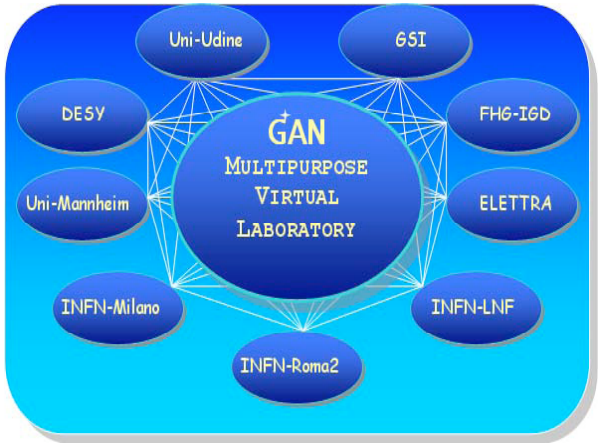

Workpackage 8
GAN-MVL Status

HCI LAB
Laboratorio di Interazione Uomo-Macchina

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Human-Computer Interaction Lab
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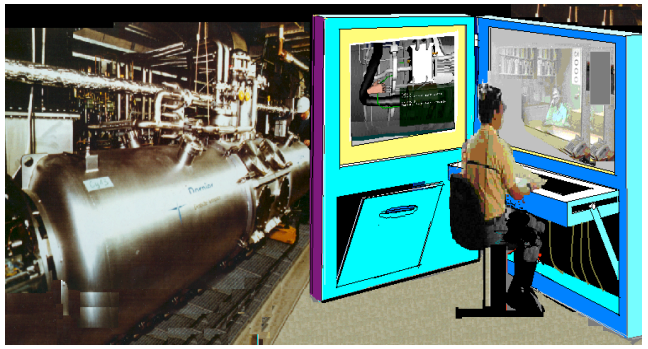
Multipurpose Virtual Laboratory

- The goal of WP8 is to design and build a novel collaboration tool and test it on existing accelerator collaborations
  - the **Multipurpose Virtual Laboratory (MVL)** aims at supporting collaborations in designing, constructing, prototyping and commissioning, troubleshooting, maintaining and optimizing accelerators
- The idea is that MVL will capture an activity as completely as possible mainly by
  - video and audio,
  - measurement apparatus and accelerator controls
- and make this information **available to remote participants** who then can contribute to the activity as much as possible minimizing the disadvantage of not being on site.



WP8 Participants

- DESY, Germany
- Elettra Synchrotron, Italy
- Fraunhofer Institute, Germany
- GSI, Germany
- INFN Milan, Italy
- University of Mannheim, Germany
- University of Udine, Italy

Outline

- What has been done so far:
  - user survey (summary of results)
  - early prototype testing (first results)
  - MVL specifications definition (will conclude end of this month)
- Our current roadmap

User Survey

- During Feb/March 05, we carried out a user survey, aimed at:
  - making the community aware of our work
  - assessing acceptability of MVL (as envisioned)
  - getting feedback about planned/missing features and their importance
  - pointing out issues which need to be recognized and properly taken care of (e.g. social / organizational challenges)
  - getting suggestions/ideas from previous related experiences
- We asked approx. 600 potential users of GANMVL, accelerator physicists as well as operation and controls people to fill a questionnaire (20 % of them answered)

Response Rate/Personal Data

Gender	Number
Female	11
Male	138

Years of relevant accelerator experience	Number
0 - 5 years	12
5 - 10 years	11
10 - 15 years	8
15 - 20 years	33
20 - 25 years	31
25 - 30 years	23
over 30 years	31

Occupation	Number
All Users	155
Accelerator user	2
Accelerator physicist	51
Designer of Accelerator Components	19
Accelerator Maintenance & Troubleshooting Operator	14
IT/Control Expert	23
Experimental Physicist	21
Management	3
Technician	5
Others	17

Experiences with Previous Collaborations

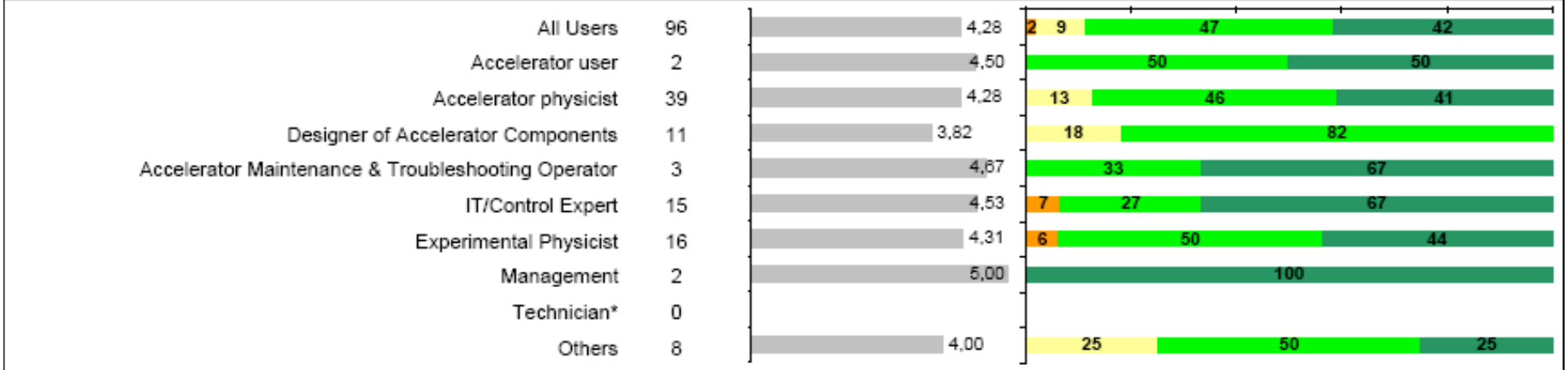
- Good experiences with trust in the professional background of the participating colleagues.
- The main forms of communication in previous collaborative projects were face-to-face and email communication.
  - telephone and video conferences rated partly important
  - Instant messaging and chat were mostly unimportant
- Electronic communication tools (e.g., videoconference, mail, chat) were more used by operators, and physicists, and less by other users (i.e. technicians, engineers).
- Data and/or video sharing seems to have been useful for some users.

Experiences with Previous Collaborations

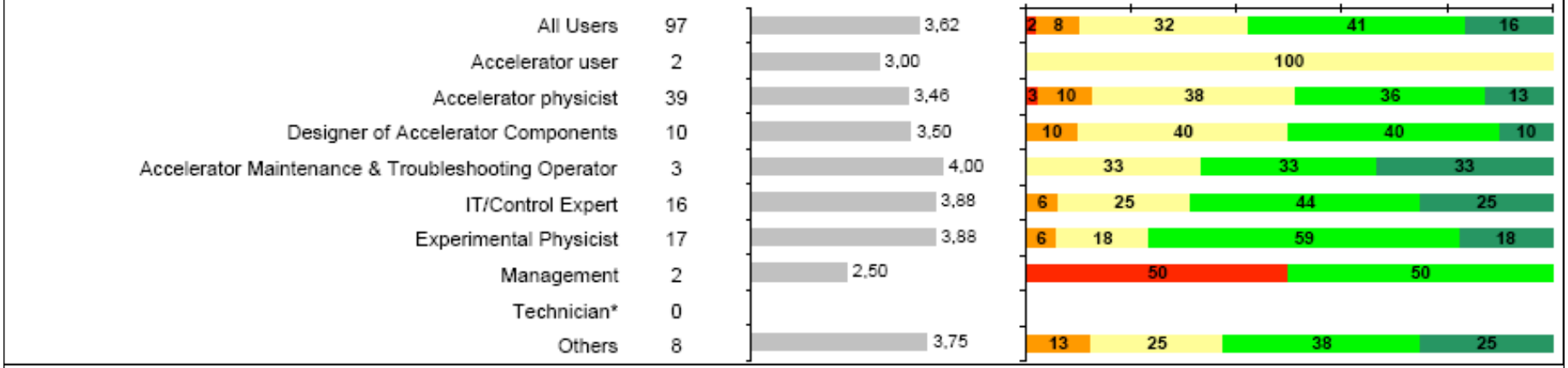
- remote operation or troubleshooting of equipment has been already experienced by a considerable number of users
  - however, users' opinions on such kind of previous experiences are mixed
- some general concerns about computer-mediated communication
  - technical difficulties
  - lack of technical competencies/equipment
- all in all, users seems to be willing to use a special communication tool for remote collaboration, both as as remote experts and as local users

Experiences with Previous Collaborations (Continuation)

22. The need for remote access to accelerator equipment may increase in an accelerator project carried out in collaboration between several partner institutes.



23. Typical activities in the construction and operation of accelerators like assembly of equipment, maintenance and tune-up can be troubleshooting, operation, testing, substantially supported by off-site experts.



MVL-supported Activities

- A list of proposed activities was given as follows:
  - Assembly of accelerator equipment
  - Setting up a test
  - Test of new equipment or entire accelerator
  - Commissioning of equipment or entire accelerator
  - Equipment maintenance
  - Trouble shooting
  - Remotely assisted repair
  - Accelerator studies
  - Tune-up of components
  - Tune-up of accelerator beam parameters
- Users favored MVL in accelerator maintenance, troubleshooting and "routine" operations.
- Users disfavored testing and design of new equipment (e.g. assembly of accelerator equipment should not be part of MVL activities for about 1/3 of users)

Activities to be supported by MVL (Continuation)

33. As an expert, I could imagine to use such a tool in my work.

	Number	Average	Quota (in %) 1 strongly disagree	2 disagree	3 partly	4 agree	5 strongly agree
All Users	120	3,81	4	28		52	17
Accelerator user	2	4,50				50	50
Accelerator physicist	43	3,67	9	28		49	14
Designer of Accelerator Components	15	3,67		33		67	
Accelerator Maintenance & Troubleshooting Operator	11	3,73		45		36	18
IT/Control Expert	22	3,86	5	23		55	18
Experimental Physicist	14	4,07		14		64	21
Management	3	3,33		67		33	
Technician	3	3,67		33		67	
Others	7	4,43		14		29	57

34. Improving communications would be helpful in performing such activities with remote support.

	Number	Average	Quota (in %) 1 strongly disagree	2 disagree	3 partly	4 agree	5 strongly agree
All Users	123	4,27		8		57	35
Accelerator user	2	4,50				50	50
Accelerator physicist	43	4,16		9		65	26
Designer of Accelerator Components	15	4,20		13		53	33
Accelerator Maintenance & Troubleshooting Operator	10	4,60				40	60
IT/Control Expert	22	4,09		14		64	23
Experimental Physicist	17	4,41		6		47	47
Management	3	4,00				100	
Technician	3	4,67				33	67
Others	8	4,63				38	63

Cooperation with Off-Site Experts

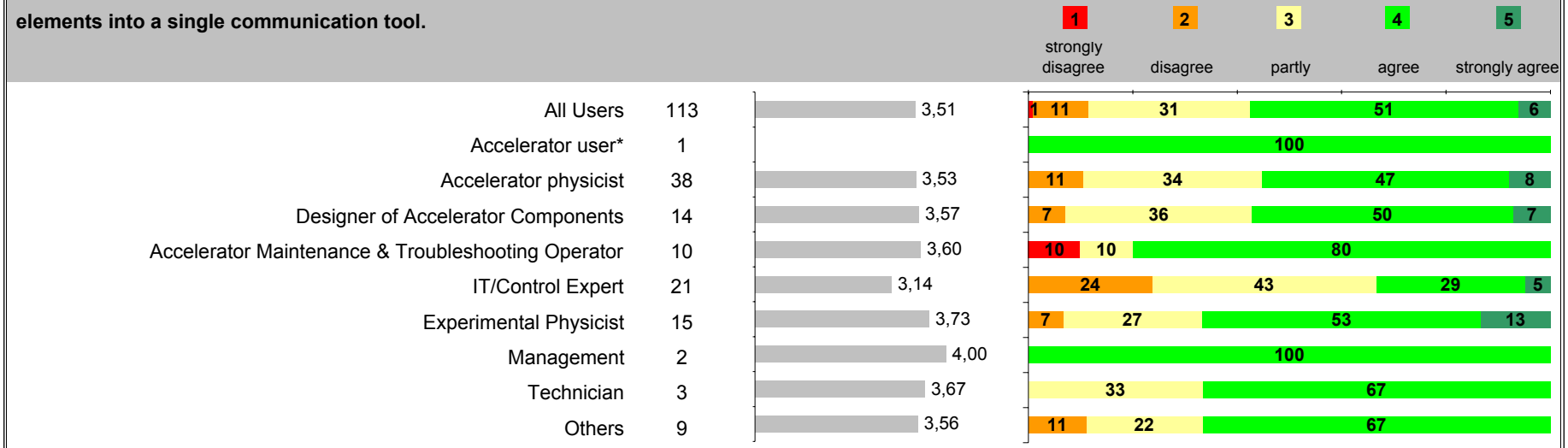
- Remote cooperation between experts and control room operators with MVL is perceived as positive.
  - Some concerns about problems with not speaking the same mother tongue.
  - There should be some face-to-face meetings on-site to get to know the accelerator and the staff there (gaining trust)
- A critical aspect seems to be the observation of control room operators with cameras (continuous presence, "supervision")
  - there should be a mechanism that allows observation only by permission of the observed operators or by areas
  - also legal aspects in some countries that have to be considered.

MVL Elements

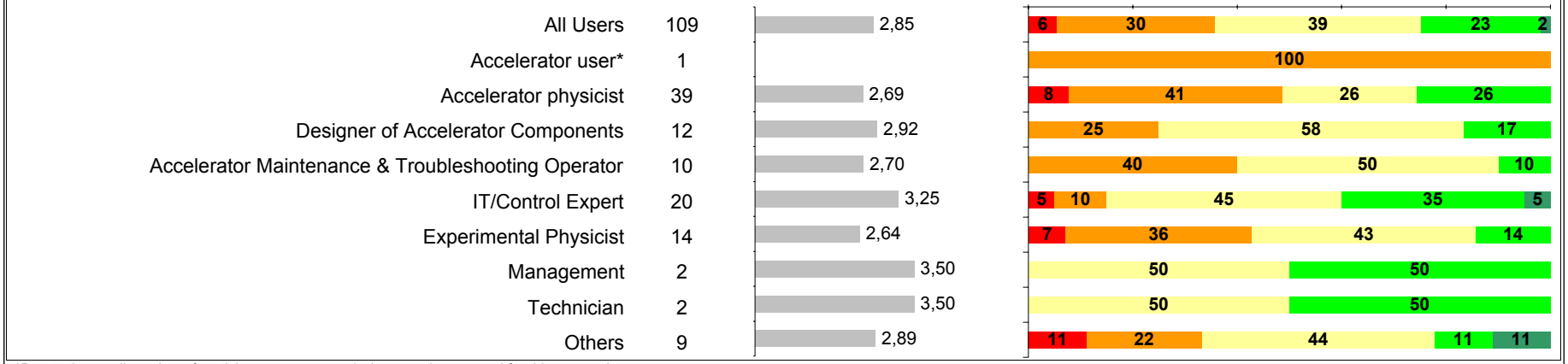
- We asked which elements would be important, among those envisioned:
  - In general, video/audio communication and mobility of the solution is judged important
  - more interest in tools for synchronous collaboration (e.g. desktop sharing)
- Risks and concerns pointed out:
  - users prefer a more simple and stable tool over “bleeding edge” technical features (e.g., 3D audio)
  - Many pointed out the need for a well-designed and effective help functionality (either provided by the system or human experts)
  - a single-tool approach can make integration of upcoming technologies hard

Elements of MVL

45. It could be useful to integrate the above elements into a single communication tool.



46. The ad hoc combination of existing tools and facilities can be sufficient or even more adequate than the proposed solution.



*Due to the small number of participants no average/values can be reported for this occupation

MVL & Safety

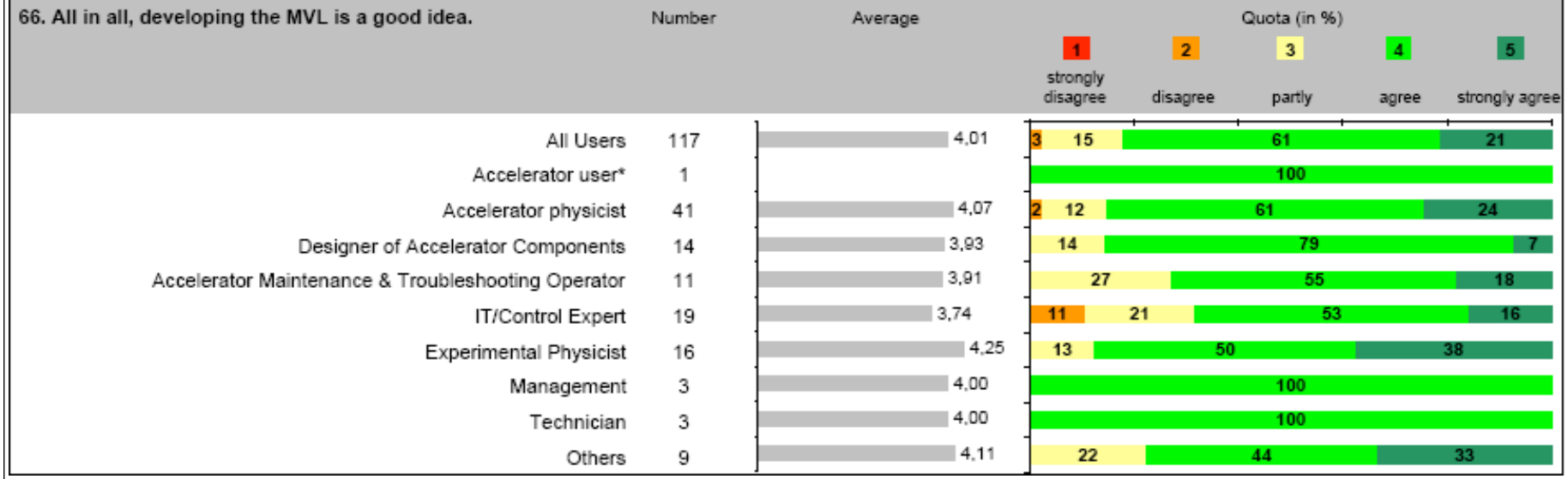
- in general, safety is perceived as an issue
  - the project should point out clearly what MVL will do with respect to safety on the accelerator site
  - simply allowing remote users to observe is not perceived as a good solution (too limiting?)
  - security & safety mechanisms are definitively needed
- according to users, safety requirements and regulations would not forbid remote control of accelerators

MVL (perceived) Benefits

- We asked users about possible benefits of MVL:
  - Wider and faster availability of experts (and generally, wider participation) is by far perceived as the greatest benefit
  - reduced travel costs
  - improved local operations
  - free comments also pointed out social benefits (e.g., reduced traveling) and sense of ownership of systems
- In general, most users trust that MVL will be able to give them these benefits

Benefit of MVL (Continuation)

66. All in all, developing the MVL is a good idea.



GAN-MVL First Tests (09.05.2005)

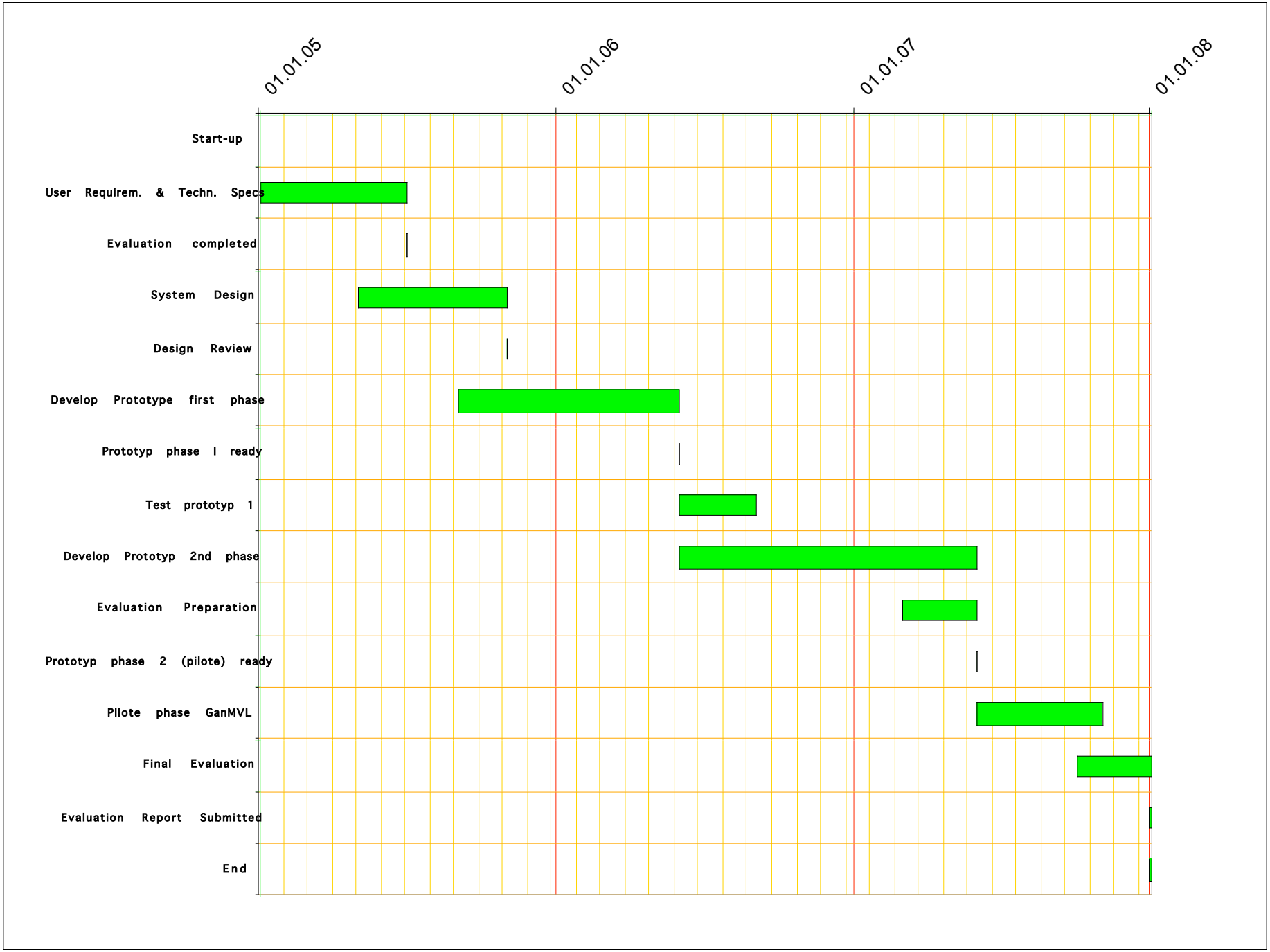
- ELETTRA (Italy) and DESY (Germany) jointly tested the MVL prototype, an integrated web-based collaborative environment with video-conferencing and desktop-sharing tools.
- An operator in Hamburg was monitored and assisted by operators in the ELETTRA control room in Trieste.
- The operator in Hamburg successfully injected an electron beam into the ELETTRA storage ring and brought it to working energy.
- During the night, the same tool was successfully used to carry out remote machine physics measurements on the ELETTRA synchrotron from ESRF in Grenoble.

MVL Requirements Specification

- using the user survey as input, a detailed list of design requirements for MVL has been derived
  - i.e. what do MVL needs with respect to:
    - communication (video conference, chat, ...)
    - work organization (calendars, address books, log book, ...)
    - accelerator control (e.g. remote instrumentation, monitoring privileges, ...)
    - access to information (e.g. logged accelerator data, databases, ...)
  - requirements have been also prioritized by importance in the different MVL activities
- the detailed design requirements specification will be published as a Eurotev report at the end of June 05

Our Current Roadmap

- WP8 consists of four tasks:
  - **ODI**: Overall Design and Integration: design the MVL on the basis of users' needs
  - **SC**: System Components: provide & integrate software components of MVL
  - **ME**: Mechanical and Electrical Design: integrating the functionality of MVL in a compact and transportable hardware set up
  - **DGF**: Demonstration of GAN and far remote operating
- each task consists of a number of subtasks


01.01.05
01.01.06
01.01.07
01.01.08
Start-up
User Requirem. & Techn. Specs
Evaluation completed
System Design
Design Review
Develop Prototype first phase
Prototyp phase I ready
Test prototyp 1
Develop Prototyp 2nd phase
Evaluation Preparation
Prototyp phase 2 (pilote) ready
Pilote phase GanMVL
Final Evaluation
Evaluation Report Submitted
End

Overall Design and Integration

- ODI-1 Analysis of User needs
- ODI-6 Evaluation of Human Computer Interface Issues
- ODI-7 Evaluation of Collaboratory Issues
- ODI-2 Overall Design Requirements
- ODI-5 Design Evaluation

Financial Year	Jan 05				Jan 06				Jan 07			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
User Query												
Design questionnaire	**2.1**			==	==	==						
Perform and evaluate questionnaire	**2.2**	==	==	==	==	==						
Evaluation												
Derive design Specs from User needs		3										
System Design			**4**	==								
Updating Design				**5**	==	==	==	==	==	==		

System Components

Financial Year	Jan 05				Jan 06				Jan 07			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Advertise posts	==											
Recruit personnel	==	==	==									
Audio System Selection	1.1	==										
Prototype implementation		1.2	==	==	==	==						
Test prototype						1.3	==					
Implement final system						1.4	==	==	==	==		
Test Final System										1.6	==	
Video Scope Decision	2.1	==										
Review exist system	2.2	==										
Implement protoype			2.3	==	==							
Integrate protoype				2.4	==	==						
Test prototype						2.5	==					
Implement final system							2.6	==	==	==		
Test final system										2.7	==	
Desktop Video, Survey exist. System	3.1	==										
installation			3.2	==								
Integration and test				3.3	==	==						
Virtual Instruments Survey	4.1	==										
Implementation		4.2	==	==	==	==						
Test						4.3	==					
Plug and Play Implementation							4.4	==	==	==		
Test of completed system										4.5	==	
Controls Access, Concept	5.1	==										
Prototype implementation			5.2	==	==	==						
Protoype Test						5.3	==					
Final System Implementation							5.4	==	==	==		
Final System Test										5.5	==	
Network Security concept developem.	6.1	==										
Implement prototype			6.2	==	==	==						
Test protoype						6.3	==					
Implement final system							6.4	==	==	==		
Test final system										6.5	==	
Integration&UserInterface 0-th order test	7.1	==										
Implementation of Prototype			7.2	==	==	==	==					
Test of Prototype							7.3	==				
Implement final system								7.4	==	==		
Test Final System										7.5	==	

SC1 - Audio

SC2 - Video

SC3 - Virtual Instruments Integration

SC-4 Integration of Controls

SC-5 Integration of Data Access

SC-6 Networking & Security

SC-7 Integration & User Interface

Mechanical & Electrical Design

WP8: ME												
Financial Year	Jan 05				Jan 06				Jan 07			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Recruting	==	==	==									
Conceptual design	1.1	==										
test installation		**1.2**										
market survey completed and ordering			**1.3**									
hardware components delivered			**1.4**	==								
test set-up MVL implementing				**1.5**	==	==						
prototype testing						**1.6**	==					
ordering for improved design							**1.7**	==				
Completing final system								1.8	==	==		
testing final system										**1.9**	==	==

Demonstration of GAN

- already taking place at some institutions now (early prototypes)!
- It is planned to test the MVL equipment in as many institutions and situations possible or desirable
- complete demonstrations will start late in 2007
  - evaluation of the results is planned for the end of 2007 as a conclusion of the project