

the complete control system integration solution

For accelerator project directors and control group leaders, who are dissatisfied with high cost of control system and with high risk of it not being delivered on-time, on-budget and on-specifications.

Our product is a **complete control system integration solution**, performed by Cosylab in collaboration with in-house experts,

that provides a cost-effective, low-risk delivery of a control system

unlike doing it all in-house from scratch,

we have assembled a team with a long track record of successful installations. We possess all the knowledge in project management, development processes and technical expertise required for successful implementation, commissioning and support of an accelerator control system.



what does it take to make a control system

Knowledge for accelerator control system development and integration is not commonly available. Most of the stuff is not complicated, but as a whole, it gets very complex.

Expertise and experience are needed in:

- ▮ **State of the art software development:** distributed systems, large networks, large throughput, a large number of supported platforms, etc.
- ▮ **State of the art hardware development:** range of a few pico-second accuracy for timing system, a broad range of devices to be integrated - from data intensive (DAQ), FPGA, to legacy devices, etc.
- ▮ **Complex customer relationship issues:** developments in the control system must be in-line with the requirements of all the other accelerator subsystems. These requirements are changing very frequently during the construction of the accelerator.
- ▮ **Complex project management issues:** the control system must adapt to the timelines and deliveries of the other subsystems. Since the control system can be tested last, but needs to be present first to commission equipment, it is very frequently on the critical path of the whole project.

consequences of doing everything in-house

- ▮ Learning curve for new control system group members is very steep, since knowledge must be acquired in a large number of different areas. As a consequence, each new member of the team is inefficient during the first year of employment. In addition, he is consuming the time of the few experts that need to train him. There is also always a risk to a person with inadequate qualifications.
- ▮ Within the control group, only a very small number of people (very often, only one) is an expert for any given subsystem. In case a problem arrives during operation, the down time of the whole accelerator can depend on availability of a single person. Often, one cannot rely on the "control system team", but only on a few bright overstressed individuals.
- ▮ During control system development and integration there are inevitable peaks and troughs in the work load on the control group members. The work load is the highest during commissioning, which puts additional pressure on the control system deployment which is already on the critical path of the whole project. On the other hand, during normal accelerator operation, the size of the control group need not be as large.
- ▮ Since new developers build their expertise and gain experience in-house starting from scratch, this inevitably leads to cases where the wheel is reinvented.
- ▮ 80/20 rule - at the beginning it looks that a given task can be "done in one week", but in practice it takes several months to finish it.



the more efficient way: outsource to Cosylab

Outsource the entire control system development and integration to Cosylab. Provide just the physics requirements (or outsource the collection of those as well) and get a fixed price contract for the whole product.

The fixed price offered by Cosylab is typically 30% lower compared to the attempted approach - forming a large control group. Instead, form a smaller in-house control group that works hand in hand with Cosylab from the onset. Furthermore, due to the high quality of the deliverables and the comprehensive documentation, total cost of ownership is significantly reduced.

At the beginning, Cosylab provides training to the control group, on both technical and organizational issues. During project execution, Cosylab and the control group make sure that all the key knowledge of the control system is adopted by the control group; the control group takes the system responsibility.

Cosylab has regular weekly seminars where it reports progress of the development and steers the effort of control group and Cosylab people. By using Cosylab project management tools, control group leader always has the ability to check the status of Cosylab developments from the high level perspective.

benefits

- Risk mitigation.** Cosylab gets penalties if the control system is not delivered as agreed on the beginning of the project. This gives a much stronger leverage for the project leader on the outcome compared to the impact he can have on the performance of in-house employees, working for a non-profit government institution.
- Risk mitigation.** Cosylab is a key member of several control system communities, which provides Cosylab the ability to contact the leading authority on any complex issue that arises during a given project. This eliminates the risk of unnecessary development.
- Quality.** By working on several projects at a time, Cosylab is motivated to provide standard solutions and to introduce best practices, both in technology and development processes.
- Quality.** Cosylab has a large pool of experienced developers and project managers. All have experience working in teams that have members both from Cosylab and the client's institutions.
- Quality.** Cosylab has a long list of references from all the major accelerator sites in the world. This makes it unique in the world in terms of experience with different control system technologies and the number of different on-site installations. It is also in touch with all the cutting edge technology developments, attempted at different institutions.
- Resource balancing.** Based on the required work load, Cosylab assigns as many developers on the project as necessary. The local control group and the project leader need not worry about work load peaks.
- Maintenance and documentation.** By having a small local control group working hand in hand with Cosylab, all the key knowledge stays in-house, reducing the risk to depend on a sole source

economic rewards

The cost of the control system is reduced by 30%. In addition, this is a fixed cost, agreed upon on the beginning of the project, so the cost reduction is even higher. Risk that the project will be late is also greatly reduced.

An infrastructure for support is established. Training is provided to the final users of the control system.

