GANMVL-
Global Accelerator Network Multipurpose Virtual Laboratory

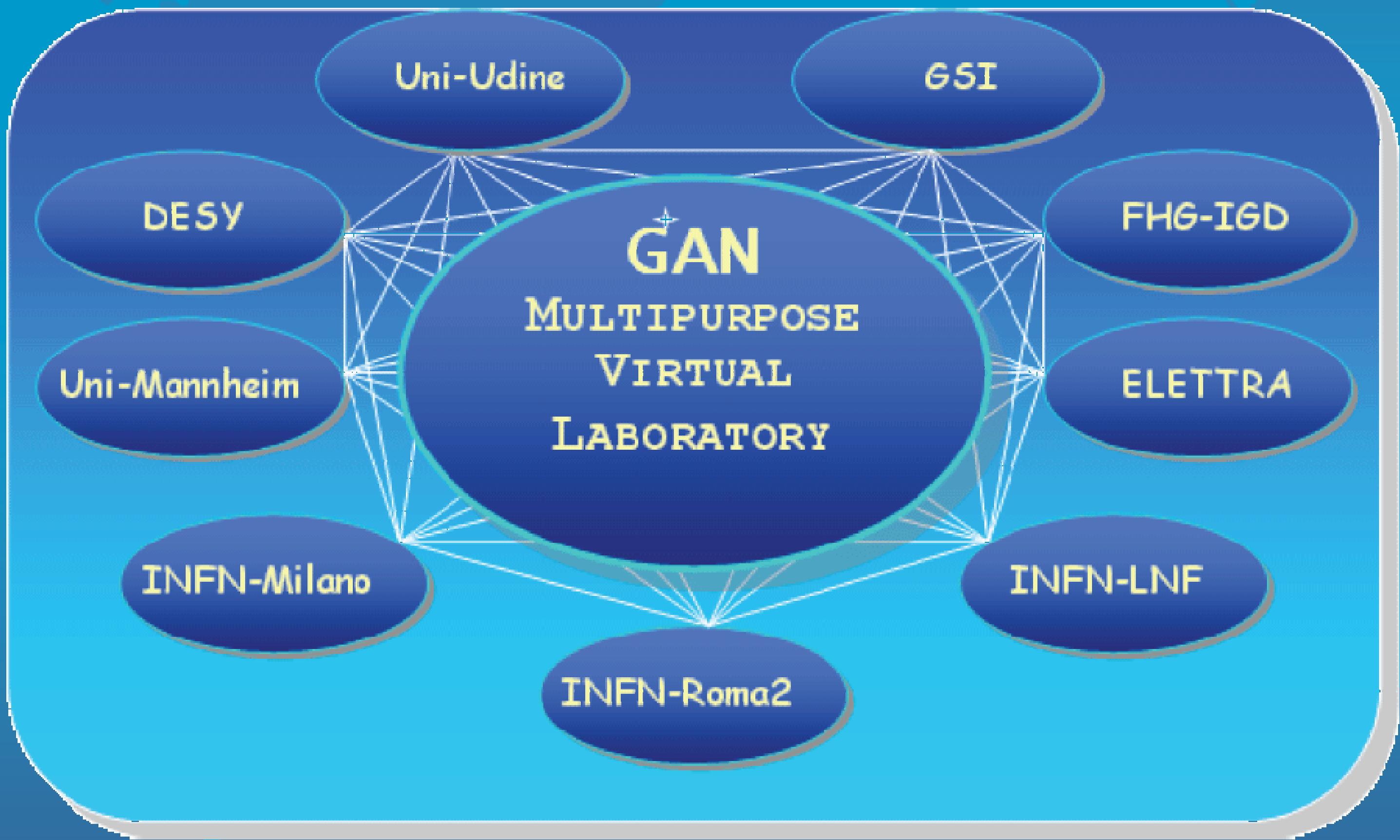
architecture overview, existing operation and outlook of a global accelerator and detector network

Sven Karstensen, DESY

contents

- What is behind GANMVL ?
- The existing Hardware
- GANMVL as a tool within the CALICE detector
- Technology inset in practice with demos

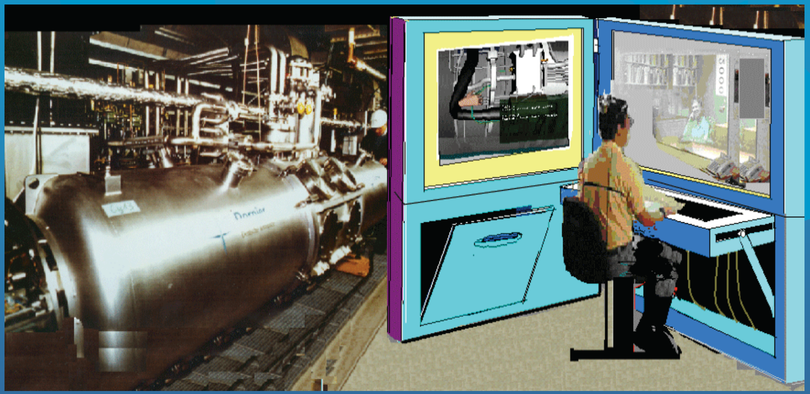
GANMVL participant institutes



motivation

5 years ago: the vision of Electro mechanical Implementation

Artist view of possible MVL implementation



What is a Collaboratory ?

Collaboratory, as defined by William Wulf in 1989, is a "center without walls, in which the nation's researchers can perform their research without regard to physical location, interacting with colleagues, accessing instrumentation, sharing data and computational resources, and accessing information in digital libraries".

The GANMVL tool

- People to people (e.g., electronic mail and tools for data conferencing, such as VRVS and EVO)
- People to information (e.g.: World Wide Web and digital libraries)
- People to facilities (e.g.: status of remore instruments) to enhence utilization by expanding access to recources
- MVL is able to implement the Global accelerator Network, connecting all the international laboratories doing research in the field of Accelerators and Detectors

In our vision GANMVL is a peer-to-peer network of collaboratories

Development approach

- Focus on both technical and non-technical aspects
- Deep involvement of human computer interaction and psychology experts
- User surveys, interviews feedbacks
- Extensive use of prototypes

User Survey

- Personal Data
- Experiences with previous collaborations: status, issues, tools, …
- Activities to be supported by MVL: usage scenarios
- Cooperation with off-site experts: critical aspects?
- Element of MVL: technical features
- Remote Access to Accelerator: safety, security, ethics, regulations
- Benefit of MVL: perceived

Roberto Pugliese

Survey results

Cooperation with off-site Experts

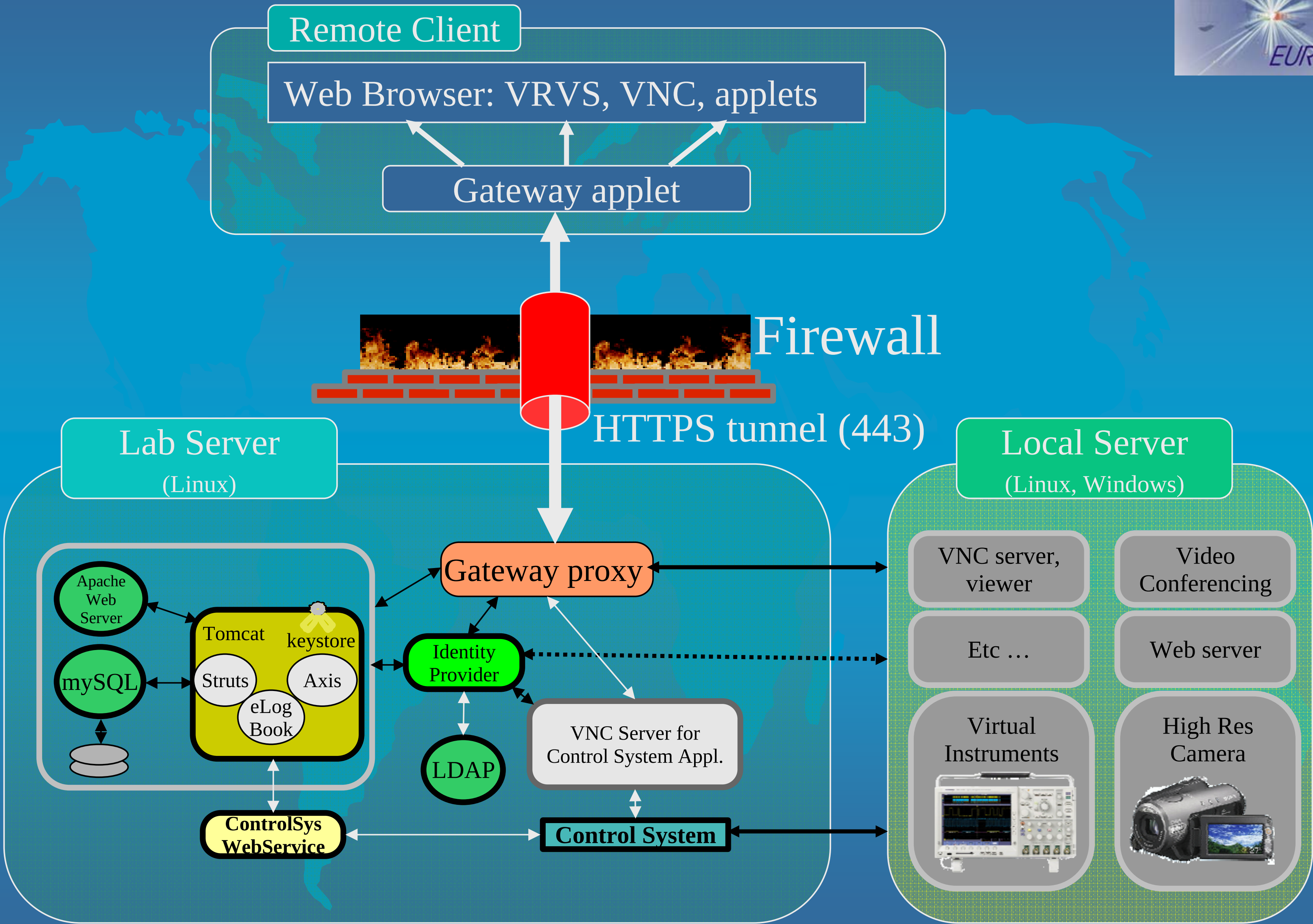
62. I think that the control room operators will accept directives from remote experts/colleagues.

	Number	Average	Quota (1 strongly disagree, 2 disagree, 3 partly, 4 agree, 5 strongly agree)
Overall user opinion	73	4,22	0 1 1 56 33
Accelerator Physicist	12	4,00	5 20 25 45
Administration and Organization	9	4,12	4 3 17 29 47
Controls Expert	15	4,16	3 3 17 29 48
Engineer	8	4,11	4 4 17 28 47
Experimental Physicist	13	4,12	2 4 18 31 45
IT-Expert	6	4,67	0 1 1 11 78
Management	7	4,34	2 10 32 54
Technician	3	4,42	2 10 29 59

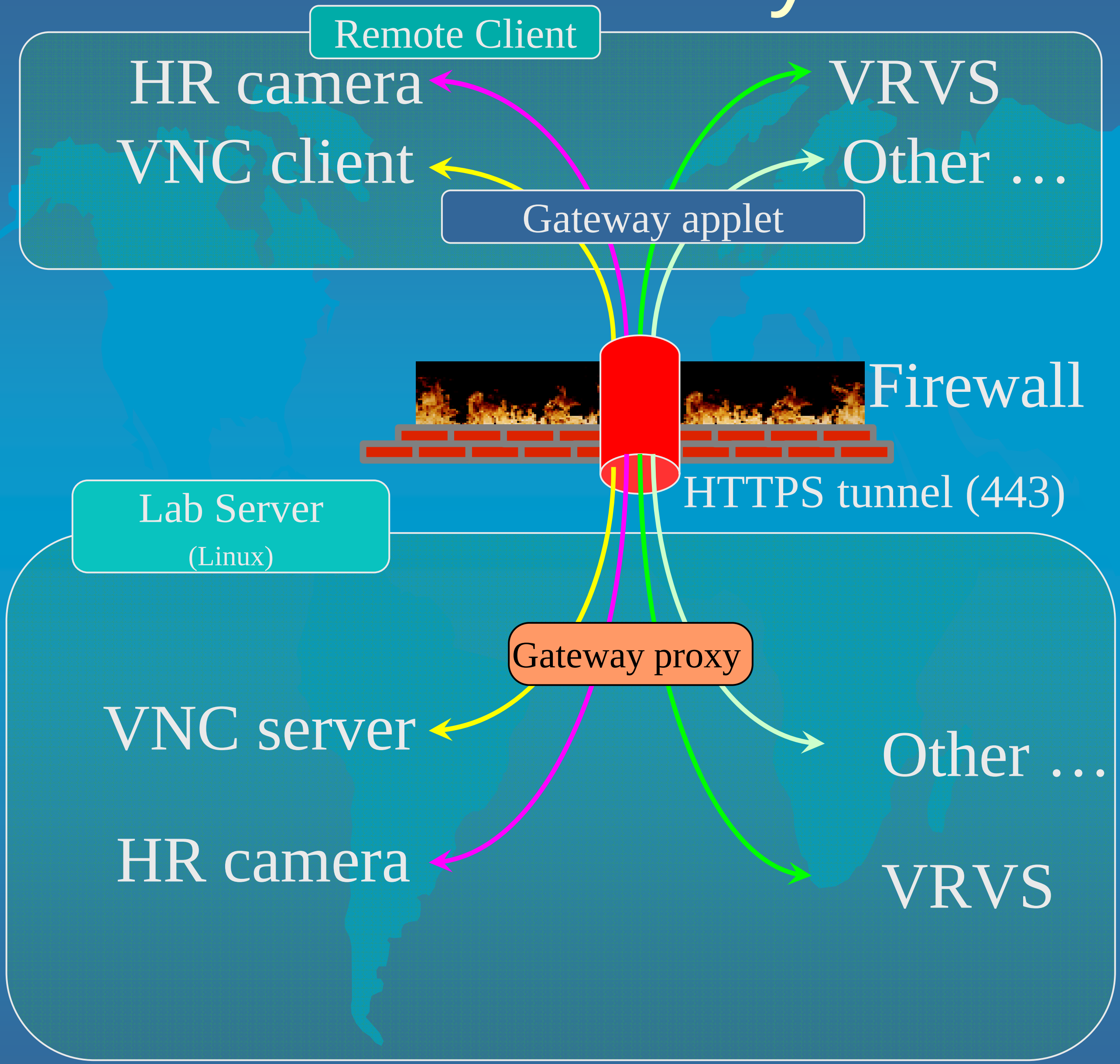
63. Not speaking the mother tongue will impose problems in such collaboration.

	Number	Average	Quota (1 strongly disagree, 2 disagree, 3 partly, 4 agree, 5 strongly agree)
Overall user opinion	73	4,22	0 1 1 56 33
Accelerator Physicist	12	4,00	5 20 25 45
Administration and Organization	9	4,12	4 3 17 29 47
Controls Expert	15	4,16	3 3 17 29 48
Engineer	8	4,11	4 4 17 28 47
Experimental Physicist	13	4,12	2 4 18 31 45
IT-Expert	6	4,67	0 1 1 11 78
Management	7	4,34	2 10 32 54
Technician	3	4,42	2 10 29 59

GANMVL technical structure



GANMVL safety mechanism



The Gateway proxy and applet allows us to tunnel all other ports through the ONE SSH-HTTPS port (443)

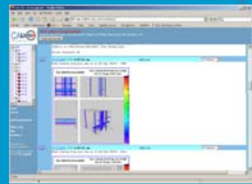
This forms the system to a very safety and admin friendly product.

EUROTeV

GANMVL components

gridsphere portal framework
open-source / portlet jsr168 compliant

REAL VNC



VRVS

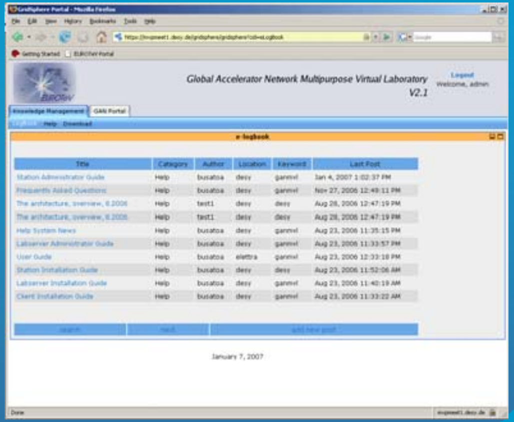
EVO

- Web-Portal (gridsphere)
- SSO (single sign on)
- VRVS/EVO (Virtual Rooms VideoConferencing System)
- e-Logbook
- VNC (Virtual Network Computing) connections
- high resolution video systems
- Virtual instruments (oscilloscope, camera, multimeter,…)

Current GANMVL features

- Web portal interface for all the type of users (remote, laboratory admin, station admin) and all usage scenarios
- Fine grain control on authorization
- Resource or capabilities can be associated to different levels
- Knowledge management tab with e-log, help, download area
- GANMVL tab with an integrated resource and people browser
- By selecting a node in the browser associated and authorized capabilities are presented on a menu
- Different kind of capabilities: high resolution cameras, file manager, chat audio and video conference (Skype, VRVS), Web tools (IVI instrument integration), VNC tools, Wizards
- Open source, modular distribution, plug-in architecture

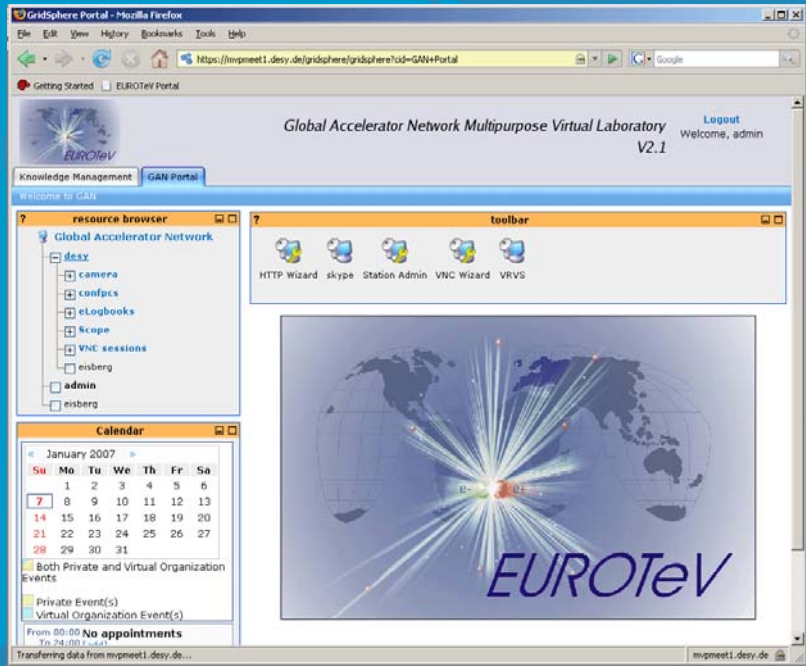
Roberto Pugliese



Wizards

- Instrument and control panels can be added by the web interface via a wizard. The wizard together with the help system will guide the Local Station admin in the procedure.
- Generally there are two modes of integration: http and remote desktop
- The http is suitable when the instrument or control already has a web interface available
- The remote desktop (VNC) is suitable when the instrument or control is equipped with legacy software which was not designed for the web.
- The help system, which is a critical feature of the GANMVL will provide all necessary information

Roberto Pugliese



September 2006

ILC NewsLine - 28 September 2006 - Feature 2 - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ilc NewsLine

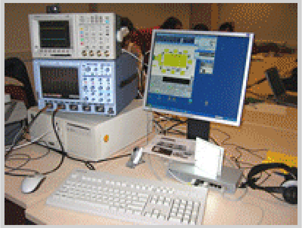
PDF For Printing • Archive • Search • ILC Home • Subscribe • Contact 28 September 2006

Virtually There - The Control Room of the Future?

Imagine the ILC is up and running. Electrons and positrons collide happily and scientists are taking data. Suddenly there's a problem with one of the laser wires. All experts are at a meeting on a different continent, but the problem needs to be fixed immediately. Difficult? Not when there's a Multipurpose Virtual Lab in place. High-speed, high-resolution cameras would allow the faraway experts to look at the fault, a web-based portal would let them access the controls and tools of the system with a simple "single-sign-on" procedure. And if you think this is far-fetched, think again: the first prototype was tested during the last week of August. And it works!

A real team working on virtual revolutions: the GANMVL collaboration at a workshop at DESY.

"I was in a hotel room in Berkeley, California, and was able do all the things you can normally do in the HERA control room and nowhere else," explains Ferdinand Willeke, one of the developers of the new tool. His partners in the project, the 20-strong collaboration (an Italian-German EUROTeV workpackage), were in a meeting at DESY in Hamburg, Germany. After 1.5 years of programming work on the Global Accelerator Network Multi-Purpose Virtual Laboratory (GANMVL), the international team set up their prototype for the first time. "It's a great success. Naturally we found a couple of things that need fixing, but that will help us improve the system," says Matthias Kasemann, leading scientist at DESY. The next step is to offer it as a tool to the whole community for testing and use – the next guinea pig for the virtual lab is the Calice collaboration. They run a test of their calorimeter at CERN in October and will try to control it remotely.



This is what the control room could look like at the ILC end...

However, the virtual lab is not just about remote operation. In principle it is already possible to run a control room remotely. This system is radically different in that it takes into account the human aspect of teamwork around the world. How do you get a virtual team to be as efficient as a real one? Why do we have problems working together over distances when it seems so easy when we're all together? For these questions, the physicists and computer scientists sought the help of two psychologists who specialise in 'human-computer interfaces'.

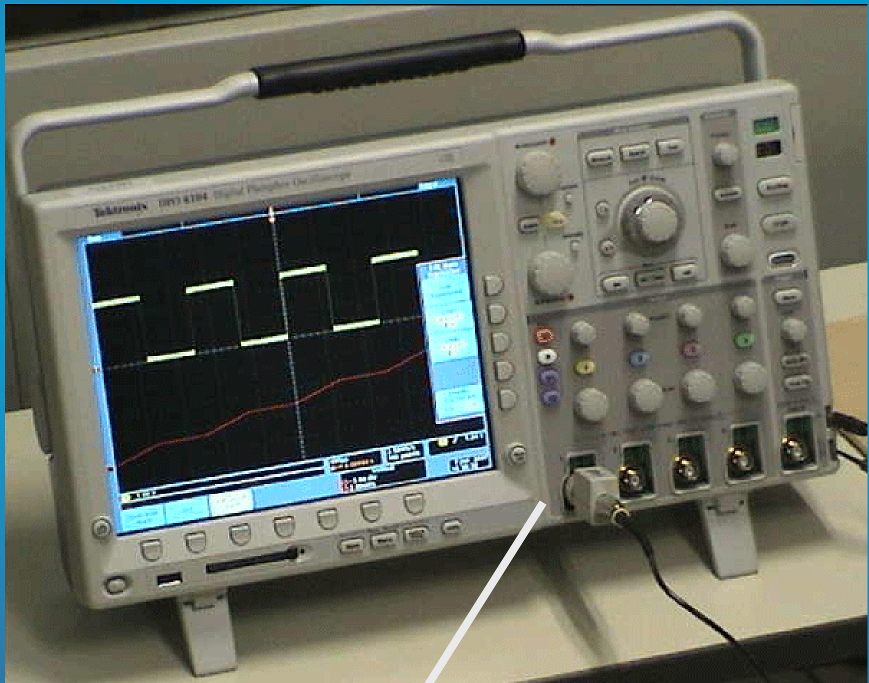
...and this is a screenshot of the expert's workspace.

"The biggest obstacle is trust," psychologist Markus Hodapp from Mannheim University sums up the first results. "In a normal working environment you know your colleagues and have a estimate of the level of trust you have in them. In the virtual team, you sometimes have to trust your opposite blindly – people are not happy with that." The psychology team from University of Mannheim, Germany and University of Udine, Italy has conducted several interviews and a survey with the team members. Preliminary results show that changes in the working environment, trust in the virtual colleague and possible disadvantages in the job situation seem to be the biggest problem. And lack of discipline, as we have all experienced. They also evaluate the usability of the tools to make them as human-friendly as possible.

Done

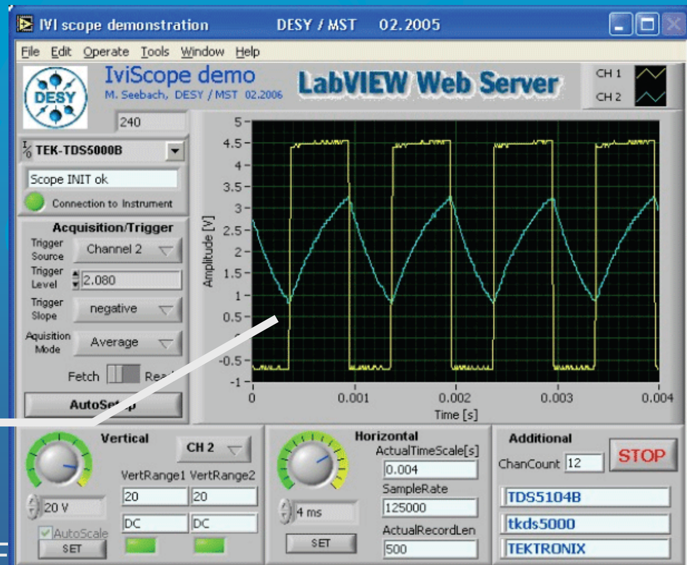
Virtual or reality?

Browser view



real view

Labview (IVI) view



Web-cams

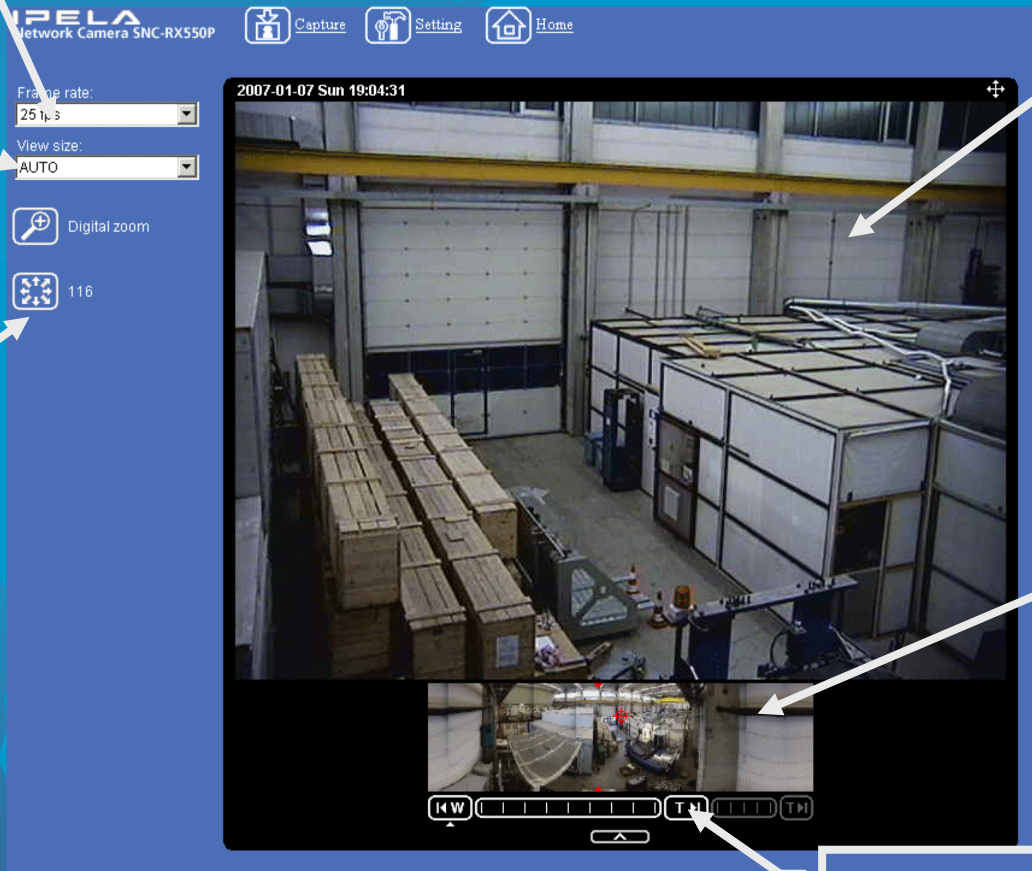
Web-cams

Web-cams

No of frames / sec

Size of view

controls



actual view

360° controlview

Optical and digital zoom

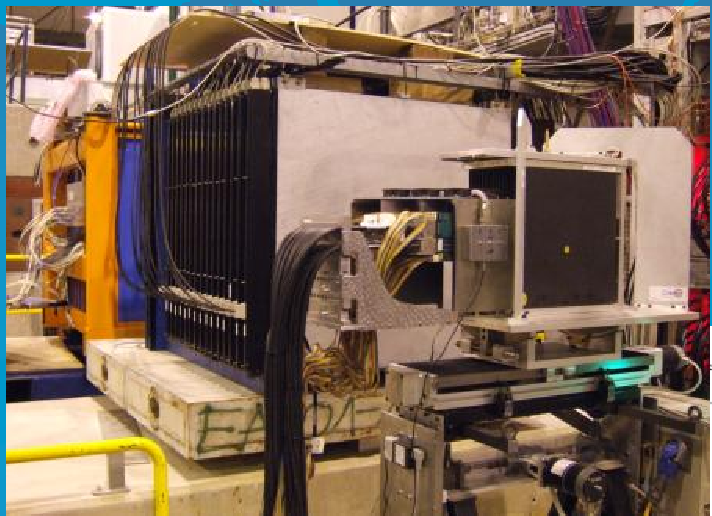
Playground for GANMVL inside the CALICE detector

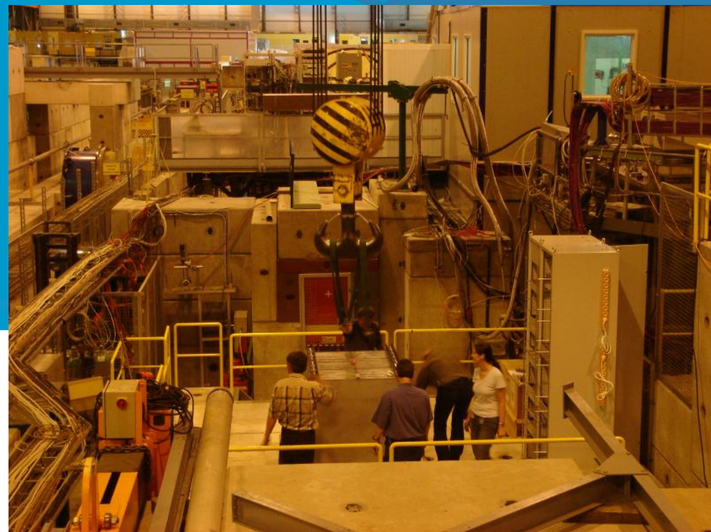
… and absolutely useful !!

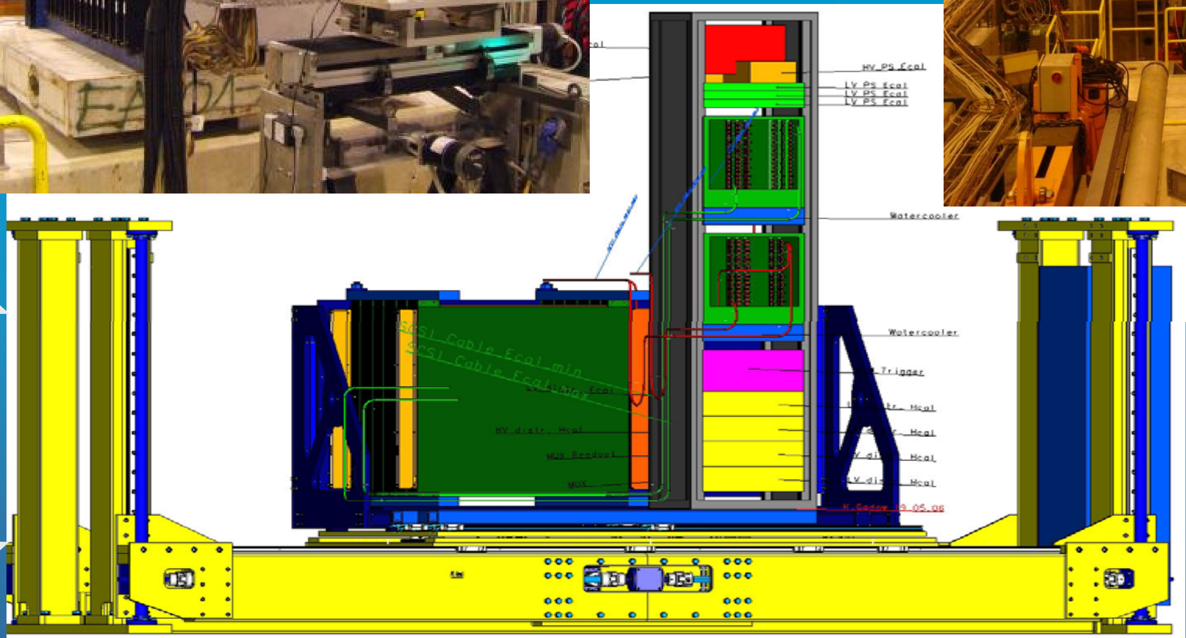
CALICE collaboration

- **CA**lorimeter for the **LI**near **C**ollider **E**xperiment
- 31 institutes, 12 countries, 200 physicists and engineers
- 3 parts:
  - HCAL (Hadron CALorometer, DESY)
  - ECAL (Electron CALorimeter, LAL)
  - Tailcatcher (Fermilab)
- 1st run period at CERN June – October 2006
- 2nd period April 2007 at CERN
- **3rd period August 2007 -> FERMILAB**

CALICE at CERN







2,2 m

4,95 m

Weight:

10 tons

CALICE global structure

And how looks the reality?

A gridsphere demonstration

start

GANMVL @ Elettra

Roberto Pugliese connected Elettra from CERN

Elettra example

using a **Function Generator** with **Labview** and observe the result with a **high resolution camera**

Credits

(in alphabetical order)

- Dominik Acri (FHG-IGD)
- Reinhard Bacher (DESY)
- Fulvio Bille (Trieste)
- Serguei Bourov (DESY)
- Alessandro Busato (Elettra)
- Luciano Catani (INFN)
- Alessio Curri (Elettra)
- Eckhard Elsen (DESY)
- Silvia Gabrielli (UNI-Udine)
- Gerhard Grygiel (DESY)
- Markus Hodapp (UNI Mannheim)
- Raimund Kammering (DESY)
- Sven Karstensen (DESY)
- Matthias Kasemann (DESY)
- Sergiy Khodyachykh (DESY)
- Christian Liebig (UNI Mannheim)
- Roberto Pugliese (Elettra)
- Roberto Ranon (UNI-Udine)
- Kay Rehlich (DESY)
- Pedro Santos (FHG-IGD)
- Petra Schütt (GSI)
- Michael Seebach (DESY)
- Daniele Setore (INFN)
- Hai Tang (GSI)
- Ferdinand Willeke (DESY)