# Usability Review Report of
# GANMVL version 2.2

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## Abstract

This document describes the experimental procedure and the results of a usability evaluation of the GANMVL software version 2.2.

The GANMVL is a web portal, which provides several services, ranging from general purpose to more specific ones, to carry out daily activities in a specific work context, to communicate with remote collaborators and to control and manage remote resources and equipment.

Version 2.2 of the GANMVL was used to carry out a few realistic usage scenarios within two of the project partners' laboratories. Results of the evaluation are positive with respect to both user's performance with the GANMVL and GANMVL ease of use. In particular, most participants were able, albeit with minimal training experience, to carry out most of the required tasks in a reasonable amount of time, and positively rated the GANMVL for ease of use and learning, and adequacy of task support.

# 1  Introduction

The goal of this document is to describe the experimental procedure and the results of a usability evaluation of the GANMVL software version 2.2. Additionally, we provide all the materials like questionnaires or operators' instructions used for the evaluation in Annex 1 of the present document.

The GANMVL is a web portal, which provides several services, ranging from general purpose to more specific ones, to carry out daily activities in a specific work context, to communicate with remote collaborators and to control and manage remote resources and equipment.

Version 2.2 of the GANMVL was used to carry out a few realistic usage scenarios within two of the project partners' laboratories.

This document is structured as follows. Section 2 provides a full description of the usability evaluation; in particular, we provide an overview of the scenarios designed for the evaluation, we describe the characteristics of test participants, the experimental procedure adopted, the experimental apparatus used to collect data and we define the evaluation criteria adopted. In Section 3, we provide details about the evaluation results, both in terms of task performance and users' subjective assessments. Section 4 describes the conclusions which can be derived from the results both in general and with respect to each GANMVL feature, also providing possible solutions to identified usability problems.

# 2  Evaluation Description

The purposes of our evaluation study include providing insights regarding the effectiveness of the GANMVL web portal and users' reaction to it, and highlighting potential usability problems. To address these purposes, we carried out laboratory studies [1] with two of the partners of the EUROTeV project, namely Elettra Sinchrotron and INFN-LASA. For each study, we collaborated with the partners to set up a realistic usage scenario and to recruit subjects familiar with the pilot application's specific domain. The same version of the GANMVL software (release 2.2) was used in all the studies.

## 2.1  Pilot Application Scenarios

To assess the flexibility of the GANMVL and its usefulness in different domains and application contexts, we set up a realistic and specific usage scenario (as recommended by [1]) for each of the two partners. Such scenarios were designed to be representative of a realistic troubleshooting situation where the GANMVL can be effectively used. For these reasons, not all the functionalities of the GANMVL were exercised in each scenario, because some of them were simply not needed in certain application contexts. Nevertheless, all the main functionalities of the GANMVL have been used in at least one scenario.

The full "Usage Scenarios" are reported in Annex 1 of the present document. In the following, a short overview of each of them is provided:

- **Elettra:** a Control Room operator of the Elettra facility (a multidisciplinary Synchrotron Light Laboratory) in a troubleshooting scenario.
- **INFN-LASA**: an operator of the electronic-room of the INFN-LASA cavity tuning test bench facility in a troubleshooting scenario.

## 2.2  Subjects

The study participants were recruited by involved partners based on: a) knowledge and familiarity with the domain of the specific pilot application, b) suitability of the GANMVL to their daily work, c) not having participated in the GANMVL development. This means that

the chosen population is quite representative of the final end users of the GANMVL. The 4 participants were all males. Two of them were 29 years old and had been associated with their current organization for 5 or 6 years. The other two were 46 and 48 years old, with an experience of 16 and 23 years, respectively within their current organization. The positions held by subjects were researcher, machine operator, senior R&D engineer and software developer.

All the subjects were fluent in English, although all of them were native Italian speakers. Moreover, all the participants made daily use of computers and already had experience with some collaboration tools. In particular, most of them had used Chat, Instant Messaging, Videoconference, Shared Calendars and Scientific Portals at least occasionally (see Figure 1 for more details). Two subjects had no previous experience with the GANMVL, while the remaining two had tried GANMVL occasionally.
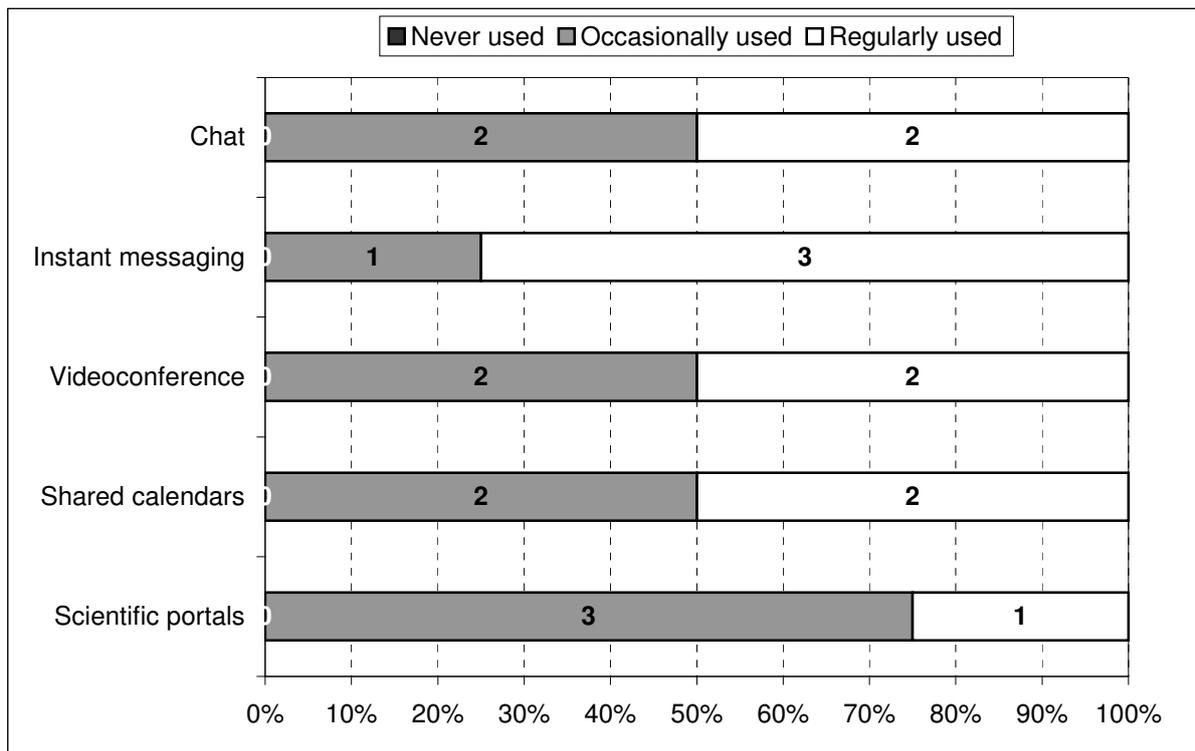


**Figure 1 – Subjects' experience with other collaboration tools**

## 2.3  Experimental Procedure

Each evaluation session was organized in the following three main activities:
- Training
- Usage Scenario's tasks execution
- Questionnaire filling

The scenario involved two collaborators coordinating their activities through the GANMVL. Depending on the scenario, subjects played one of the collaborators (while the other was played by an experimenter) or both.

### 2.3.1  Training

The training activity consisted of a hands-on training demonstration of the GANMVL main functionalities, carried out by the experimenter together with each subject. This activity was carried out on a standard installation of the GANMVL. Nevertheless, to reduce the length of the training phase, only the features useful in the scenario execution were presented in detail by the experimenter. During this phase, the experimenter walked each subject through the

GANMVL functionalities, encouraging her to try all of them and to ask for questions if needed. The training phase (carried out by following a written storyboard that is reported on the "GANMVL Training Scenario", which is included in Annex 1) typically lasted about 30 minutes.

### 2.3.2   Usage Scenario's tasks execution

Before proceeding to the usage scenario's tasks execution, subjects read a scenario description (the "Local Operator Sheet" or the "Remote Expert Sheet" – depending on the role played – of their "Usage Scenario", which are reported in Annex 1), where an overview of their role and of the activities to carry out was given, followed by the detailed list of all the tasks to be accomplished. This phase lasted between 5 and 10 minutes.

During the scenario's tasks execution, subjects were allowed to consult the scenario description and tasks' list but not to ask for any kind of assistance about how to use the GANMVL from the experimenter or any one else. Each scenario listed some of the typical tasks that should be carried out in a realistic troubleshooting context of use. The participants had to carry out each of the tasks in a required order and use the GANMVL collaboration tools to communicate with a remote expert or local operator (e.g., when required by the scenarios).

In the case of the Elettra scenario, an experimenter, who was always connected to the same GANMVL installation of the subject for the whole session, played the role of the remote expert or the local operator and ensured that certain predefined conditions were met before starting each session (e.g. availability of permissions or panels to specific users) as specified in the "Experimenter Sheet" that was prepared in advance (which is reported in Annex 1). This part of the evaluation session lasted about 10 minutes for the session where the subject interpreted the role of the remote expert and about 20 minutes for the session where the real user interpreted the role of the local operator. The difference in timings seems to be mostly due to the greater experience in the domain field of the subject who played the remote expert with respect to the one who played the local operator.

In the case of the INFN-LASA application, it was not possible to follow the same procedure, due to restrictions in time availability of subjects. For this reason, two subjects (one playing the role of the remote expert and the other one the role of the local operator) were involved in the same evaluation session. The experimenter just ensured that the preconditions of the "Experimenter Sheet" (reported in Annex 1) were met for both the subjects. This part of the evaluation session lasted about 40 minutes. The greater time with respect to the Elettra session is due to the greater complexity of the INFN-LASA scenario, which involved more tasks, and that were also more articulated and time consuming.

Each of the above mentioned evaluation sessions was video and audio recorded (all the participants gave their consent to this) for later analysis.

### 2.3.3   Questionnaire filling

At the end of the scenario's tasks execution, participants completed a questionnaire, to collect information about demographic and work information, previous experience with collaboration tools (see the data reported in Section 2.2) and get their feedback about the ease of use of the GANMVL (see Section 3.2).

## 2.4  Experimental Apparatus

An on-site experimenter carried out the two evaluation sessions at Elettra. In particular, the experimenter personally and separately trained and followed the session of each of the two subjects, recording them and their PC screen during the session. A very expert GANMVL

user, belonging to the Elettra facility staff, played the role of the counterpart colleague (remote expert or local operator), during both sessions.

On the contrary, for the evaluation session at INFN-LASA, a single experimenter was remotely connected to the subjects by means of Skype [2] audio conference. In particular, the experimenter separately carried out the training sessions with the two subjects of INFN-LASA, following what they were doing by means of the tunnel functionalities of the GANMVL itself. During the evaluation session, both the PC screens of the two users were recorded, together with the audio conversation between the subjects, and later examined by the experimenter to ensure that the scenario had been properly followed and all the tasks had been accomplished.

Three subjects used Windows XP as the client OS, while one used Linux. All subjects used the Mozilla Firefox web browser to access GANMVL, and all of them used a broadband (LAN/T1) internet connection.

## 2.5  Evaluation Criteria

We analysed the test sessions' audio and video recordings to assess users' performance with the GANMVL, by measuring the percentage of completed tasks and the scenario completion time.

We also collected subjective user ratings about the perceived ease of use of the GANMVL, both in general and with respect to each of its main features, by means of a questionnaire filled at the end of each session.

# 3  Evaluation Results

In this Section, we will present the test results derived from the analysis of the test sessions' audio and video recording, and from the user's questionnaires and remarks.

## 3.1  Task Performance

One of the goals of our evaluation was to determine whether or not users, after a short training with the GANMVL (about 30 minutes, see Section 2.3.1) could successfully carry out realistic tasks in a reasonable amount of time.

To reach this goal we measured the total completion time of the task execution phase of each test session and we analysed the test sessions' audio and video recordings to determine which tasks were successfully accomplished and which were not.

In the following sections, we present the list of the tasks to be accomplished by subjects for each usage scenario, providing details about the successful accomplishment of each task. The lists of tasks are derived by combining the tasks explicitly required to subjects by their own sheet (the "Local Operator Sheet" or the "Remote Expert Sheet", provided in Annex 1 of the present document) and those which were required during the session by the counterpart colleague.

### 3.1.1  Elettra Scenario Task Performance

In the Elettra scenario, two people, a local operator of the control room and a remote export, had to collaborate to solve a problem in the control room of the Elettra facility. The details about the tasks required to the subjects depending on their role are provided in the following paragraphs.

**Elettra Local Operator Task Performance**

In the Elettra scenario, the user playing the role of the local operator had to solve a problem in the control room of the Elettra facility, by following the instructions provided by a remote expert.

Local operator's tasks for the Elettra scenario are the followings:

1. Select a specific station (ControlRoom) of a specific laboratory (elettra)
2. Access the logbook and read the last entry of previous operator
3. Add the remote expert to the proper station (ControlRoom) and provide her with the required privileges (USER)
4. Start the needed control panels (Bqc)
5. Check values in control panels (Bqc)
6. Check values in control panels (RF RoboCAM)
7. Start the needed control panels (OrbitFB)
8. Check values in control panels (RFRoboCAM2)
9. Drop undesired connections by means of TunnelMonitor
10. Remove the remote expert from ControlRoom station

The completion time of the session where the subject played the role of the local operator was around 21 minutes. The subject successfully carried out all the tasks listed above except task 9, which was only partially accomplished, since the subject checked the active connections but he did not drop them as he should. In the following, some difficulties and problems encountered by the subject during the tasks accomplishment are reported.

In task 2, the user had some difficulties in finding the logbook of the control room.

In task 3, the user was really in trouble when he had to add another user to a station: he wandered around, searching for the "Station Admin" capability among the ones of the "ControlRoom" station. After the session, the user explained to the experimenter that he thought that the "Station Admin" capability should have been accessible from the "ControlRoom" station and complained about the lack of such a shortcut. Finally, the user found the "Station Admin" capability within the "elettra" node but wrongly tried to add the user to a "new" laboratory, instead of selecting the "ControlRoom" station. After the session, the user explained to the experimenter that he thought he was still in the "ControlRoom" since he didn't noticed that the current node ("elettra") was underlined and complained about the fact that the current node was difficult to distinguish from the other ones. The user also browsed through all the tabs of the Station Admin capability, before finding the correct one. In the end he succeeded in adding the proper user to the proper station, when the remote expert remarked that he needed to have access to the "ControlRoom" station.

Table 1 shows which GANMVL tools were needed to accomplish each task of the Local Operator in the Elettra scenario.

| | **Task short description** | Resource Browser | Toolbar | Laboratory Admin | Remote Services | VNC tunnel | HTTP tunnel | TunnelMonitor | Logbook |
|---|---|---|---|---|---|---|---|---|---|
| 1. | Select a specific station | ✓ | | | | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2. | Check the logbook | | | | | | | | ✓ |
| 3. | Edit laboratory users (add) | ✓ | ✓ | ✓ | | | | | |
| 4. | Start control panels (Bqc) | (✓) | ✓ | | ✓ | | | | |
| 5. | Check values (VNC tunnel) (Bqc) | (✓) | ✓ | | | ✓ | | | |
| 6. | Check values (HTTP tunnel) (RoboCAM) | (✓) | ✓ | | | | | ✓ | |
| 7. | Start control panels (OrbitFB) | (✓) | (✓) | | ✓ | | | | |
| 8. | Check values (HTTP tunnel) (RoboCAM2) | (✓) | ✓ | | | | | ✓ | |
| 9. | Use TunnelMonitor | ✓ | ✓ | | | | | | ✓ |
| 10. | Edit laboratory users (remove) | ✓ | ✓ | ✓ | | | | | |

**Table 1 – GANMVL tools needed to accomplish each task of the Local Operator in the Elettra scenario**

✓: the task required the usage of the GANMVL tool.
(✓): the task could require the usage of the GANMVL tool.

### Elettra Remote Expert Task Performance

In the Elettra scenario, the subject playing the role of the remote expert had to help an operator located in a control room in solving a specific problem, by providing her the needed instructions.
Remote expert's tasks for the Elettra scenario are listed in the following:

1. Call the local operator
2. Select a specific station (ControlRoom) of a specific laboratory (Elettra)
3. Check the availability of the needed control panels (Bqc)
4. Check values in control panels (Bqc)
5. Check values in control panels (RF RoboCAM)
6. Check values in control panels (RFRoboCAM2)

The completion time of the session where the subject played the role of the remote expert was around 10 minutes. The subject successfully carried out all the tasks listed above. In the following, some difficulties and problems encountered by the user during the tasks accomplishment are reported.
In task 1, the user clicked both on the checkbox and on the user name to select the user to call, due to the slow response of the system. After the session, the user complained about the slow response of the system in general, in particular he said that some feedback about the progress after every action should be provided if the response is intrinsically slow.
In task 3, the user did not immediately recognize the availability of the "Bqc" panel after its appearance, because, when the "Bqc" panel capability appeared on the "Toolbar", he was not looking at it, but he looked at the "Toolbar" only slightly after; the user noticed the "Bqc" panel capability on the "Toolbar" only after a second solicitation of the local operator.
Finally, although the use of the "Laboratory Admin" capability was not among the tasks required to the remote expert by the evaluation session, the subject had the opportunity to try out such functionality during the training session. The user complained about it, because after adding a user to the current station or laboratory, the latter was not selected anymore, so that the user had to remember the station or laboratory that was selected, select it again and finally check if the new user was properly added. Moreover, he commented that the "Update" command was not self-describing at first sight.
Table 2 shows which GANMVL tools were needed to accomplish each task of the Remote Expert in the Elettra scenario.

| | Task short description | Resource Browser | Skype | Toolbar | HTTP tunnel | VNC tunnel |
|---|---|---|---|---|---|---|
| 1. | Call the local operator | ✓ | ✓ | ✓ | | |
| 2. | Select a specific station | ✓ | | | | |
| 3. | Check panels availability (Bqc) | (✓) | | ✓ | | |
| 4. | Check values (VNC tunnel) (Bqc) | (✓) | | ✓ | | ✓ |
| 5. | Check values (HTTP tunnel) (RoboCAM) | (✓) | | ✓ | ✓ | |
| 6. | Check values (HTTP tunnel) (RoboCAM2) | (✓) | | ✓ | ✓ | |

**Table 2 – GANMVL tools needed to accomplish each task of the Remote Expert in the Elettra scenario**

✓: the task required the usage of the GANMVL tool.
(✓): the task could require the usage of the GANMVL tool.

### 3.1.2  INFN-LASA Scenario Task Performance

In the INFN-LASA scenario, two people, a local operator of the electronic room and a remote expert, had to collaborate to solve a problem in the electronic room of the INFN-LASA cavity tuning test bench facility. As specified in Section 2.3.2, the two subjects participated, with the two different roles, to the same evaluation session, which lasted about 40 minutes. The details about the tasks required to the users depending on their role are provided in the following paragraphs.

**INFN-LASA Local Operator Task Performance**

In the INFN-LASA scenario the subject playing the role of the local operator had to solve a problem in a cavity tuning test bench facility, by following the instructions provided by a remote expert.
Local operator's tasks for the INFN-LASA scenario are listed in the following:

1. Contact an available remote expert
2. Add remote expert to proper laboratory (INFN-LASA) and provide her with the required privileges (ADMIN)
3. Create the required HTTP tunnel (IVIscope.html)
4. Create the required VNC tunnel (to a resident PC of the facility)
5. Create the required HRC tunnel (to the HRC camera connected/integrated to/into the mobile station)
6. Pilot the high-resolution camera to show to the remote expert the needed equipment (piezo #1)
7. Pilot the high-resolution camera to show to the remote expert the needed equipment (instrumentation rack of the facility PLL, readout of the PLL frequency synthesizer and frequency counter)
8. Manually control certain local instrumentation based on the instructions of the remote expert (i.e. set a new frequency for the PLL local oscillator (LO) so to lock the PLL loop again)

9. Pilot the high-resolution camera to show to the remote expert the needed equipment (the manual phase shifter within the PLL instrumentation rack)
10. Manually control certain local instrumentation based on the instructions of the remote expert (i.e. move slightly the manual phase shifter in order to verify that the PLL loop is now correctly locked)
11. Add an entry to the logbook to report the interventions made

The subject playing the role of the local operator successfully carried out all the tasks listed above. In the following, some difficulties and problems encountered by the user during the tasks accomplishment are reported.

In task 3, the user didn't notice that the current node was underlined and selected an already selected node.

In task 5, the user created the HRC tunnel by means of the "Factotum Wizard" instead of "HRC wizard" because, during the training phase, the latter was not working properly (as he pointed out in his comments to the usability questionnaire).

Table 3 shows which GANMVL tools were needed to accomplish each task of the Local Operator in the INFN-LASA scenario.

| | Task short description | Resource Browser | Toolbar | Skype | Laboratory Admin | HTTP Wizard | VNC Wizard | HRC Wizard | Hi-Res Camera | Local Instruments | Logbook | Help system |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. | Contact a remote expert | ✓ | ✓ | ✓ | | | | | | | | |
| 2. | Edit laboratory users | ✓ | ✓ | | ✓ | | | | | | | |
| 3. | Create HTTP tunnel | (✓) | ✓ | | | ✓ | | | | | | ✓ |
| 4. | Create VNC tunnel | (✓) | ✓ | | | | ✓ | | | | | ✓ |
| 5. | Create HRC tunnel | (✓) | ✓ | | | | | ✓ | | | | ✓ |
| 6. | Pilot the Hi-Res camera | | | | | | | | ✓ | | | |
| 7. | Pilot the Hi-Res camera | | | | | | | | ✓ | | | |
| 8. | Control local instruments | | | | | | | | (✓) | ✓ | | |
| 9. | Pilot the Hi-Res camera | | | | | | | | ✓ | | | |
| 10. | Control local instruments | | | | | | | | (✓) | ✓ | | |
| 11. | Update the logbook | | | | | | | | | | ✓ | |

**Table 3 – GANMVL tools needed to accomplish each task of the Local Operator in the INFN-LASA scenario**

✓: the task required the usage of the GANMVL tool.
(✓): the task could require the usage of the GANMVL tool.

**INFN-LASA Remote Expert Task Performance**

In the INFN-LASA scenario, the subject playing the role of the remote expert had to help an operator located in a cavity tuning test bench facility in solving a specific problem, by providing her the needed instructions.

Remote expert's tasks for the INFN-LASA scenario are listed in the following:

1. After answering to the local operator's call, select a specific station (Lab Piezo) of a specific laboratory (INFN-LASA)
2. Check the availability of the needed control panel (IVIscope.html)
3. Use HTTP tunnel to check the values of an instrument (scope) connected to the mobile station:
    a. Output signal from signal generator (input to piezo amplifier) to check whether the piezo driving signal is correct or not.
    b. Phase locked loop (PLL) error signal and Piezo #2 (sensor) signal on scope to check whether there is piezo action on the cavity or not.
4. Use VNC tunnel to access a resident PC of the facility and verify that an instrument (piezo amplifier) is fully functional
5. Find instructions about commands syntax to use the piezo amplifier within the portal help system
6. Use HRC tunnel to provide instructions to the operator to capture certain instrumentation (piezo #1) and detect a problem (verify that the piezo actuator is actually loosened due to an excessive stepper motor movement)
7. Use VNC tunnel to the resident PC of the INFN-LASA facility to take remote control of an instrument (the stepper motor driver) and set appropriate parameters (i.e. provide the needed displacement to the stepper motor in order to ensure a good mechanical contact to the piezo actuator)
8. Find instructions about commands syntax to use the stepper motor driver within the portal help system
9. Use HTTP tunnel to check the values of an instrument (scope) connected to the mobile station (in particular, verify that sensor piezo is now responding correctly but PLL is instead unlocked)
10. Use HRC tunnel to provide instructions to the operator to locally control certain instrumentation (i.e. set a new frequency for the PLL local oscillator (LO) so to lock the PLL loop again)
11. Use HRC tunnel to provide instructions to the operator to capture certain instrumentation (i.e. point out the manual phase shifter, within the PLL instrumentation rack, with the camera and move it slightly to verify that the PLL loop is now correctly locked)
12. Use HTTP tunnel to check the values of an instrument (scope) connected to the mobile station (check the channel #1 signal on the mobile station scope to see that the piezo tuning action is correctly felt by the cavity)

The subject playing the role of the remote expert successfully carried out all the tasks listed above, without any particular problem.

Table 4 shows which GANMVL tools were needed to accomplish each task of the Remote Expert in the INFN-LASA scenario.

| Task short description | Resource Browser | Toolbar | VNC | HTTP tunnel | VNC tunnel | HRC tunnel | Help system |
|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. | Select a specific station | ✓ | | | | | | |
| 2. | Check panels availability | (✓) | ✓ | | | | | |
| 3. | Check values in panels | (✓) | ✓ | ✓ | ✓ | | | |
| 4. | Check instrument (VNC tunnel) | (✓) | ✓ | | | ✓ | | |
| 5. | Use the help system | | | | | | | ✓ |
| 6. | Check instrument (HRC tunnel) | (✓) | ✓ | | | | ✓ | |
| 7. | Control instrument (VNC tunnel) | (✓) | (✓) | | | ✓ | | |
| 8. | Check values (HTTP tunnel) | (✓) | (✓) | | ✓ | | | |
| 9. | Use the help system | | | | | | | ✓ |
| 10. | Give instructions (HRC tunnel) | | (✓) | | | | ✓ | |
| 11. | Check instruments (HRC tunnel) | | (✓) | | | | ✓ | |
| 12. | Check values (HTTP tunnel) | | (✓) | | ✓ | | | |

**Table 4 – GANMVL tools needed to accomplish each task of the Remote Expert in the INFN-LASA scenario**

✓: the task required the usage of the GANMVL tool.

(✓): the task could require the usage of the GANMVL tool.

## 3.2  Subjective Assessments

Subjective assessments about the ease of use of the GANMVL have been collected by means of a questionnaire both on general aspects of the system and with respect to some of its specific tools and features. The results are presented in the following two Sections.

### 3.2.1  General Aspects

To collect feedback about how the users perceived the GANMVL in general, we asked users to rate the aspects listed in Figure 2 on a 5-point Likert scale [1] ranging from "Very Bad" to "Very Good".
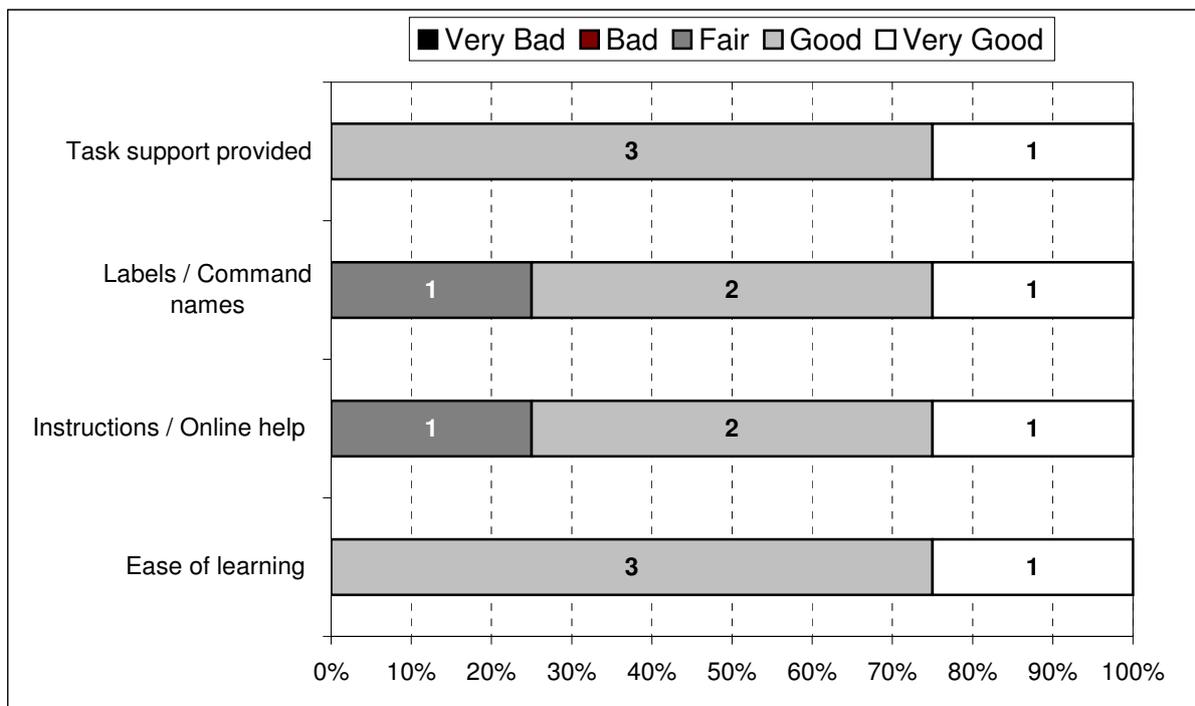


**Figure 2 – Users' ratings about general aspects of the GANMVL**

In summary, ratings about the general aspects of the GANMVL highlight the following results: users were favourably impressed by the ease of learning and use of the GANMVL, they thought that the GANMVL offered a good support to the tasks that they had to carry out and they were satisfied by the language (labels and command names) used by the GANMVL.

### 3.2.2  Specific Features

The same 5-point scale ranging from "Very Bad" to "Very Good" was used to rate the ease of use of specific features of the GANMVL. As anticipated in Section 2.3.2, although each main functionality of the GANMVL has been adopted and evaluated in at least one scenario, it was not evaluated in scenarios where it was not needed. For this reason, the additional "Never used" answer was available for each feature, since the same questionnaire was administered to all participants. The results are reported in Figure 3.
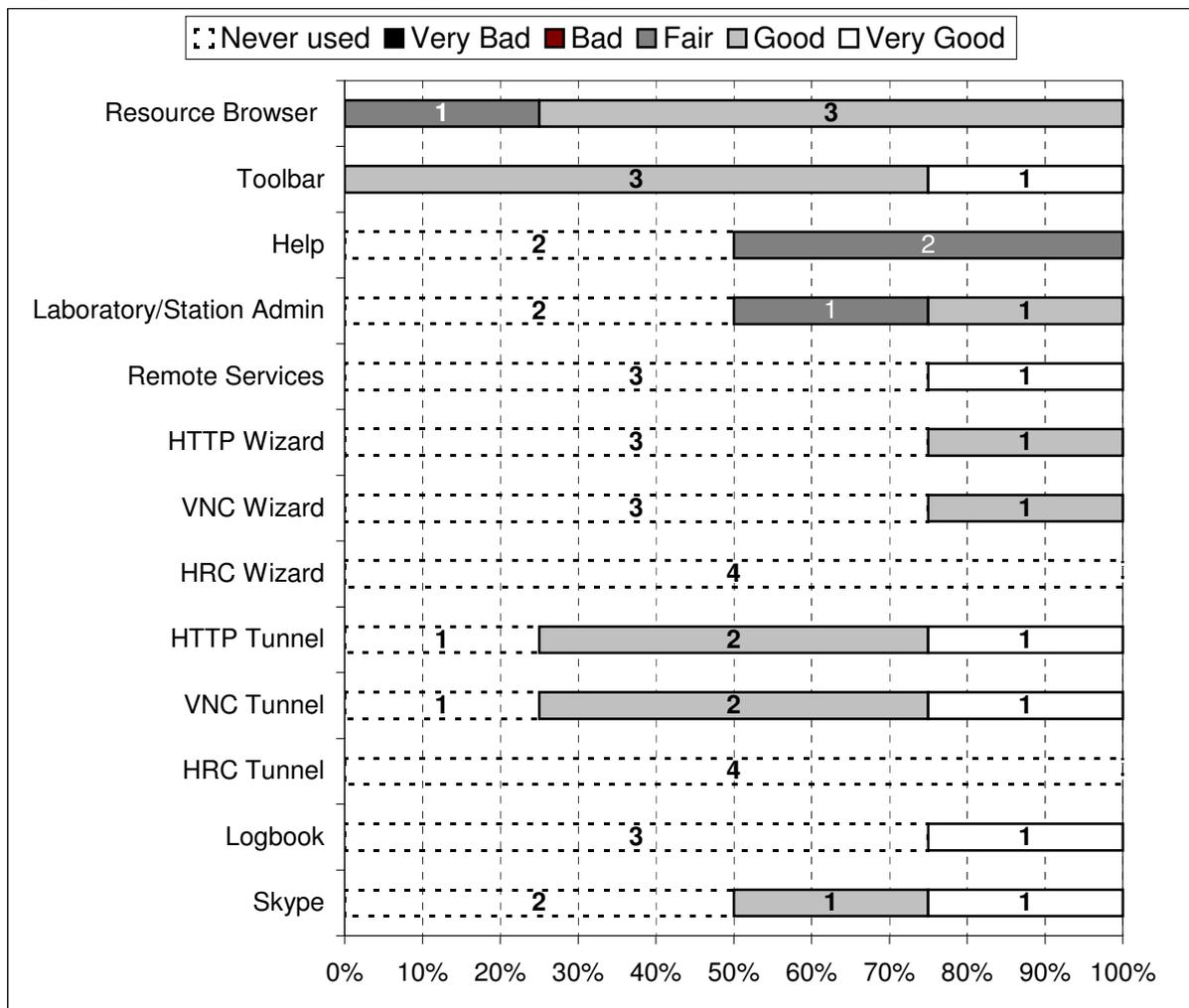


**Figure 3 – Users' ratings about specific features of the GANMVL**

A more detailed analysis of the ratings provided for each GANMVL functionality is provided in Section 4.

# 4  Conclusions

In general results of the evaluation are positive with respect to both user's performance with the GANMVL and GANMVL ease of use. In particular, most participants were able, albeit with minimal training experience, to carry out most of the required tasks in a reasonable

amount of time, and positively rated the GANMVL for ease of use and learning, and adequacy of task support.

Although no direct comparisons have been made between the GANMVL and the tools used by subjects in their daily work activities, the results of our test show that the GANMVL usability and user's task performance with it are adequate for the realistic scenarios used during the evaluation sessions. Although our test has been very limited in scope and number of subjects, its results suggest that the GANMVL could represent a viable unique alternative to the variety of existing software and tools currently used by our subjects and a valid solution for the remote access to needed resources by means of a simple web browser.

In the following paragraphs, we summarize and comment upon results derived for each GANMVL feature from subjective ratings, user comments and test session observations, also suggesting possible solutions to identified usability problems where possible.

### Resource Browser

The Resource Browser, which is one of the main tools of the GANMVL, allowing users to browse and access electronic (e.g. laboratory or station) and human resources, was used in every scenario and in several tasks, since the use of some resource (e.g. selecting a laboratory or station, contacting a collaborator) was always required.

Most users (3 out of 4) rated its ease of use as "Good", while only 1 user rated it as "Fair". No negative ratings were given for this tool.

This result seems to be motivated by the intrinsic simplicity and familiarity of the tool, which is very similar to the tree-views that are frequently found in traditional GUIs (e.g. to browse directory structures): it provides a hierarchically structured list of resources, where nodes can be expanded to browse resources and leaf nodes can be clicked to activate the corresponding resource.

Despite its simplicity and ease of use, two users expressed some complaints and had some difficulties in using it. In particular, in several occasions, one user clicked on an already selected node of the "Local Resources" of the Resource Browser, since (as he explained) he did not recognize the underlined node as the currently selected one. As the user himself suggested, a stronger highlighting of the currently selected node (e.g. a different background colour) could greatly help in recognizing it at a glance. Another user complained about the slow response not only of the Resource Browser but also of the system in general. In particular, the user repeatedly clicked several times the same node, believing that his command had not been received, due to the lack of any form of immediate feedback when the user clicks a node. The problem could be easily solved by showing some progress indicator immediately after the user clicks any node.

### Toolbar

The Toolbar, which is another one of the main tools of the GANMVL, providing access to the capabilities related to each laboratory or station, was also used in every scenario and in several tasks, since the use of some capability (e.g. a wizard, a tunnel, an administration tool) was always required. The Toolbar was often used just after the Resource Browser, since the contents of the Toolbar are always updated based on the selections made on the Resource Browser and on the user privileges with respect to the selected node.

All the 4 users gave positive ratings to the Toolbar (3 "Good" and 1 "Very Good"). This result seems motivated by the simplicity and intuitiveness of the tool, which shows, for each different capability, the name of the capability and a clearly distinguishable and quite intuitive icon.

Nevertheless, based on the observation of what happened during some evaluation sessions, the following suggestions can be provided to further improve the usability of the Toolbar:

- Add the name of the currently selected resource (station or laboratory) to the title of the Toolbar (e.g. Elettra laboratory toolbar, ControlRoom station toolbar); this would help the user to more easily understand the relationship between the Toolbar and the currently selected node of the Resource Browser; for instance, this could have helped in the case of the above mentioned user who did not recognize the currently selected node.

- Highlight (e.g. with a different background and/or a "New" text) the capabilities which have been recently (e.g. since the last login of the currently connected user) added to the toolbar, removing the highlight after the first usage of the capability; for instance, this could have helped in the case of a user who did not easily recognize the presence of a new capability, since it was added when he was not looking at the toolbar.

**Help**

The Help system of the GANMVL has been used only in the INFN-LASA evaluation session, by both the local operator (to find the data to be filled in the tunnel wizards' forms) and the remote expert (to find some useful commands to use in specific remote control panels). The help consisted in a single page where all the relevant information about the LabPIEZO laboratory used during the session was collected, in particular: available equipment, instructions about how to use it (e.g. most frequently used commands) and configuration information to set up the tunnel wizards.

Subjects rated the Help system as "Fair", without providing further comments, which means that they where satisfied, since they found all the information they needed to carry out the task, but not enthusiasts. This could be due to an overall poor format and style of the page, which mostly consisted of plain text (e.g. without titles highlighting and separating the different sections, or links to jump to the needed content).

**Laboratory/Station Admin**

The Laboratory Admin and the Station Admin capabilities allow to manage the resources of GANMVL laboratories and stations, respectively. In particular, during the evaluation sessions, only local operators used this capability to add (or remove) the remote experts to a specific laboratory or station to give them the needed privileges to use the laboratory or station resources. One user rated the Laboratory/Station Admin as "Fair" and the other one as "Good". The two capabilities were not rated separately, since they provided the same functionalities, although on different targets (i.e. laboratory or station).

The problems highlighted during the evaluation sessions were the following ones:

- Both the Laboratory Admin and the Station Admin capabilities are not available when, respectively, a laboratory or a station is currently selected; this forces the user to first select the parent node if he wants to modify the properties of the currently selected laboratory or station, which is not so intuitive and caused problems to one of the subjects, who also complained about this. For this reasons, when a laboratory or a station is currently selected, a Laboratory or Station Admin capability should be provided to directly manage the selected laboratory or station.

- The currently selected laboratory or station is not properly highlighted; this problem has been pointed out by a subject who wrongly added the remote expert to a "new" station instead of selecting the correct station; indeed, the name of the currently selected laboratory or station should be made more prominent; moreover, the functionalities to create a new laboratory or station and the ones to modify an existing laboratory or station should be better separated: to create a new laboratory or station a user must select the "new" item from a menu labelled "Modify station" and then click a "Create" link below the "Modify station" menu; to modify a laboratory or station a user must select the proper item from the same "Modify station" menu, make the needed changes and finally click an

"Update" link below the "Modify station" menu. For this reasons, it seems appropriate to separate the functionality to create a new laboratory or station, providing a separate "Create new" link and removing the "new" item from the "Modify station" menu.

- The "Update" link is poorly labelled, and what happens after pressing is disorienting. These problems were pointed out by a subject during the training session; in particular, the user commented that the "Update" command was not self-describing at first sight and he complained about the fact that after adding a user to the current laboratory or station, the latter was not selected anymore, so that the subject was disoriented and had to remember the laboratory or station that was selected, select it again and finally check if the new user was properly added. For this reasons, the label of the "Update" command should be changed to something like "Save changes", which better reflects its effect of saving the changes made to the laboratory or station (and the corresponding "Cancel" command should be consequently labelled "Cancel changes"); moreover, there is no need to deselect the current laboratory or station after saving the changes made to it.

### Remote Services

The Remote Services tool allows to see the list of several predefined remote services together with their current status (started or stopped), to edit any of them and to start or stop them. Such tool was needed and used only by the subject playing the role of the local operator in the Elettra scenario, who rated it as "Very Good" and had no problems in using it.

### Tunnel Wizards

The different Wizard tools to configure and create different types of tunnels (e.g. HTTP, VNC) were needed and used only by the subject playing the role of the local operator in the INFN-LASA scenario, who rated it as "Good" and had no problems in using them. There was only a technical problem with the HRC Wizard, which did not work properly during the training session and was thus replaced by the Factotum Wizard during the evaluation session.

### Tunnels

The different Tunnels (e.g. HTTP, VNC) used to monitor or control remote instrumentation where used by all the subjects except the local operator of the INFN-LASA scenario, who didn't need them since he had the possibility to directly interact with the physical devices. The three users who used the Tunnel tools rated them between "Good" (2 out of 3) and "Very Good" (1 out of 3) and had no problems in using them.

### Logbook

The use of the Logbook was required only to the subjects playing the role of the local operator, but only one of them used the GANMVL integrated logbook, rating it as "Very Good", while the other one used an external logbook linked via tunnel but not integrated into the GANMVL, since there were technical problems with the integrated logbook.

### Skype

The Skype integrated functionality of the GANMVL was actively used only by the two subjects who had to contact their remote colleague in both scenarios. In fact, they were the only ones who had to select their colleague from the "Users" section of the Resource Browser and start a Skype call through the proper GANMVL capability, while the responding users had just to answer a traditional Skype call. Both users rated the Skype functionality as positive (1 "Good" and 1 "Very Good").

## **Acknowledgement**

## **References**

1. Dix, J. Finlay, G. Abowd and R. Beale. Human Computer Interaction, Third Edition, Prentice Hall, 2003
2. Skype Communication Tool, http://www.skype.com

# Annex 1

This document collects together all the material used for the GANMVL evaluation. In particular, the GANMVL Training Scenario is included in its integral version. For scenario, the Local Operator Sheet and the Remote Expert Sheet given to each subject based on his role in the scenario and the Experimenter Sheet used by the experimenter during the test session are included. Finally, the Questionnaire, which was administered to subjects at the end of each test session, is also provided.

# GANMVL Training Scenario

The Training Scenario was carefully designed in advance and written in a way to provide the experimenter with a precise track to follow during the presentation of the GANMVL functionalities. In this way, we guaranteed that the same information was given to each user.

## Introduction

The goal of our meeting is to collect your feedback about the usage of the GANMVL software, in a real-world scenario. The GANMVL is a web portal, which provides several services (ranging from general purpose to more specific ones) to carry out daily activities in a specific work context, to communicate with remote collaborators and to control and manage remote resources and equipment.

First of all, I will walk you through the main functionalities of the GANMVL, so that you can start to become familiar with them, then you will be provided with a scenario, describing a set of activities that you should carry out on your own, by means of the GANMVL and finally I will ask your feedback about your experience with the GANMVL.

Do you have any question, before we start?

Go to the following address: https://gan.elettra.trieste.it/

## Description

**Login and Layout**

1. **Login** with user **demarco@dimi.uniud.it** password **ganmvl**.
2. Take a moment to familiarize yourself with the **page layout**.

As you can see, at the top of the page there are **two tabs "GAN Portal" and "Info Point"**. The first one contains the core tools of the portal, while the second one collects together different kinds of information, such as the logbook, the help system and tools downloads.

The "GAN Portal" tab is divided into 3 portlets (sort of windows in the web page).

The top left portlet is the **"Resource Browser"**, which allows to browse the list of all the available resources. In particular, it is divided into 3 sections, which can be expanded or collapsed.

3. **Click on each section** to expand or collapse it.

The **"Local Resources"** section reflects the structure of the GAN virtual organisation. The top node represents the whole virtual organization, while each node at the first level represents a different participating **laboratory**. To access the resources of each laboratory you have to select its corresponding node.

4. For instance, **click the "Elettra" laboratory** or the plus sign beside it. As you can see a list of nodes appears.

Each of the nodes under each laboratory represents a different station in the laboratory.

The **"Remote Resources"** section of the "Resource Browser" allows to access to the resources of the remote laboratories which are listed.

Finally the **"Users"** section allows to browse the list of all the GANMVL portal users, see their availability, and contact them. Note that users who are currently logged-in are displayed in bold font.

The top right portlet is the **"Toolbar"**, where available tools are displayed based on the resource you select within the Resource Browser and your role within the GANMVL portal.

5. For instance, **click the "Global Accelerator Network"** node. As you can see a list of mainly administrative tools is displayed within the "Toolbar".

6. Then, **click the "ControlRoom"** station of the "Elettra" laboratory. As you can see a list of different tools is displayed within the "Toolbar". We will examine in more detail each possible kind of tool within a few minutes.

Finally, The bottom left portlet is the **"Calendar"**, which allows to schedule meetings and appointments.

At the bottom right of the page (where the logo of the EUROTeV project is displayed) non-floating tools are displayed when they are selected from the "Toolbar".

7. For instance, **click the "Factotum Wizard"** tool. As you can see the EUROTeV logo is replaced with a panel displaying information an operations related with the tool.

Do you have any question?

Now we will examine in more detail each possible kind of tool provided by the GANMVL.

### Global Accelerator Network Tools

We will start from the tools, which are available under the "Global Accelerator Network" node of the "Resources Browser".

### Capability Admin

The **"Capability Admin"** tool allows to manage (install, configure etc.) the *Capabilities* (or tools) available to users.

8. **Click on the "Capability Admin"** icon: currently available tools are listed.

9. **Select an item in the list**: the configuration parameters for that particular capability are shown. Administrators can edit and modify these parameters or add a new capability by clicking the "Upload" button.

### Factotum Wizard

10. **Click on the "Factotum Wizard"** tool, which allows to create a new capability or to delete and modify an existing capability in the "Toolbar".

In particular, it allows to create connections of the following types: **SSH**, **Telnet** or **Generic**. If you want to use a generic connection you must specify the application that you want use and arguments needs for application.

### FileManager

The **"FileManager"** tool allows you to create file repositories and access them from the stations. We will not use this tool.

### Global Accelerator Node Admin

11. **Click on the "Global Accelerator Node Admin"**, which allows to manage users, properties and resources of the Global Accelerator Node.

12. In particular, **select the "Users" tab**, which allows to add or remove system users to and from the Global Accelerator Node group.
13. Then, **select the "Resources" tab**, which allows to add or remove tools from the Global Accelerator Node or temporarily disable/enable them for some specific reason.

### Laboratory Admin

14. Now **click on the "Laboratory Admin"** tool, which allows to manage virtual laboratories. In particular, it is possible to create a new virtual laboratory, delete an existing one or select an existing laboratory and modify it.
15. For instance, **select the "Elettra" laboratory** from the "Modify laboratory" menu. As you can see you could change the "Description", and you can also set the visibility of the laboratory to be public or not, by checking the item "Public".
16. Now, **select the "Users" tab**, which is identical to the one of the "Global Accelerator Node Admin", although, in this case, only the users of the selected laboratory (currently "Elettra") can be edited.
17. **Select user [gabrielli@dimi.uniud.it](mailto:gabrielli@dimi.uniud.it)** from the list of available users and **click "ADD user to group"** to give her access to the "Elettra" laboratory.
18. **Select "ADMIN" from the "Role" menu** to give full privileges to the user just added.

Remember that **user privileges are inherited from parent to child nodes**, so that, for instance, a user with administrator privileges in the "Global Accelerator Network" node will have the same privileges in all the laboratories and station if not specified differently. **Any user privilege specified at a lower level will have the precedence** (e.g. considering the previous example, the user can be given just "User" privileges at the laboratory level and "Guest" privileges at station level.

19. **Click on several users** to select them (note that selected users become highlighted in yellow) and click on them again to deselect them.
20. **Select user [gabrielli@dimi.uniud.it](mailto:gabrielli@dimi.uniud.it)** from the list of subscribed users and **click "REMOVE selected users from group"** to remove her from the "Elettra" laboratory.
21. Now, **select the "Resources" tab**, which is identical to the one of the "Global Accelerator Node Admin", although, also in this case, only the resources of the "Elettra" laboratory can be edited.

### Script Admin

22. Now **click the "Script Admin" tool**, which allows to create a new script or to search and modify an existing one.

The "**Search Scripts**" section, which can be expanded or collapsed, allows manually browsing scripts or searching them by name.

The "**Edit Scripts**" section, which can be expanded or collapsed too, allows to edit existing or new scripts.

### Tunnel Monitor

23. Now **click the "Tunnel Monitor" tool**, which allows monitoring all the tunnels (e.g. VNC, HTTP) currently opened.

The popup window, which gets opened, is continuously updated to show information about the currently active sessions. In particular, it shows the user name, the client's address and the application that is being run, together with the age of the session, allowing the operator to "DROP" unnecessary sessions (because they are too old or undesired), by clicking the corresponding link.

### User Profile

24. Now **click the "User Profile" tool**, which allows to modify the user profile of the currently logged in user.

### User Profile Manager

25. Now **click the "User Profile Manager" tool**, which allows to create a new user or to search and modify an existing user.

The "**Search Users Form**" section, which can be expanded or collapsed, allows manually browsing users or searching them by name.

The "**Edit User Form**" section, which can be expanded or collapsed too, allows to edit existing or new users.

Do you have any question about the features we have seen so far?

### Laboratory Tools

Now we will focus on a specific tool, which is available for each laboratory and which allows to manage stations. We will see the different wizards for tunnel connections in more detail later.

26. **Click on the "Station Admin"** tool, which allows to manage virtual stations. In particular, it is possible to create a new virtual station, delete an existing one or select an existing station and modify it.

27. For instance, **select the "ControlRoom" station** from the "Modify station" menu. As you can see you could change the "Description", and you can also set the visibility of the station to be public or not, by checking the item "Public".

28. Now, **select the "Users" tab**, which is identical to the one of the "Global Accelerator Node Admin", although, in this case, only the users of the selected station (currently the "ControlRoom") can be edited.

29. **Select user [gabrielli@dimi.uniud.it](mailto:gabrielli@dimi.uniud.it)** from the list of available users and **click "ADD user to group"** to give her access to the "ControlRoom" station.

30. **Select "ADMIN" from the "Role" menu** to give full privileges to the user just added.

31. **Click on several users** to select them (note that selected users become highlighted in yellow) and click on them again to deselect them.

32. **Select user [gabrielli@dimi.uniud.it](mailto:gabrielli@dimi.uniud.it)** from the list of subscribed users and **click "REMOVE selected users from group"** to remove her from the "ControlRoom" station.

33. Now, **select the "Resources" tab**, which is identical to the one of the "Global Accelerator Node Admin", although, also in this case, only the resources of the "ControlRoom" station can be edited.

### Station Tools

Now we will focus on the specific tools, which are available for each laboratory station. In particular, we will see a set of wizards allowing to create different kinds of tunnels, like HTTP, VNC and HRC (High Resolution Camera) ones. These tunnels allow to have remote access to resources which would be not otherwise accessible from outside the local laboratory network.

34. First of all **select the "ControlRoom" station of the "Elettra" laboratory**. As you can see several tools are available in the "Toolbar".

Note that some tools have a **"popup"** label to denote that, when selected they will be displayed into a separate popup window, contrarily to those which are not labeled as popup, which will be displayed within the page, immediately below the "Toolbar". The popup feature

allows to use more than one tool at the same time and to arrange and resize their windows as considered appropriate by the user.

### Remote Services

We will start to examine the station specific tools from the "**Remote Services**" tool.

35. **Click the "Remote Services" tool**, which allows to see the list of several predefined remote services together with their current status (started or stopped), to edit any of them and to start or stop them.

36. For instance, **click on the "Stop" button of the "Big_DX" and "Big_SX" control panels**, supposing that we don't need them anymore. As you can see the two corresponding VNC remote services disappear from the "Toolbar" and they will not be available until they are restarted from the "Remote Services" tool.

37. If you **click the "Edit" link** besides the name of one of the remote services, you can also edit its parameters in the "Service Form" section.

38. If you **click the "NEW" link** at the bottom of the "Service Form" section, the form fields are cleared and it is possible to define a new remote service.

Note that the **"Viewer Info"**, which defines the type of tunnel, is also used to display a proper icon within the "Toolbar".

### HTTP Tunnels

39. **Click the "HTTP Wizard" tool**, which allows to create tunnels based on HTTP connections.

Similarly to other wizards that we have already seen, there is a "**Search**" section, which, as always, can be expanded or collapsed, allowing to manually browse existing tunnels or searching them by name. Then a collapsible "**Edit**" section allows to edit existing or new HTTP tunnels.

To properly configure a HTTP tunnel you have to provide the following information:

- **Name**: that will be read by the end user
- **URL**: the endpoint of the HTTP resource
- **View through tunnel**: check the box if tunnelling is needed (e.g. if the resource is behind a firewall)
- **Width** and **Height**: the initial width and height of the window expressed in percentage
- **Open in a new window**: check the box if you want the tunnel to be opened into a floating window (the "popup" label will be automatically added to the corresponding tool within the "Toolbar")
- **Share with other groups**: check the box if you want the tunnel to be shared outside the laboratory or station

Note that HTTP tunnels are displayed with a Firefox browser icon within the "Toolbar".

40. For instance, **select the "RF RoboCAM" HTTP tunnel**, from the "Toolbar".

### HRC Tunnels

41. **Select the "MobileStation"**, of the "Elettra" laboratory.

42. **Click the "HRC Wizard" tool**, which allows to create tunnels connections to a High Resolution Camera. Generally, the HRC is manually operated by a local operator situated in a physical electronic room of some real laboratory.

Similarly to other wizards that we have already seen, there is a "**Search**" section, which, again, can be expanded or collapsed, allowing to manually browse existing tunnels or searching them by name. Then a collapsible "**Edit**" section allows to edit existing or new HRC tunnels.

To properly configure a HRC tunnel you have to provide the following information:

- **Name**: that will be read by the end user
- **HRC Host**: the endpoint of the HRC
- **Remote HRC Port**: set to 5010 by default, which should be fine on most occasions
- **Width** and **Height**: the initial width and height of the window expressed in percentage
- **Open in a new window**: check the box if you want the tunnel to be opened into a floating window (the "popup" label will be automatically added to the corresponding tool within the "Toolbar")
- **Share with other groups**: check the box if you want the tunnel to be shared outside the laboratory or station

Note the specific icon that distinguishes the HRC tunnels within the "Toolbar".

### VNC Tunnels

43. **Go back to the "ControlRoom"**, of the "Elettra" laboratory.
44. **Click the "VNC Wizard" tool**, which allows to create tunnels based on VNC connections.

This is particularly useful when you have not only to monitor, but also take control of remote panels or instrumentation which do not provide any kind of web based user interface, so that you have to start a remote desktop on a physical machine of the laboratory.

Similarly to other wizards that we have already seen, there is a "**Search**" section, which, again, can be expanded or collapsed, allowing to manually browsing existing tunnels or searching them by name. Then a collapsible "**Edit**" section allows to edit existing or new VNC tunnels.

To properly configure a VNC tunnel you have to provide the following information:
- **Name**: that will be read by the end user
- **VNC Host Configuration**: to be used if more host/ports must be set
- **VNC Host**: the endpoint of the VNC
- **Remote VNC Port**: set to 5900 by default, which should be fine on most occasions
- **Remote VNC Password**: set a password which must be always provided
- **Width** and **Height**: the initial width and height of the window expressed in percentage
- **Open in a new window**: check the box if you want the tunnel to be opened into a floating window (the "popup" label will be automatically added to the corresponding tool within the "Toolbar")
- **Share with other groups**: check the box if you want the tunnel to be shared outside the laboratory or station
- **Select your VNCviewer**: Applet Viewer

Note that VNC tunnels are displayed with a VNC icon within the "Toolbar".
45. For instance, **select the "Small_DX" VNC tunnel**, from the "Toolbar".

**NOTE:** if you want to temporarily disable a tunnel service, you'd better stop it by means of the "Remote Services" tool. If you delete the tunnel from its dedicated wizard, you will loose also its configuration that will need to be manually performed when the tunnel will be needed again.

### Tunnel Monitor

Note that the **"Tunnel Monitor"** that we have already seen within the "Global Accelerator Node", is available also here with the same functionalities (monitoring and dropping currently opened tunnels).

Do you have any question about the features we have seen so far?

**Communication Tools**

The GANMVL portal provides integrated support for some communication tools to facilitate collaboration among users. In particular, it is possible to start a chat or a call through Skype or a videoconference through VRVS or EVO.

**Skype**

46. **Click the "Skype" tool**: a **SkypePad** panel is displayed just below the "Toolbar" with instructions about how to use it.
47. **Select users roberto.pugliese and fabio.bonaccorso** from the "Users" section of the "Resources Browser", by checking the box beside them. As you can see, selected users that have a Skype name in their GANMVL profile get visualized within the "SkypePad", together with two links, one to start a call and one to start a chat.

**VRVS**

48. **Click the "VRVS" tool**: a **VRVSPad** panel is displayed just below the "Toolbar" with instructions about how to use it.
49. **Select users roberto.pugliese and fabio.bonaccorso** from the "Users" section of the "Resources Browser", by checking the box beside them. As you can see, the list of selected users gets visualized within the "VRVSPad".

**EVO**

50. Finally, **Click the "EVO" tool**: a new window is displayed which allows to connect to EVO.

In this case no more integrated functionalities are provided and the tool represents just a sort of bookmark to quickly have access to EVO.

Do you have any question about the communication tools?

**Info Point**

The "Info Point" tab collects together a logbook, where events can be registered and read, the help system of the GANMVL and a tools download section.

**Logbook**

The "**Logbook**" tool provides the opportunity to register important events and read the ones already present, for example for troubleshooting activities.
51. **Click on the title** of one of the entries. You will see the full message, which has been added by some operator.
52. Then **select the "Back" link**, to return to the list of all the entries.
53. Finally **select the "Add New Post" link**: as you can see a form with several fields and a text editor are displayed. The only fields that you have to fill-in are the "Title" and the text area where some meaningful and descriptive text should be entered. Of course you should also change the values of the other fields, which are set to default values, if necessary. For instance, you should set the "Severity" and the "Keyword" according to the type of event that you are adding, while the "Author" and the "Post Date" fields should be left to their default values.

**Help**

In the "Help" section you can find information about the installation, usage and administration of the GANMVL.

**Download**

In the "Download" section you can find all the software needed to run the GANMVL client, the GANMVL station and the GANMVL labserver. Most of the software is automatically downloaded and installed from your browser. The software you can find here generally requires manual setup.

Do you have any question, before starting the next phase?
Now you can go to the INFN - LASA installation of the GANMVL, you can login with the username and password that I provided to you and take some minutes to familiarize yourself with this GANMVL. Feel free to try out everything and ask for clarifications if you need them. Remember that in the next phase, I will not be allowed to help you anymore.

# Usage Scenarios

## Elettra Scenario

### Elettra Local Operator Sheet

You are an operator of the control room of the **Elettra** facility.
Your task is to solve a problem in the control room. In particular, the problem is the following:
- **The quality of the accelerator's beam is not good. You have to contact a remote expert to solve the problem together using the GANMVL Portal.**

In summary, your tasks are the following:
- Access the GANMVL portal:
  **user**: fabio.bonaccorso@elettra.trieste.it; **password**: ganmvl
- Read the **messages** of previous operator on the **Logbook CR** of the **ControlRoom** station of the **elettra** laboratory
- Contact the **remote** expert user roberto.pugliese@elettra.trieste.it, explain the problem and ask for instructions
- Follow the **instructions** of the remote expert by performing the required actions
- Keep the **connections** to the portal's panels monitored and drop the ones that are not desired (i.e. that do not belong to you or the remote expert)
- Logoff, after **the** problem has been solved

The only laboratory and station that you and the expert need to access to carry out your tasks and complete the intervention are the following ones:
- Laboratory: **elettra**
- Station: **ControlRoom**

### Elettra Remote Expert Sheet

You are an expert of the control room of the **Elettra** facility.
Your task is to help an operator, located in the control room of **Elettra**, to solve a problem. You are far from the control room but you are connected to the GANMVL portal. You have to provide instructions to the operator to collect the data you need to diagnose and solve the problem.
In summary, your tasks are the following:
- Access the GANMVL portal:
  **user**: fabio.bonaccorso@elettra.trieste.it; **password**: ganmvl

- Answer to the call of the local operator and listen to his request.
- In case of troubles with the beam quality of the accelerator, perform the actions listed in the following to collect data and solve the problem and give instructions to the operator when needed (e.g. to have access to specific panels or data), moreover, remember to keep the operator always informed about what you are doing so that she can follow all of your steps:
    - Ask the operator which laboratory and station you have to connect to and connect to it
    - Check the current situation of the beam:
        - **Open the BQC (Beam Quality Control) panel**
    - Check the values of the "Cavità a radio frequenza" parameters to see if there is any problem with them:
        - **Open the RF RoboCAM panel**
    - **Ask the operator to start the OrbitFB remote service** to solve the problem
    - Check if everything is ok after launching the OrbitFB:
        - **Open the RFRoboCAM2 panel**
    - If everything is fine, tell to the operator that the problem is solved and logoff

### Elettra Experimenter Sheet

- Set the **login skype name** of user fabio.bonaccorso@elettra.trieste.it properly, **both on the portal and on the client machine** used by the current subject
- Conditions for **test user** gabrielli@elettra.trieste.it:
    - Remove user from **elettra** laboratory and **ControlRoom** station
    - Add user to **Global Accelerator Network** node with **GUEST** privileges
- Conditions for **local operator user**: (roberto.pugliese@elettra.trieste.it or fabio.bonaccorso@elettra.trieste.it)
    - Ensure that the user has ADMIN privileges in: **Global Accelerator Network** node, **elettra** laboratory and **ControlRoom** station
- Conditions for **remote expert user**: (roberto.pugliese@elettra.trieste.it or fabio.bonaccorso@elettra.trieste.it):
    - Remove user from **elettra** laboratory and **ControlRoom** station
    - Add user to **Global Accelerator Network** node with **GUEST** privileges
- Switch off **OrbitFB** and **Bqc** control panels by means of **Remote Services** capability.
- Connect to the **RF RoboCAM** control panel with user demarco@dimi.uniud.it

## INFN-LASA Scenario

### INFN-LASA Local Operator Sheet

You are an operator of the electronic-room of the **INFN-LASA cavity tuning test bench** facility.

Your task is to solve a problem in the electronic-room. In particular, the problem is the following:

- **Fine cavity tuning action provided by piezo actuator (piezo #1) on cavity is absent. A second piezo (piezo #2) is used as a sensor. A time-varying control voltage, a 10 Hz sinusoidal waveform 20 Vpp has been applied but no corresponding effect has been observed on cavity tune.**

You are equipped with a mobile station, which consists of:

- **Laptop Win XP based, Firefox, Skype, VNC, and VLC clients installed.**
- **Dual channel digital oscilloscope already configured with IVI driver via the configuration steps described in the GANMVL help system.**

- **High resolution camera, USB connection to laptop.**
- **Microphones and speakers.**
- **On site: Network cables and connection, power cables, signal cables and probes.**

After reaching the electronic-room with your mobile station, you need to contact a remote expert to help you in diagnosing and solving the problem.

In summary, your tasks are the following:

- Reach the electronic-room carrying with you the mobile station.
- Connect the included laptop to the network and access the GANMVL portal.
- Contact an available user, explain the problem and ask for instructions.
- Follow the instructions of the remote user by performing the required actions.
- Logoff, after the problem has been solved.

In the following, information that you need to carry out your tasks is provided:

- Laboratories and stations needed for the intervention:
    - Laboratory: **INFN Milano – LASA**; Station: **Lab Piezo**
- **High-resolution camera**, relevant data:
    - Remote Access URL (for HRC tunnel):
      pcares2.mi.infn.it
- **Local piezo amplifier**, relevant data:
    - Remote Access URL (for VNC tunnel):
      pcares2.mi.infn.it
- **Mobile station Oscilloscope**, relevant data:
    - Remote Access URL (for HTTP tunnel):
      http://pcares2.mi.infn.it/iviScope.html

**INFN-LASA Remote Expert Sheet**

You are an expert of the electronic-room of the **INFN-LASA** facility.

Your task is to help an operator, located in the electronic-room of the **INFN-LASA cavity tuning test bench** facility, to solve a problem. You are far from the electronic-room but you are connected to the GANMVL portal. You have to provide instructions to the operator to collect the data you need to diagnose and solve the problem.

In summary, your tasks are the following:

- Access the GANMVL portal:
  **user**: **rocco.paparella@infn.lasa.it**; **password**: **infn-lasa**.
- Answer to the call of the local operator and listen to his request.
- Perform the actions listed in the following to collect data and solve the problem and give instructions to the operator when needed (e.g. to have access to specific panels or data or to perform operations on local equipment):
    - Ask the operator which laboratory and station you have to connect to and connect to it.
    - Open the **IVIscope.html panel** (if not already available ask the operator to create it) to check the current status of the mobile station scope.
    - Ask the operator to identify the **BNC cables** needed to manually connect to the channels of the mobile station oscilloscope to detect the following signals:
        - **Output signal from signal generator (input to piezo amplifier)**
        - **Phase locked loop (PLL) error signal**
        - **Piezo #2 (sensor) signal**
    - Ask the operator to manually connect to the mobile station scope the following signal:

- ▪ **Output signal from signal generator (input to piezo amplifier) on scope channel #1**
- o Check whether the piezo driving signal is correct or not by looking at the above signal.
- o Ask the operator to connect the **output from signal generator** to the **external trigger input** of the oscilloscope since this will be needed for the next measurements.
- o Ask the operator to manually connect to the mobile station scope the following signal:
  - ▪ **Phase locked loop (PLL) error signal on scope channel #1**
  - ▪ **Piezo #2 (sensor) signal on scope channel #2**
- o Check whether there is piezo action on the cavity or not by looking at the above signals:
  - ▪ If there is **no 10 Hz sinusoidal pattern** on the observed signals proceed with the following steps.
- o Tell the operator that you need to take remote control of the PI piezo amplifier:
  - ▪ Ask the operator to give you access to the proper remote machine of the electronic room**.**
- o Connect to the remote machine of the electronic room and verify whether the piezo amplifier is fully functional or not:
  - ▪ Bring up the **"PI's WinTerm32 – Teminal Window"** control panel (<u>check syntax of commands to perform the following operations into the GANMVL help system</u>).
  - ▪ **Take remote control of the piezo amplifier**
  - ▪ **Set an arbitrary voltage level** (not too high, e.g. 10 V DC) on the **actuator piezo #1**.
  - ▪ Verify the presence of the corresponding response on both scope channels**:**
    - • **amplifier output on channel 1**
    - • **piezo #2(sensor) on channel 2**
  - ▪ **Release the remote control of the piezo amplifier**.
- o Ask the operator to switch on her **high-resolution camera** and give you access to its video streaming.
- o Check the piezo actuator status by means of the **remote camera**:
  - ▪ Connect to the video-streaming of the high-resolution camera.
  - ▪ Ask the operator to point the high resolution camera closely to the **point where the piezo sensor is installed on the test facility** (if needed ask to adjust the camera focus).
  - ▪ While pointing the camera to sensor piezo**, ask the operator to slightly and gently move the steel bolt holding the piezo stack on the side opposite to the tuner** (<u>ATTENTION: refer to the sensor piezo, avoid touching the actuator one!</u>) to check whether piezo are actually loosened.
- o **If piezo are actually loosened** due to an excessive displacement of the tuner (and cavity) driven by the stepper motor, you need to move the stepper motor to a different position, thus displacing the cavity and the tuner as needed to that a good mechanical contact of piezo. To do this perform the following steps:
  - ▪ Connect to the remote machine of the electronic room.
  - ▪ Bring up the **"MIND T2 RTA"** control panel (<u>check syntax of commands to perform the following operations into the GANMVL help system</u>).
  - ▪ **Take remote control of the stepper motor driver software**.

- **Drive the motor with successive steps of +10000 steps** (about +20000 to +30000 total steps should be enough).
- Meanwhile, continuously **monitor the signals connected to the scope**
- When the **10 Hz sinusoidal pattern** clearly emerges on sensor piezo signal connected on **scope channel #2**, the sensor piezo is responding correctly.

o Check whether the Phase Locked Loop (PLL) still needs to be reset to a correct working point or not:
- If the **PLL error signal (scope channel #1) has a high offset and no sinusoidal response** proceed with the following steps.

o Provide instructions to the local operator to identify and capture, through the **high-resolution camera**, the following instrumentation and operate on it, to set the PLL loop in the correct working point:
- Ask the operator to point the high resolution camera to the **rack containing the instrumentation for the Phase Locked Loop (PLL)** of the facility.
- Ask the operator to **closely capture the display of the PLL frequency counter and the manual phase shifter installed close to it**.
- Ask the local operator to **start moving the manual phase shifter** (rotating the dial wheel clockwise).
- Meanwhile, **look at the camera** (frequency counter display should reveal the cavity frequency shifting) **and at the PLL error signal on scope channel #1**.
- The manual phase shifter must be moved **until the PLL error signal offset is set to zero and the 10 Hz sinusoidal pattern appears**.

o The problem is solved.
o Ask the operator to **add an entry to the laboratory logbook** to report the interventions made.
o Logoff.

**INFN-LASA Experimenter Sheet**

- Remove user **rocco.paparella@infn.lasa.it** from **INFN Milano – LASA** laboratory.
- Switch off **PLL** and **Piezo#2** control panels by means of **Remote Services** capability.
- Delete the HTTP tunnel to mobile station scope
- Delete the VNC tunnel to the resident PC **pcares2.mi.infn.it** of the facility
- Delete the HRC tunnel to the Hi-Res camera connected/integrated to/into the mobile station
- Set the displacement to the stepper motor to zero in order to ensure a loose mechanical contact to the piezo actuator
- Set the frequency for the PLL local oscillator (LO) to zero


# Global Accelerator Network Multipurpose Virtual Laboratory (GANMVL): Usability Evaluation Questionnaire

Please answer the following questions (by filling the blanks or replacing the ❏ character with a "X", as appropriate).
This questionnaire should take approximately 15 minutes to complete.
The data collected will be kept confidential and treated anonymously by the University of Udine (HCI Lab) for statistical analysis and solely for the purposes of the EUROTeV project.

For questions, please send an e-mail to Luca De Marco: luca.demarco@dimi.uniud.it

## Organization & General Information

| 1        General Information |
|---|
| Sex: |
| Organization: |
| E-mail: |
| Mother tongue: |
| Age: |

| 2        How long have you been associated with your current organization? |
|---|
| |

| 3        What is your current position in this organization? |
|---|
| |

| 4        What is your experience of using the following collaboration tools? | | | |
|---|---|---|---|
| | **Never used** | **Occasionally used** | **Regularly used** |
| **Chat** | ❏ | ❏ | ❏ |
| **Instant messaging** | ❏ | ❏ | ❏ |
| **Videoconference** | ❏ | ❏ | ❏ |
| **Shared calendars** | ❏ | ❏ | ❏ |
| **Scientific portals** | ❏ | ❏ | ❏ |

| 5        What is your GANMVL user category? (check user if you don't know) |
|---|
| ❏ User |
| ❏ Administrator |

## Ratings of the GANMVL features

| 1        In general, how would you rate the following aspects of GANMVL's user interface? | | | | | |
|---|---|---|---|---|---|
| | **Very Bad** | **Bad** | **Fair** | **Good** | **Very Good** |
| Task support provided | ❏ | ❏ | ❏ | ❏ | ❏ |
| Labels / Command names | ❏ | ❏ | ❏ | ❏ | ❏ |
| Instructions / Online help | ❏ | ❏ | ❏ | ❏ | ❏ |
| Ease of learning | ❏ | ❏ | ❏ | ❏ | ❏ |
| General ease of use | ❏ | ❏ | ❏ | ❏ | ❏ |

| Additional comments: | |
|---|---|
| | |

**2      Rate the ease of use of each of the following main features of GANMVL**

| GANMVL main features | Ease of use | | | | | |
|---|---|---|---|---|---|---|
| | **Never used** | **Very Bad** | **Bad** | **Fair** | **Good** | **Very Good** |
| **Resource Browser** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **Toolbar** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **Help** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **Additional comments:** | | | | | | |

**3      Rate the ease of use of each of the following administration/configuration features of GANMVL**

| GANMVL admin/config features | Ease of use | | | | | |
|---|---|---|---|---|---|---|
| | **Never used** | **Very Bad** | **Bad** | **Fair** | **Good** | **Very Good** |
| **Laboratory Admin** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **Remote Services** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **HTTP Wizard** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **VNC Wizard** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **HRC Wizard** | ❐ | ❐ | ❐ | ❐ | ❐ | ❐ |
| Describe eventual difficulties encountered | | | | | | |
| **Additional comments:** | | | | | | |

**4**     **Rate the ease of use of each of the following remote monitoring and control features of GANMVL**

| GANMVL remote monitor/control features | Ease of use | | | | | |
|---|---|---|---|---|---|---|
| | **Never used** | **Very Bad** | **Bad** | **Fair** | **Good** | **Very Good** |
| **HTTP Tunnel** | ❏ | ❏ | ❏ | ❏ | ❏ | ❏ |
| Describe eventual difficulties encountered | | | | | | |
| **VNC Tunnel** | ❏ | ❏ | ❏ | ❏ | ❏ | ❏ |
| Describe eventual difficulties encountered | | | | | | |
| **HRC Tunnel** | ❏ | ❏ | ❏ | ❏ | ❏ | ❏ |
| Describe eventual difficulties encountered | | | | | | |
| **Additional comments:** | | | | | | |

**5**     **Rate the ease of use of each of the following communication features of GANMVL**

| GANMVL communication features | Ease of use | | | | | |
|---|---|---|---|---|---|---|
| | **Never used** | **Very Bad** | **Bad** | **Fair** | **Good** | **Very Good** |
| **Logbook** | ❏ | ❏ | ❏ | ❏ | ❏ | ❏ |
| Describe eventual difficulties encountered | | | | | | |
| **Skype** | ❏ | ❏ | ❏ | ❏ | ❏ | ❏ |
| Describe eventual difficulties encountered | | | | | | |
| **Additional comments:** | | | | | | |

## Hardware and Software

| **1**     **Which OS did you use to access the GANMVL?** |
|---|
| **(check all that apply)** |
| ❏ Windows |
| ❏ Macintosh |
| ❏ UNIX |
| ❏ Other, please specify: |

| **2**     **Which browser did you use to access the GANMVL?** |
|---|

| **(check all that apply)** |
| --- |
| ❒ Internet Explorer |
| ❒ Mozilla Firefox |
| ❒ Other, please specify: |

**3    Which was the speed of the internet connection you used to access the GANMVL?**

| **(check all that apply)** |
| --- |
| ❒ 56K |
| ❒ ISDN |
| ❒ ADSL |
| ❒ LAN |

Please, write below any additional comment, problems encountered or suggestions:

**THANK YOU FOR YOUR COLLABORATION!**