

Tango Controls Collaboration Status in 2023

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The TANGO Controls Collaboration: 25 Years!!

Tango Controls (Telescope & Accelerators Next Generation Object-oriented Control System) was created **25 years** ago by **Emmanuel Taurel, Pascal Verdier and (the now famous) AG** (who did not break TACO but is not allowed to write code for Tango Controls anymore).

Tango is not just an open-source device-oriented controls toolkit . It is a **well organized** and amazing **collaboration**, gathering institutes from many science fields:

light sources, astronomical telescopes, laser facilities, neutron sources, private companies, universities, ...



The Tango Controls Steering Committee as of 2023

TH1BC003 - The Tango Controls Collaboration Status in 2023, ICALEPCS 2023, Cape Town, South Africa



- We are back with face-to-face Tango Community Meetings:
 - MAX IV (2022)
 - SKAO, Jodrell Bank (2023)



(taco-tango workshop, 2001)



- **NEW** Special-Interest-Group Meetings (SIG):
 - Jupyter for controls - SKAO Headquarter, UK - Sep. 2022
 - The Tango archiving database (HDB++) - ASTRON, Netherlands - Nov. 2022
 - The future of GUIs (TAURUS) - ESRF, France - March 2023
 - Roadmap to Tango 10 (a.k.a. IDLv6 meeting) - ALBA, Spain - May 2023


To start developing on Tango, just get the tools from your preferred channel:

- **Download Docker Images from SKAO's artefact repository**
 - <https://artefact.skao.int/#browse/browse:docker-all:v2>
- **Get all Tango tools (Python, C++, Java) from Conda and PyPI**
 - `conda install -c conda-forge cpptango pytango`
- **Get all Tango Tools already preinstalled in the updated TangoBox**
 - <https://tango-controls.readthedocs.io/en/latest/installation/virtualmachine.html>
(New release currently under review)

Pogo, the Tango Controls code generator for creating new Tango devices, has been recently improved: adding latest improvements from JTango, using latest CMake version and better templates for Java, Python and C++.

New project will be started to migrate Pogo to Python, replacing current technologies with Jinja2, YAML, JSON



All of the Tango Controls repositories are now hosted on  **GitLab**
<https://gitlab.com/tango-controls>

Gitlab's CI/CD completely replaced Travis/Appveyor

A great collaborative feature: all CI/CD is run on community provided runners

Thank you!



Tests are run for every commit in an MR

Available packages:

- Tango Source Distribution
- Windows Installer
- Debian
- RPM
- Conda
- PyTango wheels

Python has become the de-facto default language for Tango, for both new server developers and client users. Nevertheless, **cppTango** is the real core of the control System as well as **JTango**-based tools the most used for initial configuration of the system.

cppTango (current stable version 9.5.0, released 2023-10-09)

- Switch to fixed release cycles: every six months
- Refactoring/Templatisation: templatisation alone removed >10k lines of code.
- Observability: tracing of the call stack in the distributed Tango Controls system
- Full macOS support in cppTango >= 9.5.0

PyTango (current stable version 9.4.2 and 9.5.0-rc about to be released for testing)

- Release process now tied to cppTango release process: Faster updates after cppTango releases
- Changed support policy: Python versions to < 42 months old,
- People
 - Increase in number of contributors from 13 (2019 - 2021) to 28 (2021 - 2023)
 - New maintainer joined team
 - Regular meetings for developers, twice a month (better communication between devs, accountability/reminder mechanism for work in progress)
 - Meeting schedule & minutes publicly available: aids transparency, makes it easy for new people to join

jTango (current stable version 9.7.2)

- Next up: Logging system improvements, units tests and Tango v10+ features.

After 10 years of LTS, focussing on stability, performance and improving the code base, the community have pushed for adding new features and data-types, beginning with Tango Controls v10

Future releases and features roadmap:

- **Tango v10**
 - New *alarm event*
 - Warning and alarm *hysteresis*
 - New *observability* service for tracing and profiling (hidden *OpenTelemetry* API).
 - *Extended version information* of the full software stack on which a device server relies available at run time.
- **Tango v11**
 - New data type: *DevDict*. A python like dictionary of key/value pairs.
- **Tango v12**
 - *Multi-parameter commands* removing the current limitation of one argument per command. It is planned to use DevDict, introduced in V11, for this feature.
- **Tango v13**
 - New *multi-dimensional arrays* removing the current limitation to 2D-arrays.

Growing Collaboration on User Interfaces / Experiment Frameworks / Web Clients

Taurus, Sardana, JupyTango, Taranta, Panic
Puma, RestAPI, eGiga, ArchViewer, ...

The collage displays several distinct user interface components:

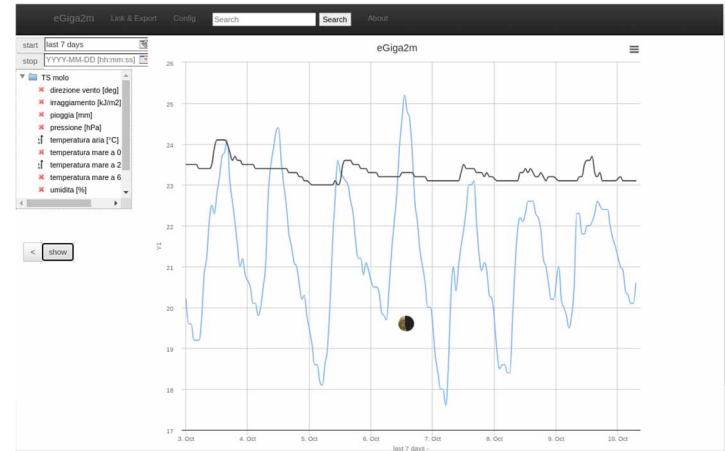
- Master Control Panel:** Shows system status (ONSTANDBY, State ON), VCC States (001-004), and Unassigned receptors (4.00, 2.00, 1.00, 2.00).
- SubArrays Configuration:** Detailed screens for subarrays 001 and 002, including address fields, configuration buttons, and receptor status.
- Beamline Schematic:** A diagram of the accelerator layout with components labeled K10-K15, BC02, L2-L4, BST, FEL-1, FEL-2, and MOD.1. A callout bubble says "Use mouse wheel or pinch to zoom in".
- Data Plots:** A graph showing a blue curve and a heatmap, and another graph showing a signal waveform over time.
- Control Logic Diagram:** A complex schematic with boxes for "TURBO PUMP BACKUP", "TURBO PUMP", "VENT SYSTEM", "PUMP THE CONE", and "PUMP TILES & PROBE". It includes numerous interconnections and status indicators.
- Process Flowchart:** A list of steps for "PUMP TILES & PROBE" and "TURBO PUMP BACKUP", such as "1. START the TURBO PUMP BACKUP" and "2. Check that V1 is CLOSED".
- Monitoring Dashboard:** A screen with multiple small graphs and data points, likely for real-time monitoring.

Different User Interface communities are meeting yearly to share experiences, organize workshops, bug-squashing parties and documentation camps.

A collaborative effort to tackle archiving with Tango

Multi database backend support:

- MySQL/MariaDB
- postgresSQL/TimeScaleDB
- and (now) SQLite




Full archiving ecosystem:

- Large variety of tools to manage archiving
- Backend agnostic python extraction library

For more details please come and see our poster!

THMBCMO01: *New developments on HDB++, the high performance data archiving for Tango Controls, Damien Lacoste et al.*

Better development dynamics

- Kernel, C++ and PyTango developers meeting every 2 weeks
- Unlocked new features by (re)opening the Tango IDL
- Fixed release cycle
 - Releases = Milestones  Clear roadmap
- SIG meetings and workshops to push specific topics

Growing community

- Number of active code contributors has significantly increased.
- New facilities from the astronomy research with new inputs
- Collaboration budget: 3 official subcontractors now on board
- 43 Contributions to ICALEPCS 2023 (look for Tango stickers!)

Come and join us! Remember: It takes (at least) two to Tango.

Thank you!

We want to thank Andy Götz, Emmanuel Taurel, Pascal Verdier, Manu Perez and Nicolas Leclercq who created Tango Controls 25 years ago; and thank all the developers, contributors and users that have continued making the Tango Controls Community bigger and bigger. We thank you all.

*Thank
you!*



Time for questions!



TH1BCO03 - The Tango Controls Collaboration Status in 2023, ICALEPCS 2023, Cape Town, South Africa

