## SEVENTH FRAMEWORK PROGRAMME THEME 3

## **Information and Communication Technologies**



#### **Grant agreement for:**

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Technical Report TR-TARWIS-USER-MANUAL:

**TARWIS 2.X User Manual v0.9** 

**Project acronym:** WISEBED **Project full title:** Wireless Sensor Network Testbeds **Grant agreement no.:** 224460

**Responsible Partner:** UBERN (Philipp Hurni, Gerald Wagenknecht, Markus Anwander, Torsten Braun) **Report Preparation Date:** March 14, 2011

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# **1 What Is TARWIS?**

All over the world, researchers have set up small wireless sensor network testbeds for research purposes, in order to test and evaluate the real-world behavior of developed protocol mechanisms. A large number of testbeds have been put into operation, each with different equipment and testbed architecture design (e.g. MoteLab [6], Kansei [3], PowerBench [2], JAWS-DSN, DES-Testbed [1]). The popularity of wireless sensor networks is increasing, and many researchers are setting up and deploying their own new testbeds. Although each testbed may differ with respect to hardware and software, all wireless sensor network testbeds require common functionalities. As every shared resource, a testbed needs a notion of users, it requires support for reprogramming and reconfiguration of the nodes, provisions to debug and remotely reset sensor nodes in case of node failures as well as a solution for collecting and storing experimental data.

TARWIS targets at providing these functionalities independent from the node type and node operating system. The system has been designed to access and manipulate a testbed from within a website, in order to also let researchers access testbed resources remotely over the Internet, in order to share testbed resources with European research partners in a federation of testbeds. TARWIS hence relieves researchers setting up a sensor network testbed from the burden to implement their own scheduling and testbed management solutions. TARWIS has been incrementally developed during the first two years of the WISEBED [4] project by University of Bern, and has recently been demonstrated to the European sensor network research community [5].

## 2 Before You Start

First, the user has to be member of the WISEBED federation. To get a WISEBED login, the user has to ask the administrator of its home organization (which is a partner in the WISEBED federation). Every partner is responsible for its own users!

### 2.1 User Login

To access the TARWIS GUI the user needs to be authenticated using its WISEBED login. By accessing the TARWIS GUI with a web browser the user is directed to the two-step login process (cf. Fig. 1 and 2).

	WISEBED
ber AAL : F	AQ : Hilfe : Datenschutz
lome O	rganisation auswählen
m auf Reso enutzeraut	urcen auf dem Rechner <b>'gcidlab23.unibe.ch</b> ' zuzugreifen, ist eine gültige hentifizierung nötig.
University of	Bem
Wählen Sie	hre Home Organisation
Freie   Iniver	sitet Berlin
Algorithms (	sroup, Institute of Operating Systems and Computer Network, Braunschweig Institute of Technology
adouging c	
Research A	cademic Computer Lechnology Institute
Research Av Universitat P	cademic Computer Lechnology Institute Valitacina de Catalunya.
Research A Universitat F University of	cademic Computer Lechnology Institute Olitecnica de Cablunya. Geneva Si ot Tachalana :
Research A Jniversitat F Jniversity of Jelft University and	cademic Computer Technology Institute Officerrica de Catalunya. Geneva sity of Technology niserativ
Research A Jniversitat F Jniversity of Delft Univers .ancaster U	cademic Computer I echnology institute Officenica de Catalunya. Geneva Niversity. Rom Bron
Research A Universitat F University of Delft University of Ancester U University of AISEBED V	zadamic Computer I etimology institute Usernica de Cabalitationa General Mental Homo Homo Homo

Figure 1: Login: select home organization.

Step 1:

- (A) First, the user is redirected to the WAYF (Where Are You From) server.
- (B) There, the user has to select its home organization (e.g. University of Bern).
- (C) If the user has no own home organization, it can select a so called virtual home organization (in this example it is *WISEBED VHO*).

#### Step 2:

(D) Now, the user is directed to the login dialog (cf. Fig. 2) of its own home organization and has to enter its credentials (from its WISEBED login).

Login		
Password		<b>– n</b>
AND FURTH	LÖDOUTN	

Figure 2: Login: enter the credentials.

#### 2.2 User Roles

After login the user is redirected to the TARWIS GUI. To perform experiments on the testbed the user requires access rights, a so called *User Role*. It is not enough to be part of the WISEBED federation! On the *Welcome* site, the user can see its own roles (cf. Fig. 3).

You have the following roles in the testbed:	TARWISVie	ewer TARWI	SUser TARW	ISAdmin
You can register for further roles at the SNA	A Portal.			

Figure 3: User roles: current roles.

Possible roles are *TARWIS Viewer*, *TARIWS User*, and *TARWIS Admin*. A TARWIS Viewer is allowed to monitor public experiments and download theirs results. It is not allowed to reserve sensor nodes and perform own experiments. A TARWIS User can reserve sensor nodes nodes from the testbed and perform experiments. A TARWIS Admin can perform all administrative tasks.

Figure 4: User roles: register for roles.

User roles can be obtained by the following steps:

- (A) By clicking on *register for roles* on the right top of the site (cf. Fig. 4), the user can register itself for roles.
- (B) The user is directed to the SNA (Sensor Network Authorization) portal, shown in Fig. 5, where the user has to login again (using its wisebed login).
- (C) The user can now subscribe for a role (cf. Fig. 6).
- (**D**) By clicking on the *Subscribe* button (cf. Fig. 7), the role administrator will get a notification about the request. The user gets informed by email, when it is accepted or not accepted for the requested role.
- (E) By clicking on List My Roles in the left menu, the user can see its roles, including the status (cf. Fig. 8).
- (F) The user can also *Unsubscribe* for a role.





All Available Roles		
This is the list of all roles you can su <b>Subscribe</b> to submit a subscription	ubscribe to. Click on <b>View Details</b> to a request for this role.	see detailed information about a role. Click o
Pala Titla	Status	Actions
Role Title	Status	Actions
Role Title TARWIS Admin	Status Open for Subscription	Actions View Details   Subscribe
Role Title TARWIS Admin TARWIS User	Status Open for Subscription Open for Subscription	Actions View Details 1 Subscribe View Details 1 Subscribe

Figure 6: User roles: available roles.

Subscribe to a Role						
Click on Subscribe to s	lick on Subscribe to subscribe for the following role.					
Role Title	TARWIS User					
Role Description						
can be edited must not be	empty. The subscription request cannot be accepted unless all empty form fields are filled in.					
If you click on Subscribe request in the next few da subscribed roles for the la	a subscription request is sent to the role provider. He or she will accept or reject your subscription ys. You might want to regularly check your list of pending subscription requests and your list of test status of this subscription.					



My Subscribed Roles	
bis is the list of roles you are sub	cribed to. Click on View Details to see detailed information about a role. Click o
Jnsubscribe to unsubscribe from Role Title	a role. 🕒 redirects you to the role.

Figure 8: User roles: list of subscriptions.

### **2.3 Binary Code Image for Experiments**

The behavior of the sensor nodes only depends on the software running on the nodes. This software is developed by the user. There is no pre-installed software.

(A) By clicking on the *Experiment Configuration*  $\rightarrow$  *My Images* tab (cf. Fig. 9), the user can upload its software to the TARWIS GUI

Reservation         Experiment Configuration         Experiment Monitoring         Testbed Management           My Image         My Emeriments         Funded Encomments         Funded Encomments         Funded Encomments						_
My Images My Exceriments Finished Exceriments	Reservation	Ex	Experiment Configuration		Experiment Monitoring	Testbed Management
		My Images	My Experiments	Finished Experiments		

Figure 9: Image: menu.



Figure 10: Image: upload.

- (B) Selecting Upload New Image (...), the user can upload its developed binary code image (cf. Fig 10).
- (C) Afterwards, the user can enter the name, version, platform, and description of the image.
- (D) Then, the user selects the file of the image.
- (E) Finally, the user finish the form by clicking on the *Upload New Image* button. The image is now uploaded to the TARWIS GUI and can be used for the experiments (see Section 3.2).



Figure 11: Image: update.

- (F) By selecting a previously uploaded image, the user can update the name, version, description, and the platform (cf. Fig. 11).
- (G) By clicking on the according button, the user can update, delete or download the image.

## **3** How to Perform an Experiment on TARWIS?

This Section describes the steps how a user can perform its experiment. It starts with the nodes reservation, and afterwards the experiment configuration. Finally it describes the experiment monitoring and downloading the experiment results.



Figure 12: Reservation: menu.

(A) By clicking on the *Reservation*  $\rightarrow$  *Reservation Overview* tab (cf. Fig. 12) the user can reserve nodes of the underlying testbed using the schedule sheet



Figure 13: Reservation: calendar sheet.

(B) First, the user can select the day, when its experiment should performed (cf. Fig. 13). The current day is preselected.



Figure 14: Reservation: overview.

- (C) The available sensor nodes are listed on the left side of the schedule sheet (cf. Fig. 14). Different types of sensor nodes are separated by a white line.
- (**D**) On the top of the schedule sheet the 24 hours of the day are listed (in UTC) and divided into 15 minute slots.
- (E) The state of the nodes is depicted by the color of the sheet. Available slots are colored green, blocked ones red and own reservations blue. Slots in the past are gray colored.
- (F) To reserve sensor nodes for an experiment the user can select nodes in the green area. To achieve this you can either click&drag to select a rectangle (nodes vs. time) and double-click on a node to remove this node from the selected nodes of the rectangle. Or the user can select (single-click) the first and the last time slots.

Your reservation was successful

Undo Reservation

Configure Experiment for Reservation

Figure 15: Reservation: undo reservation or configure experiment.

- (G) By click on the *reserve* button on the bottom of the page the reservation is finished.
- (H) Afterwards it is depicted, if the reservations was successful or not. Now, the user can either undo the reservation (button *Undo Reservation*) or
- (I) go directly to the experiment configuration tab, clicking the button *Configure Experiment for Reservation* (cf. Fig. 15).

	Reservation	_	Experiment Configuration	Experiment Monitoring	Testbed Management
Testbed Map	Reservation Overview	My Reservations			
		•			



(J) By clicking on the *Reservation*  $\rightarrow$  *My Reservations* tab, the user can find its own reservations (cf. Fig. 16).

Upcoming Reservatio	ns:
User:	858047@midlab21.umbe.ch
Experiment ID:	GpTleC6v4s
Name:	
Description:	no description supplied
Start:	2011-02-18T09:15:00
End:	2011-02-18T10.29:59
	Modify Reservation Configure Experiment Delete Reservation

Figure 17: Reservation: my reservations.

- (K) The unique ID of the experiment owner, the ID of the experiment, the name and description (if available), and the start- and end-time of the experiment are displayed.
- (L) The user can modify the reservation (button Modify Reservation) or
- (M) can configure the experiment (button *Configure Experiment*) or
- (N) delete the reservation (button *Delete Experiment*), see Section 3.2.

Reservation	Experiment Configuration	Experiment Monitoring	Testbed Management
Testbed Map Reservation Overview My Reservations			



- (O) By clicking on the *Reservation*  $\rightarrow$  *Testbed Map* tab (cf. 18),
- (P) the user can find the map of the positions of all nodes of the testbed (cf. Fig. 19).
- (Q) On the right side, there are additional information about the nodes (ID, type, description, capabilities).



Figure 19: Reservation: testbed map.

## **3.2 Experiment Configuration**

After the user has reserved nodes for certain time slots it has to configure the experiment. Configuration of an experiment includes binary code images and configuration commands for the sensor nodes, number of runs which the experiment should be performed, and additional information such as experiment description.



Figure 20: Configuration: menu.

(A) By clicking on the *Configure Experiment for Reservation* button (cf. (H) in Fig. 15) after reservation or via the *Experiment Configuration*  $\rightarrow$  *My Experiments* tab (cf. Fig. 20 the user can configure its experiments using the dialog shown in Fig. 21.



Figure 21: Configuration: image, description, number of runs, automated commands.

(B) First, the user can use a experiment template. This includes the images of the selected nodes, the description, the number of runs and the set of automated commands. Using a template could be utile, if the user wants to perform a series of similar experiments.

- (C) The user can choose its binary code which will be uploaded to the selected sensor nodes. It can choose one image for all nodes or different images for different sensor nodes.
- (D) A *Name* and a *Description* can be entered optionally by the user.
- (E) If the user checks the *public experiment* checkbox, the experiment can be monitored by every TARWIS User and TARWIS Viewer.
- (F) The user can select the number of runs, how often the experiment should be repeated. The time of a run is divided through reserved time. After a run the nodes are reseted and the experiment starts again.
- (G) To configure the nodes or control the experiment the user may add commands which are transmitted to the sensor nodes at the chosen time. The commands are transmitted to the sensor nodes using the serial interface and have to be interpreted and executed by the operating system on the sensor node. A command can be send to all or only to selected sensor nodes.
- (H) On the right side, the map with the selected sensor nodes and additional information (such as (ID, type, description, capabilities) are displayed.
- (I) Clicking on the *Finish* button finish the configuration sheet.

User:	Wagenknecht Gerald (858047@gridlab21.unibe.ch)
Experiment ID:	GpTleC6v4s
Name:	Beacon Experiment
Description:	The sensor nodes sends beacons and discover the neighborhood.
Start:	2011-02-18 09:15:00
End:	2011-02-18 10:29:59
Runs:	1 <b>J</b>
Selected Nodes:	Images:
Selected Nodes:	Images:
um wisched ne deut em 16	Beacoing v1.0
umwisebed node ubern 17	Beaconing v1.0
umwisebednode:ubern:18	Beaconing v1.0
um wisebed no de ubern 19	Beaconing v1.0
	Press reine et l

Figure 22: Configuration: configured experiment.

- (J) After finishing, the configuration data of the experiment are depicted (cf. Fig. 22), like experiment ID, name and description of the experiment, start and end time and number of runs, and
- (K) the selected sensor nodes with the selected images.
- (L) Furthermore, the user can save the current configuration into a template for re-using with further experiments.

By clicking on *Experiment Configuration*  $\rightarrow$  *My Experiments* (cf. Fig. 20 the user can finds its experiments, the unconfigured ones and the configured ones (cf. Fig. 23).

My Unconfigured E	xperments:	
so <b>unconfigured</b> experime	nts saved	
My Configured exp	eriments:	
User:	858047@gridlab21.unibe.ch (wagen@iam unibe.ch)	
Experiment ID:	GpTleC6v4s	
Name:	Beacon Experiment	
Description:	The sensor nodes sends beacons and discover the neighborho	od.
Start:	2011-02-18 09:15:00	
	2011.02.18.10.20.50	
End:	2011-02-10 10:29:59	

Figure 23: Configuration: my experiments.

(M) The user can find again the configuration data of all its experiments, like experiment ID, name and description of the experiments, and start and end time as well.

- (N) To modify the experiment configuration, the user can press the *Modify Experiment* button.
- (O) To delete the experiment configuration, the user can press the *Delete Experiment* button.

#### **3.3** Experiment Monitoring

A configured experiment is performed during the reserved time slots. The user can monitor its own experiments (or public experiments). It can follow the output of the sensor nodes. If necessary, the user can send commands to the sensor nodes or reset the sensor nodes (if it is owner of the experiment). It is possible that two or more experiments running in parallel on the testbed and the user can switch between them.

Reservation	Experiment Configuration	Experiment Monitoring	Testbed Management
		~	



(A) By clicking on the *Experiment Monitoring* tab the user can monitor the experiments (cf. Fig. 24).

Experiment ID (encrypted):	mbCi	
User:	460048@gridlab21.unibe.ch (hurni@iam.unibe.ch)	
Name:	MaxMAC ticks=0	
Experiment ID (encrypted):	ubq9317J1L3L1Q-	
User:	460048@gridlab21.unibe.ch (hurni@iam.unibe.ch)	
Name:	xmac_4_hops_dualcon	
Experiment ID:	GoTIeC6v4s	
User:	858047@gridlab21 unite ch (wagen@iam unite ch)	
Name:	Bracon Experiment	
Displayed Experiment:		
Emeriment ID:	Contraction L	
Experiment ID:	252042@midth21.unite.ch.(ummer@inm.unite.ch)	
Name:	Beacon Exteriment	
Description:	The center nodes cents beacons and discouter the neighbor	though
Start	2011.02.18.09.15.00	
End:	2011-02-18 10:29:59	
Runs:	1	
	End	Experiment Save Results
Experiment Control Output: 2011-02-18 09:16:05: time elapsed siz 2011-02-18 09:16:11: time elapsed siz 2011-02-18 09:16:17: time elapsed siz	es extent: 00 ; (of max: 120 ; WAIT_FEEDO_AFTER_REBOOT) es extent: 65 ; (of max: 120 ; WAIT_FEEDO_AFTER_REBOOT) es entent: 73 ; of max: 120 ; WAIT_FEEDO_AFTER_REBOOT)	
2011-02-18 09:16:23: time elapsed siz 2011-02-18 09:16:29: time elapsed siz	re seboot: 78 s (of max. 120 s WAIT_PERIOD_AFTER_REBOOT) re seboot: 84 s (of max. 120 s WAIT_PERIOD_AFTER_REBOOT)	
2011-02-18 09:16:35: time elapsed siz	es aboot: 90 s (of max. 120 s WAIT_PERIOD_AFTER_REBOOT)	
2011-02-18 09:16:47: time elapsed sir	re reboot: 102 s (of max. 120 s WAIT_PERIOD_AFTER_REBOOT)	
2011-02-18 09:16:50: status of request * 2011-02-18 09:16:50: status of request *	equest#GpTlaC6v4s#1" (resetNodes) (unn.wisebed:node.ubern:15): 1 except#GnTlaC6v4s#1" (resetNodes) (von wisebed:node.ubern:16): 1	
2011-02-18 09:16:50: status of request *	equest#GpTleC6v4s#1" (resetNodes) (untwisebed:node.ubern:17): 1	
2011-02-18 09:16:50: status of request * 2011-02-18 09:16:50: status of request *	equest#GpTlaC6v4s#1" (resetNodes) (unn.wisebed:node.ubern:18): 1 amast#GnTlaC6v4s#1" (resetNodes) (von minabed-mode.ubern:19): 1	
2011-02-18 09:16:50: status of request *	equest#GpTleC6v4s#1" (resetNotes) (unswisebed.node.ubern.20): 1	
2011-02-18 09:16:53: nodes successfu	ly reset	
2011-02-18 09:16:57: waited 0 s (of m	NEECHU ANAGES IO CHE SERIOF MORES MR. 80 5 WAIT_PERIOD_BEFORE_FLASH_RETRY) for status updates	
2011-02-18 09:17:01: waited 4 s (of n	ax. 80 s WAIT_PERIOD_BEFORE_FLASH_RETRY) for status updates	

Figure 25: Monitoring: switching between parallel experiments.

- (B) On top of the site (cf. Fig. 25), all running experiments are listed including the *Experiment ID*, the owning *User*, and the *Name* of the experiment.
- (C) By clicking on the experiment ID, the user choose the experiment it wants to monitor.
- (**D**) This experiment is listed with additional information such as experiment description, start and end time, and number of runs.
- (E) Also displayed is the control output, which includes, e.g., status of flashing the images on the sensor nodes.
- (F) By clicking on the *End Experiment, Save Result* button, the user cancel the experiment before the regular end. The user will get an email with the zipped experiment results.

On the bottom of the site the output of the sensor nodes of the chosen experiment is displayed as shown in Fig. 26.



Figure 26: Monitoring: experiment output and map.

- (G) On the left side the nodes' connectivity on the node map is displayed, as soon as nodes transmits packets and discover each other.
- (H) On the right side an output window including a *Reset* button and a command line is displayed for each sensor node used in the experiment.
- (I) The output window can be switched off for performance and clearness reasons by clicking in the *output* checkbox.
- (J) If the user notices that a node misbehaves (e.g., is stuck in an endless loop or similar), it can reset the node using the *Reset* button.
- (K) Furthermore the user can send commands to the sensor nodes using the command line. The set of commands which can be used is the same as for the control of a local physical testbed and depends on the operating system on the sensor nodes.
- (L) It is also possible to reset all nodes with one click and send a command parallel to all sensor nodes.

### **3.4** Finishing Experiments

After finishing (or canceling) an experiment, all results are stored in the designated TARWIS database. The experiments' results and further information about the experiment are stored using WiseML (Wireless Sensor Network Markup Language) as described in the next Section.



Figure 27: Configuration: menu.

- (A) The finished experiments can be found in the *Experiment Configuration*  $\rightarrow$  *Finished Experiments* tab (cf. Fig. 27).
- (B) On this site (cf. Fig. 28) all users' experiments are listed as well as all public experiments. The user can download the experiment results of its own experiments and of the public experiments
- (C) For its own experiment, the user can delete the definitions and the results.

User:	858047@gridlab21.unibe.ch (1	wagen@iam.unibe.ch)
Experiment ID:	GpTleC6v4s	
Name:	Beacon Experiment	
Description:	The sensor nodes sends beaco	ons and discover the neighborhood.
Start:	2011-02-18 09:15:00	
End:	2011-02-18 09:31:48	
Results:	Download	Delete Experiment Definition & Results
Public experiments:	R	
Public experiments: <sup>User:</sup>	858047@gridab21.unibe.ch.(*	wagen@jam.unibe.ch)
Public experiments: User: Experiment ID:	B 858047@gridab21.unibe.ch.(* GpTleCóv4s	wagen@iam.wabe.ch)
Public experiments: User: Experiment ID: Name:	B 858047@gridab21.unibe.ch (* GpTieC6v4s Beacon Experiment	wagen@iam.unibe.ch)
Public experiments: User: Experiment ID: Name: Description:	B 858047@gridiab21.unibe.ch (t GpTieC6v4s Beacon Experiment The sensor nodes sends beacc	wagen@iam.unike.ch)
Public experiments: User: Experiment ID: Name: Description: Start:	B 858047@gridab21.uube.ch (v OpTieCov4s Beacon Experiment The sensor nodes sends beaco 2011-02.18 09.1500	wagen@am.unite.cb) ms and discover the neighburhood.
Public experiments: User: Experiment ID: Name: Description: Start: End:	B 858047@gridab21.urabe.ch (* OpTisCówis Beacon Experiment The senser nodes sends beaco 2011-02-18 09:1500 2011-02-18 09:148	wagen@am.wabe.ch) ons and discover the neighborhood.

Figure 28: Configuration: finished experiments.

## **4** Data Acquisition and Representation

TARWIS integrates the WiseML (Wireless Sensor Network Markup Language) for several purposes. On one side, it uses WiseML for reading and parsing the necessary information about it's underlying *Network definition*. Furthermore, it uses WiseML for storing and generating the output of the *Experiment log and debug traces* in a common defined format.

*Network definition:* in order to read the network resources (node type, sensors, positions, etc), TARWIS calls the getNetwork() function of the SessionManagementService API, and retrieves a WiseML document listing the entire network endowment. It uses the retrieved positions to display the nodes of the network in the network graph. Listing 1 lists one *instantiation* of a node entry. The node type and endowment are described in the *defaults* section.

Listing 1: Node entry in SessionManagementService of Univ. of Bern testbed

```
1 <node id="urn:wisebed:node:ubern:1">
2 <position>
3 <x>69</x>
4 <y>20</y>
5 <z>52</z>
6 </position>
7 <gateway>true</gateway>
8 <description>Node 1 - Office 205 (2nd Floor)</description>
9 </node>
```

*Experiment log and debug traces:* As soon as an experiment is scheduled and configured, the TARWIS *ControllerService* retrieves experiment output (e.g. debug information, sensor values) over the *receive* function and stores it to the TARWIS internal database.

As soon as the experiment time has expired, the nodes are reflashed with a default image, and the network is prepared for the subsequent experiment. Every output of the finishing experiment is exported by TARWIS to a WiseML-file, zipped and saved to the TARWIS database. This WiseML-file hence comprises all important information about an experiment run, e.g., where the experiment took place geographically, what kind of nodes were used, what their sensor endowment was, and much more. Storing all this experiment-related information in one WiseML file offers many advantages, besides the possibility to easily use it for post-experiment analysis. As it defines essentially all crucial information of an experiment, it further allows to make the experiment data public to other research partners in a common well-defined language, giving them the opportunity to repeat the same or similar experiment, e.g. trying to improve the results. Hence, having integrated WiseML into the Testbed Management System inherently pushes research on wireless sensor networks one crucial step towards transparency and repeatability of sensor network experimentation.

Listing 2: Excerpt from a TARWIS-generated Experiment Trace

1 <wiseml> [...]

```
<trace id="experiment_UBERN_uniqueID_23453323">
2
3
     \left[ \ldots \right]
    <timestamp>3605.164612</timestamp>
    <node id="urn:wisebed:node:ubern:9">
5
    <position>
         < x > 85 < /x >
         < y > 80 < /y >
         < z > 52 < /z >
     </position>
10
    <data key="textOutput">latency 15 ms</data>
11
     </node>
12
    <timestamp>3605.164612</timestamp>
13
    <node id="urn:wisebed:node:ubern:9">
14
    <position>
15
         < x > 85 < /x >
16
         < y > 80 < /y >
17
         < z > 52 < /z >
18
     </position>
19
    <data key="textOutput">Light 1 202</data>
20
21
     </node>
     [...]
22
  </trace>
23
  [...]
24
25 </wiseml>
```

The WiseML code sample in Listing 2 lists two trace events retrieved in a small experiment at the University of Bern testbed. For each output line, one can determine the exact time (within the precision of some few milliseconds) relative to the experiment start time (c.f. the *timestamp* tag), the position of the node (hence, with mobile nodes, the node movement can also be captured) and the output itself. The WiseML-file generated by TARWIS can therefore describe to a very high degree what has happened at a certain time during the experiment.

## 5 Administration of TARWIS

In this Section the administration of the testbed, the users and their roles are described.

### 5.1 Testbed Management

To perform testbed administration tasks the user has to be a TARWIS Admin. How to become a TARWIS Admin is described in Section 5.3.





- (A) By clicking on the *Testbed Management*  $\rightarrow$  *Reservations and Experiments* tab, the administrator can modify the reservations and experiments (cf. Fig. 30).
- (B) The TARWIS Admin has the same reservation schedule sheet as the TARWIS user, but the administrator can block some nodes (or the whole testbed) for a certain time period due to maintenance reasons.



Figure 30: Testbed management: block for maintenance.

Undo Blocking

Figure 31: Testbed management: undo blocking.

(C) After blocking the administrator can also undo it.

User:	858047@gridlab21.unibe.ch	
Experiment ID:	EYjuóxysjL	
Name:		
Description:	no description supplied	
Start:	2011-02-18T12:00:00	
End:	2011-02-18T12:59:59	
		Delete Maintance Block
Other Users Uncon	figured Experiments:	
Other Users Uncon	figured Experiments: 460048@gridab21.unbe.ch	
Other Users Uncon User: Experiment ID:	figured Experiments: 4600480ggridab21.unibe.ch 599	
Other Users Uncon User: Experiment ID: Name:	figured Experiments: 46004@@gridab21.unabe.ch 599	
Other Users Uncon User: Experiment ID: Name: Description:	figured Experiments: 46004@@gridab21.unabe.ch 599 no description supplied	
Other Users Uncon User: Experiment ID: Name: Description: Start:	figured Experiments: 460048@gridab21.umbe.ch 599 no.description.supplied 2011-02-18707/4557	
Other Users Uncon User: Experiment ID: Name: Description: Start: End:	figured Experiments: 460043@gridab21.umbe.ch 599 no.deucryption.supplied 2011-02-18710745-57 2011-02-18710745-57	
Other Users Uncon User: Experiment ID: Name: Description: Start: End:	figured Experiments: 460048@gst8bb21.uube.ch 599 no.discription.tagpled 2011-02-18T0745:57 2011-02-18T0130:57	Delete Experiment & Reservator
Other Users Uncon User: Experiment ID: Name: Description: Start: End: User:	figured Experiments: 460048@gridbb21 wabe ch 599 no description supplied 2011-02-18T0145:57 2011-02-18T113057 460048@gridbb21 wabe ch	Delete Experiment & Reservation

Figure 32: Testbed management: list of maintenance blocks and users' reservations.

- (D) The administrator has a list of all maintenance blocks and can delete them.
- (E) And, it has a list of all users' reservations and experiment configurations and can delete them as well.

Reservation	E	xperiment Configuration	Experiment Monitoring	Testbed Managen	nent
				Reservations & Experiments	Testbed
				-	

Figure 33: Testbed management: menu.

- (A) By clicking on the *Testbed Management*  $\rightarrow$  *Reservations and Experiments* tab, the user can add new sensor nodes to the testbed (cf. Fig. 34), or update existing ones (cf. Fig. 35).
- (B) By selecting *Add New Sensor Node(...)* from the drop-down menu, the user can enter the properties of the new sensor node into the form.
- (C) This includes the ID (urn), position, gateway, type, description, and capabilities.



Figure 34: Testbed management: add new sensor node.

- (**D**) The x-, y-, and z-value of the sensor nodes' position are between 0 and 100 according to the coordinates in the map.
- (E) By clicking the *Create New Sensor Node* button, the node is added to the TARWIS database and depicted in the map.
- (F) By selecting an existing sensor node from the drop-down menu, the user can update the properties of the new sensor node.
- (G) The user can either update the properties for the selected sensor node or delete the sensor node from the database.



Figure 35: Testbed management: update sensor node.

### 5.2 User Administration

#### **Manage Groups**

The following example (cf. Fig 36) illustrates a possible scenario for an university with different faculties and departments.

To create a group, first, login to the IDPtools web-interface (as main admin). Choose menu *Group: Create*, as shown in Fig. 37. To create Department C as a child of the Faculty A, choose Faculty A in the list. Fill in *Name*, a *Short Description* and an *Entitlement Prefix*. Now press the *Create* button.

Now fill in the Helpdesk information and press the Save button, as shown in Fig 38. In this menu it is possible to:

• Invite an user as administrator for this group and all its sub groups (later in this tutorial)



Figure 36: User administration: manage groups.

departmentc	
Department C	
MainGroup facultya - Faculty A departmenta - Department A departmentb - Department B facultyb - Faculty B facultyc - Faculty C rvsphd - RVS PHD students testusers - Test Users	
	departmentc Department C MainGroup facultya – Faculty A departmenta – Department A departmentb – Department B facultyc – Faculty C rvsphd – RVS PHD students testusers – Test Users

Figure 37: User administration: create group.

- Change the helpdesk information
- Change the mail templates for user notifications
- Enabling and disabling this group

After creating all faculties and departments click on Group: List to get an overview, as shown in Fig. 39.

#### **Manage Users**

Now we create some users. Select in the menu *Group: List* the group the user should be added. Then click on *User: Create*. Now you see the selected group in the upper right corner (cf. Fig. 40).

Because it is not feasible for the main administrator to do the whole work, delegate the subgroups to other administrators. To add an administrator select the corresponding group in *Group: List* and the click on *Group: Manage*.

To invite the further administrator, send him an email, as shown in Fig. 42 and 43.

Now the user opens the URL inside the email. The URL is protected by shibboleth, so the user has to log in with its AAI login. After successful login he is automatically added as administrator for the selected group (cf. Fig.44).

The group failed in the group failed in the group of t	acultyb has been cre	zated.	
acultyb : Adminis	trators of this group		
The following peop	e can administer this	group and all subgroups of it:	
Name	E-Mail	Description	Last login
Add group admin	6		
E-mail:			
Description:			>> Invit
	16 M.V.		
elpdesk informa	tion		
he following info he contact inform	rmation will be display nation should be a gro	ved on the aai Helpdesk page. Sup phone/email address and not a personal	al address.
escription:	Department B		
/ebsite:	http://www.unibe.cl	h/facultyb	
-mail:	facultyb@unibe.ch		
hone:	01334667897565		
all tomolotor			
ail templates			
lail templates New user			
ail templates New user Subject: [	New IDP-Account		
ail templates New user Subject: [ (\$NAME\$, \$USI	New IDP-Account RNAME\$, \$PASSWC	RD\$, \$GROUPADMIN\$, \$CUSTOM1\$, 1	SCUSTOM25 will be replaced correspondingly
ail templates New user Subject: [ (\$NAME\$, \$USI Dear \$NAME\$,	New IDP-Account IRNAME\$, \$PASSWC	)RD\$, \$GROUPADMIN\$, \$CUSTOMI\$, 1	\$CUSTOM2\$ will be replaced correspondingly
lail templates New user Subject: [ (\$NAME\$, \$USI Dear \$NAME\$, We created yo	New IDP-Account IRNAME\$, \$PASSWC	ORD\$, \$GROUPADMIN\$, \$CUSTOMI\$, 1	scustom2s will be replaced correspondingly
ail templates New user Subject: (\$NAME\$, \$USI Dear \$NAME\$, We created yo Username: \$US	New IDP-Account IRNAME\$, \$PASSWC NI a new AAI accou	DRD\$, \$GROUPADMIN\$, \$CUSTOMI\$, t	\$CUSTOM2\$ will be replaced correspondingly
ail templates New user Subject: (\$NAME\$, \$USI Dear \$NAME\$, We created yo Username: \$U5 Password: \$PJ	New IDP-Account IRNAME\$, \$PASSWC PG a new AAI accou IERNAME\$ SSWORD\$	DRD\$, \$GROUPADMIN\$, \$CUSTOMI\$, 1 int in the Virtual Home Organizati	SCUSTOM2\$ will be replaced correspondingly
ail templates New user Subject: ( (\$NAME\$, \$USI Dear \$NAME\$, We created yo Username: \$US Password: \$PP Please be awa	New IDP-Account (RNAME\$, \$PASSWC u a new AAI accou LENDARE\$ LSWORD\$ Ire that the users	DRD\$, \$GROUPADMIN\$, \$CUSTOMI\$, 1 int in the Virtual Home Organizati name and password are case sensiti	SCUSTOM25 will be replaced correspondingly Lon.
tail templates New user Subject: ((SNAMES, SUS) Dear \$NAMES, We created yc Username: \$US Password: \$PA Please be awa If you have a help desk. A https://gridl	New IDP-Account IRNAMES, \$PASSWO IERNAMES SSWORDS Ire that the users iny problem using list of all IOP h ab21.unibe.ch/idp	DRD\$, \$GROUPADMIN\$, \$CUSTOMI\$, 1 int in the Virtual Home Organizati name and password are case sensiti your credential, please contact d help desks is available online at makin/support/	SCUSTOM25 will be replaced correspondingly ion. ive. firectly the IDP
tail templates New user Subject: (\$NAME\$, \$USI Dear \$NAME\$, We created yo Username: \$US Passord: \$PP Please be awa help desk. A https://gridl When using yc please select	New IDP-Account IRNAMES, \$PASSWO us new AAI account LENAMES LSWORDS is of all IDP h ab21 unibe.ch/idp tist of all IDP h ab21 unibe.ch/idp is acount and your *Virtual Home Or	DRDS, SGROUPADMINS, SCUSTOMIS, I ant in the Virtual Home Organizati ame and password are case sensiti your credential, please contact ( elp desk is available online at admin/aupport/ u have to choose a sai Home Organ ganisation faai*.	SCUSTOM25 will be replaced correspondingly ion. ive. firectly the IDP tization,

Figure 38: User administration: manage group.

You have access to	o the following 9 g	roups
Name	Description	Users
	IDP ADMIN	1
🗕 facultya	Faculty A	0
▶ departmenta	Department A	0
▶ departmentb	Department B	0
departmentc	Department C	0
▶ facultyb	Faculty B	0
▶ facultyc	Faculty C	0
▶ rvsphd	RVS PHD students	3
▶ testusers	Test Users	14

Figure 39: User administration: list groups.

To list and manage current user, click on *User: List.* There you get an overview about the users in the currently selected group. Groups can be selected in the *Group: List Menu.* In this menu you can manage the users:

- Edit attributes (name, email, expiration date, ... )
- Reset password.
- Expire a user immediately
- Delete a user

IMPORTANT: IT IS NOT POSSIBLE TO REMOVE AN USER FROM THE DATABASE. For security and auditing reasons (legal issues), every deleted unique ID remains in the database to ensure that no other new user can get the same unique ID.

It is also possible to import users with a file formated with the CSV format (ISO-8859-1). Goto to the menu *User: Import* to get further information. The fields marked with an asterisk (\*) have to be in your CSV header.

Here an example. We try to import 14 users:

username, password, surname, givenname, mail, postalAddress, telephoneNumber, preferredLanguage, description, dateExpire user1, pass1, surname1, givenname1, user1@example.com, street 1, +41 44 268 01 05, en, user 1, 31.12.2009

roup: Create   List   Mar	age User: Create   List   Import Preferences Statistics Logout
facultyb : Create a new us	ser
<ul> <li>Fields marked with a</li> </ul>	in asterisk (*) are mandatory.
<ul> <li>A password and an</li> </ul>	AAI UniqueID will be generated automatically.
Username	* test01
Last name	* Doe
First name	* John
E-mail	* johndoe@unibe.ch
Entitlement	<pre>* https://gridlab04.unibe.ch/</pre>
	All entitlements must be prefixed with https://gridlab04.upibe.ch/
	Use one line per entitlement, if you want to define multiple values.
Business phone number	
	i e.g.+41 44 268 15 05
Business postal address	
	Enter the full postal address with carriage returns.
Preferred Language	en 🗘
Description	
	The description is intended for internal use only.
Affiliation	affiliate
Home organization	gridlab21.unibe.ch
Home organization type	idp
Evaluation date	
Expiration date	6 months or enter date 25.11.2009
	After the expiration date is reached the user won't be able to login with his IDP
	account.
Custom field 1	
Custom field 2	
custom neiu a	
Cancel	Create

#### Figure 40: User administration: create user.

acultyb : Admin	istrators of this group			
The following peo	ople can administer this	group and all subgroups of it:		
Name	E-Mail	Description	Last login	
Add group adm	in			
E-mail:	johndoe@unibe.ch			
Description:	Department 8 Administ	trator		>> Invite
Description: felpdesk inform The following inf The contact info	Department 8 Administ ation	trator ed on the aai Helpdesk page. up phone/email address and not a t	personal address.	>> Invite
Description: telpdesk inform The following info The contact info Description:	Department 8 Administ ation formation will be display rmation should be a grow Department 8	ed on the aai Helpdesk page. up phone/email address and not a p	personal address.	>> Invite
Description: telpdesk inform The following inf The contact info Description: Website:	Department 8 Administ ation formation will be display rmation should be a grou Department 8	ed on the aai Helpdesk page. up phone/email address and not a p	personal address.	>> Invite
Helpdesk inform The following inf The contact infor Description: Website: E-mail:	Department 8 Administ ation formation will be display mation should be a gro Department 8	ed on the aai Helpdesk page. up phone/email address and not a p	personal address.	>> Invite



Group: Create   List   Manage User: Create   List   Import	Preferences	Statistics	Logout
facultyb : Invite a new group admministrator			
Click on the button to send the invitation email by your default email application to the new group administrator.			
<< Manage group Send invitation email >>			



```
user2, pass2, surname2, givenname2, user2@example.com, street 2, +41 44 268 01 05, en, user 2, 31.12.2009
user3, pass3, surname3, givenname3, user3@example.com, street 1, +41 44 268 02 05, en, user 3, 31.12.2009
user4, pass4, surname4, givenname4, user4@example.com, street 1, +41 44 268 04 05, en, user 4, 31.12.2009
user5, pass5, surname5, givenname5, user5@example.com, street 1, +41 44 268 05 05, en, user 5, 31.12.2009
user6, pass6, surname6, givenname6, user6@example.com, street 1, +41 44 268 06 05, en, user 5, 31.12.2009
user7, pass7, surname7, givenname7, user7@example.com, street 1, +41 44 268 07 05, en, user 7, 31.12.2009
user8, pass8, surname8, givenname8, user8@example.com, street 1, +41 44 268 08 05, en, user 8, 31.12.2009
user9, pass9, surname9, givenname9, user9@example.com, street 1, +41 44 268 09 05, en, user 9, 31.12.2009
user10, pass10, surname10, givenname10, user10@example.com, street 1, +41 44 268 10 05, en, user 10, 31.12.2009
```

.

An: Kopie:	johndoe@uni	be.ch		
Blindkopie:	aai IDP Invitatio			
E*	aan ibr mercauur			- C
Hello You have been inv You have to read a http://www.iam.uni	ited as virtual home ind accept the AAI I be.ch/aai/docs/AAI_	organization (IDP) grou DP policy: IDP_Policy.pdf	up administrator of the gro	sup "facultyb".

#### Figure 43: User administration: invitation email.

	nistrators of this group			
he following pe	cople can administer this g	roup and all subgroups of it:		
Name E	-Mail	Description	Last login	
je	ohndoe@unibe.ch	Department B Administrator	never	delete
elodesk inform	nation			
The following in	formation will be displaye	d on the aai Helpdesk page. p phone/email address and not a personal addres	5.	
The contact info				
Description:	Department B			
The contact info Description: Website:	Department B			

Figure 44: User administration: admin is defined for this group.

user11,pass11,surname11,givenname11,user11@example.com,street 1,+41 44 268 11 05,en,user 11,31.12.2009 user12,pass12,surname12,givenname12,user12@example.com,street 1,+41 44 268 12 05,en,user 12,31.12.2009 user13,pass13,surname13,givenname13,user13@example.com,street 1,+41 44 268 13 05,en,user 13,31.12.2009 user14,pass14,surname14,givenname14,user14@example.com,street 1,+41 44 268 14 05,en,user 14,31.12.2009

As you can see, the password is clear text. If you enter no password, a password will be generated for every user. Select the csv-file and upload it (cf. Fig. 45).

Now we get an overview with the message that all 14 users are feasibly to be imported (cf. Fig. 46).

Press button *Import correct users now*. Now you can see an overview about the 8 imported users. If you press the *Download password list* button, as shown in Fig. 47 you will get a list about all given respectively automatic created passwords.

In the menu *Preferences* you can modify several preferences, such expiration date, attributes, email settings, and more. In the menu *Statistics* you get an overview about the statistics and the possibility to maintain the database.

#### 5.3 Administration of User Roles and Actions

In this Section the administration of user roles according to the local testbed is described. First, the administrator has to login with its AAI login and register for a role (e.g. TARWIS User), as shown in Section 2.2. In the next step, the AAI login of the user has to get the *Portal Administrator* role in the SNA, thus it can administrate the roles of all other AAI users.

Group: Create   List   Manage	User: Create   List   Import	Preferences	Statistics	Logout
testusers : Import users from C	SV file			
You can import a list of users in	the IDP using a CSV (Comma Sep	arated Values) fi	le.	
Caution: Please use this new	template with the specified at	tribute names.		
Use this Excel template idp-impo then just export the sheet in CS <sup>1</sup>	ort.xls to create your users list, V format ( <b>ISO-8859-1</b> ) in order t	to import your us	ers in the IDF	2
CSV Data Specifications At least the fields marked with a	n asterisk (*) need to be in your	CSV header:		
<ul> <li>username*: The prefixt +</li> <li>password: if the field ha Please choose a good pas mixed uppercase and low</li> <li>surname*: The last nam</li> <li>guenname*: The first n</li> <li>mail* The enail address</li> <li>duPersonEntitlement:</li> <li>portalAddress: Use the telephoneNumber: e.g.</li> <li>preferredLanguage: Hu description: For your int</li> <li>dateExpire: Expected for If the field has no date, tt</li> <li>An AAI UniqueID will be g</li> </ul>	estusers - will be added automatic s no value, a new password will b sword if you define one: minimum e. ame. of the user. If the field has no value, http:// Iglesse add additional eduPerson dollar sign *\$* for line breaks. international format +41 44 268 st be one of de/fr/liven. ernal use. i.e. PhD Student. mat is dd.mm.YYYY ne user will expire in <u>1 year</u> . enerated automatically for each u	cally if missing. e generated. 6 characters, mber. gridlab21.unib Entitlement col 15 05 ser.	e.ch/testUse umns.	ars will be used as default
<ul> <li>The file encoding should be Additional columns in you</li> </ul>	e ISO-8859-1. (You can change r CSV file will be ignored.	the encoding in	the <u>preference</u>	<u>es)</u>
Choose the CSV file containing y a/Desktop/importUsers.csv Durch	our users list to import in the IDP	:		
				Process CSV file > >

Figure 45: User administration: import users.

testu	sers : Preview	of the	CSV import		Logout
Proce 14 fr	essed the file in om 14 users	nportU are fe	sers.csv for group testusers asible to be imported		
line	username	stat	us		
2	user1	$\bigcirc$	User will be imported		
3	user2	٢	User will be imported		
4	user3	$\bigcirc$	User will be imported		
5	user4	٢	User will be imported		
6	user5	$\odot$	User will be imported		
7	user6	٢	User will be imported		
8	user7	$\bigcirc$	User will be imported		
9	user8	٢	User will be imported		
10	user9	$\bigcirc$	User will be imported		
11	user10	$\bigcirc$	User will be imported		
12	user11	٢	User will be imported		
13	user12	$\odot$	User will be imported		
14	user13	۲	User will be imported		
15	user14	0	User will be imported		

Figure 46: User administration: import users.

- (A) First, the administrator has to login as the user *portaladmin* (cf. Fig. 48). This has to be done only once, because before the first use, no AAI user has the *Portal Administrator* rights (which are necessary to administrate the roles of all other AAI users.
- (B) The administrator has to enter the credentials for the *portaladmin* (user=portaladmin, password=wisebed), as shown in Fig. 49.
- (C) Now, the user is logged in as user *portaladmin* (cf. Fig. 50).
- (D) The next step it to edit the own pending subscription as TARWIS user (clicking on *Process Subscription Requests*) and
- (E) accepting the request (cf. Fig. 51). This has nothing to do with the own role as Portal Administrator.
- (F) In the next step, the administrator gets the *Portal Administrator* privilege. After clicking on *All Users*, choosing the own AAI user, clicking on *Edit*

test	users : CSV	import		
Proc	essed the fil Jsers have	e importUse been impo	rted	sv for group testusers
line	username	password	stat	tus
2	user1	pass1	$\bigcirc$	OK - Send username and password to givenname1 surname1 <user1@example.com></user1@example.com>
3	user2	pass2	$\bigcirc$	OK - Send username and password to givenname2 surname2 <user2@example.com></user2@example.com>
4	user3	pass3	$\odot$	OK - Send username and password to givenname3 surname3 <user3@example.com></user3@example.com>
5	user4	pass4	$\bigcirc$	OK - Send username and password to givenname4 surname4 <user4@example.com></user4@example.com>
6	user5	pass5	$\bigcirc$	OK - Send username and password to givenname5 surname5 <user5@example.com></user5@example.com>
7	user6	pass6	$\bigcirc$	OK - Send username and password to givenname6 surname6 <user6@example.com></user6@example.com>
8	user7	pass7	$\bigcirc$	OK - Send username and password to givenname7 surname7 <user7@example.com></user7@example.com>
9	user8	pass8	$\bigcirc$	OK - Send username and password to givenname8 surname8 <user8@example.com></user8@example.com>
10	user9	pass9	$\bigcirc$	OK - Send username and password to givenname9 surname9 <user9@example.com></user9@example.com>
11	user10	pass10	$\bigcirc$	OK - Send username and password to givenname10 surname10 <user10@example.com< td=""></user10@example.com<>
12	user11	pass11	$\odot$	OK - Send username and password to givenname11 surname11 <user11@example.com< td=""></user11@example.com<>
13	user12	pass12	$\bigcirc$	OK - Send username and password to givenname12 surname12 <user12@example.com< td=""></user12@example.com<>
14	user13	pass13	$\bigcirc$	OK - Send username and password to givenname13 surname13 <user13@example.com< td=""></user13@example.com<>
15	user14	pass14	0	OK - Send username and password to givenname14 surname14 <user14@example.com< td=""></user14@example.com<>





Figure 48: User role administration: login as user portaladmin.

- (G) the properties of the AAI user are shown and can be edited (cf. Fig. 52).
- (H) After choosing *Portal Administrator* and clicking on *Save*, the AAI login of the administrator has the *Portal Administrator* privilege and can administrate the roles of all AAI users.
- (I) By clicking on All Roles, as shown in Fig. 53,
- (J) all roles can be seen (TARWIS Admin, TARWIS User, TARWIS Visitor are pre-configured),
- (K) and the administrator of the roles. Currently it is the user portaladmin (we logged in as portaladmin, see step (B)).
- (L) By clicking on *Admins*, we change it to the own AAI user (in step (H), we gave the own AAI user the *Portal Administrator* privilege.
- (M) Now, the role provider (owner of the role) has to be changed from the initial portaladmin user to the own AAI user (in the current example *Markus Anwander*), as shown in Fig. 54.

	ogin as Administrator
j.	WISEBED
AAI Login for	Administrator
Available to the participating in SNAportal admi	members of the institutions the WISEBED Federation which are inistrators.
	WISEBED Login
Login for I	ocal administrators
Login for I Username	portaladmin
Login for I Username Password	portaladmin

Figure 49: User role administration: portaladmin credentials.

SNAportal 1.0.5			Admin: portaladmin (Portal Adm	ninistrator)
Home Role Management My Roles Add a Role All Roles	Welcome to the SNA This is your personal start page for a There are 1 pending subscription req	portal dministering the SN uests to process.	C A-Portal.	
My Profile (Lang: en) My Users	Role Title	# Subs. Requests	Actions	
Add a User All Users All Orphans	TARWIS User	1	Edit I Process Subscription Requests	
Actions All Actions Add Actions				
Status Events Viewer (On) Email Notifications (On) PHP Info				
Logout				

Figure 50: User role administration: administrator menu.

- (N) The own AAI user should also be added as a role administrator.
- (O) We do this for all three roles (TARWIS Admin, TARWIS User, and TARWIS Visitor). Now, the administrator has the *Portal Administrator* privilege and can administrate all three roles (cf. Fig 55).
- (P) As last step, the default password of the user *portaladmin* has to be changed (cf. Fig. 56), by clicking on *Edit*. The default password can be changed using *Change Local Password*.
- (Q) Now, the administrator (currently as user portaladmin) has to be logged out and again logged in as administrator with its own AAI login (cf. Fig 57).

SNAportal 1.0.5		Ad	lmin: portaladmin (Portal Admin	nistrato
Home Role Management My Roles Add a Role All Roles	Subscriptions for Role: TARWIS User [1. Pending Subscriptions	E10F7CBD7C]		
User Management My Profile (Lang: en) My Users Add a User All Users All Orphans	User Name (User ID) Anwander Markus (215329@gridlab21.unibe.ch) Select All I Unselect All Accept Selected (Mail to Selected) (SMS to Sel	Status         Subscribed On           Pending         21.06.2010           ected	Actions Details I Accept I Delete I Invite I Send Email	
Actions All Actions Add Actions Status	Confirmed Subscriptions 0 subscriptions (100 + subs/page on 0 pages	)		
Events Viewer (On) Email Notifications (On) PHP Info Logout	User Name (User ID) Currently, there are no accepted, rejected or suspended sub	Status scriptions for this role.	Subscribed On Actions	



SNAportal 1.0.5		Admin: portaladmin (Portal Administrator
Home Role Management My Roles Add a Role All Roles	Edit User	List Subscriptions I Delete User I Change Local Password
User Management	Last Login	21.06.2010 [19:46]
My Profile (Lang: en)	User ID	215329@gridlab21.unibe.ch
Add a User All Users All Orphans	User Role	User Role Administrator Portal Administrator
All Actions	Family Name	Subscription Administrator
Add Actions	Given Name	Markus
Status Events Viewer (On)	Birthdate	
Email Notifications ( <b>On</b> ) PHP Info	Gender	
Logout	Language	en
	Email	anwander@iam.unibe.ch
	Home Address	

Figure 52: User role administration: change role to portaladmin.

SNAportal 1.0.5			Admin: port	aladmin (Portal Administr
Home				
Role Management My Roles Add a Role All Roles	All Roles Show roles where Role Title	starts with	Search Al	D
User Management My Profile (Lang: en)	3 roles (100 \$ roles/page on 1	I pages)		
My Users	Role Title [ Role Key ]	Provider Name ( Prilivege )	Creation	Actions
Add a User	TARWIS Admin [2.42E359CC94]	portaladmin (Portal Administrator)	06.04.2010	Edit I Copy I Delete I Admins
All Users	TARWIS User [1.E10F7CBD7C]	portaladmin (Portal Administrator)	06.04.2010	Edit I Copy I Delete I Admins
All Orphans	TARWIS Visitor [3.7AB7716F2E]	portaladmin (Portal Administrator)	06.04.2010	Edit I Copy I Delete I Admins

Figure 53: User role administration: all roles.

- (**R**) By clicking on *All Actions*, the administrator can see all possible actions.
- (S) Every action corresponds to a webservice supported by TARWIS and the Reservation System.
- (T) Actions can be edited and deleted.
- (U) By clicking on *All Roles* and afterwards on *Edit*, a role can be edited (cf. Fig 58).

SNAportal 1.0.5		Admin: portaladmin (Portal Administrator)			
Home		Edit Role I Edit Standard Attributes I Edit Custom Attributes			
Role Management					
My Roles	Edit Role Administrators				
All Roles	You can change the role owner. Only Portal and Role Administrator privileged users are allowed to be role owner.				
User Management		, , , , , , , , , , , , , , , , , , , ,			
My Profile (Lang: en)	Role Provider				
My Users	Role Title (Key)	TARWIS Admin (2.42E359CC94)			
Add a User All Users	Provider Name (Privilege)	portaladmin (Portal Administrator)			
All Orphans		Anwander Markus (Portal Administrator) 🛟 Change Owner			
Actions All Actions Add Actions	You can manage the Role Ad Privilege.	ministrators of this role. A Role Administrator will be able to manage the role regarding his			
Status	Role Administrators				
Events Viewer (On)	Role Title (Key)	TARWIS Admin (2.42E359CC94)			
PHP Info	No role administrator associated to t	his role.			
Logout		Anwander Markus (Portal Administrator)			

Figure 54: User role administration: change role owner and add role administrator.

SNAportal 1.0.5			Admin: porta	aladmin (Portal Administrato
Home				
Role Management My Roles	All Roles			
Add a Role All Roles	Show roles where Role Title	starts with	Search All	)
User Management	3 roles (100 \$ roles/page on	1 pages)		
My Profile (Lang: en) My Users	Role Title [ Role Key ]	Provider Name ( Prilivege )	Creation	Actions
Add a User	TARWIS Admin [2.42E359CC94]	Anwander Markus (Portal Administrator)	06.04.2010	Edit I Copy I Delete I Admins
All Users	TARWIS User [1.E10F7CBD7C]	Anwander Markus (Portal Administrator)	06.04.2010	Edit I Copy I Delete I Admins
All Orphans	TARWIS Visitor [3.7AB7716F2E]	Anwander Markus (Portal Administrator)	06.04.2010	Edit I Copy I Delete I Admins
Actions All Actions Add Actions	0			
Status Events Viewer (On) Email Notifications (On) PHP Info				
Logout				

Figure 55: User role administration: allowed to administrate all three user roles.

SNAportal 1.0.5					Ad	min: portaladm	in (Portal Administrator)
Home							
Role Management My Roles Add a Role All Roles	Al	Users where User ID	contains	\$		Search All	
User Management	2 us	sers (100 🛟 users/page	on 1 pages)				
My Profile (Lang: en) My Users		User ID	Lastname	Firstname	Privilege	Last Login	Actions
Add a User		portaladmin			Portal Administrator	21.06.2010 [19:49]	Subscriptions I Edit I Delete
All Users All Orphans		215329@gridlab21.unibe.ch	Anwander	Markus	Portal Administrator	21.06.2010 [19:46]	Subscriptions I tent I Delete
Actions All Actions Add Actions	2	Select All I Unselect All elete Selected					
Status Events Viewer (On) Email Notifications (On) PHP Info							
Logout							

Figure 56: User role administration: change initial password of user portaladmin.

(V) The important thing is the correlation between the actions and a role. In case of the role *TARWIS User*, the actions *createExperiment*, *deleteReservation*, *getReservations*, *makeReservation*, *makingOwnReservation*, and *viewNetwork* are allowed.

SNAportal 1.0.5			Admin: Anwander	Markus (Po	rtal Administr
Home			Q	,	
Role Management My Roles	All Actions				
Add a Role All Roles	Show actions where Ac	tion Title 🗘 starts with 🗘	Search	All	
Jser Management	8 actions (100 🛟 action	ons/page on 1 pages)			
My Profile (Lang: de) My Users	Action Name	Action Title	Creation	Modified	Actions
Add a User	getReservations	Access the rervation table	06.04.2010	Never	Edit I Delete
All Users	makingOwnReservation	Create, modify or remove own reservations	06.04.2010	Never	Edit I Delete
All Orphans	createExperiment	Define an experiement	06.04.2010	Never	Edit I Delete
ctions	deleteReservation	delete a reservation	14.06.2010	Never	Edit I Delete
All Actions	maintainReservation S	Maintaing all reservation	06.04.2010	Never	Edit I Delete
Add Actions	maintainTARWIS	Maintaing TARWIS	06.04.2010	Never	Edit I Delete
tatus	makeReservation	make a Reservation	22.04.2010	Never	Edit I Delete
Events Viewer (On) Email Notifications (On) PHP Info	viewNetwork	View an all nodes	06.04.2010	Never	Edit I Delete
Logout					

Figure 57: User role administration: all actions.

SNAportal 1.0.5				Admin: Anwander Markus	(Portal Adm	
lome						
tole Management	Edit Role A	dministrators	I Edit Standard Att	ributes I Edit Custom Attributes I	Delete	
My Roles Add a Role All Roles	Edit Role					
Ser Management My Profile (Lang: de) My Users Add a User All Users	Fields marked with   must be Your role is not visible to othe Users cannot subscribe to you Subscription State.	e filled in. rs unless you ur role unless	select <i>Visible</i> in the f you select <i>Free, Mar</i>	ield <b>Role Visibility.</b> aaged, Passwords or Suspended in t	the field <b>Role</b>	
All Orphans	Date Created	06.04.2010 [12:06]				
All Actions	Role Key	1.E10F	7CBD7C	•		
Add Actions	(Password)	You can	define a unique role key a	and use it as password if the subscription state	e is set to	
atus		Passwoi The leng	d. th of the key must be betw	ween 6 and 40 characters.		
Events Viewer (On) Email Notifications (On)	Role Title	TARWIS User				
PHP Info	Role URL	http://www.wisebed.eu				
ogout	Bole Description					
	Role Visibility	• Vis	ble 🔿 Invisible			
	Role Subscription State					
	Allowed Actions	State	Action	Title		
		J.	createExperiment	Define an experiement		
			deleteReservation	delete a reservation		
			getReservations	Access the rervation table		
		V	V maintainReservation Maintaing all reservation			
			maintainTARWIS	Maintaing TARWIS		
			makeReservation	make a Reservation		
			makingOwnReservation	Create, modify or remove own reservations		
			viewNetwork	View an all nodes		
	Role Adapter TARWIS Redirect Adapter +					
		This Role Adapter redirects the user to the Role URL.				
		This Rol	e Adapter redirects the us	er to the Role URL.		

Figure 58: User role administration: all roles.

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