



E. DELACROIX - 1830
La liberté guidant le peuple, Le Louvre (Paris)

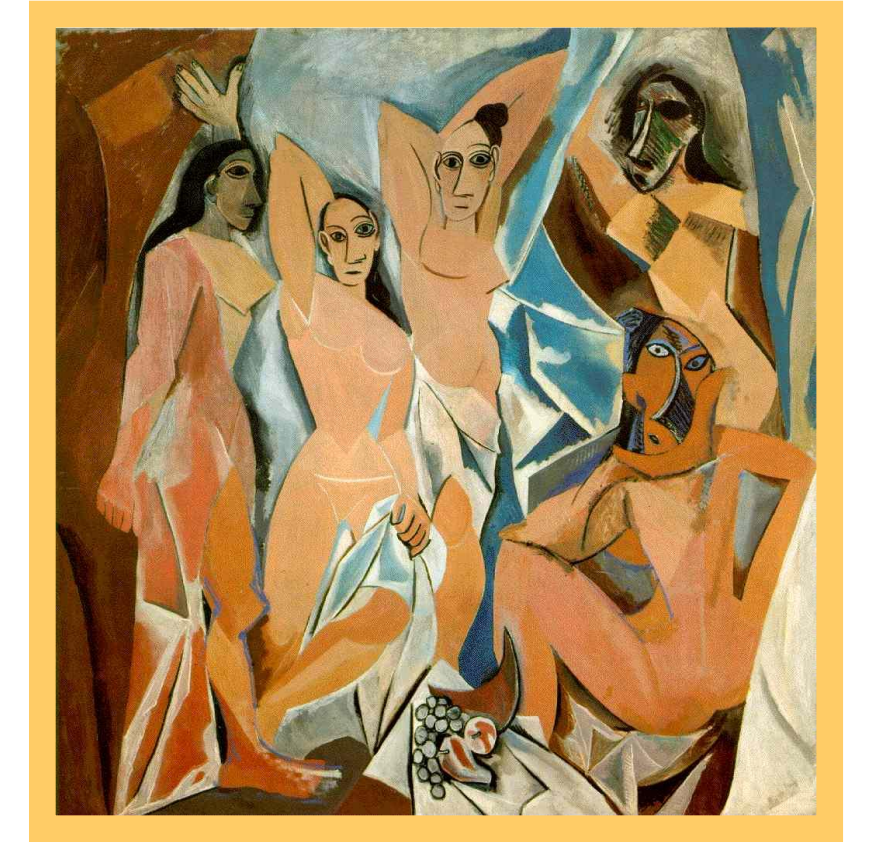
WHAT IS REVOLUTION



Not a political revolution Not an artistic revolution

REVOLUTION is the acronym of

REconsider **V**arious contr**OL**lers for yo**U**r mo**TION**

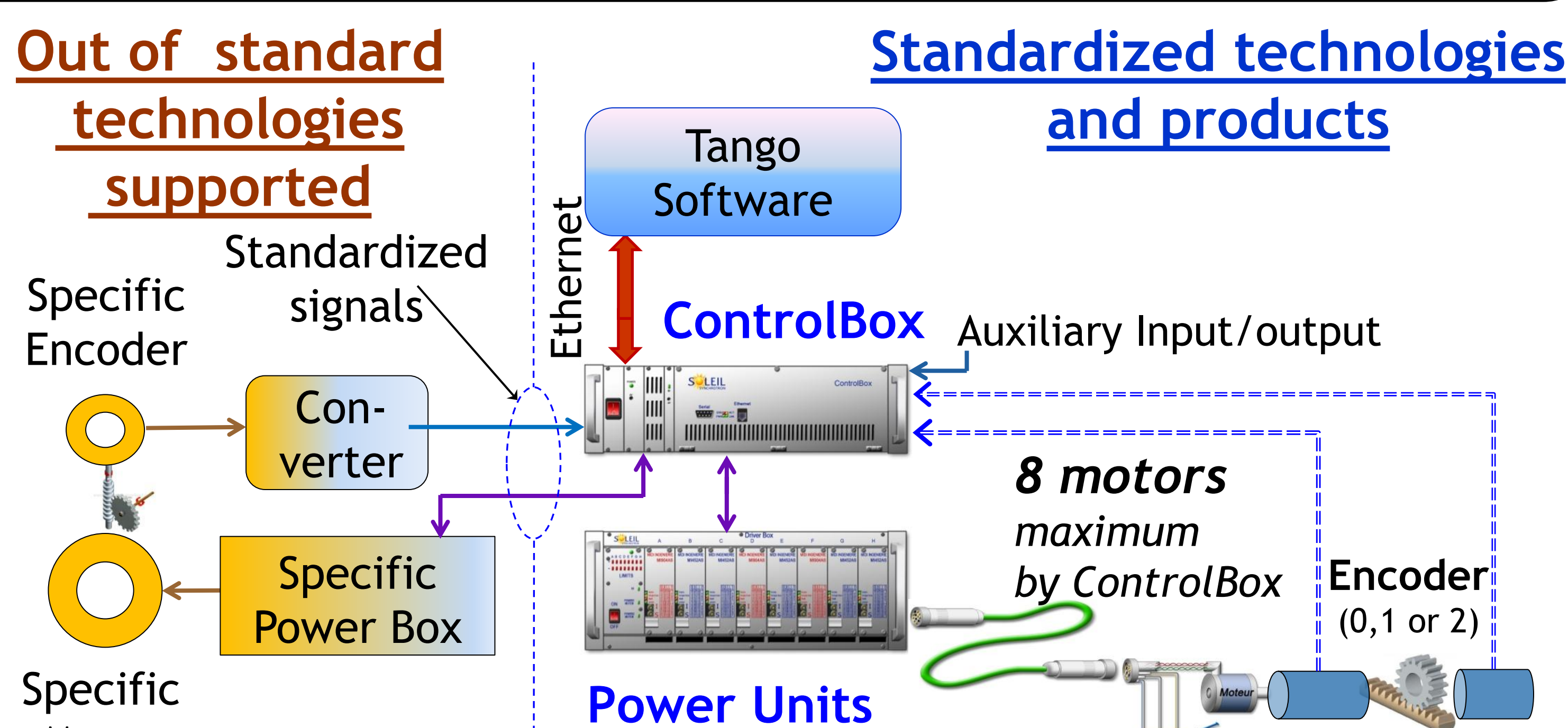


P. PICASSO - 1907
Les demoiselles d'Avignon, MOMA (New-York)

Review of the current motion control system

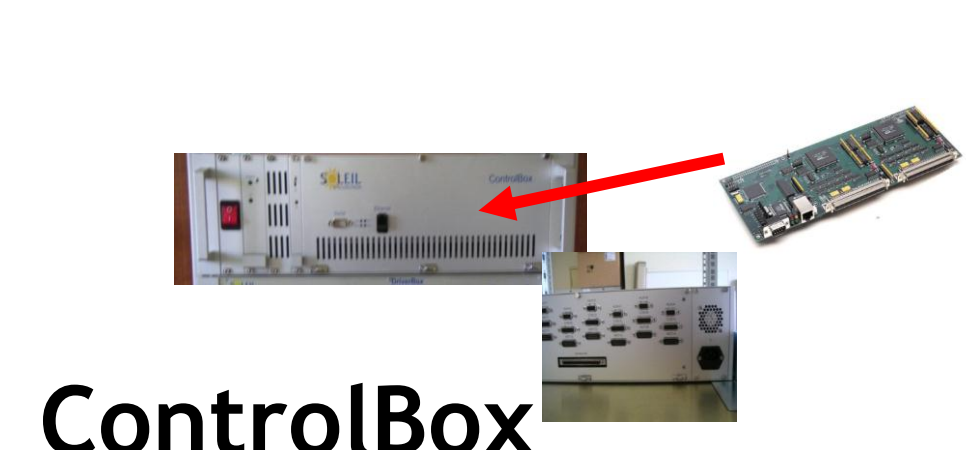
Hardware

Flexible and modular hardware architecture
BASED on standardized products and industrial technologies
and OPEN to other technologies (piezo, sin/cos, etc.)



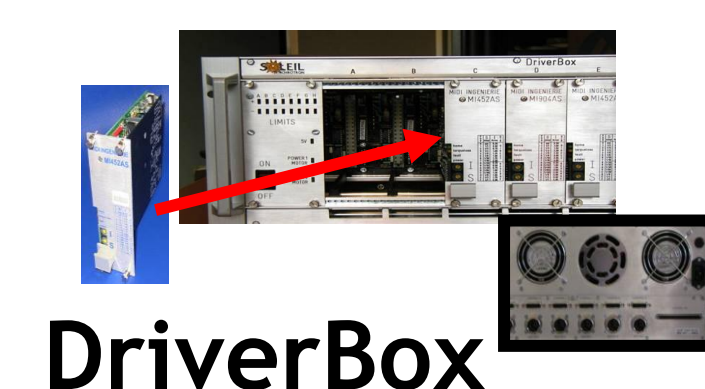
Standard products and technologies :

- Motor** stepper motor 4 phase, Brushless and DC
- Encoder** incremental quad, SSI, analog, resolver (servo)
- Cables and connectors** are clearly defined
- ControlBox** integrates a Galil[1] DMC2182 – 8 axis controller
- DriverBox** integrates Midi-Ingenierie[2] power boards (stepper)
- VacuumBox** integrates Phytron[3] power boards (stepper in vacuum)
- ServoBox** integrates power boards for servomotor developed by SOLEIL and based on Elmo[4] component



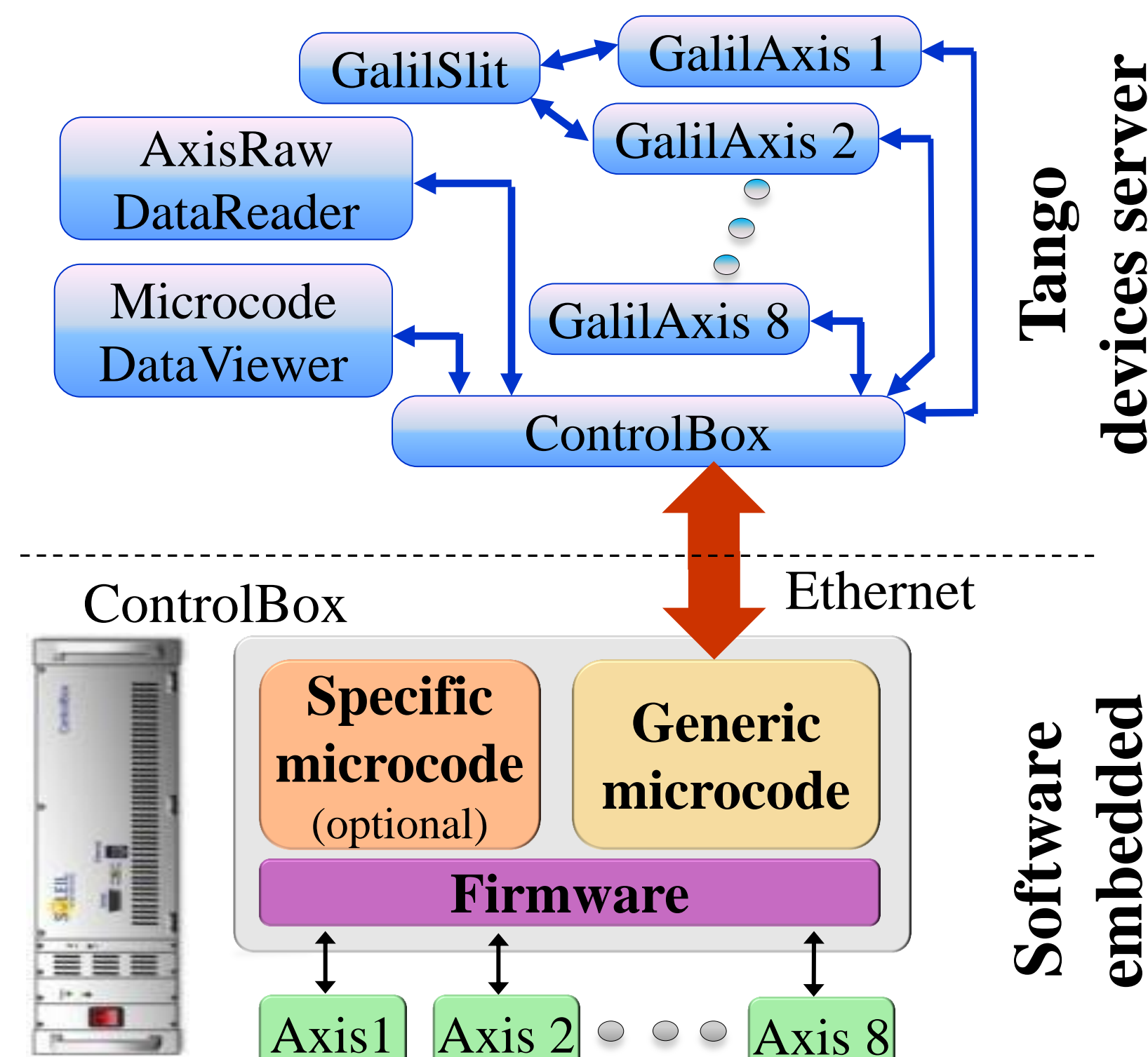
Motion Boxes :

- ✓ Easy to use
- ✓ Easy to maintain
- ✓ Cost effective



Software

Multilayer processing
Motion processes are closer to the hardware in the firmware and the microcode. User Tango devices (GalilAxis, GalilSlit) have a short and simple interface. The device (ControlBox) manages data exchange.



Software architecture

Dedicated microcodes meet the needs of specific applications (phase loop RF, collision avoidance, safety equipment, etc.). Users access via device MicrocodeDataViewer

Results

Extensive, relatively homogeneous installed base of motion controllers

1534 axes: 1197 standard steppers
107 non standard supported axes
244 fully non standard axes
Controllers 220 ControlBox
37 fully non standard controller

Standard systems represent 84% of total
Non-standard axes are used for magnetic insertion devices, diffractometers and hexapods.

Figures from May 2011



Satisfactory quality

- ✓ Initial objectives achieved
- ✓ Motion systems efficient and reliable
- ✓ Cost controlled
- ✓ Performance sufficient for almost all applications

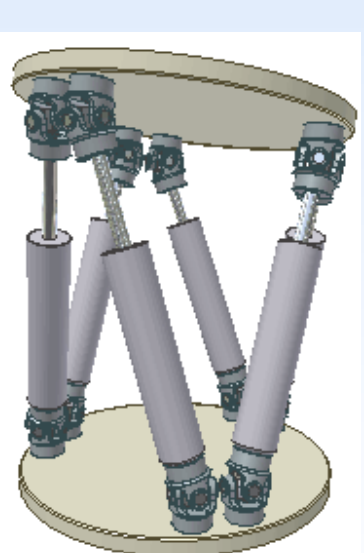
But we must prepare for the future TODAY

Prospect of a new system

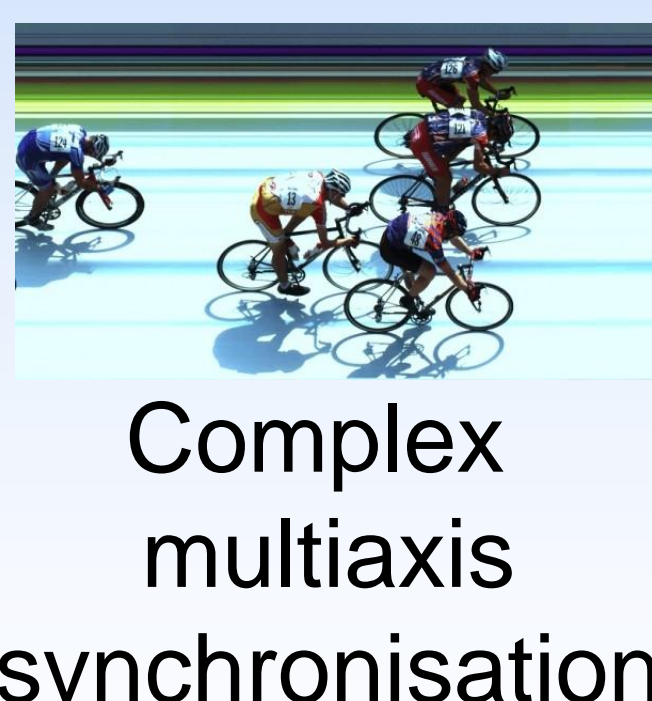
Reasons

SOLEIL needs to upgrade

- Risk of obsolescence of our current controller
- New complex applications demand higher performance



Hexapods & complex trajectories



Complex multi-axis synchronisation



Nano-positioning

MAX IV needs to

- Define an up-to-date motion system
- Select a controller

Guidelines

Similar requirements

- RELIABLE
- FLEXIBLE
- HIGH PERFORMANCE



REVOLUTION

A technical collaboration to provide a complete and ready-to-use solution for motion control

Similar orientations

- MODULAR SOLUTION
- STANDARDIZATION OF HARDWARE
- NO OR MINIMAL IN-HOUSE DEVELOPMENT



Current results

Founding event: Workshop

Discussions about motion control in radiation facilities - May 2011

20 people from 7 synchrotrons

- A written summary
- A mailing list: mocraf@synchrotron-soleil.fr
- A motion workshop every second year (next in Diamond facility)

Main steps defined

- Selection of industrial motion control
- Design of a crate for integration
- Call for tenders
- Software development (embedded and Tango devices)
- Training sessions and documentation

In progress

- Market analysis of controllers
- Technical evaluation of some controllers