

TANGO STEPS TOWARD INDUSTRY*

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Abstract

TANGO has proven its excellent reliability by controlling several huge scientific installations in a 24*7 mode. Even if it has originally been built for particle accelerators and scientific experiments, it can be used to control any equipment from small domestic applications to big industrial installations. In the last years the interest around TANGO has been growing and several industrial partners in Europe propose services for TANGO. The TANGO industrialization project aims to increase the visibility of the system fostering the economic activity around it. It promotes TANGO as an open-source flexible solution for controlling equipment as an alternative to proprietary SCADA systems. To achieve this goal several actions have been started, such as the development of an industrial demonstrator, better packaging, integrating OPC-UA and improving the communication around TANGO. The next step will be the creation of a TANGO software Consortium able to engage itself as a legal and economical partner for industry. This foundation will be funded by industrial partners, scientific institutes and grants. The goal is to foster and nurture the growing economic eco-system around TANGO.

A SUCCESS STORY

Initial Phase

The initial idea of TANGO started at the European Synchrotron Radiation Facility (ESRF) in 1998 when ESRF decided to build a new control system based on the proven concepts of their former system (TACO), i.e. the Device as an object on the network and the Database as a service. The technology choices were updated to emerging standards (CORBA, C++, Java, Python). Although CORBA was an important cornerstone of the TANGO Controls because it was used as the network protocol it was hidden from the user so that it could be replaced in the future if needed.

A Growing Collaborative Development

Around 2001 the new synchrotron in France (SOLEIL) decided to adopt TANGO as their control system.

They joined the ESRF effort to build TANGO. SOLEIL commissioned the first synchrotron fully controlled by the TANGO control system. In 2002 a workshop on CORBA based control systems was held at the ESRF. This showed the strong interest in CORBA as a network protocol and container for controls. In 2003 ELETTRA, the synchrotron in Italy, joined the TANGO community. It

was followed by ALBA (Spain), PETRA III (Germany), and recently MAXIV (Sweden). However, TANGO is not confined to the synchrotron community. TANGO has been adopted by a number of laser sites (LMJ, CILEX) and small university projects

New Opportunities

Last year the French aerospace lab Onera decided to renew their control systems on one site. The outcome of their comparative studies gave a clear advantage to TANGO. Therefore in summer 2013 they decided to adopt it.

In the same period of time, we have seen several new sizeable scientific projects in Europe who chose TANGO for building their control system, i.e. Extreme Light Installation (ELI-NP)[1] project in Romania, the Italian Mars Society and the ERAS project[2].

In addition to that we have been in touch with other projects that need to choose a control system framework in the year to come.

OPENING TO INDUSTRIAL WORLD

More and More Industrial Business

There is a clear trend in the new scientific projects such as Onera or ELI-NP to entrust the development of their control system to industrial companies instead of hiring control specialists themselves. In this context, a large part of the new projects involving TANGO has no internal programming resources. Therefore several service and support companies are jumping on the TANGO framework technology in order to respond to the multiple calls for tenders. These companies need to be trained and to have access to high quality documentation to develop efficiently a TANGO server or TANGO GUI. Furthermore, industrial companies are often seeking technical support and training. All these requests are not a part of the mission of the staff of research institutes like the ESRF.

Therefore we have started to analyse the situation to find the best response.

We identify 3 types of TANGO users

1. Final users who need to control a set of equipment using a solution built on TANGO framework.
2. Service companies or integrators providing consulting, development, services or support to final users
3. Hardware suppliers, providing TANGO ready equipment i.e. detectors, sensors, actuators, motor controllers, measurement systems, imaging systems etc...

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A Transition Period

Recently we have observed a growing interest for TANGO in the 3 categories of industrial partners. Unfortunately, the present TANGO sites are not in position to provide all the necessary support to help all the new comers to take TANGO in hand. Everybody is busy and nobody really has the time to provide the necessary consultancy for helping the new projects to make their choice.

On the other hand we would not like to miss this unique opportunity for TANGO to become a natural choice in the Distributed Control System world. It became clear that we had to find external resources to help us in finding the best strategy.

Therefore we asked a technology transfer funding agency Gravit[3] to helping us in setting up solution to broader the TANGO community

Opening to Industry Benefits Directly to the TANGO Scientific Community

By increasing the number of service company partners, we enable our institutes to find competent partners for outsourcing development and services around TANGO.

Another aspect concerns the hardware providers. If the community is big enough, it represents a sizeable economical market which motivates hardware suppliers to propose TANGO aware hardware. It becomes a strong selling argument for the company, and it saves a lot of energy for the institute which gets equipment directly connectable on TANGO without having to develop any software interface. Last, if the product is well known and widely used it increases the interoperability between projects and allows fruitful exchange of practice.

FIRST STEPS TOWARD INDUSTRY

A Different World, Different Needs

We understood rapidly that for convincing the industrial world we need a clearer communication, a better beginner's guide, a professional training and possibly an official company/consortium able to engage itself on behalf of the TANGO community.

In addition to that, it is obvious that, commercial companies need revenues; therefore we have to build an eco-system who generates economical revenues in a durable manner for our partners.

Training Sessions

The first concrete action in this direction was in 2012 the building of a professional training on TANGO together with industrial partners enabling company to sell this training. In such a way we got 4 positive effects

- TANGO sites like the ESRF are discharged from this task
- The industrial partners get regular revenue
- New comers find high quality training.
- The number of trained people grows

Since then, a number of companies have trained a lot of new comers coming from both the industrial and scientific world.

A New Professional Communication Charter

It was clear that our web site and communication media was not as professional as the commercial world is used to. We worked with professional in communication to review our policy in this domain. We started by defining an official logo associated to a tag line, (see figure 1) and to decline slides and letters templates.



Figure 1: The new logo and its tag line.

We are now in the process of redesigning the TANGO web site on a professional manner.

Protect the Intellectual Properties

The third action was to clarify the ownership to protect the intellectual property to guaranty the product against any attempt to buy it or take the control of it.

To this end, we first performed a full analysis of the source code with the help of a specialized company [4]. It concerned all the C++ core libraries and C++ core servers, Java libraries and Java tools, python libraries, and all the exogenous components such as Corba, zmq libraries, header files configuration files and documentation. Over 604 different files have been analysed.

This analysis clarified the ownership of the software and confirmed that all the parts are correctly licensed for open source free distribution

Once this analysis was finished, we registered TANGO-controls as a trademark together with its web domain and its logo.

Improve Tutorials and Interoperability

Another important need was to ease a new comer to understand what TANGO is. With this goal in mind we commissioned a video based tutorial and built a complete downloadable virtual machine[5] that allows beginners to easily understand and take in hand the product.

The industrial SCADA market is promoting a new protocol named OPC-UA. If TANGO becomes compatible with this protocol, it opens the door to new sites. We outsourced the development of a bridge between TANGO and an OPC-UA[6] system.

LISTENING TO THE INDUSTRIALS

We started a first market study by interviewing a certain number of industrial companies in Europe for listening to their experience about TANGO and better

understand their needs. We contacted integrators, final users and hardware companies which have already been in touch with TANGO in the recent past.

All the companies interviewed showed their interest for the product. They judge it as a well done, flexible, stable but with a clear roadmap. However, they would appreciate to get shorter learning curve thanks to a better packaging and better user's guides and tutorials. Furthermore, they sometimes lack an official body able to engage its responsibility on the product.

Open Source = Freedom and Independence

These interviews confirmed the growing interest of the industrial equipment control world for open source software. The main argument is not the price but the independence from software editors and more largely the long term independence. It is particularly true for the final users but also for the hardware constructors. The service companies see an opportunity to provide more services, compensating the absence of licence cost by a more complete service for their customers.

The Economic Activity, Chicken and the Egg

Although, the product is good and there is a real interest around it, the market share is not yet large enough for supporting many companies. Beside the few companies we interviewed TANGO is still nearly unknown in the industrial world. A few innovative companies are ready to invest if they see the market picking up. And the market will start only if the product is more widely known and if more companies trust in it. We need to increase the visibility and the general knowledge of the product if we want to boost the market share. In other words, we have still not reached the critical mass that would allow us to be the de facto choice. This conclusion encouraged us break this circle by making a new step forward.

CREATE A LEGAL BODY

We understand from our first steps toward industry that if we want to increase the general knowledge of TANGO we need to invest a lot in communication, marketing and representation. Furthermore, somebody needs to become the official representative of TANGO for commercial companies. Until today, TANGO community is represented only by a memorandum of understanding between institutions and has no legal representative able to take responsibility. The required services cannot be carried out only by the staff of our institutions because it is not their main mission. This explains why we propose to create an official TANGO consortium in the form of a legal body.

This legal body should work on behalf of the overall TANGO community and offer all the missing services.

It will be in charge of animating the community and covering the needs expressed in the previous paragraph. The Gravit funding agency helps us and accompanies us in building up the most adapted legal body.

At the Barcelona Tango Controls meeting in May 2013, the Tango executive committee endorsed the need to develop and increase the benefit that the community enjoys from the use of the Tango Controls software suite. The need to structure the growth of the community is critical to maintain and further develop the benefit of Tango Controls to the community.

The Mission

The TANGO consortium promotes an independent, sustainable, collaborative and meritocratic community.

The TANGO consortium will guarantee that the community continues to enjoy the same rights they have today namely open access to the source code, the right to modify and contribute, free to use.

The TANGO consortium will ensure that the Intellectual Property of TANGO (source code, trademark and logo) are protected.

The TANGO consortium will deliver services to its member community in three distinct areas which are:

Support to Software Development: It guarantees that the TANGO core is maintained and evolves in such a way that it satisfies the needs of the TANGO community. TANGO is an open source toolkit which can be downloaded and modified by anyone. The consortium must ensure that the changes and new developments are integrated into the core in such a way that a maximum number of users can benefit. The role of the consortium is to ensure the maintenance of TANGO e.g. maintaining packages on standard platforms, but also to integrate and test changes do not break backwards compatibility.

Ecosystem Development: The consortium will be in charge of all the actions for animating and contributing to the growing of the eco-system.

It will take care of the communication and follow-up the visual identity charter (web, brochures prospecting, social networks, etc...). Tango will also be represented in the different commercial events, trade shows, etc. to increase its visibility

An important point is to work on an education program with schools and universities. Some agreements have already been signed for introducing TANGO as an item in the training program of engineering school. The consortium will pursue and improve this link.

Consortium Operation: The consortium will be in charge of defining and driving the release process and the TANGO Enhancement Proposals (TEP) - anyone can make a proposal for an enhancement to TANGO. The proposals will be published, discussed and voted at the TANGO meetings.

It will promote the use of community contributions to TANGO.

It will provide a quality control process and maintain a database of all TANGO device servers.

It will promote the reuse of device servers.

It will organize the source code repository infrastructure

It will guarantee that the long term support of TANGO is ensured for decades.

Funding

The key of the success is to obtain sufficient funding to give a real starting push to the market. Several possibilities have to be explored.

One of the first issues is to obtain and manage financial and human resources for TANGO for the short term. To achieve this, the consortium will lobby funding agencies like European Commission (e.g. Horizon 2020).

In order to be sustainable over the longer term the consortium should be able to be auto-financed by its members. We are currently working on a Tango Affiliate program with membership fees

The goal is to organize the different statutes of members as sponsors, members, contributors, etc.

Governance

The consortium will be made up of paying members, honorary members and employees. The membership fees will be used to cover the hiring of employees and running costs of the Consortium. Honorary members will not have the same voting rights as paying members.

The consortium should be setup in such a way to guarantee that the main objectives of TANGO can be

continued in a free manner, avoiding any attempt for one company to take full control of the development strategy. Therefore the founding members represented as the executive committee will continue to play a role.

CONCLUSION

Over the recent years, the number of TANGO users has been growing regularly within the scientific community. We are now giving the necessary push to change scale and address new opportunities. Thanks to this effort, we think tha TANGO could become the de-facto standard for open source Distributed Control System over Europe

REFERENCES

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- [5] Tango Box <http://www.tango-controls.org/download>
- [6] OPC-UA https://www.opcfoundation.org/Default.aspx/01_about/UA.asp?MID=AboutOPC