

# "The Future of Tango"

or

*A light talk about control system evolution, trends, vision, common sense, philosophy and images ...*

# The talk should be honest ...



***pom pom  
scale 1-5***

# The Future of Tango Meeting

- A meeting on the *Future of Tango* was held in 2006 at Hotel des Skieurs in the French Alps ↵



# The Future of Tango Participants

- The usual crowd plus some EXXS spies :



# What is TANGO ?

go to the TANGO home page

<http://www.tango-controls.org>

The screenshot shows a Mozilla Firefox browser window displaying the TANGO website. The browser's address bar shows the URL <http://www.tango-controls.org/>. The website's header features the TANGO logo and a navigation menu with links for [about](#), [news](#), [events](#), [tango kernel](#), [gui](#), [bindings](#), [tools](#), and [download](#). A search bar is also present. The main content area is titled "Welcome to the TANGO website" and includes a paragraph describing TANGO as an object-oriented distributed control system using CORBA, developed collaboratively by ALBA, DESY, Elettra, ESRF, and Soleil institutes. Below this text are five logos: ALBA, DESY, Elettra, ESRF, and SOLEIL ANCHROTRON. A sidebar on the left contains a "navigation" menu with links to Home, Members, About us, News, Tango kernel, GUI, Bindings, Tools, Device classes, Embedded, Download, Events, Bug, HowTos, and Web. A "news" sidebar on the right lists recent updates, including "Archiving System 1.2.4" (2007-10-09), "A Starter kit to build Tango Class Packages" (2007-10-02), "New PyTango" (2007-09-04), "New ATKPanel release (3.1)" (2007-07-17), and "Motor abstract class" (2007-07-10). The footer of the browser window shows the URL <http://www.tango-controls.org/contact-info>.

# TANGO @ SourceForge

<http://www.sf.net/projects/tango-cs>

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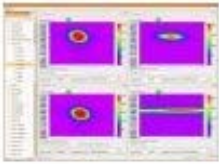
## TANGO - A CORBA based control system

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TANGO is an object oriented control system based on CORBA for Linux, Unix and Windows. It provides a framework in C++, Java and Python for implementing distributed control objects. TANGO has a full set of tools and hundreds of device servers. [\[Edit\]](#)



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TANGO - A CORBA based control system

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**Project Admins:** [andy\\_gotz](#), [jensmeyer](#), [nieclercq](#), [pivetta](#), [taurel](#)  
**Operating System:** (None Listed)  
**License:** (None Listed)  
**Category:** (None Listed)

# CORBA

- *A fundamental part of the success of Tango is the choice of CORBA and its binary protocol IIOP*



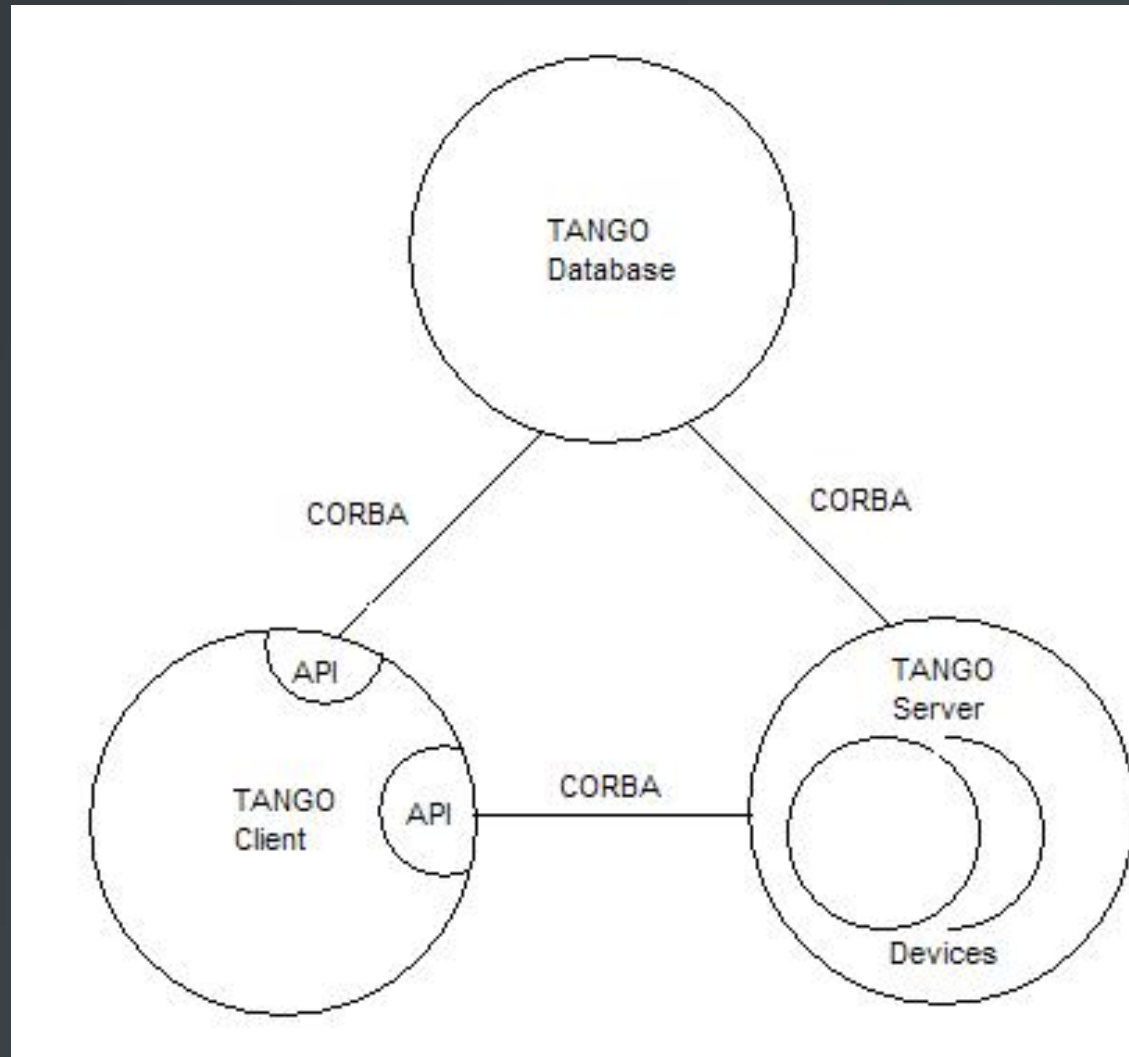
# CORBA

- *A fundamental part of the success of Tango is the choice of CORBA and its binary protocol IIOP*





# Tango is simple !



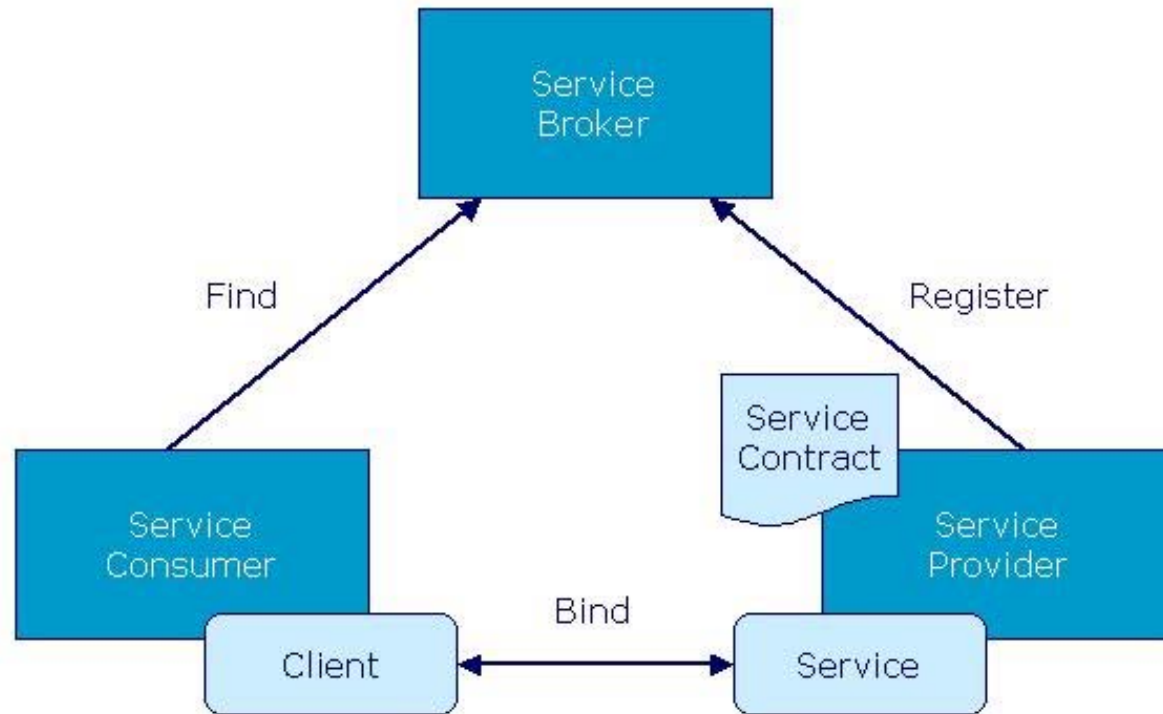
**C++**  
**Java**  
**Igor**  
**Python**  
**Matlab**  
**Labview**

**C++**  
**Java**  
**Python**

since TACO 1991

# hey , this is SOA !

## Service Oriented Architecture



it is just a pity we forgot to patent it !

**TANGO works !**



**100% TANGO**

# Tango Philosophy

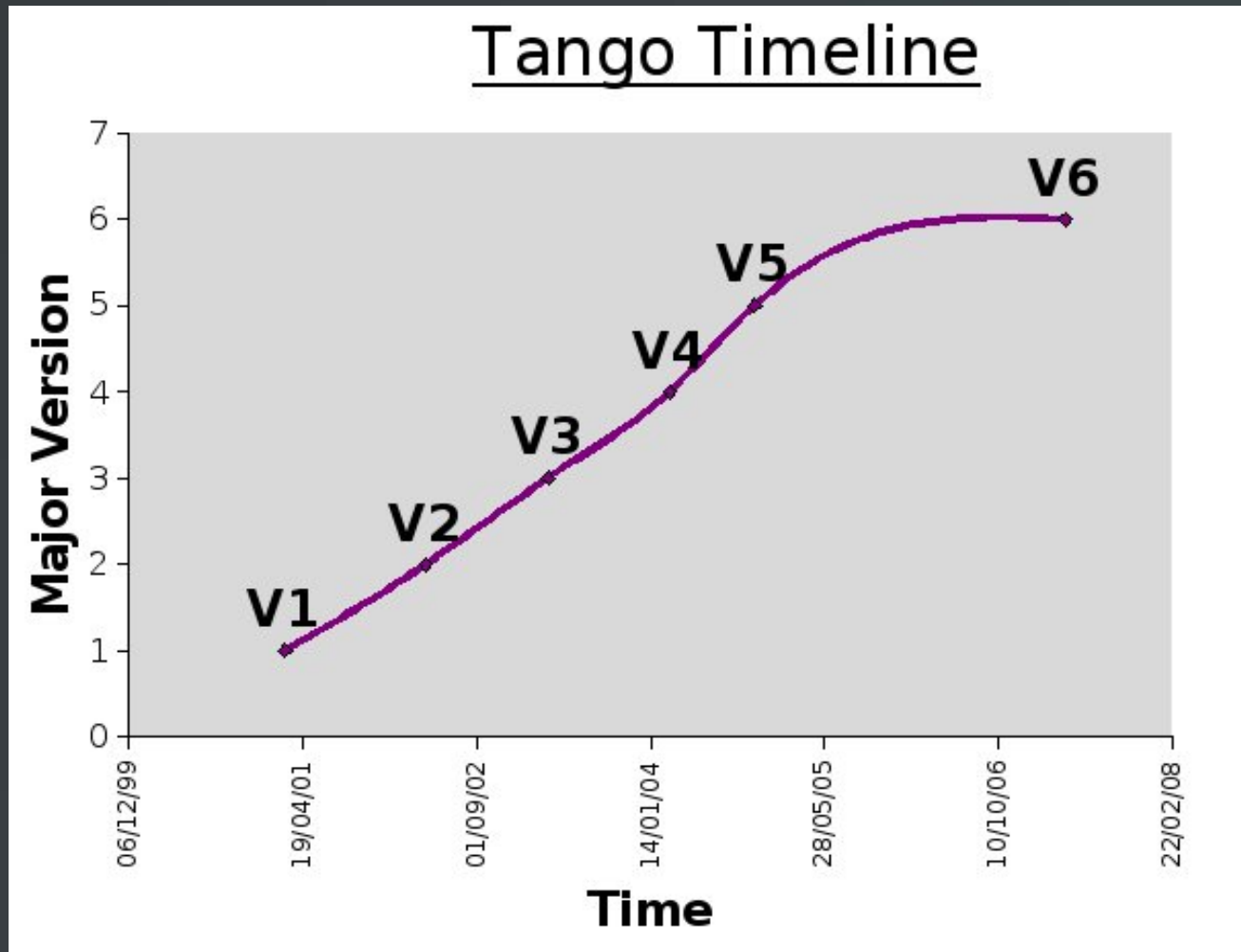
- *”build a modern control system which is constantly being improved based on user needs and technology trends”*
- *this is a nice idea but it needs resources and constant reflection to happen*

# Tango Onion Model

- *“Tango is a layered system with new layers being added constantly, like an onion”*



# Tango Evolution



# Sharing + Not Sharing

*to share or not to share, that is the question ...*



- *the Tango community not only shares software*
- *it also does not share software*

# Mont Blanc effect

*“look !”*



**XML**

**PYTHON**

**ECLIPSE**



# Mont Blanc effect

**“WOW!”**



**ECLIPSE/XML/PYTHON**

# Mont Blanc effect

*“oo la la !”*



# Tango Collaboration

## SHARES

- the CORBA protocol
- the device server model
- the database
- management tools
- navigation + test tools
- common device servers
- tool to generate device servers
- an archiving database

# Tango Collaboration

## DOES NOT SHARE

- device servers for institute specific hardware
- institute specific graphical user interfaces
- domain specific applications for accelerator physics, beamline control, online data analysis

# Tango - *Quo Vadis*\* ?

- *The October 2006 meeting on the future of Tango decided that Tango should concentrate on the following areas :*
  - strengthen the collaboration
  - stability, quality and packaging
  - scalability and reliability
  - new needs-driven features
  - more and improved tools
  - sharing of domain specific solutions

# Tango Feature Requests

- *In order to document, keep track of and followup new features a system of*

## *Tango Feature Requests*

*has been created*

- *TFR's will be*
  - *numbered*
  - *consultable via the web*
  - *followed up at meetings*

# Tango Feature Requests

- *we currently have 21 TFR's*
- *read the PROCEEDINGS for the details*

# Collaboration

- is the key to the success of Tango
- *Tango Feature Request 1* :

*each institute must be responsible for one or more Tango Feature Requests*



# SCALABILITY

- *exchange of information between clients and device server is totally distributed. The event system allows efficient asynchronous communication between a client and hundreds of servers.*
- *however Tango has scaling problems when thousands of servers are started simultaneously e.g. at the ESRF, Soleil, ILC, ...*
- *Tango Request Feature 5 :*  
***distribute the load of the tango naming service to be able to support tens of thousands of servers and clients starting simultaneously***

# REDUNDANCY

- *one way of increasing reliability is by means of redundancy. Tango supports redundancy for the central database but not for device servers*

- *Tango Request Feature 6 :*

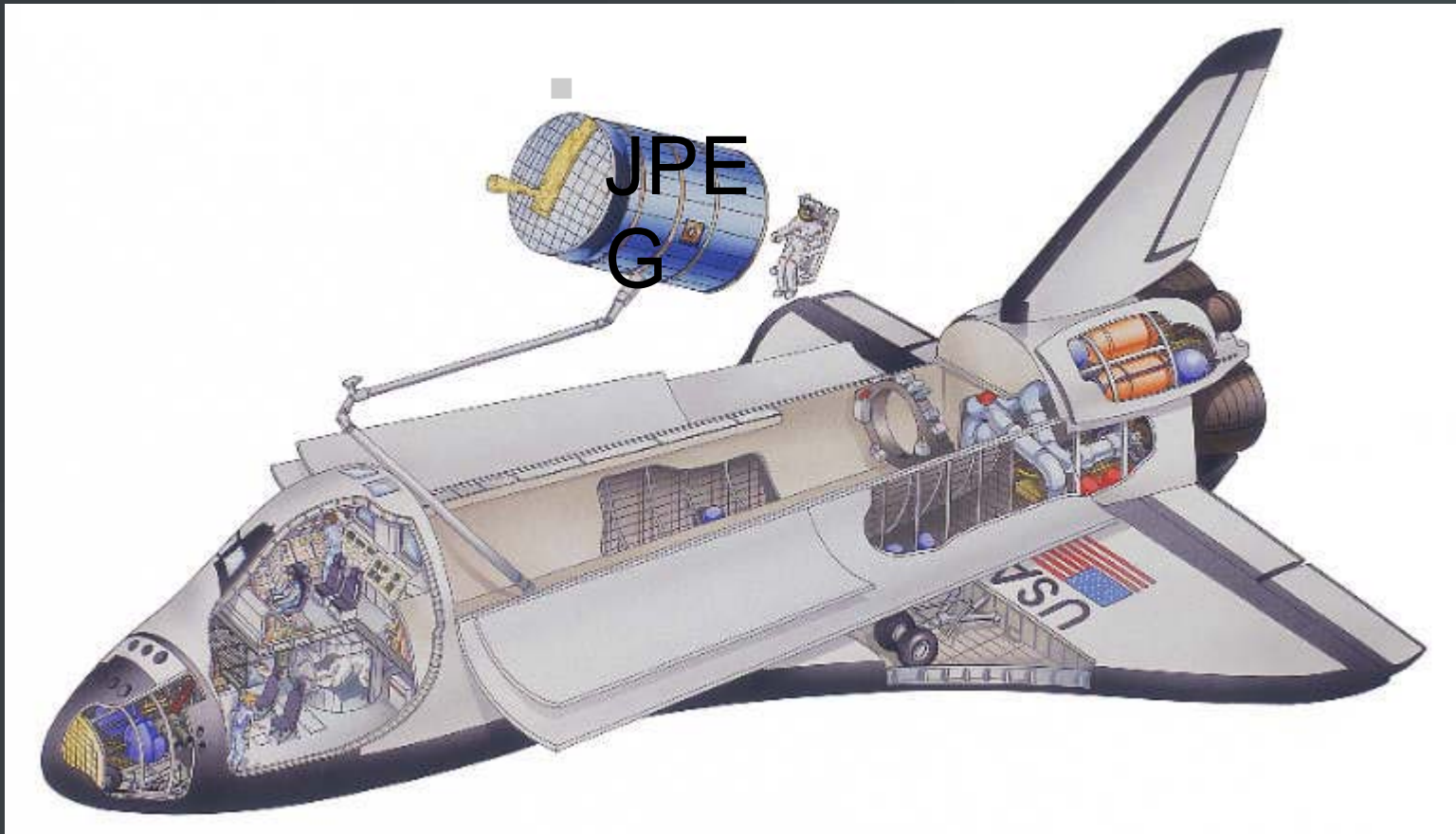
- add redundancy for device servers which will enable multiple copies of the same device to be running with automatic switchover in the event of failure*

# MORE FEATURE REQUESTS

- **TFR 7: update the Java server implementation**
- **TFR 8: implement a multi-channel device class in the Tango device library**
- **TFR 9: extend security service to C++ clients**
- **TFR 10: cache device properties in the database server**
- **TFR 13: extend polling thread to one per device**

# COOKED DATA TYPES (TFR 11)

- *transfer pre-defined data types as a byte stream with an identifier e.g. JPEG, HDF*
- *TANGO transfers up to 256 MB per packet*

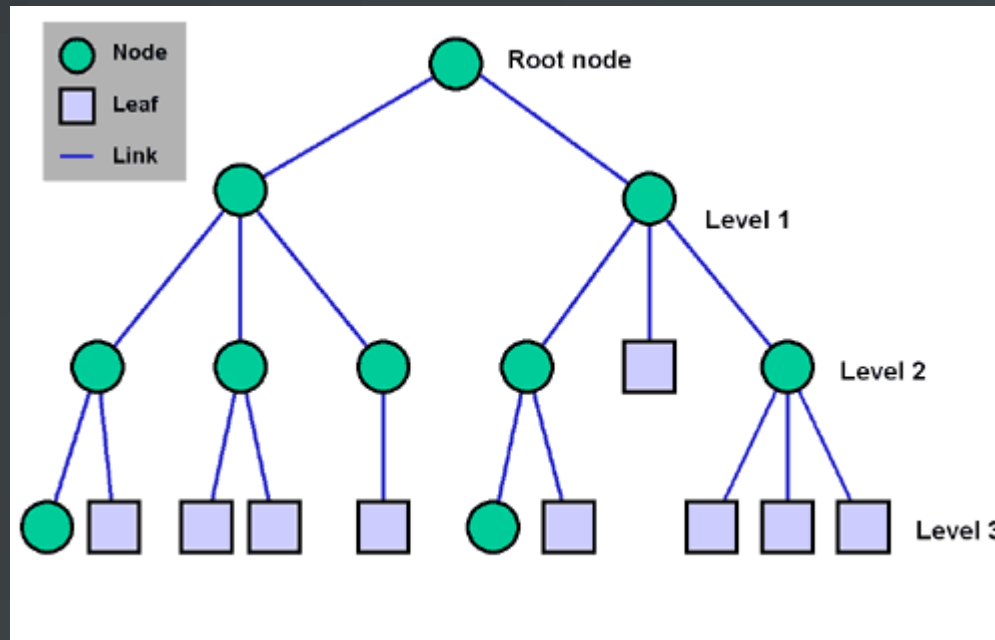


# SYSTEM TOOLS

- *Jive and Astor are the standard system tools. These should be constantly enhanced by for example :*
- **TFR 16: monitoring and plotting metrics for all devices**
- **TFR 15: displaying dependancies dynamically between device servers**

# DEVICE HIERARCHIES

- ***TANGO is an object oriented control system and therefore allows hierarchies of devices to be built :***



- **TFR 17: improve the dynamic configuration of device hierarchies**

# STANDARD INTERFACES



- *another name for Abstract Classes*
- **IS THE ONLY WAY TO GUARANTEE THE SHARING OF APPLICATIONS !**
- *encourages sharing of device servers and hardware e.g. detectors, ccds, motors, video cameras, measuring devices etc.*
- *Tango standard interfaces could become de facto standards*

# SERVICES

- *Service Oriented Architecture (SOA) is the practice of grouping core functions into independent services that don't change frequently*
- *Tango already has a service – security*
- *others : alarms, data analysis, storage, ...*
- *TFR 14: add support services via a dedicated API*

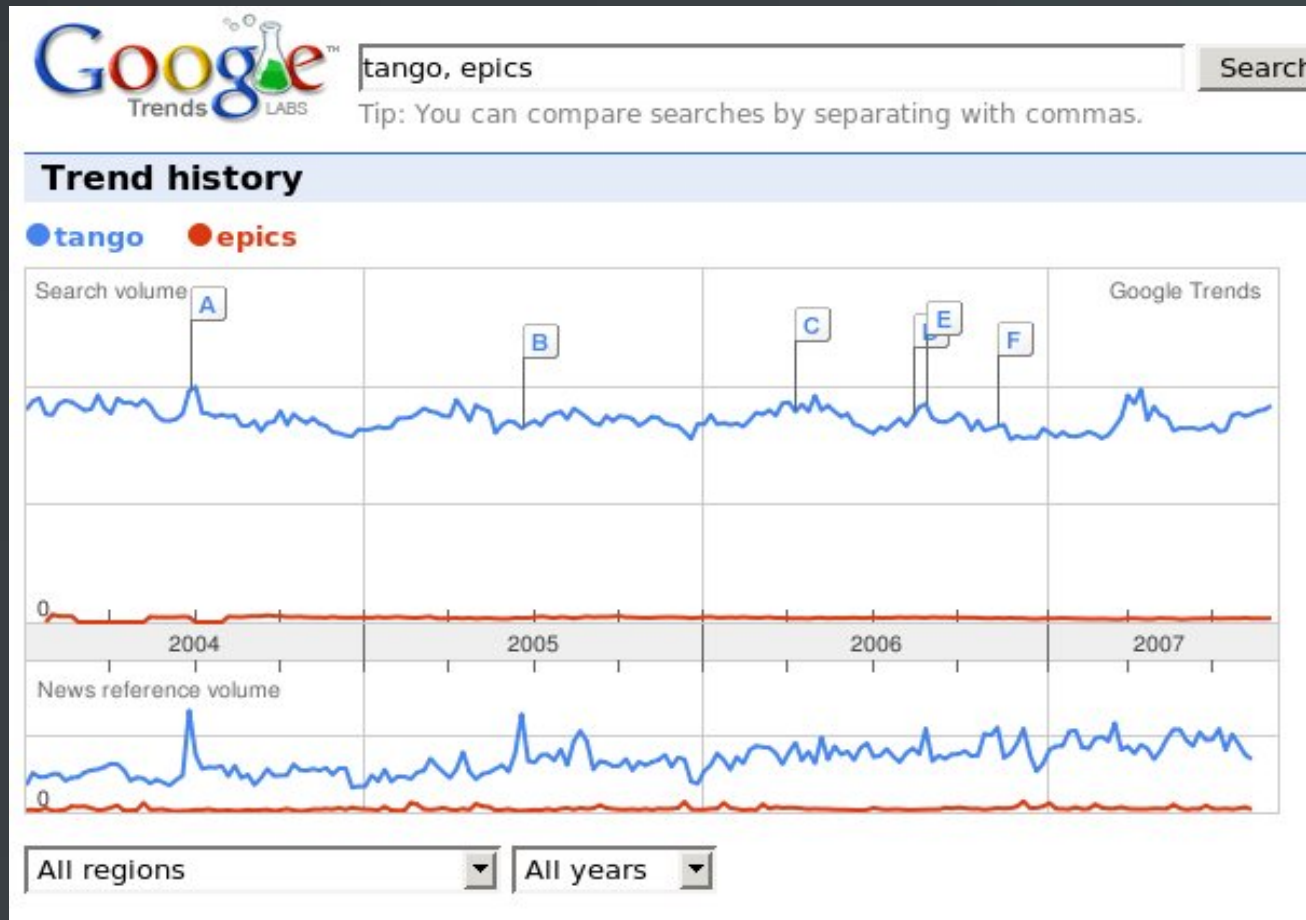


# TANGO COMPONENT MODEL

- *the long term future of TANGO is to be a wrapper technology which supports multiple communication protocols*
- ***this will enable Tango to outlast CORBA and other products i.e. we decide when the “expire by” date should be***

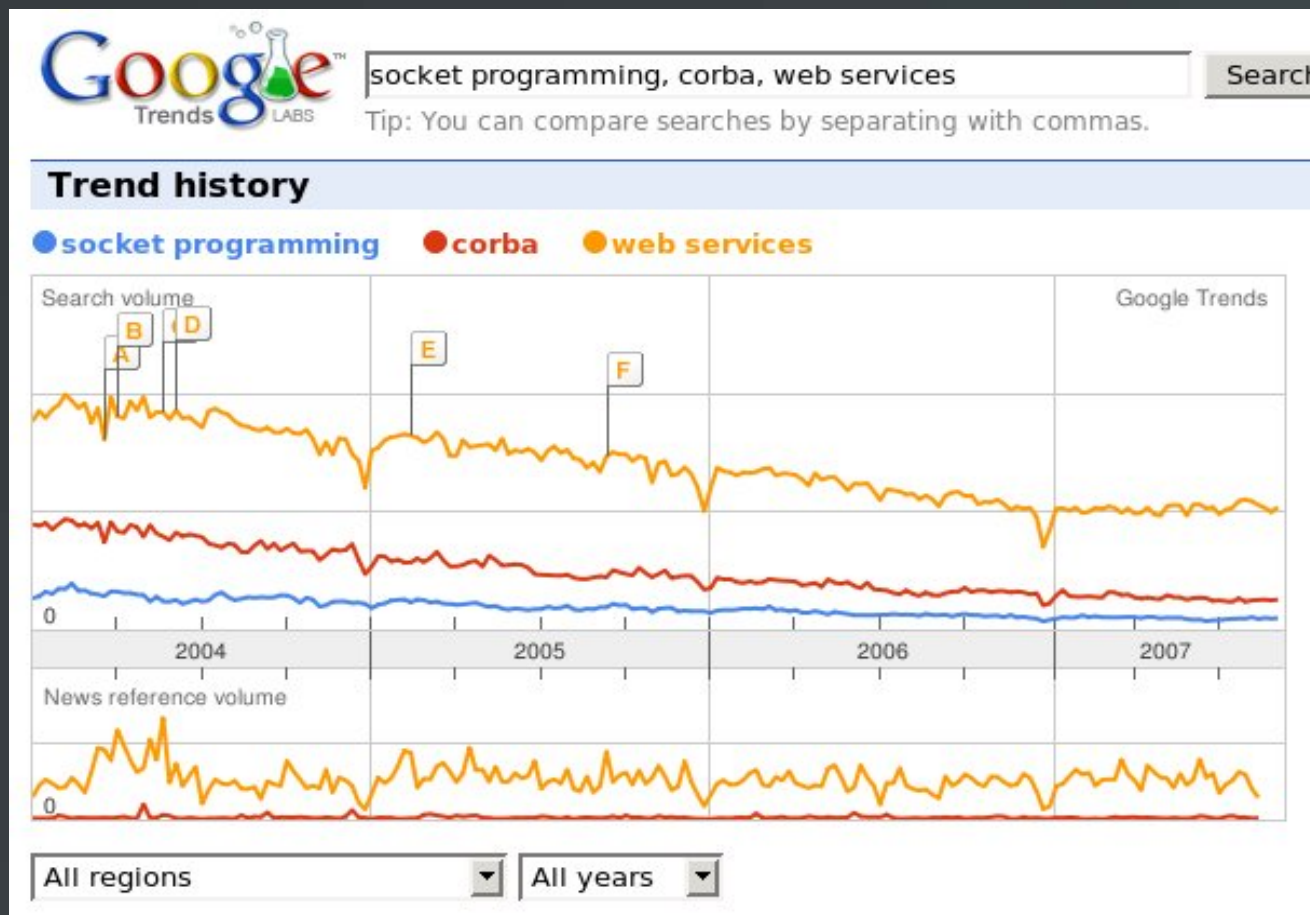


# TANGO GOOGLE TRENDS



- TIP : choose a good name for your system !

# CORBA GOOGLE TRENDS



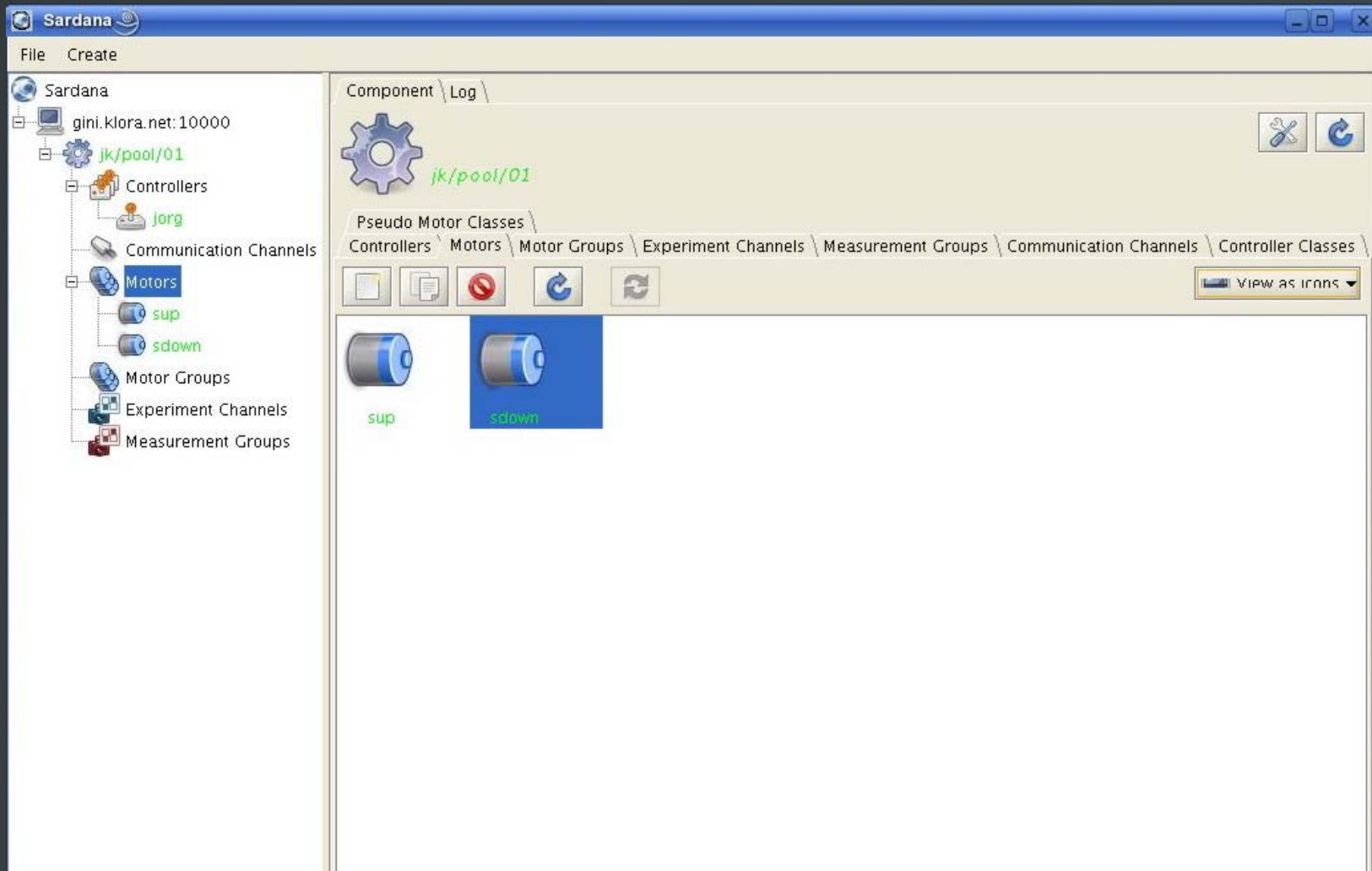
# SHARING DOMAIN SOLUTIONS

- *the second most wanted feature in the Tango community is to raise the level of sharing to the domain specific areas e.g. beamlines, accelerator physics, ...*
- *sharing beamline solutions e.g.*
  - *HKL library*
  - *device servers for detectors*
  - *fast scanning techniques*
  - *Python, Spectra, SPEC bindings*
  - *even frameworks like Device Pool*
  - *even online data analysis ?*





- *a Python based framework for doing beamline control*



# INTEGRATED WORKBENCH



- *Eclipse but don't forget about Netbeans*
- *“best-of-breed” for enhancing the Tango user experience by integrating Jive, Astor, Device Tree and even Pogo into one Workbench*
- *CSS is already doing it, why not join forces with them ?*
- *we will try to join the CSS collaboration*



# ECLIPSE RICH AJAX PLATFORM (RAP)

this is hot – check it out !

The screenshot shows the Eclipse Discovery website in Mozilla Firefox. The browser title is "Eclipse Discovery - Mozilla Firefox" and the address bar shows "http://eclipsediscovery.yoxos.com/discovery/rap". The page features a navigation bar with "Download" and "Tag It" buttons, and a "yoxos" logo. Below the navigation bar, there are links for "Register for Free!", "Login", "Add Features", "Give Feedback", "RSS Feeds", "Enterprise Solutions", and "Users online: 15".

The main content area is divided into two columns. The left column, titled "Discovered Features", lists three features:

- 68 Eclipse Project SDK**: orq.eclipse.sdk discovered on 2 sites. Tags: Europa. Note from Yoxos: Eclipse SDK. Description: The Eclipse SDK includes the Eclipse Rich Client Platform (RCP), ...
- 30 Eclipse C/C++ Development Tools**: orq.eclipse.cdt discovered on 1 site. Tags: Europa. Note from Yoxos: Eclipse C/C++ development tools. (Binary runtime and user documentation.) CDT. Description: The C/C++ Development Tools (CDT) Project is an open source ...
- 18 TPTP Test**: orq.eclipse.ttp.test discovered on 1 site. Note from Yoxos: The TPTP Test Feature provides the test execution and UI test frameworks, base layers that test tools can be built upon. Refer to the TPTP Test Tools Features for exemplar tools

The right column, titled "Feature Tags", shows a list of tags: RAP, VE, ajax, c++, cdt, commercial, communication, core, database, desktop, development, eclipsedev, essential, europa, evh, gef, grid, java, javascript, languages, mobile. Below the tags is a "My Download" section with a "Select the platform for your download" dropdown menu (Windows, Linux, Mac OS X). A list of features to be downloaded is shown, including Mylyn Bridge, Eclipse Modeling Framework (EMF), Mylyn Connector, and XML Schema Infoset Model (XSD). A "Legend" section explains the status of each feature: a green checkmark means "Included in your download", a yellow warning icon means "Only available when logged in", and a red X icon means "Not available for the selected platform". A "Start Download" button is visible, with a size of 162.57 MB.

# ECLIPSE WORKSHOP ?

- Eclipse has a steep learning curve
- Eclipse is being used in controls + scientific programming
- Why not share our experiences around a plate of cheese + wine ?





# WHY WE DON'T USE EPICS / DOOCS / TINE ...



- the answer is obvious - **BIODIVERSITY**

# CROSS-POLLINATION

- *BIODIVERSITY also means cross pollination is possible*
- *TANGO is planning to support multiple protocols in the future*
- *we will seriously look at integrating TINE's multicast protocol*

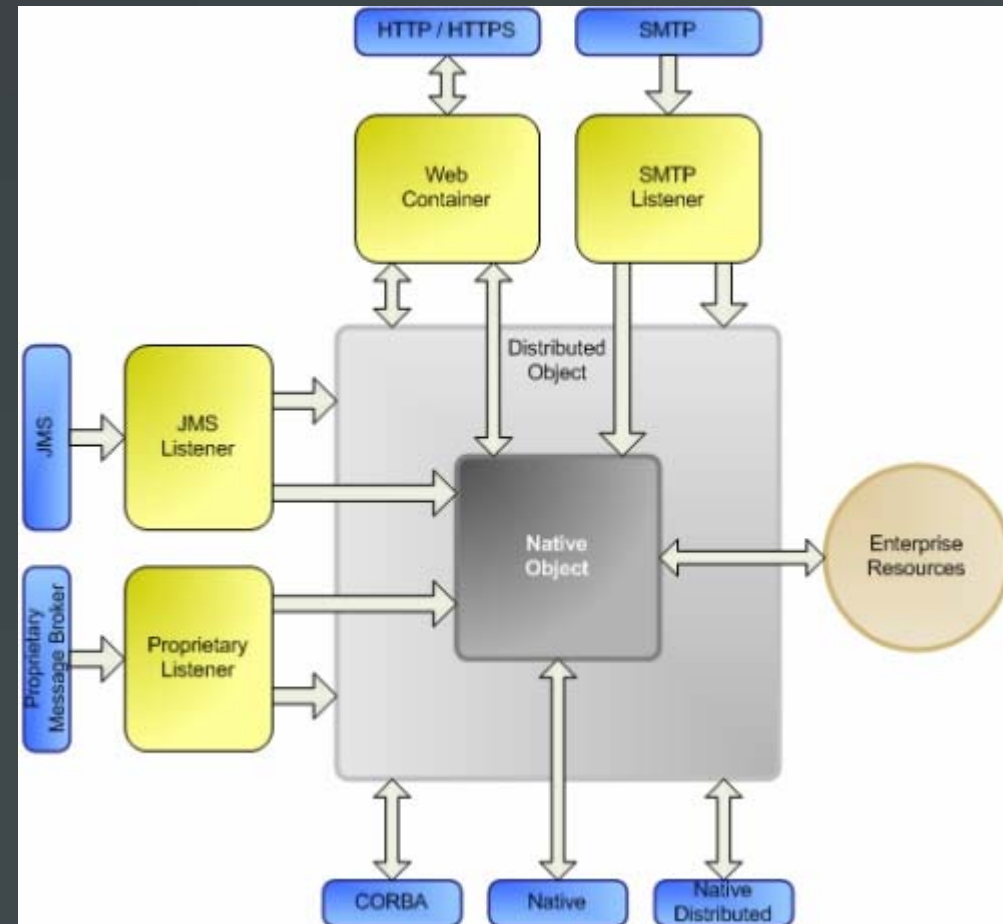


# MULTI-PROTOCOLS



- TFR 21 : add support for new protocols to Tango e.g.

- *Soleil's web protocol*
- *TINE, DOOCS, DAL, ...*
- *SNMP, multi-cast, CORBA's DDS*
- *Web Services, XML-RPC*



# COMMONS



- *a public area where we share technologies of common interest e.g.*

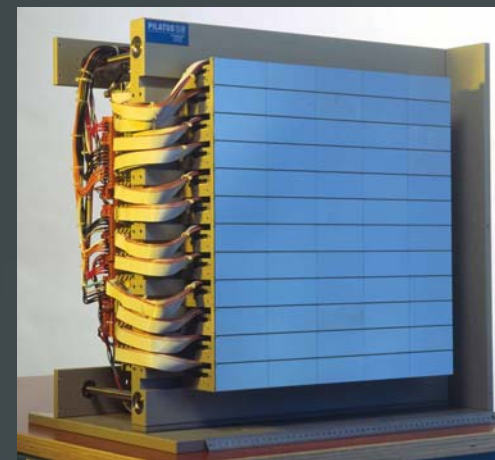
- *FPGA's*



- *Libera*



- *Detectors*



# GIS



- *Geographical Information Systems - GIS is a system for creating, storing, analyzing and managing spatial data and associated attributes*
- *Tango will integrate GIS information into every device so we can display live information like temperatures overlaid on a map*
- *we will try to copy the work by SPRING8*

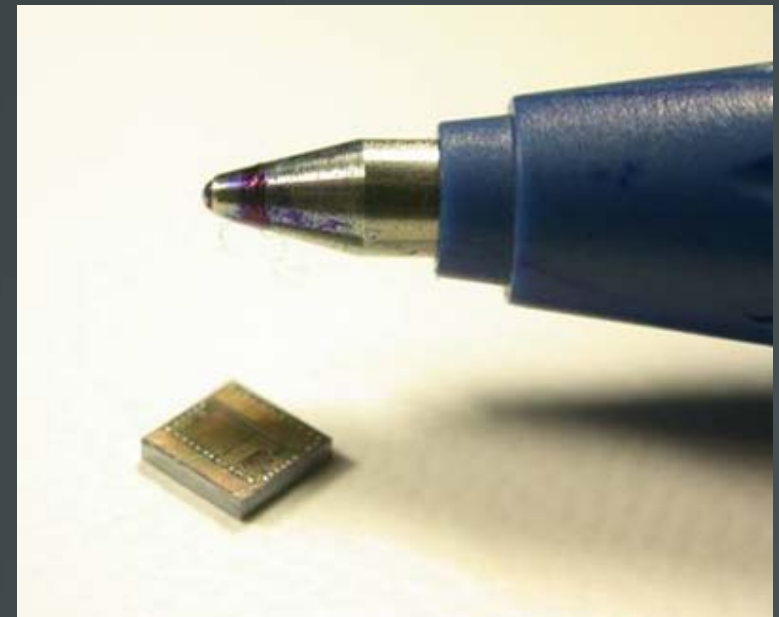


# UBIQUITOUS COMPUTING

## *TANGO EVERYWARE*



- Ubicomp is the third wave in computing
- We are exploring Tango everywhere



# OFFICIAL CONCLUSIONS

- *Tango has adopted the approach of “constant evolution” i.e. there is no revolution !*
- *we share a common toolkit where we can implement common solutions*
- *the Tango collaboration is a success*

# UNOFFICIAL CONCLUSIONS

- *the big challenge in the future is how to share domain specific applications*
- *if we can just manage to compromise on our favourite technology (Mont Blanc effect) we will achieve the holy grail of sharing applications*
- *Tango is not the best system in the world but we think Tango has some good features*



# TANGO IS A PASSION !

