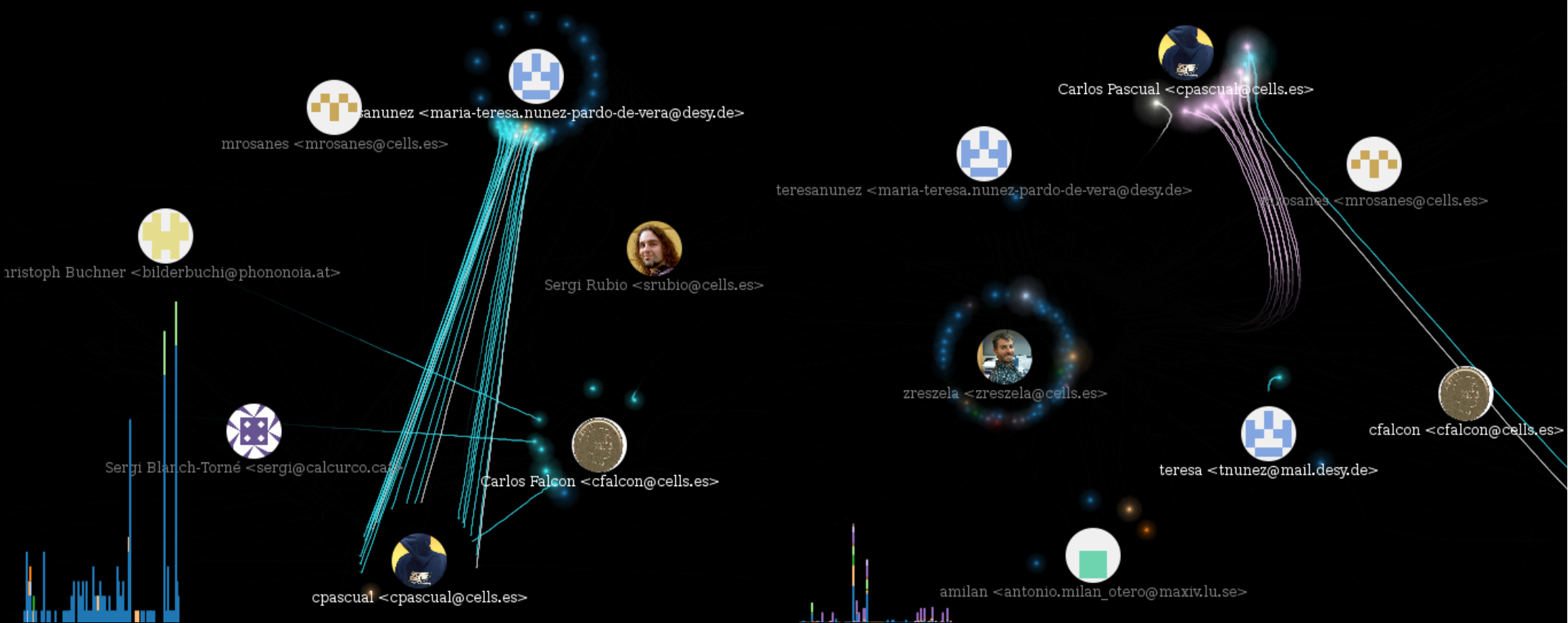
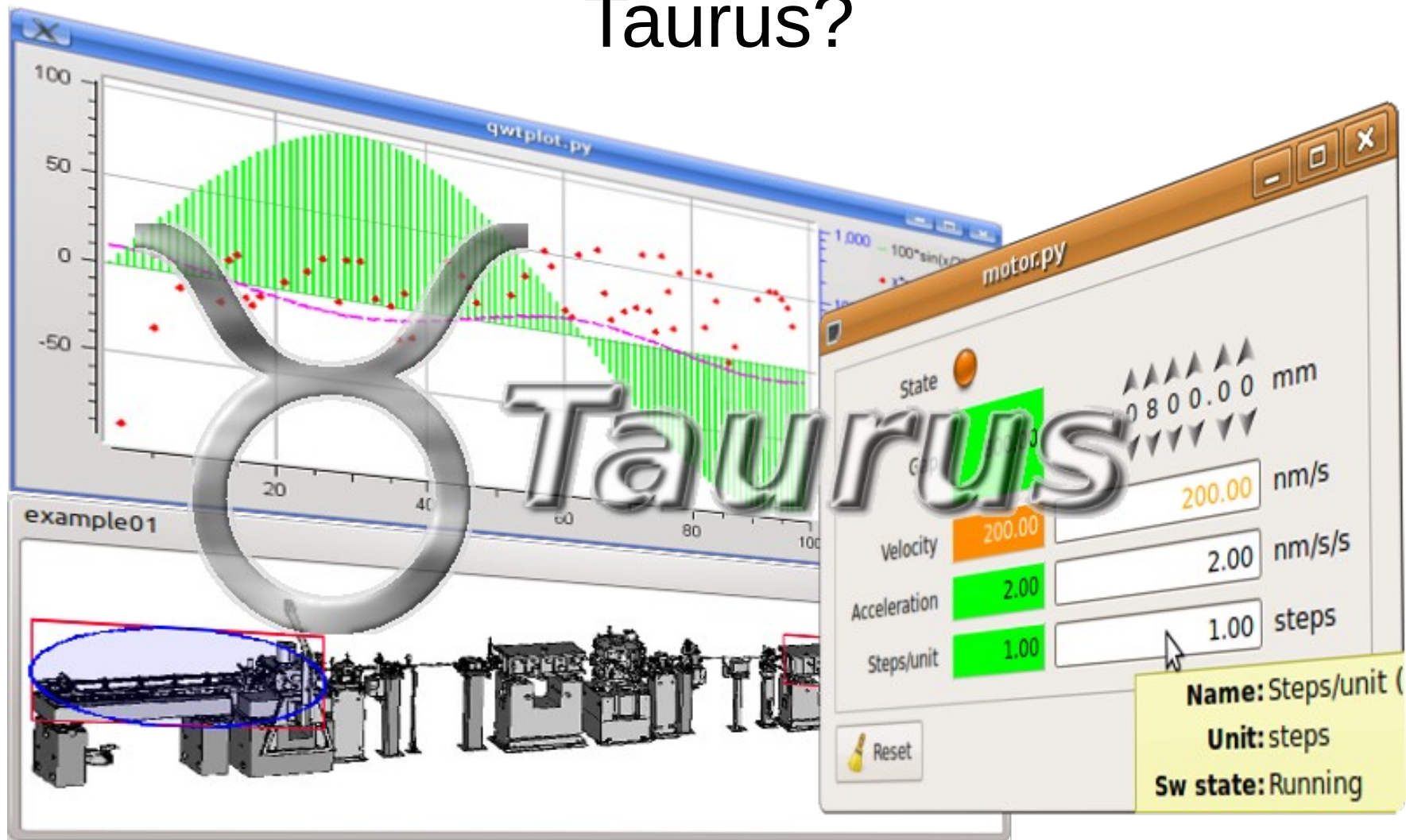


TAURUS + SARDANA STATUS



CARLOS PASCUAL-IZARRA
ON BEHALF OF TAURUS & SARDANA COMMUNITIES

Taurus?



Taurus is a framework for building control and data acquisition **CLIs** and **GUIs**

It is based on **Python** and extends **PyQt**

It supports plugins for various control systems (**Tango**, **EPICS**,...) or data sources (**HDF5**, **Python eval**,...)

Sardana?

The image displays the Sardana SCADA interface, which is a graphical user interface for controlling scientific installations. It features several panels and a console:

- Consoles:** A Python 2.7.1x IPython console window showing the following code:

```
Python 2.7.1x (r271:86832, Apr 11 2011, 10:05:24)
Type "copyright", "credits" or "license()" for more information.

IPython 0.11 -- An enhanced interactive Python.
?          -> Introduction and overview of IPython's features.
?quickref  -> Quick reference.
?help      -> Python's own help system.
?object?   -> Details about 'object'. use 'object??' for extra
?squirrel  -> A brief reference about the graphical user inter

Spock [0]:
Spock [1]: from scipy import special as sp
Spock [2]: x = linspace(0, 20, 100)
Spock [3]: for n in range(4):
...:     plot(x, sp.jn(n, x), label=r'$J_{%d}(x)$' % n)
...:
Spock [4]: m1 = Motor("M1")
Spock [5]: m1.position = 1000
Spock [6]:
```
- Motor Groups Panel:** A panel for "Motor Group 1" showing a "Go" button and a table of motor data:

Motor	ID	Position	Velocity
M1	46.7602647147	0.00	0.00
M2		0.0	0.00
- Motors Panel:** A panel for "Motors on DummyMotorCtrl1" showing a table of motor data:

Motor	Position	Velocity	Unit
M1	0.00	1000.00	km
M2	0.00	0.00	*
M3	0.00	0.00	—
M4	0.00	0.00	—
- Motors on DummyMotorCtrl2:** A panel for "Motors on DummyMotorCtrl2" showing a table of motor data:

Motor	Position	Velocity	Unit
M101	0.00	0.00	—
M102	0.00	0.00	—
M103	0.00	0.00	—
M104	0.00	0.00	—
M105	0.00	0.00	—
M106	0.00	0.00	—
- Demo group box:** A panel for "Demo group box" showing a "Backlash" control with a value of 100 and a "100" button.
- Plot:** A plot showing a sine wave with a period of approximately 10 units on the x-axis and a range of approximately 1.0 on the y-axis.

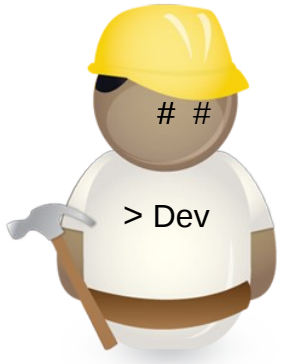


Sardana is a SCADA for scientific installations originally developed at ALBA.

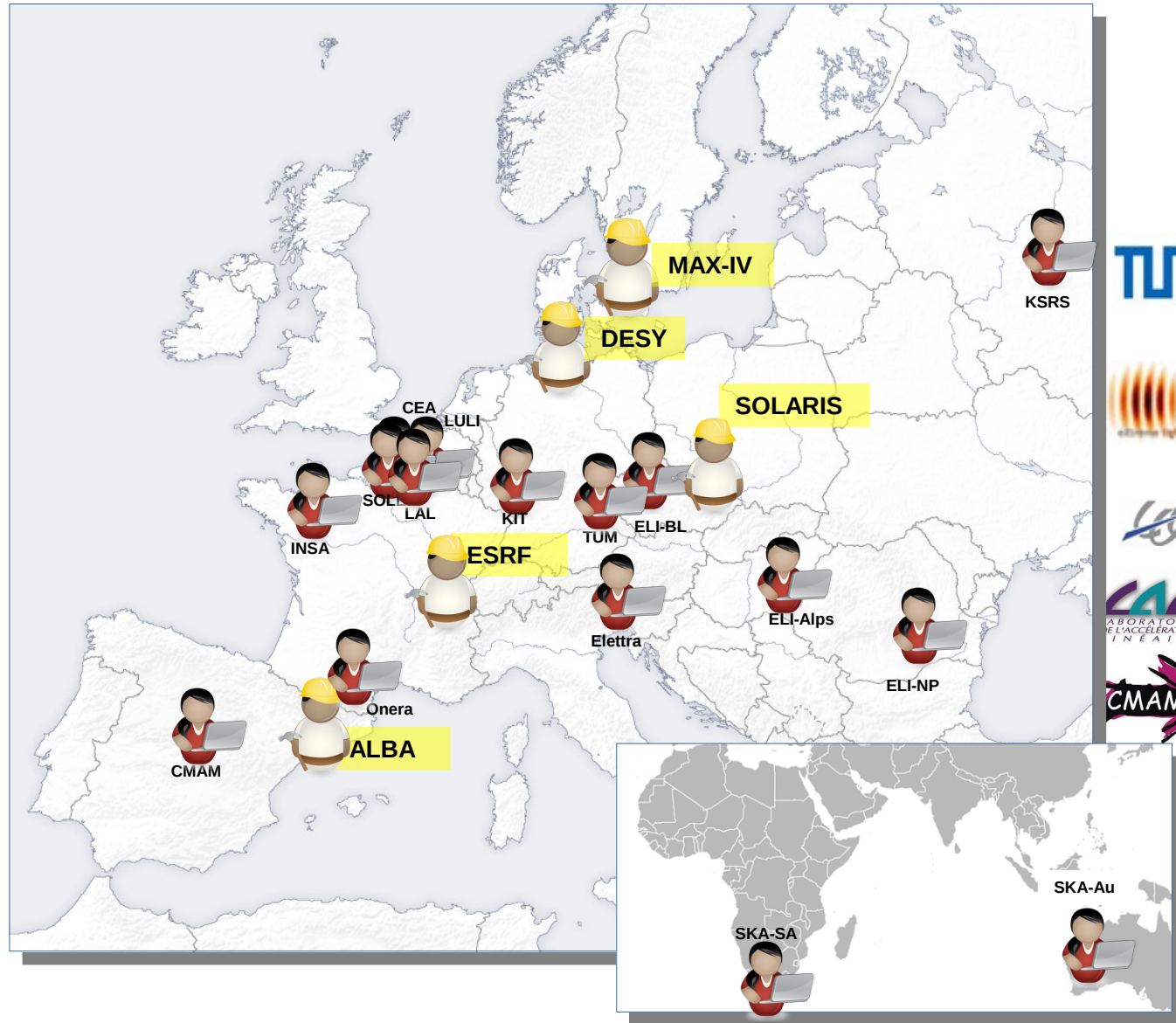
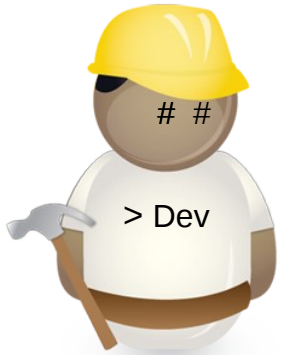
It is built on top of **Taurus** and **PyTango**.

It provides **automation** of procedures and **synchronization** in a distributed control system.

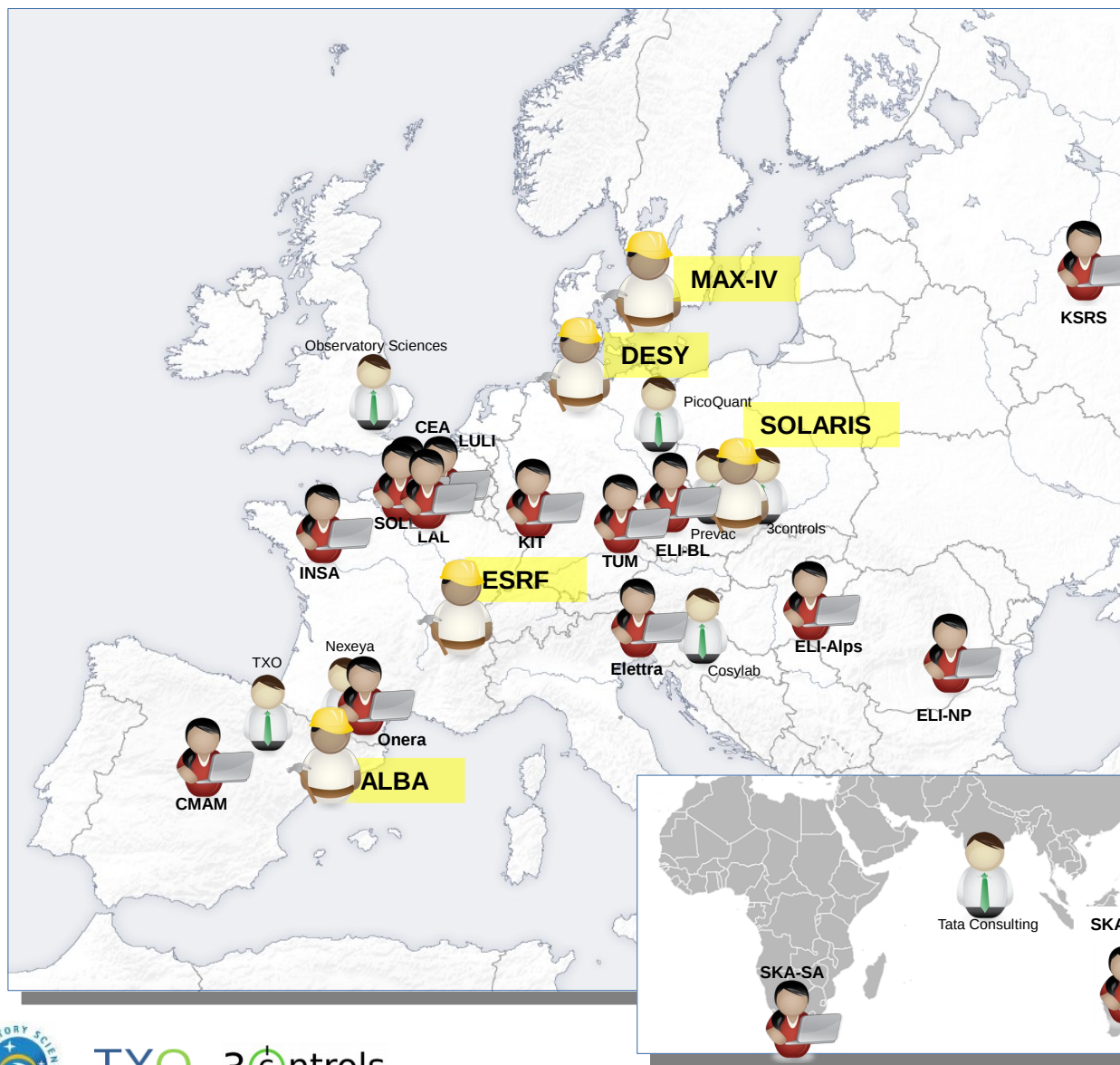
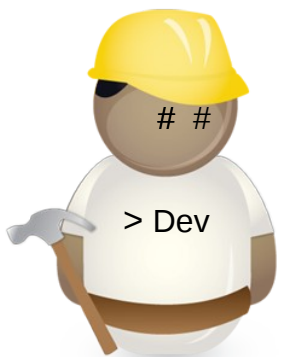
Taurus & Sardana Communities



Taurus & Sardana Communities

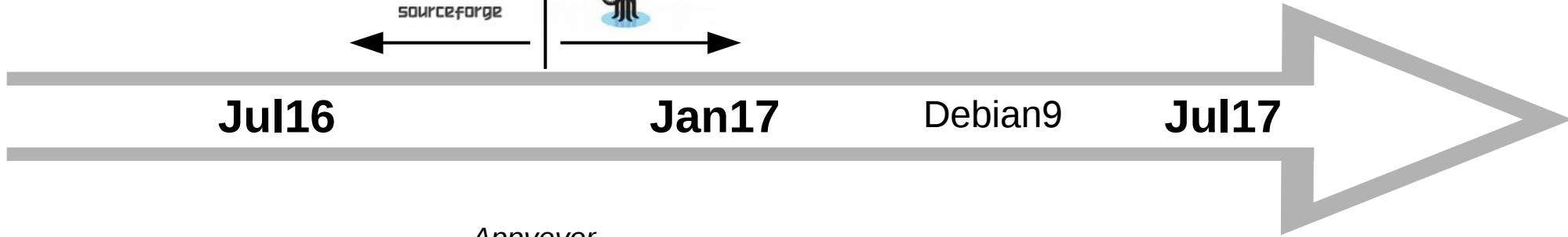
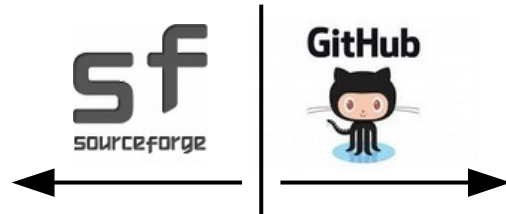


Taurus & Sardana Communities



ICALEPCS2017
Barcelona · Spain, October 8-13 · Palau de Congressos de Catalunya

Main changes in the last 12 months



Taurus

Taurus4

4.0.1
3.7.3

Appveyor
bumpversion
(h5py scheme)

4.0.3

eval ++
formatting API

4.1.0
3.7.4

pyqtgraph plots



support Taurus3+4
support Tango9.2

2.1.0

setuptools
bumpversion

2.2.0

h5py recorder

2.2.2-3

Continuous Scans
Improved "ParamRepeat"

2.3.0



<https://github.com/taurus-org/taurus/blob/develop/CHANGELOG.md>

<https://github.com/sardana-org/sardana/blob/develop/CHANGELOG.md>



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Taurus4

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(h5py scheme)

eval ++
formatting API

pyqtgraph plots



Taurus

4.0.1

4.0.3

4.1.0

3.7.3

3.7.4



2.1.0

2.2.0

2.2.2-3

2.3.0

support Taurus3+4
support Tango9.2

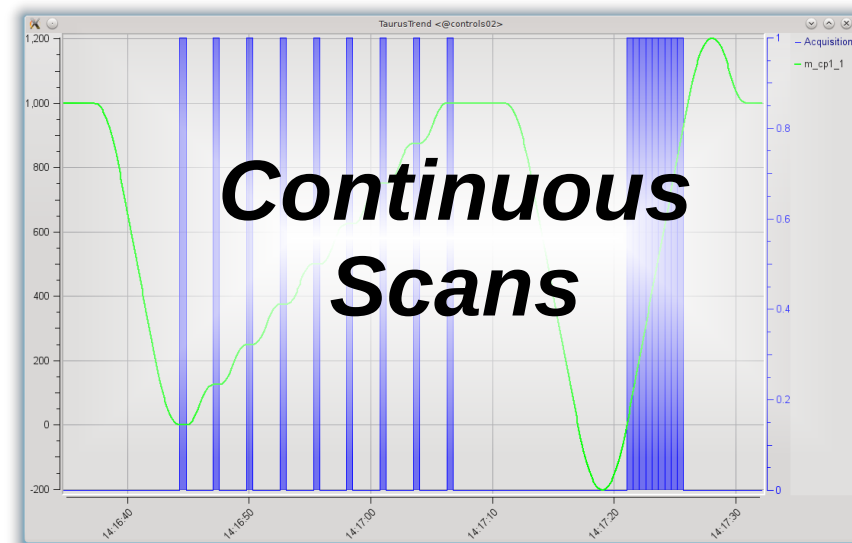
setuptools
bumpversion

h5py recorder

Continuous Scans

Improved "ParamRepeat"

Taurus4 & Continuous Scans



- **Merged to develop:** April 2016
- **Released:** Jul16
- **In production:** starting in ALBA machine now
- **Provides:**
 - Quantities (units) support
 - Scheme-agnostic core
 - Model fragment support
 - Improved Eval scheme (read only)
 - PyQt new-style signals support
 - New icon API (taurus.qt.qtgui.icon)
 - ...

- **Merged to develop:** April 2017
- **Release:** Jul 2017
- **In production:** used in ALBA Beamlines
- **Provides:**
 - Continuous scans
 - Generic interface (abstracts the Hardware)
 - Fast and slow channels support
 - API equivalent to step scans
 - backwards-compatibility on Meas. Groups
 - ...

Taurus4 & Continuous Scans



ALBA

1

Taurus Status and Update

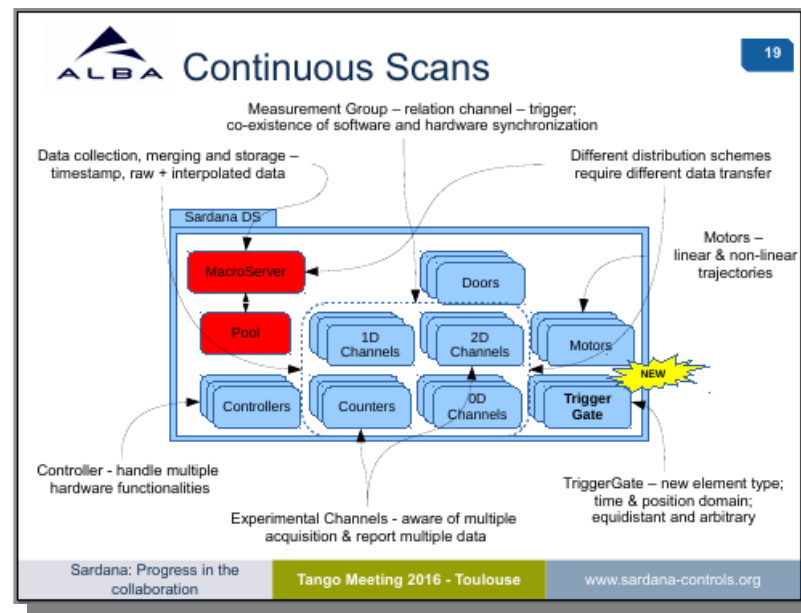
by
Carlos Pascual-Izarra
(On behalf of the Taurus community)

TANGO

Taurus Status <http://taurus-scada.org> 30th Tango Meeting - Toulouse - June 2016

TANGO
Collaboration Meeting
21-23 June 2016 - ONERA Toulouse, France

ONERA
THE FRENCH AEROSPACE LAB



THHC3003

Proceedings of ICALEPCS2015, Melbourne, Australia

EFFORTLESS CREATION OF CONTROL & DATA ACQUISITION GRAPHICAL USER INTERFACES WITH TAURUS

C. Pascual-Izarra[#], G. Cuní, C. Falcón-Torres, D. Fernández-Carreiras, Z. Reszela, M. Rosanes,
ALBA-CELLS Synchrotron, Cerdanyola del Vallès, Spain
T. Coutinho, ESRF, Grenoble, France

ICALEPCS 2015
International Conference on Accelerator
& Large Experimental Physics
Control Systems
17-23 OCTOBER 2015 MCEC MELBOURNE

TUB3002

Proceedings of ICALEPCS2015, Melbourne, Australia

ITERATIVE DEVELOPMENT OF THE GENERIC CONTINUOUS SCANS IN SARDANA

Z. Reszela, G. Cuní, C. M. Falcón Torres, D. Fernandez-Carreiras, C. Pascual-Izarra, M. Rosanes
Siscart, ALBA-CELLS Synchrotron, Cerdanyola del Vallès, Spain

TEP3 and TEP14 : <http://www.taurus-scada.org/tep/>



Enhancement
Proposals

SEP6 : <http://www.sardana-controls.org/sep/?SEP6.md>



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Taurus4

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bumpversion
(h5py scheme)

eval ++
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pyqtgraph plots



Taurus

4.0.1

4.0.3

4.1.0

3.7.3

3.7.4



2.1.0

2.2.0

2.2.2-3

2.3.0

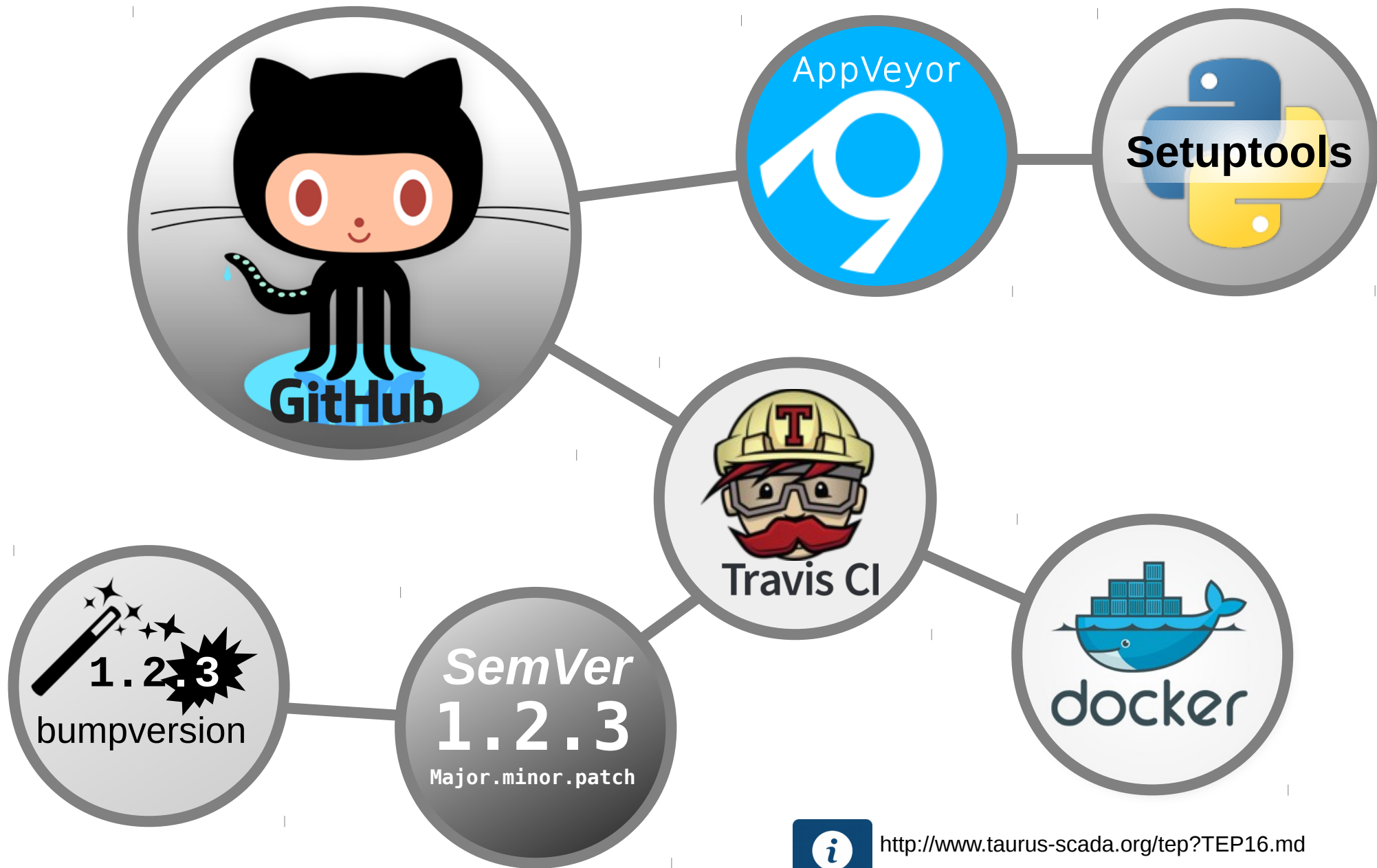
support Taurus3+4
support Tango9.2

setuptools
bumpversion

h5py recorder

Continuous Scans
Improved "ParamRepeat"

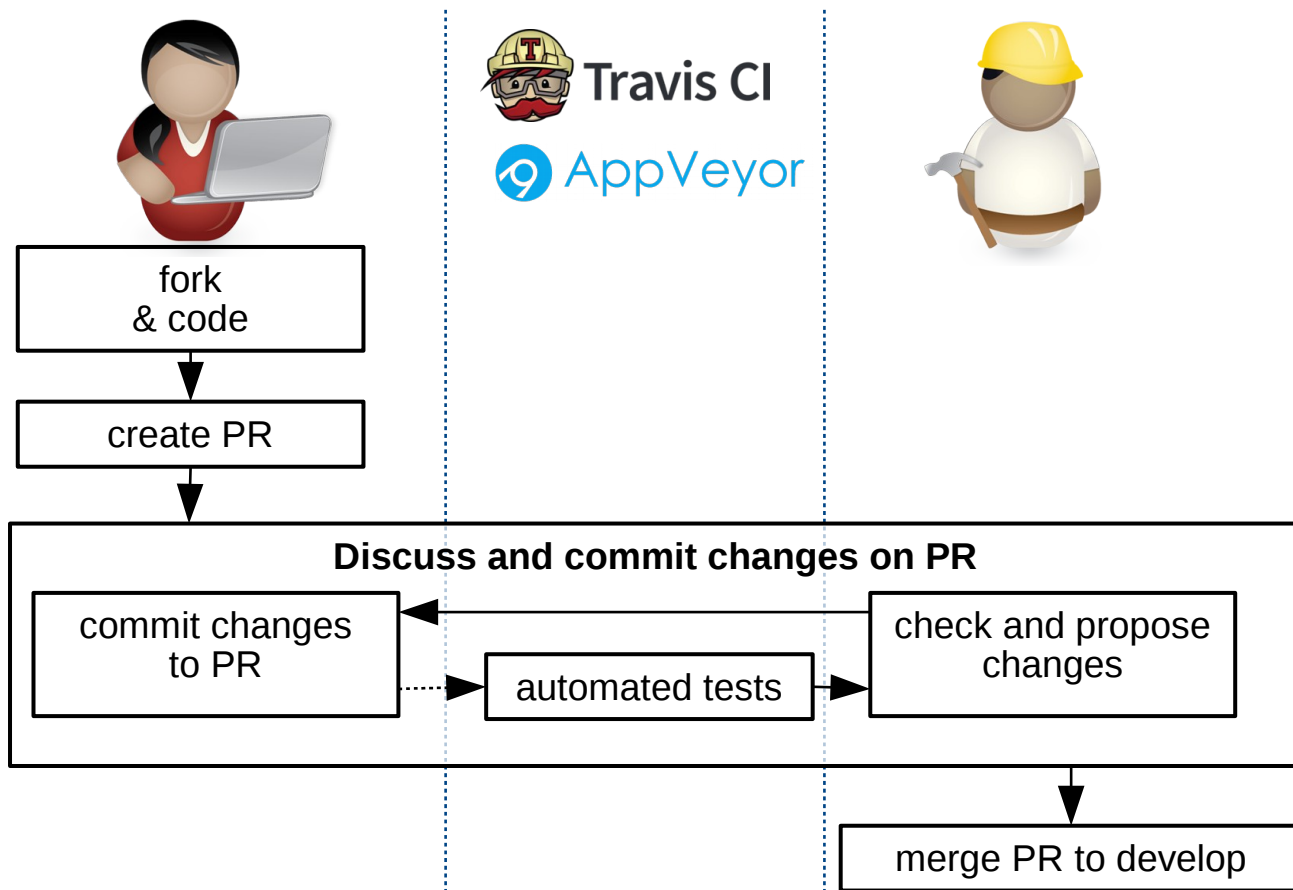
Migration to Github (& other improvements)



<http://www.taurus-scada.org/tep?TEP16.md>

<http://www.sardana-controls.org/sep/?SEP15.md>

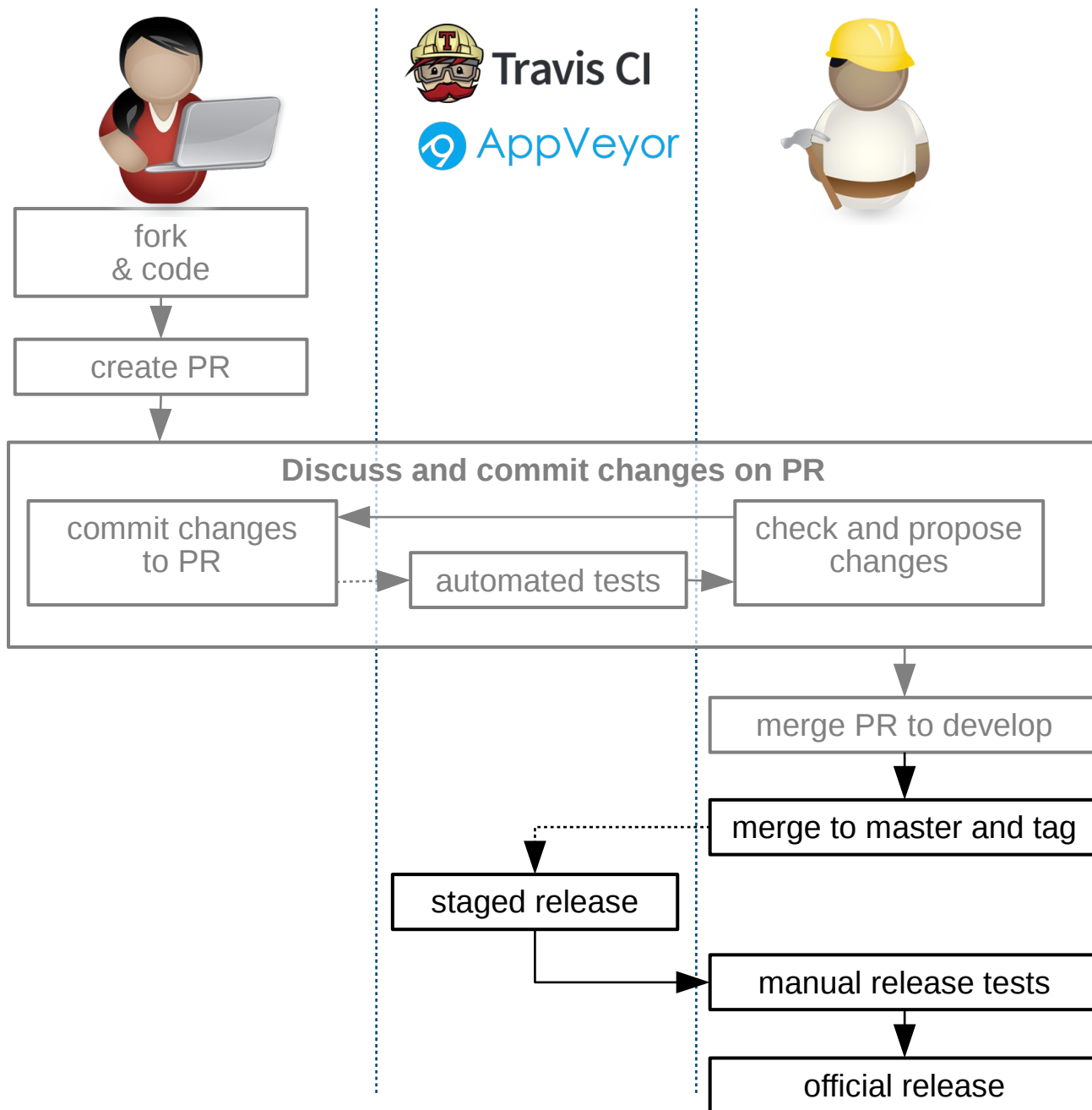
Migration to Github (new code review workflow)



Pull-request based Continuous Integration

- ✓ Easier for contributors
- ✓ Lighter for integrators
- ✓ All logged in PR discussion
- ✓ Every iteration is auto-tested

Migration to Github (continuous delivery)



Continuous Delivery

- ✓ Public and transparent
- ✓ Not tied to any institution
- ✓ Agile



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Taurus4



Taurus

4.0.1

3.7.3

4.0.3

4.1.0

3.7.4

2.1.0

2.2.0

2.2.2-3

2.3.0



sardana

support Taurus3+4
support Tango9.2

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h5py scheme

```
$> pip install git+https://github.com/taurus-org/h5file-scheme.git
$> echo 'EXTRA_SCHEME_MODULES = ["h5file"]' >> taurus/tauruscustomsettings.py
$> taurusform h5file:/tmp/foo.h5::entry/time \
    tango:sys/tg_test/1/ampli \
    eval:{tango:sys/tg_test/1/ampli}/{h5file:/tmp/foo.h5::entry/time}
```

The screenshot shows the HDFView application window. The 'File/URL' field contains '/tmp/foo.h5'. The file tree on the left shows 'foo.h5' with an 'entry' folder containing a 'time' dataset. A 'TableView' window is open, displaying a table with two columns and two rows. The first row has a value of '0' in the second column. The second row has a value of '10.0' in the second column. At the bottom, the metadata for the 'time' dataset is shown: 'time (1832)', '64-bit floating-point, 1', 'Number of attributes = 1', and 'units = s'.

	0
0	10.0

time (1832)
64-bit floating-point, 1
Number of attributes = 1
units = s

The screenshot shows the TaurusForm application window. It displays a configuration for the 'time' dataset. The 'time' field is set to '10.0 s'. The 'ampli' field is set to '12.0', with '12 m' and 'm' displayed to its right. The 'ampli/time' field is set to '1.2', with 'm / s' displayed to its right. There are 'Reset' and 'Apply' buttons at the bottom.

time	10.0	s
ampli	12.0	12 m m
ampli/time	1.2	m / s

Reset Apply



<https://github.com/taurus-org/h5file-scheme>



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Taurus

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sardana

2.1.0

2.2.0

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2.3.0

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NeXus scan Recorder (h5py-based)

Problem: the `NXscan_FileRecorder` depends on the python `nxs` module (NAPI), and...

- From the NeXus Manual, section4 (NAPI):

*It is expected that most application developers will use standard HDF5 tools to read and write NeXus. (...)Therefore, **the decision has been taken to freeze the NAPI.***

- From nexus package info in Debian:

autoremoval from testing

- Version 4.3.2-svn1921-5 of nexus is marked for autoremoval from testing on 2017-06-16.
- It is affected by RC bug [#861736](#).

Solution: Implement `NXscanH5_FileRecorder` (based on h5py) to replace it.

Notes:

- The python-sardana package in Debian 9 already uses the new recorder
- It will also be used by default in the Jul17 release



<https://github.com/sardana-org/sardana/issues/460>



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Taurus4



Taurus

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3.7.3

4.0.3

4.1.0

3.7.4



sardana

2.1.0

2.2.0

2.2.2-3

2.3.0

support Taurus3+4
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Improved "ParamRepeat"

Eval scheme improvements

Eval scheme improvements in Taurus >= 4.0.4:

- Support writable eval attributes
- Use **any module or class** as a **custom evaluator**



```
$> taurusform 'eval:@c=mymod.MyClass()/c.foo' \
              'eval:@datetime.* /date.today().isoformat()' \
              'eval:@os.* /environ["TANGO_HOST"]' \
              'eval:@os.path.* /getsize("/var/log/boot")<50'
```

mymod.py

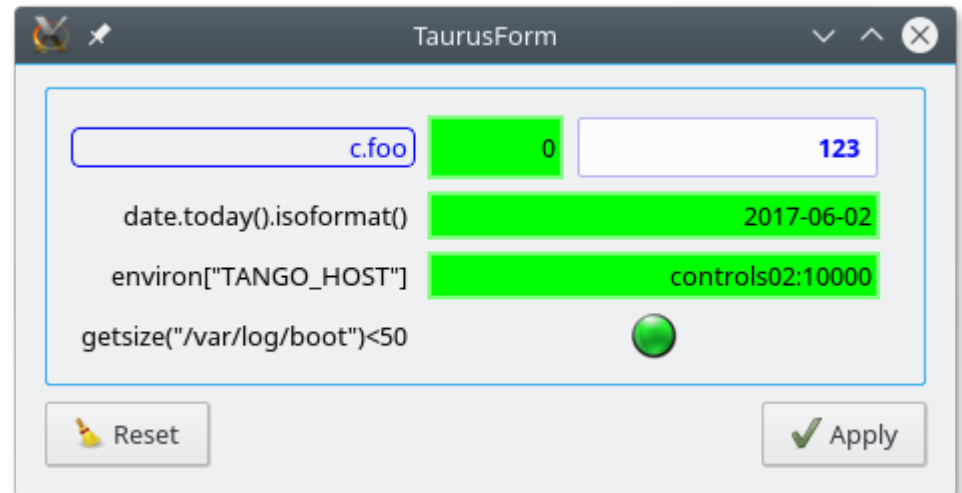
```
class MyClass(object):

    _foo = 0

    def get_foo(self):
        return self._foo

    def set_foo(self, value):
        self._foo = value

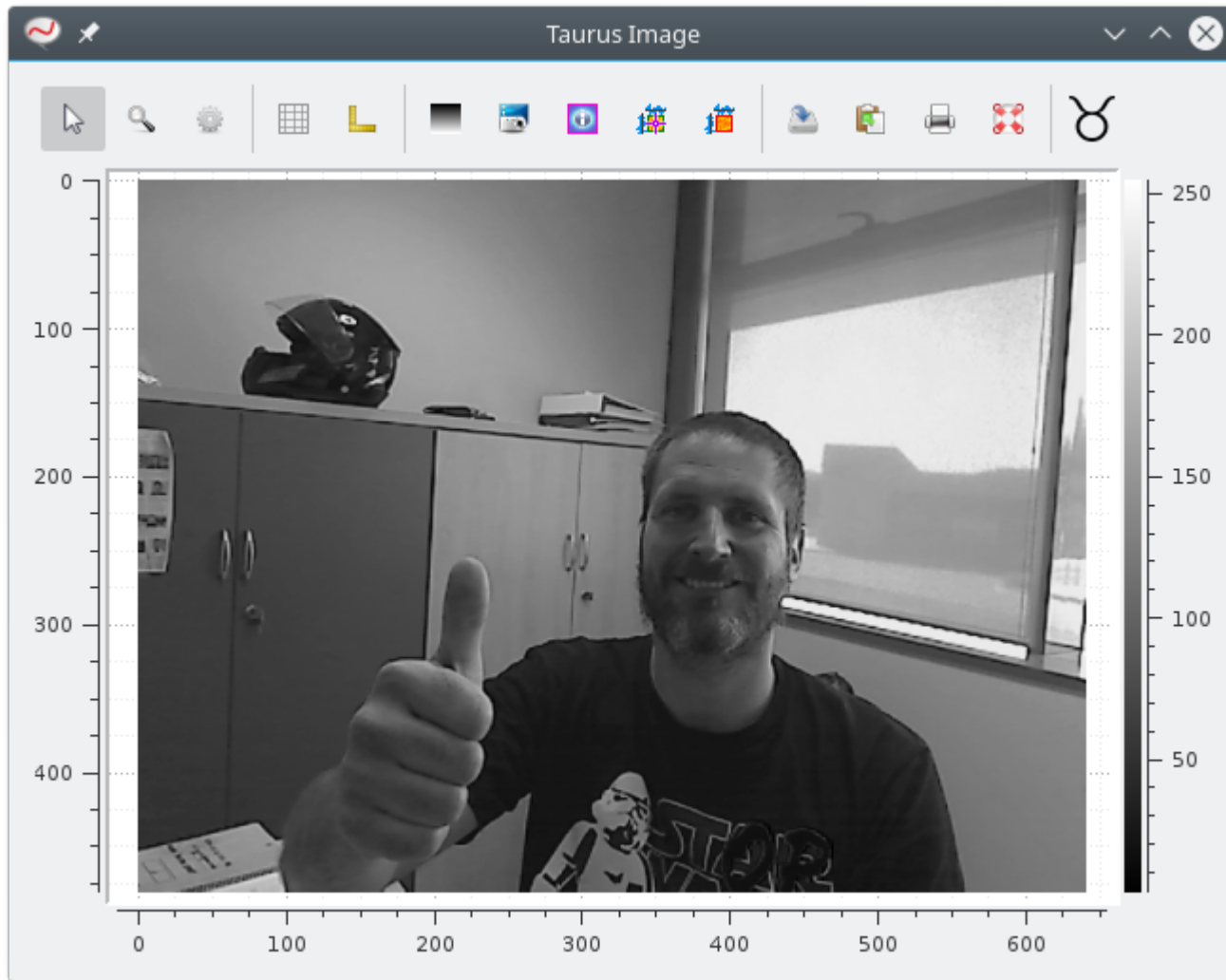
foo = property(get_foo, set_foo)
```



docs: <http://www.taurus-scada.org/devel/api/taurus/core/evaluation.html>
mymod example: `taurus.core.evaluation.test.res.mymod`

Eval scheme improvements

```
$> taurusimage 'eval:@c=cv2.VideoCapture(0)/c.read()[1][...,1]'
```



docs: <http://www.taurus-scada.org/devel/api/taurus/core/evaluation.html>
mymod example: `taurus.core.evaluation.test.res.mymod`



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Taurus

4.0.1
3.7.3

4.0.3

4.1.0
3.7.4



sardana

support Taurus3+4
support Tango9.2

2.1.0

setuptools
bumpversion

2.2.0

h5py recorder

2.2.2-3

Continuous Scans
Improved "ParamRepeat"

2.3.0

New Parameter repeat (macro API)

Previously:

- **maximum 1** repeat parameter
- must be **the last one**,
- **nesting not allowed**.

Now:

- **any** number of repeat parameters
- located at **arbitrary** positions
- **nesting allowed**
- **old syntax still supported**

```
@macro([[ "m_p_pairs", [  
    ["moveable", Type.Moveable, None, "moveable to be moved"],  
    ["position", Type.Float, None, "absolute position"]  
    ],  
    None, "list of moveables and positions to be moved to"]])  
  
def mv(self, m_p_pairs):  
    """This macro moves moveables to the specified positions"""  
    for moveable, position in m_p_pairs:  
        moveable.move(position)  
        self.output("%s is now at %s", moveable.getName(), moveable.getPosition())
```



http://www.sardana-controls.org/devel/howto_macros/macros_general.html

http://www.sardana-controls.org/devel/examples/macro_parameter_examples.html

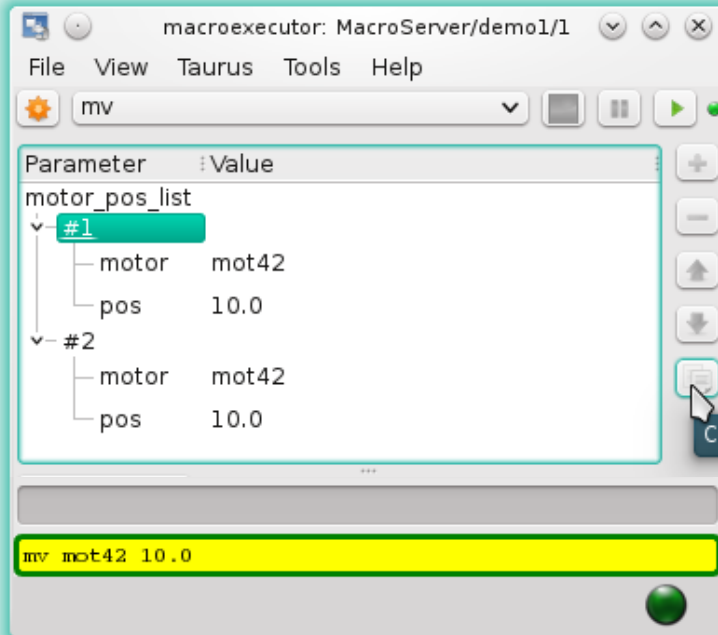
New Parameter repeat (clients)

Spock:

- **Old syntax:**
 - concise but limited
- **New syntax**
 - more verbose but allows nesting, arbitrary order, multiple repeats, etc.

Macroexecutor & Sequencer:

- Repeat parameters can be “cloned”



```
$ > spock
```

```
Door_1 [1]: umv?
```

```
Syntax:
```

```
umv [ <motor> <pos> ] ->
```

```
Move motor(s) to the specified position(s)
and update
```

```
Parameters:
```

```
motor : (Moveable) Motor to move
pos : (Float) Position to move to
```

```
Door_1 [2]: umv mot1 1 mot2 2
```

```
mot1      mot2
1.0000    2.0000
```

```
Door_1 [3]: umv [[mot1 8] [mot2 9]]
```

```
mot1      mot2
8.0000    9.0000
```



<https://github.com/sardana-org/sardana/pull/405>
<https://github.com/sardana-org/sardana/pull/426>



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Taurus4

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Taurus

4.0.1

4.0.3

4.1.0

3.7.3

3.7.4



2.1.0

2.2.0

2.2.2-3

2.3.0

support Taurus3+4
support Tango9.2

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Continuous Scans
Improved "ParamRepeat"

Plots: PyQwt → pyqtgraph

PyQwt

- ✗ Orphaned

guiqwt3

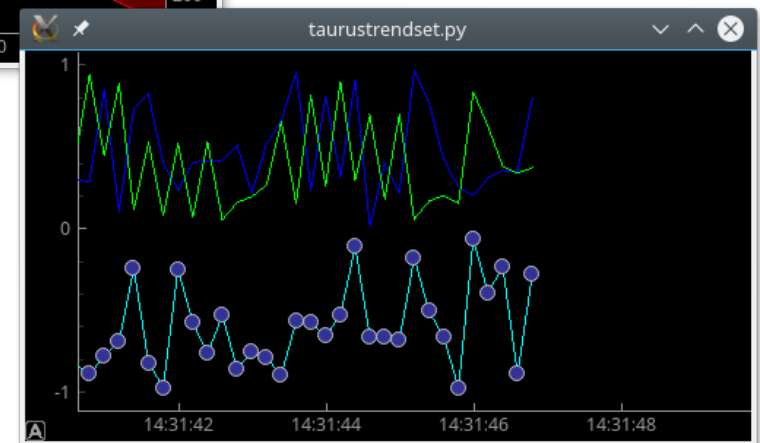
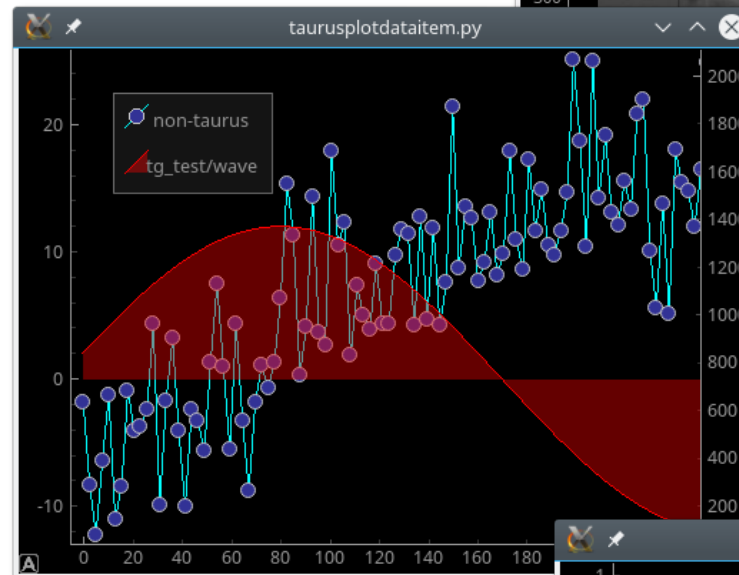
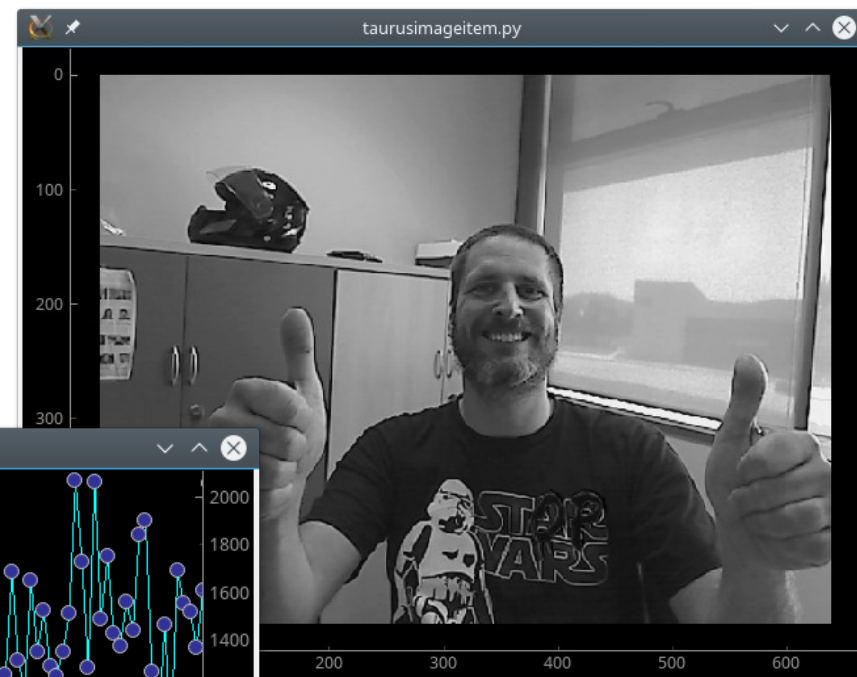
- ✓ taurus.qt.qtgui.extra_guiqwt already implements some stuff
- ✓ many tools out-of-the-box
- ✗ not good support
- ✗ Uncertain future

silx

- ✓ promising community
- ✓ supports 3D and OpenGL
- ✓ shared interests with Taurus
- ✗ Not yet ready (e.g. OO API)

pyqtgraph

- ✓ well supported (popular)
- ✓ supports 3D & OpenGL
- ✓ simple API
- ✓ minimal dependency



TEP17: <https://github.com/taurus-org/taurus/pull/452>

HIGH SCORES (*)

TAURUS

AUTHOR	%
CARLOS PASCUAL-IZARRA	71.14
VINCENT MICHEL	14.44
CARLOS FALCON	12.23
ZBIGNIEW RESZELA	1.14
SERGI BLANCH	0.29
DANIEL ROLDÁN	0.23
JENS KRÜGER	0.19
JAN KOTANSKI	0.10
JAIRO MOLDES	0.04
MARC ROSANES	0.03
JORDI ANDREU	0.03
SERGI RUBIO	0.01
ZBIGNIEW RESZELA	0.01
OSCAR PRADES	0.01
GEORG BRANDL	0.01

SARDANA

AUTHOR	%
ZBIGNIEW RESZELA	70.63
TERESA NUNEZ	12.22
SERGI BLANCH	6.23
ROBERTO J. HOMS PURON	6.04
MARC ROSANES	2.98
LUKASZ DUDEK	1.33
JORDI ANDREU	0.29
JAN KOTANSKI	0.14
DANIEL ROLDÁN	0.10
CARLOS PASCUAL-IZARRA	0.02
CARLOS FALCON	0.01

(*) LINES CHANGED FROM JUNE 2016
TILL JUNE 2017, EXCLUDING
MERGES AND PEP8 CHANGES

INSERT COMMIT TO CONTINUE...