icalepcs 2011 Summary

14 oct 2011

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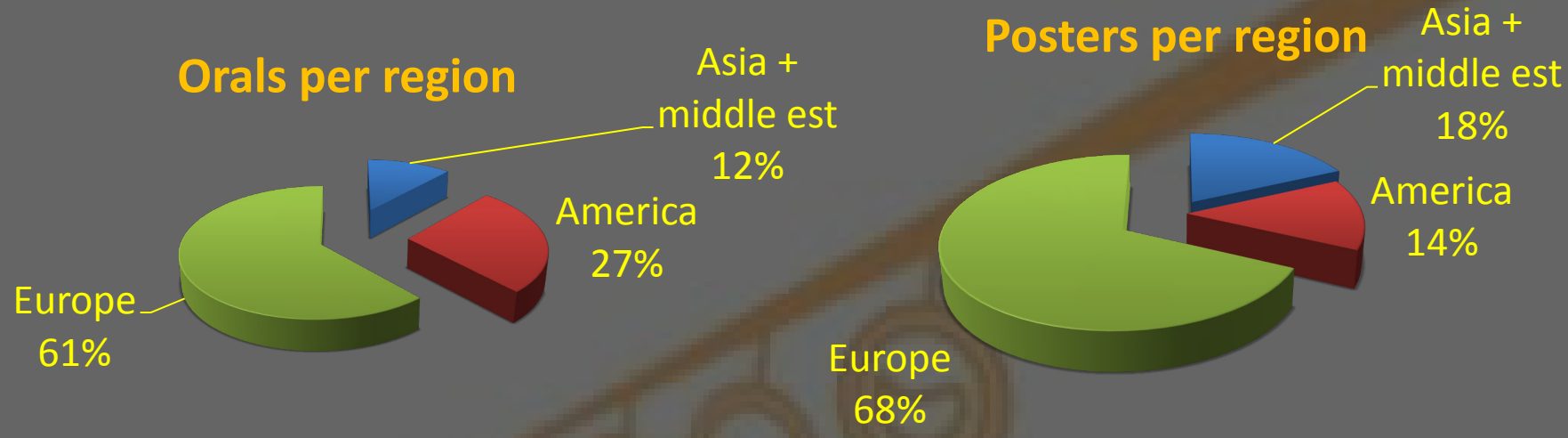
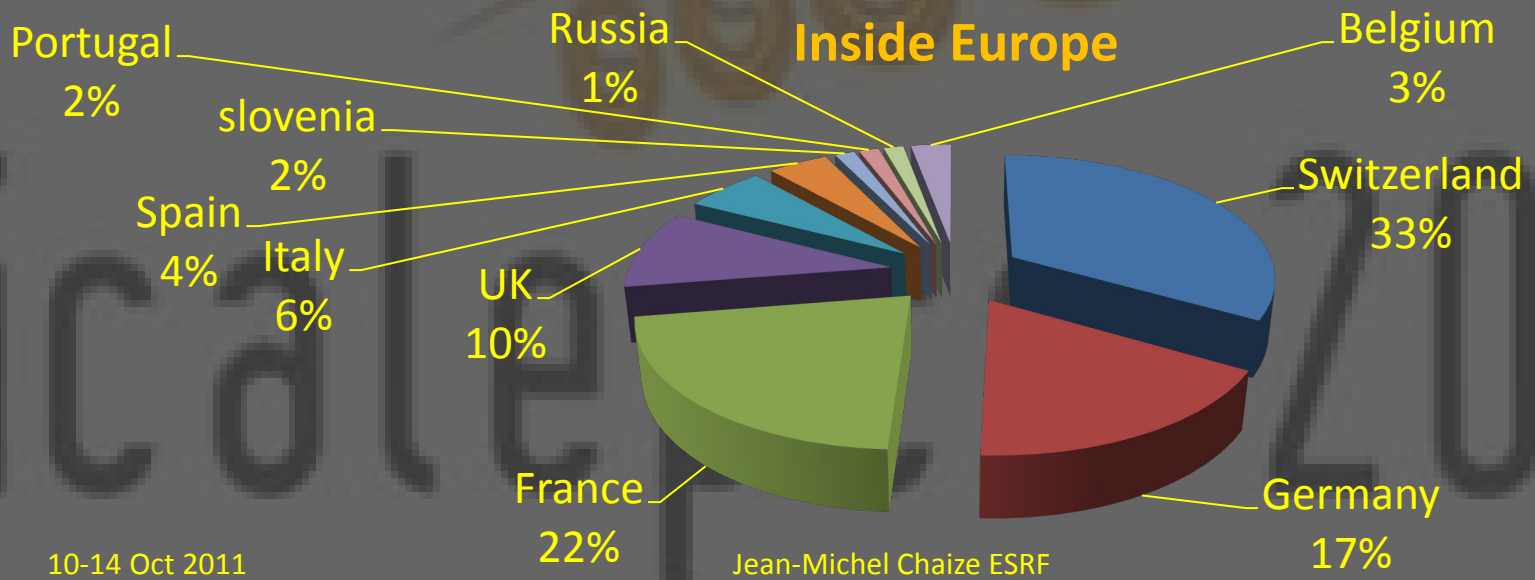
Program chairman

ABSTRACTS

- General statistics:
  - 445 abstracts
    - 112 selected for oral
    - 301 posters
    - 32 posters with mini orals
  - 390 distinct authors and 1342 co authors
  - from 126 affiliations
  - From 27 countries

Regional distribution





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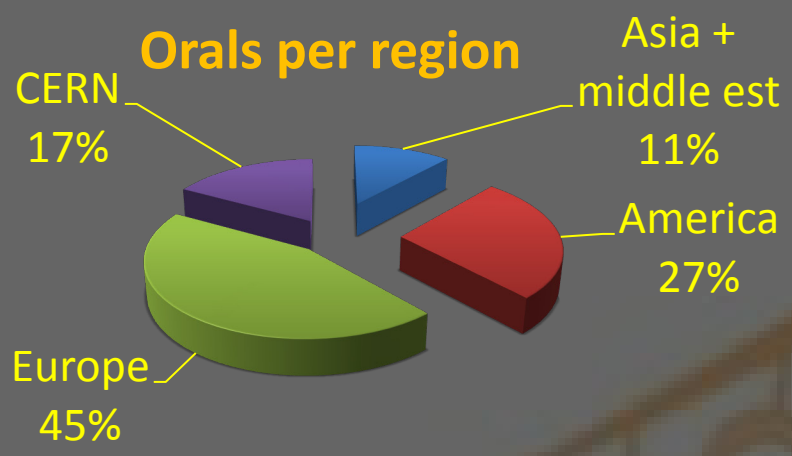
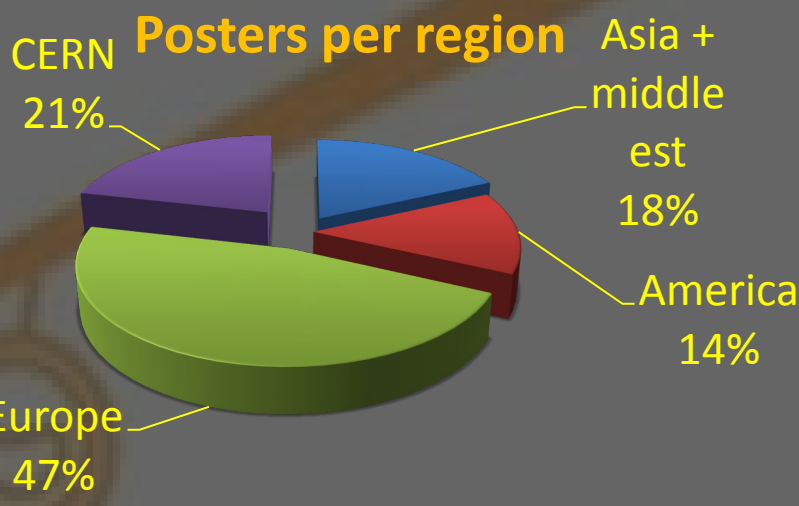
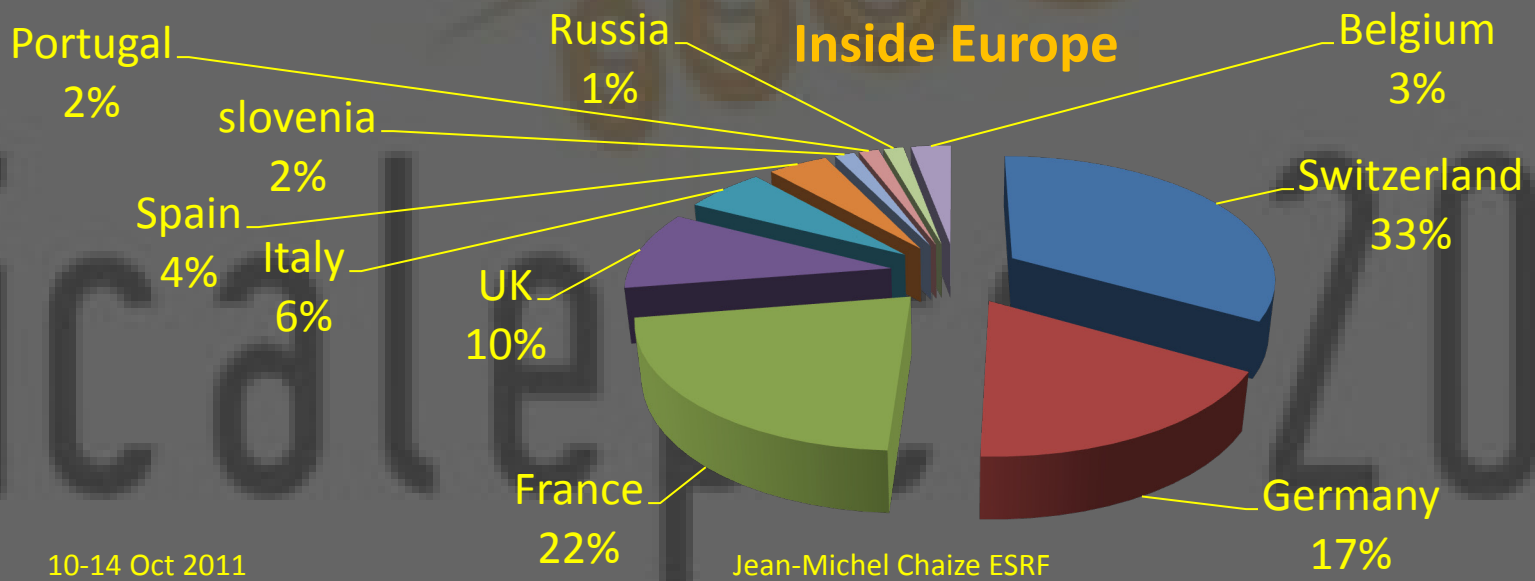
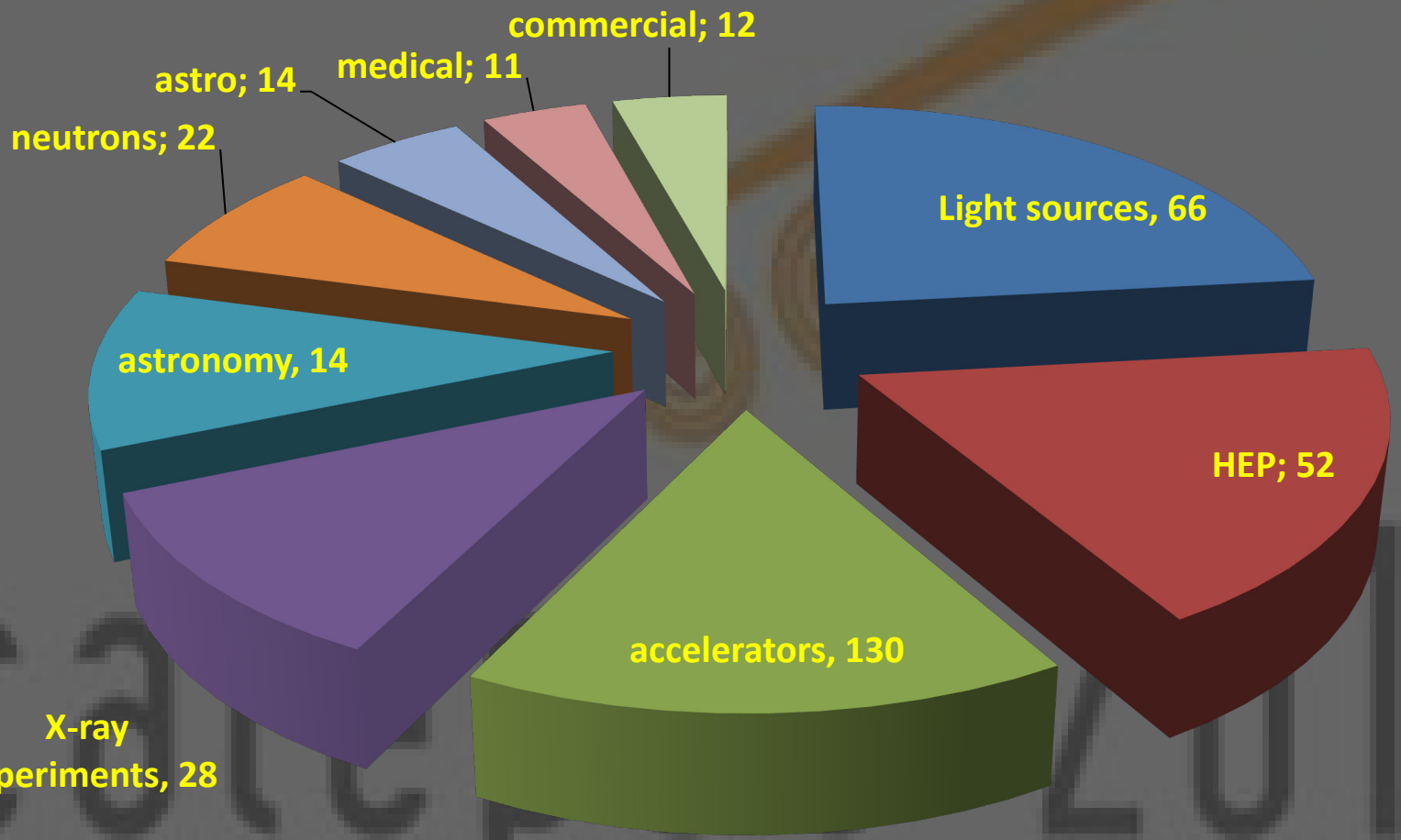






Statistics

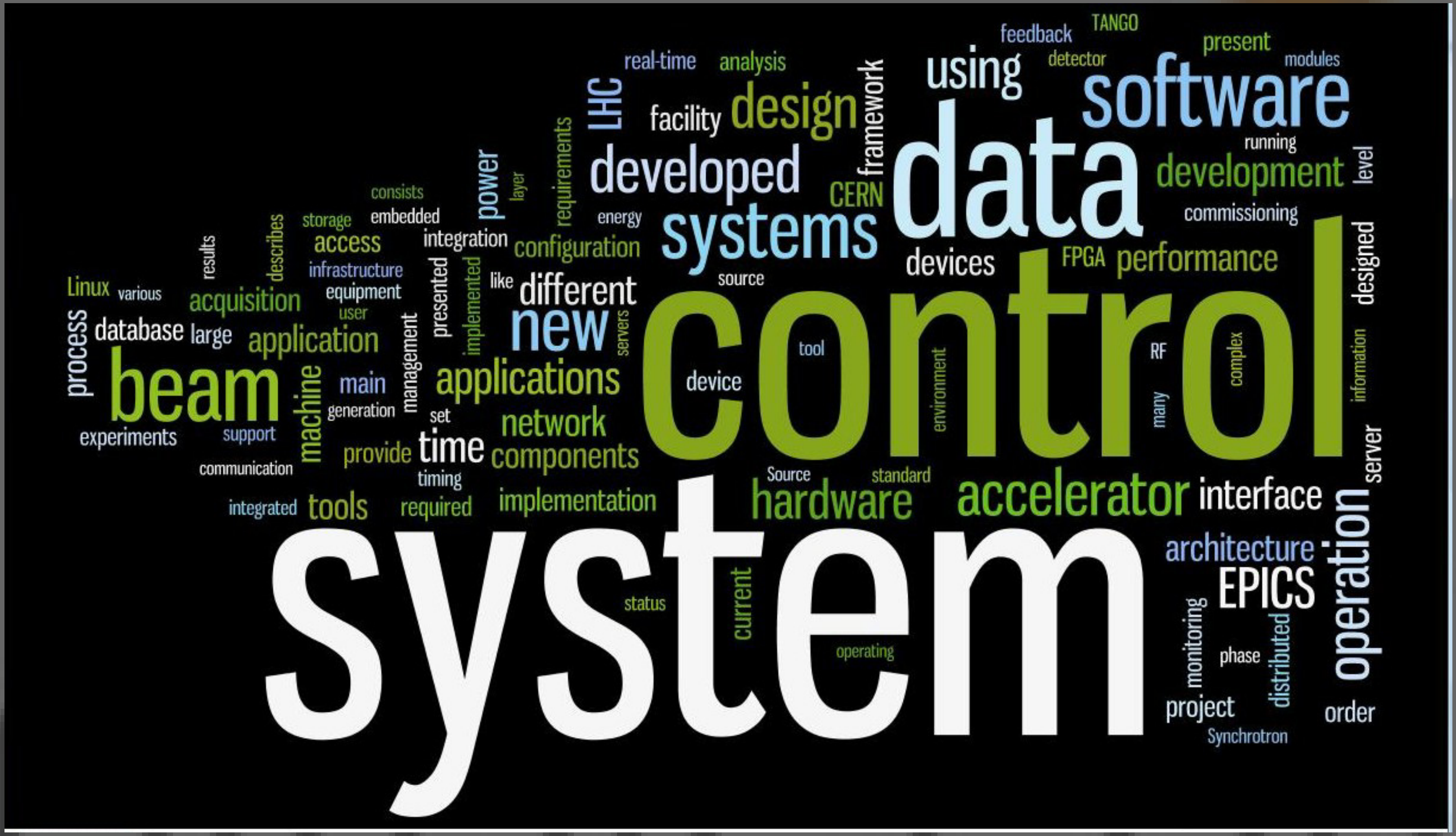
- Domains



Keywords

- A word counting on all the abstracts

Keywords



feedback
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Keywords


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required
communication
results

Innovations in the format

- Keynotes
  - Big success (full attendance)
  - Mostly seen as an added value for ICALEPCS
  - Should be continued with appropriate guidance
- Round table: well attended discussion
- Parallel sessions: Good but…
  - Some room size problems
- Tutorials
  - Surprisingly well attended

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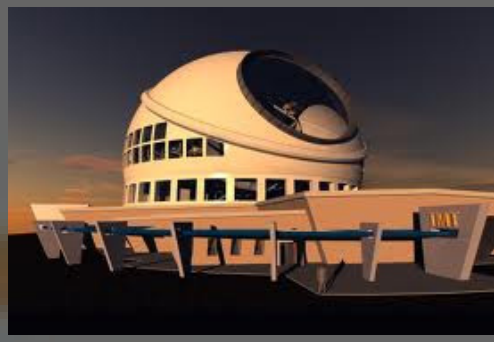
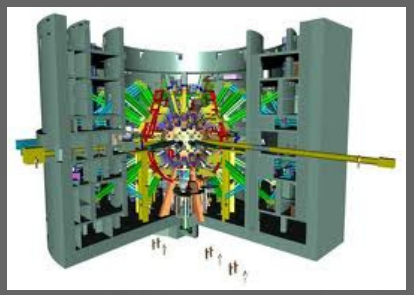
Status report



Challenging projects, new solutions in our fields

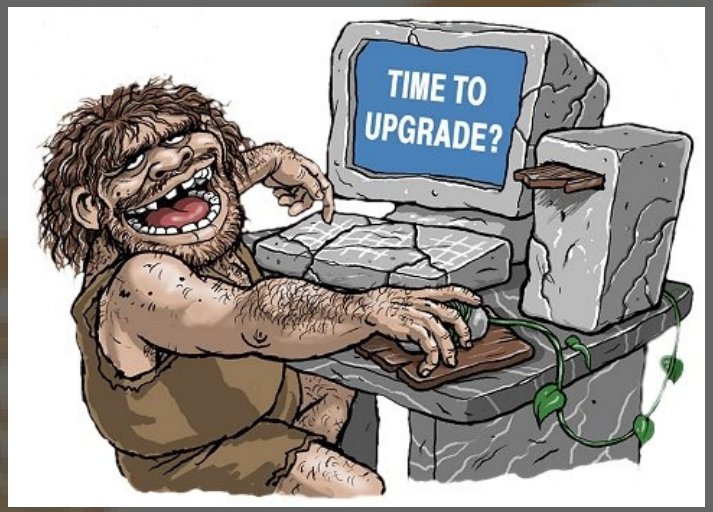
- Free electron lasers
  - Japan, Italy Switzerland and Germany
- Medical
- Detectors
- Fusion (Tokamaks + inertial)
- Astronomy (TMT)
- Neutrons (spallation sources)
- High energy physics



- Data management is their main challenge

Upgrade of Control System

- Find the right moment
- Do not break reliability of operation



- Human resource sharing
  - Operation/upgrade

Project management

- Managing human beings
  - *"True motivation comes from achievement, personal development, job satisfaction, and recognition."*
  - Motivation, leadership, Managing crativity …
- International projects complexity
  - Need to secure the engagement of partners until the end of the project (Politic engagement)
  - Main problem is integration of sub elements from various origins

Software technology

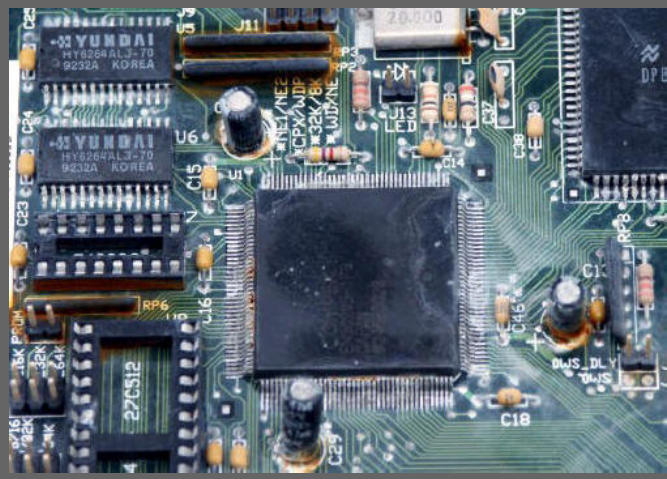
- The culture is changing
- Languages following Java,C++, Python
  - Address concurrency and parallelism
  - Scala, ...
- Domain Specific Languages (State charts)
  - Better tools to generate DSL
  - Automatic code generators
  - Improve productivity

Hardware

- **FPGAs** are used for
  very complex tasks: e.g. Plasma control, adaptive optics
  Very fast processing: e.g. GSPS ADC
  high level protocols: e.g. Ethernet

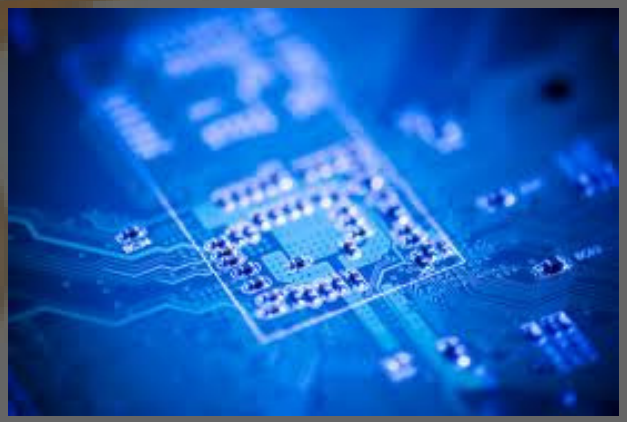
- **Hardware communication** changes from parallel to serial:
  VME is extended by VXS
  MicroTCA: lab requirements -> industrial standard
- **White Rabbit** usage growing
  - LHASSO evaluates 10000 nodes

- **Sharing of hardware** - open source:
  like open software



Hardware

- Hardware getting closer and closer to software
  - Open source/licencing
  - Languages choices (VHDL…)
  - IDEs
  - Repository
- Opportunities to work together
  - Hardware has inspired OO programming, Graphical programming (LabView…)
  - Now Sw can inspire Hw development for managing development



Integrating Industrial/Commercial Devices

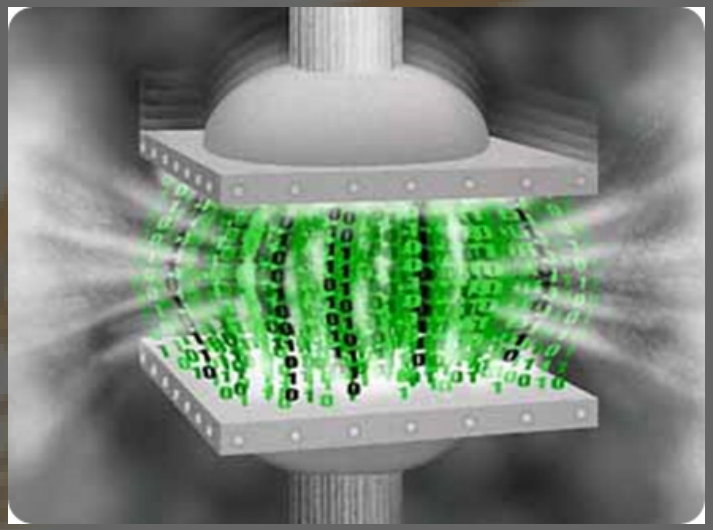
- 3 Talks + 1 keynote
- Examples of success in integration of commercial dev
- Keywords are
  - FPGA, “EPICS ready devices”, Labview, OPC-UA
- Cooperation between huge organization (CERN) and Industry (Openlab)
  - Transposition possible? (ITER and smaller structures)
- NI shows a will to adapt strategy to big physics
- Good Standards and long term availability are necessary

Embedded and real-time

- Real-time difficult to define:
  - 10KHz ?, 32Hz ?, hours ?
  - deadline that must not be exceeded.
- FPGA is a common platform.
  - Embedd processor, embedd software, linux, process
- Interfacing custom hardware with LINUX, using custom kernel drivers, is also becoming common.
- New trends: Parallelism, multicore distributed, virtialization
- Collaboration is evident
  - ALICE Gbit/s optical data link at the IRAM telescope.
  - CERN integrate custom LINUX kernel drivers in standard LINUX kernel.

Data Management

- Data deluge (peta bytes)
- Multi petabytes Databases
- Need for data reduction
- Unique-> to be secured forever
- Harmonization of data format, meta-data (HDF5…)
- Yet another human issue



Distributed Computing

- **Java** can be used for **time critical** processing (soft RT): highly tunable GC
- Trend is **Data Driven** architecture/middleware
- Clear **separation/stable** APIs between **industrial** and **domain specific** architecture layers
- Several new interesting **middleware solutions** on the table
- Astronomical projects and accelerators share the same models
  - publisher/subscriber
  - request/reply

Infrastructure management

Infrastructure management

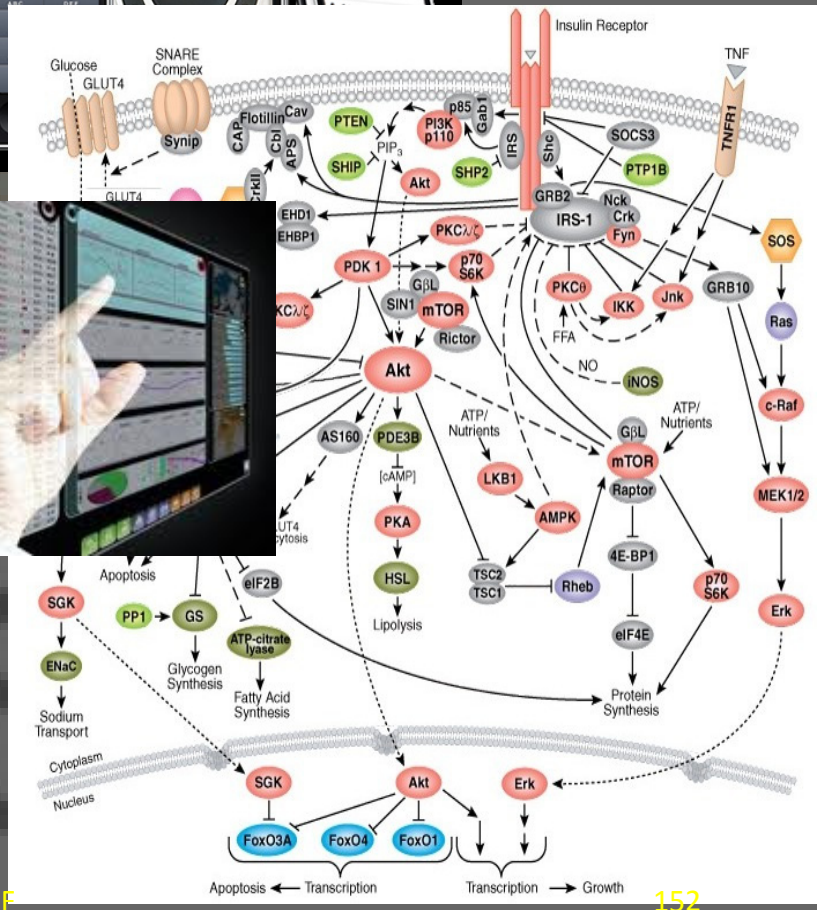
- Huge amount of data to deal with
- Large bandwidth DAQ network

- Pulsed experiments (Inertial fusion, FELs, LHCb)
- **Virtualization** becomes a new space of solution high availability, rapid recovery, dynamic load balancing, server consolidation.
- Data-mining efforts to manage the Logging and Monitoring

Operation Tools/Operator View

- New media (web, Cell phones, Ipad…)
- Build correct Mental models
- Ergonomy

Controls view different
From Operator's view

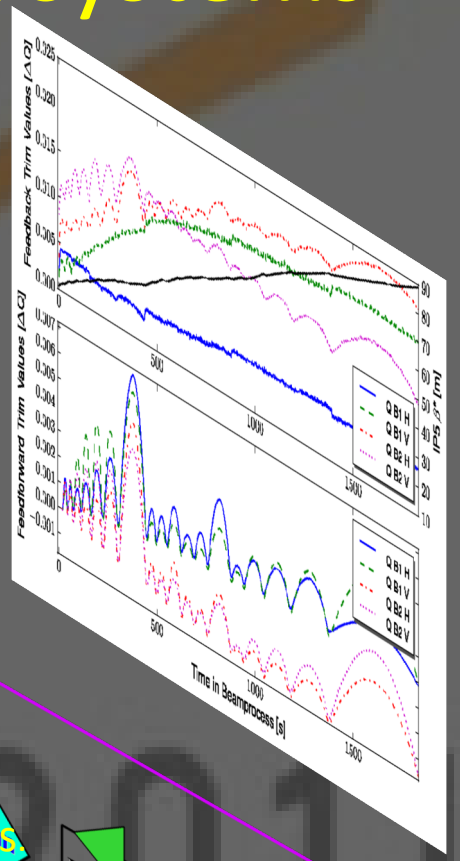


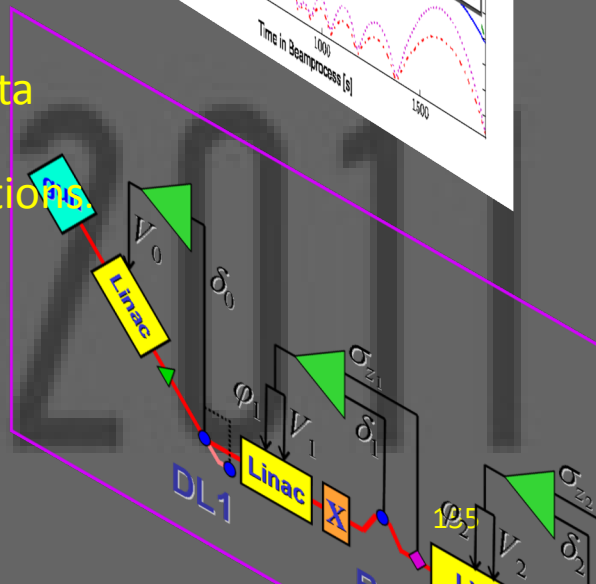
- Thin clients and rich servers

Process tuning and feedback systems

- Astronomy (TMT)
  - adaptive optics, 35000 sensors, 8000 actuators at 800Hz, multiple FPGAs.
- Fusion
  - Plasma instability control is intermixed with protection
- Accelerators
  - Fast feedback data available for analysis

- Common aspects:
  - Increased use of Ethernet for distributing real-time data for feedback.
  - High-end requirements can only be met by FPGA solutions





Protection and Safety System

- Higher Energies, Powers, Energy Densities = more reliance on protection at all levels
- Higher complexity increasingly present in mission-critical systems
- Compliance to EN 61508 standard is possible

- STUXnet : A real Cyber War
  - control systems became a target
- Tools for Calculating risks
- Protection system: complex decision process (Plasma)

Quality Assurance

- Increasing acceptance of its necessity.
- More focus on testing
  - Continuous Integration
  - Virtual machines
  - A lot of different tools being used
  - Many different types of testing
- Changing the culture
  - Making quality a project deliverable
  - Quality improves productivity
- Benefits of collaboration to improve quality
  - Sharing of success and failures
  - Many more people testing the code

Thanks to the program committee!