

Safe and secure control of VLBI stations from remote

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FESG

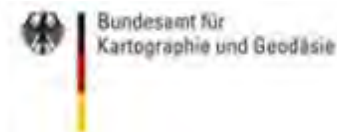
NEXPREs

EUROPEAN
vlbi
NETWORK

JIVE
JOINT INSTITUTE FOR VLBI IN EUROPE



Max-Planck-Institut für Radioastronomie



***Martin Ettl (FESG/MPIfR), Jim Lovell (UTAS),
Walter Alef (MPIfR), Ed Himwich (NASA/GSFC), Christopher Beaudoin (MIT-Haystack),
Christian Plötz (BKG), Arpad Szomoru (JIVE), Matthias Mühlbauer (BKG),***

Geodetic Observatory Wetzell



The ideas behind ...

The ideas behind ...



Local

- Standard operations
- Local operator

The ideas behind ...



Local

- Standard operations
- Local operator



Remote

- Check system states from everywhere at the observatory
- Tele-working
- Remote assistance and diagnostics
- Control very remote, inaccessible telescopes

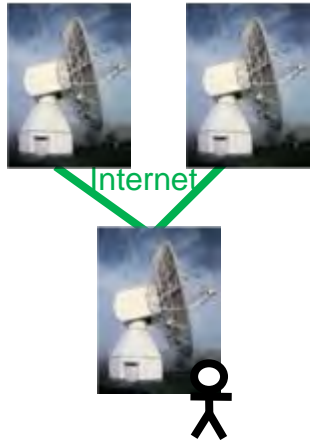
The ideas behind ...



Local



Remote



Shared

- Standard operations
- Local operator

- Check system states from everywhere at the observatory
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- Save, passive data live monitoring
- Dedicated control access by responsible person
- Shared access from different observatories
- Shared night shifts

The ideas behind ...



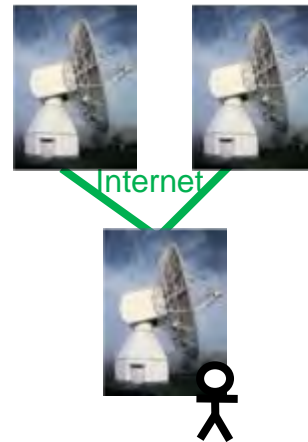
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Shared

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Unattended

- Observations run autonomous, (semi-) automated and unattended



The ideas behind ...

NEXPRoS

Novel EXplorations Pushing Robust e-VLBI Services

NEXPreS WP5/Task 3: Continuous quality monitoring & Station Remote Control



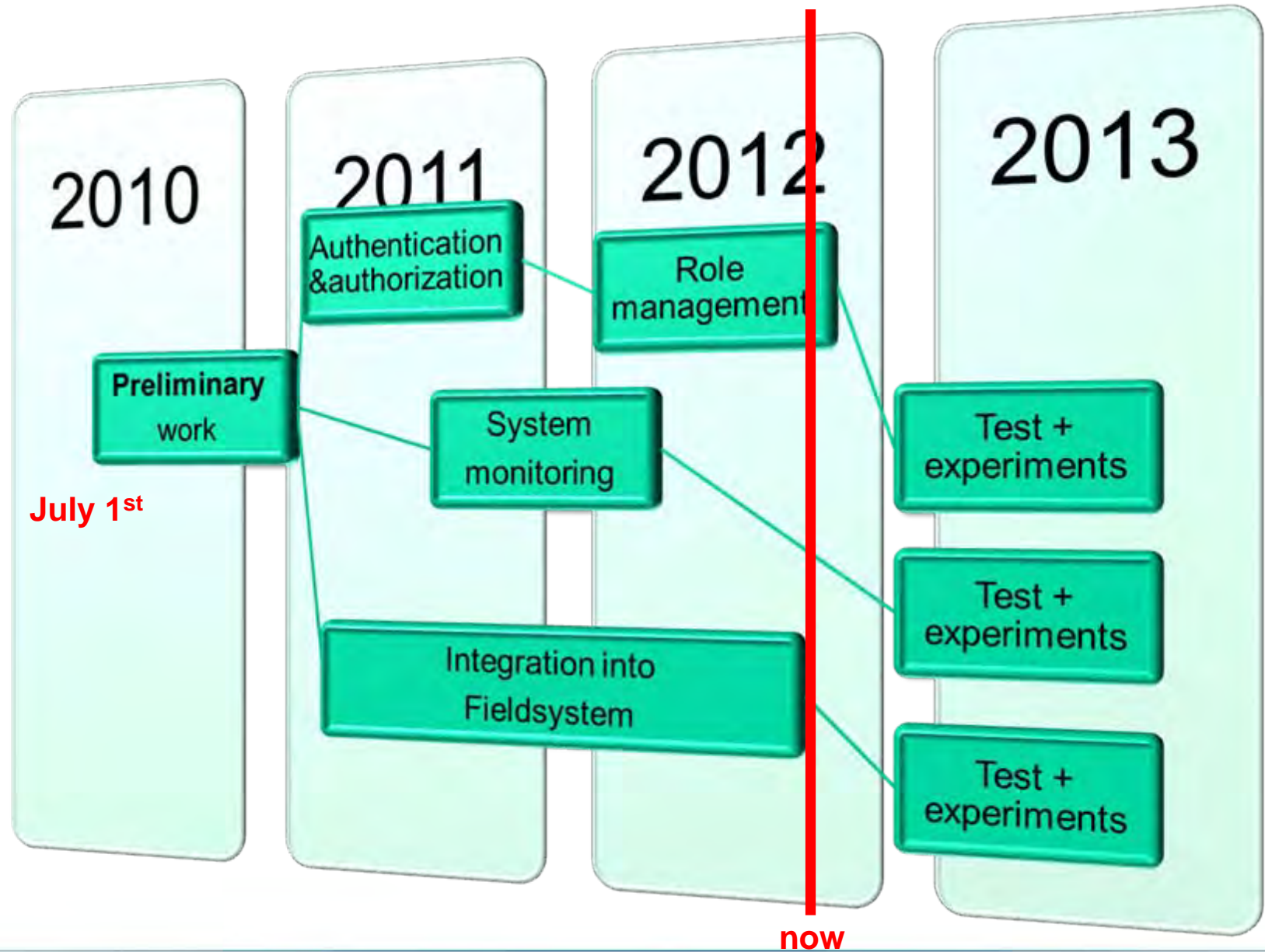
**Novel EXplorations Pushing
Robust e-VLBI Services**

- three-year project from July 2010 to June 2013
- with the goal to develop future e-VLBI services of the European VLBI Network (EVN) and to use e-VLBI for each astronomical observation of the EVN
- cooperation of 15 astronomical institutes and National Research and Education Network (NREN) providers
- funded by the European Union's Seventh Framework Programme as e-Infrastructure project
- with the four technical main activities:
 - Cloud Correlation
 - Dynamically Provisioned Network Resources
 - Computing in a Shared Infrastructure
 - Provisioning High-Bandwidth, High-Capacity Networked Storage

WP5/Task 3: **(TUM, MPIfR, JIVE)**

- identify and re-act on observation failures in near real-time
- improve diagnostics
- allow direct (read) access to the field system control parameters
- extend the capabilities of the NASA Field System with
 - a secure remote control (authentication, authorization, operator roles) and
 - system monitoring

NEXPreS WP5/Task 3: Continuous quality monitoring & Station Remote Control



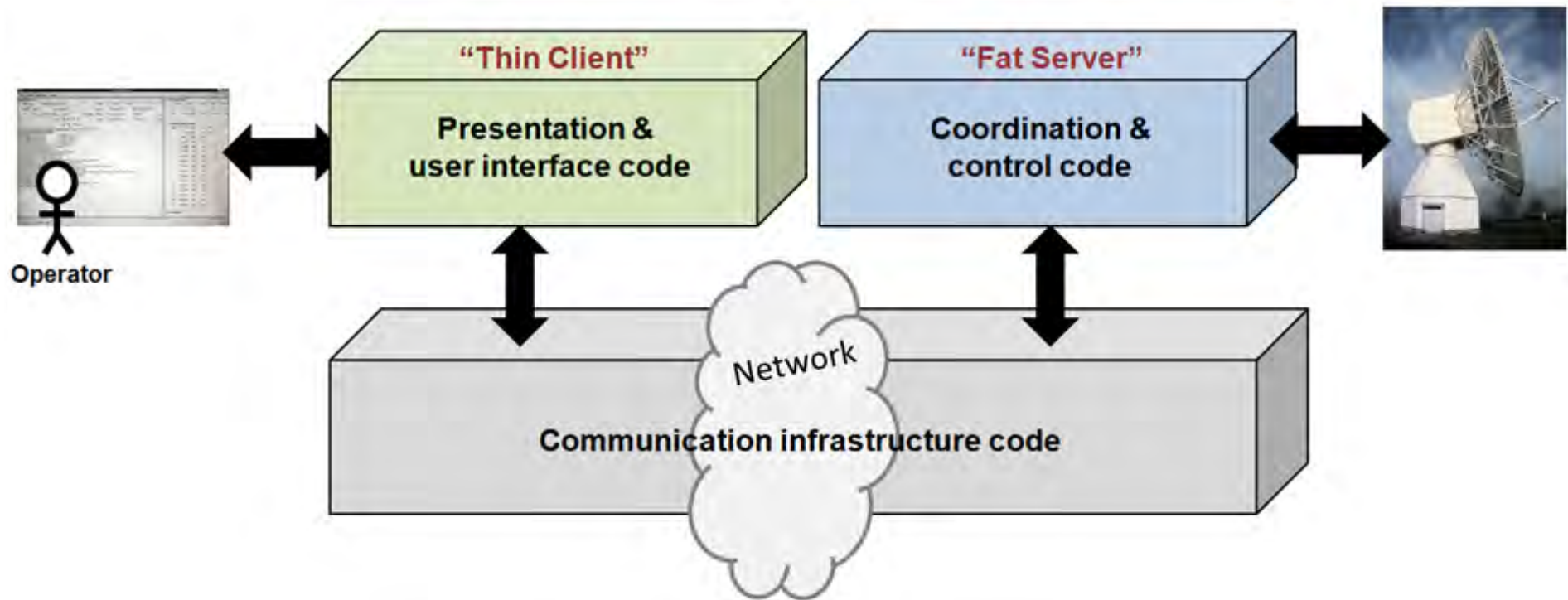
The ideas behind ...

NEXPRoS

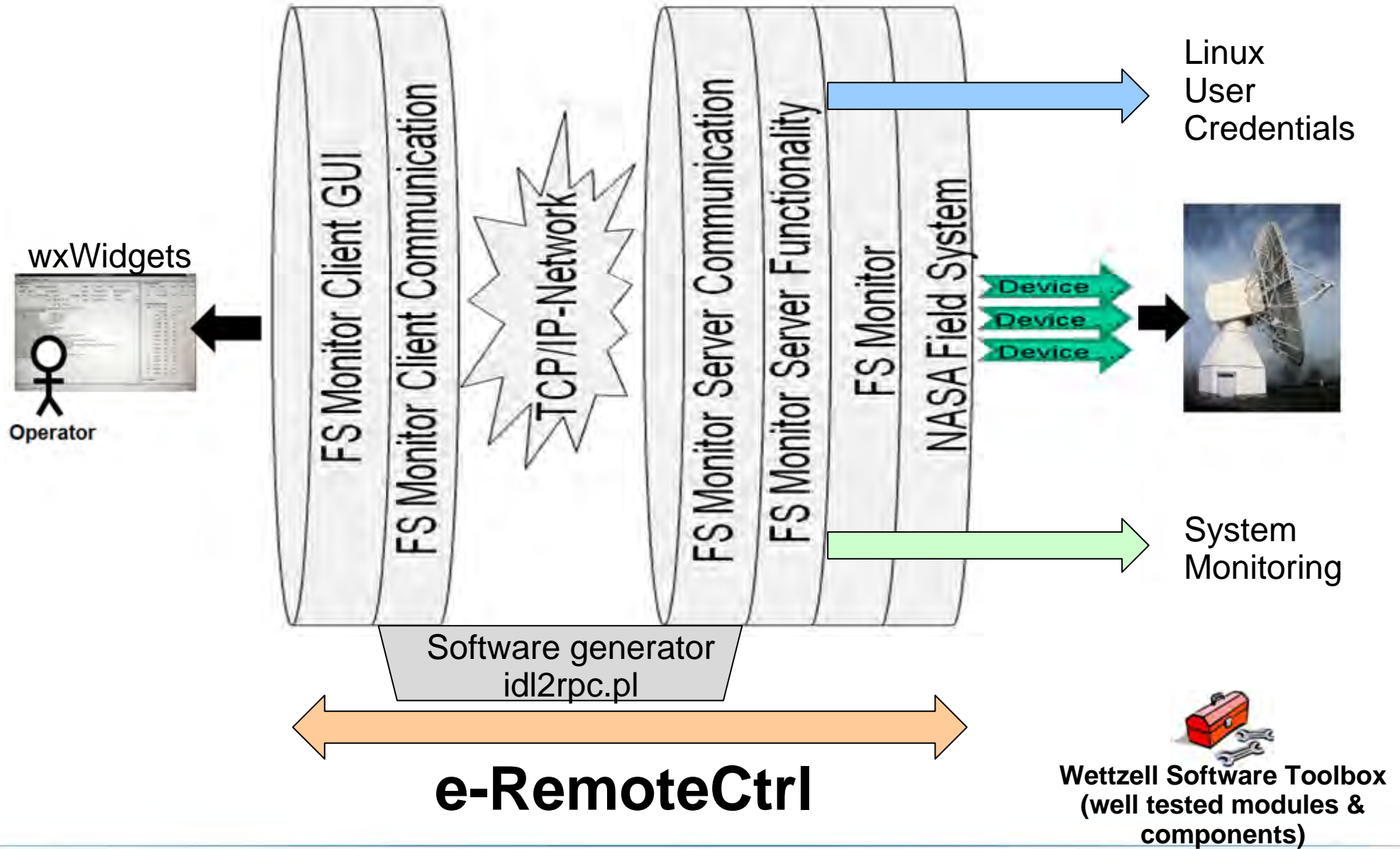
Novel EXplorations Pushing Robust e-VLBI Services

The solution: e-RemoteCtrl

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The ideas behind ...

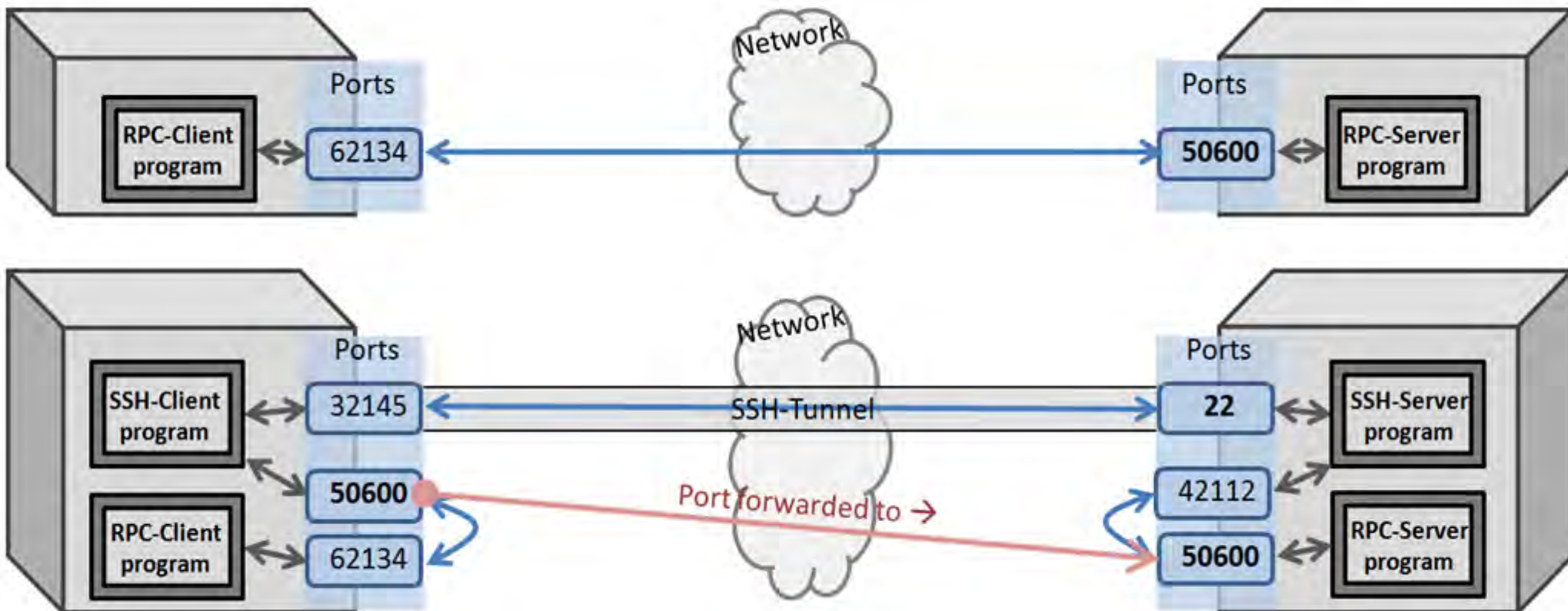
NEXPReS

Novel EXplorations Pushing Robust e-VLBI Services

The solution: e-RemoteCtrl

Security

Security



sshbroker

rbash

Tunneled e-RemoteCtrl



Wetzell Software Toolbox
(well tested modules & components)

Security

SSH-Broker configuration (passwords are AES encrypted)

RPC-Clients RPC-Server SSH Hot-Key Table Appearance

Station Network Access Settings

Enable

Site

Port

User Name

Port Binding automatic

Additional Cmd

Station IP

Open Timeout [s]

DSA file ...

Pass Phrase

Password

System Access Settings

Enable

Name

Port

User Name

Port Binding automatic

Additional Cmd

IP Address

Open Timeout [s]

DSA File ...

Pass Phrase

Password

Timeout settings [s]

Connection quality settings

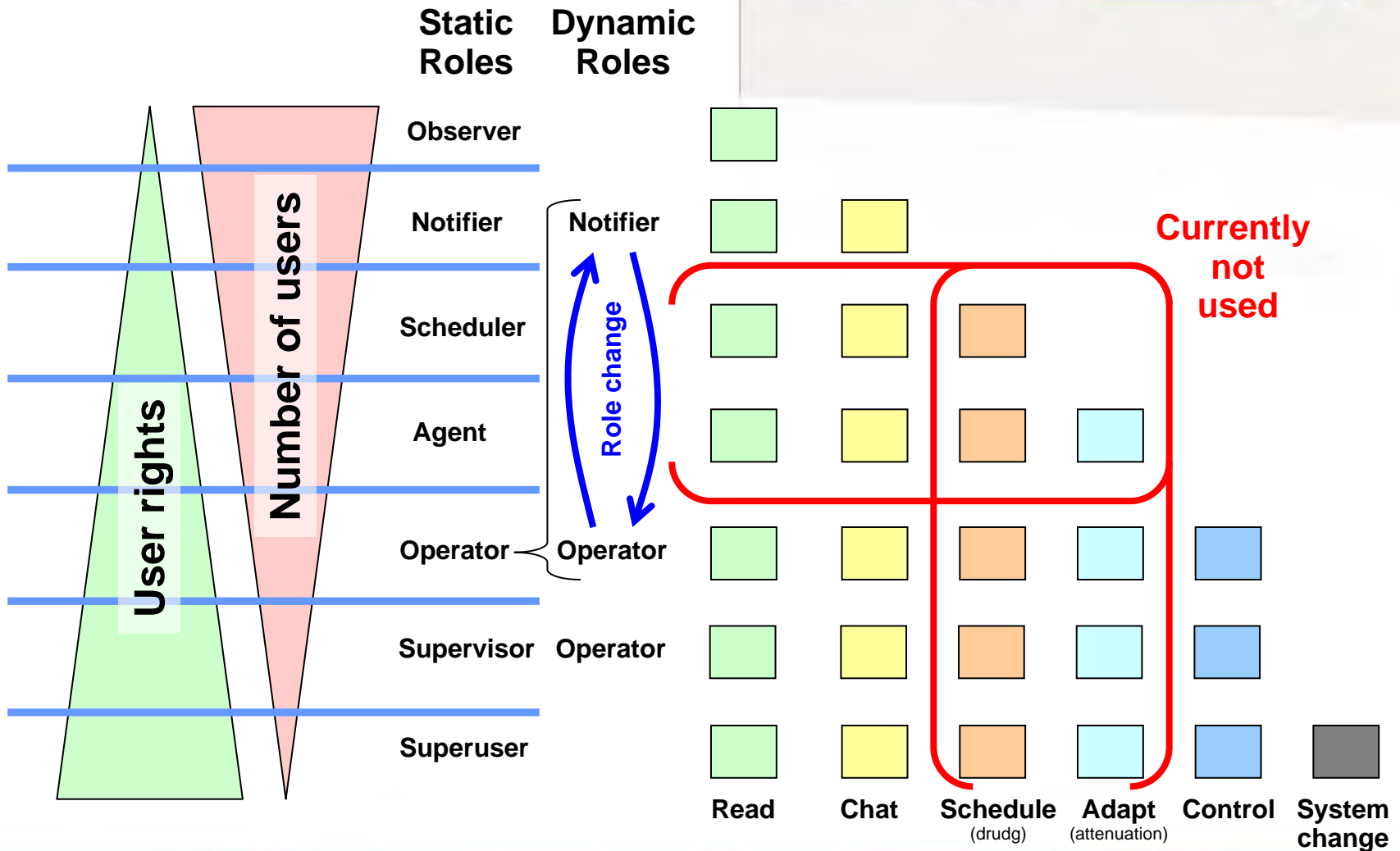
poor medium good

/home/oem/projects/wxgui/trunk/config-eremotectrl/RPCClient.conf

Reload Edit Save Append Delete

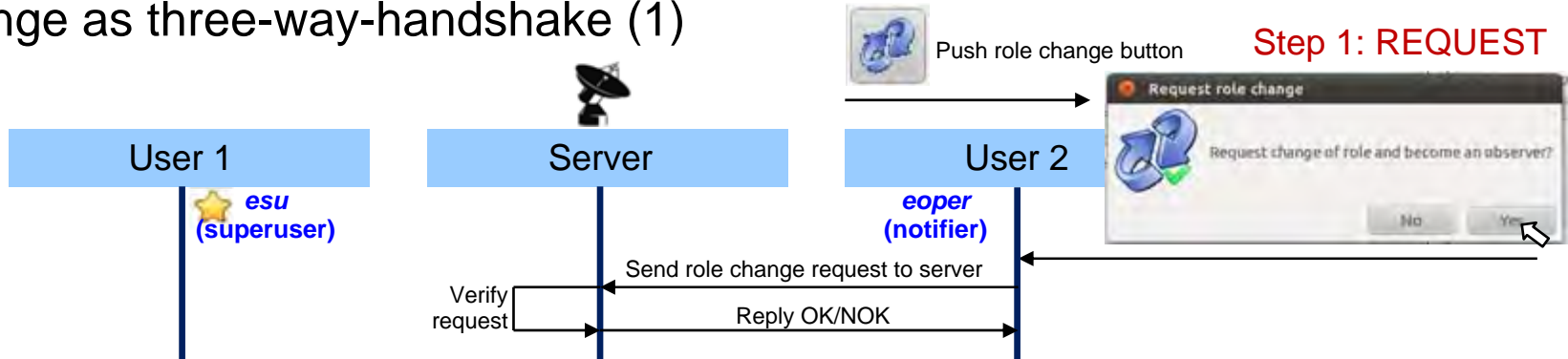
Security

User role management with authentication and authorization



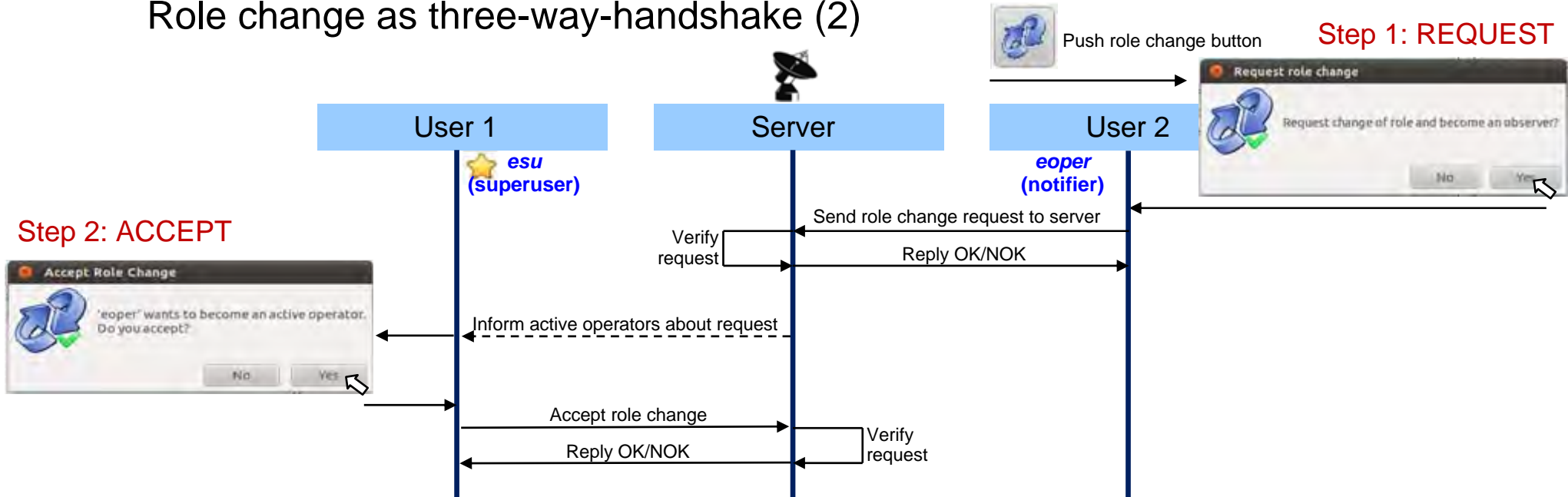
Security

Role change as three-way-handshake (1)



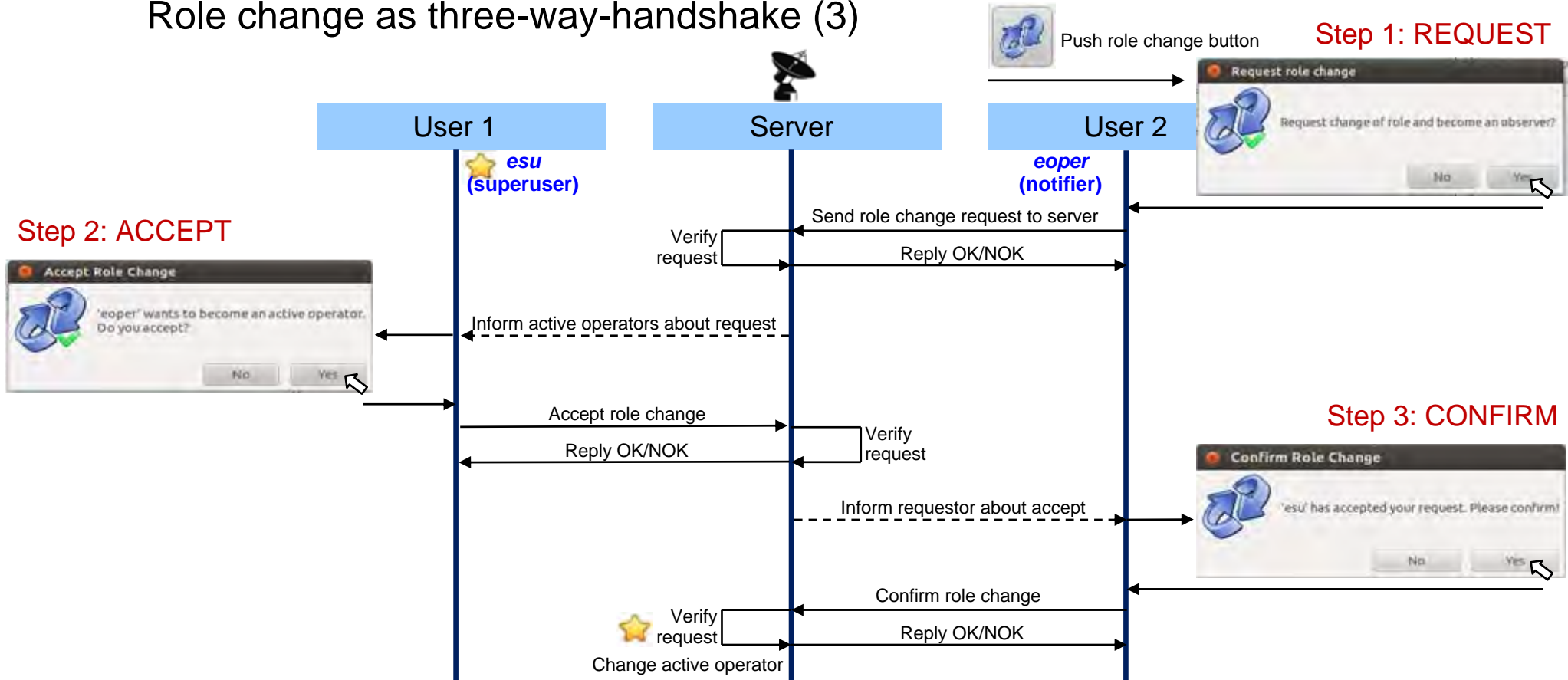
Security

Role change as three-way-handshake (2)



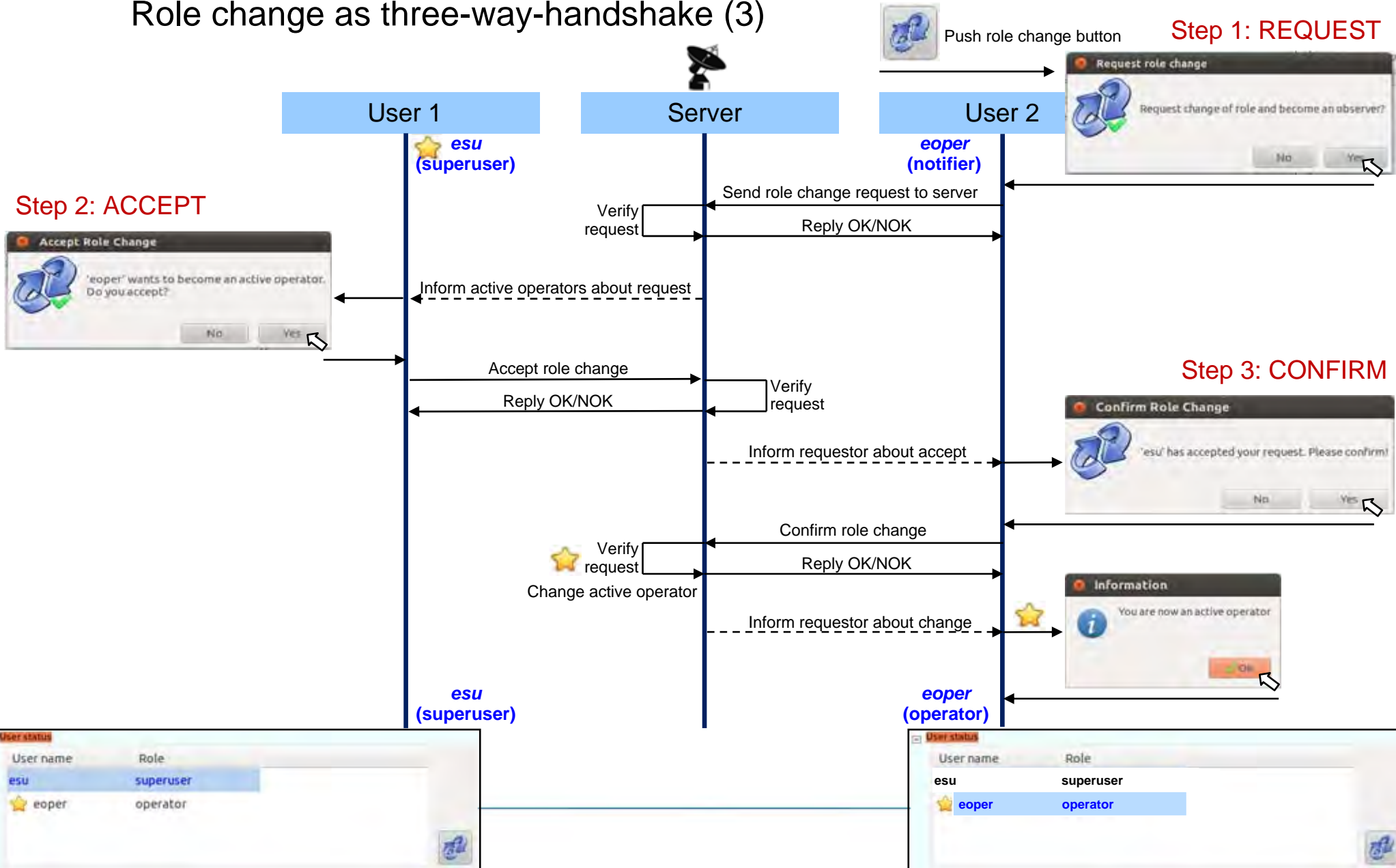
Security

Role change as three-way-handshake (3)



Security

Role change as three-way-handshake (3)



The ideas behind ...

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Novel EXplorations Pushing Robust e-VLBI Services

The solution: e-RemoteCtrl

Security

Features

Features

Main window

Status monitor

Logging

Command input

Connection information

The screenshot shows the 'Station Tools' application window. It features several panels: 'StatusMonitor' with a table of station data, 'HDCapacity' with two pie charts showing disk usage, and 'SystemTemperature' with a line graph. A 'Chat' window is open in the foreground, displaying a conversation between 'alexander*' and 'oper'. The interface includes a menu bar (File, View, Settings, Help) and a toolbar. The status bar at the bottom shows 'Connected to 127.0.0.1' and a 'webcam1 - Mozilla Fire...' browser window.

WETZELL	2010.023.08.43.22 UT	TEMP	-3.8 C	Azel	0
MODE	RATE	06:45:58	NEXT	HUMID	90.6 % DA 00:48m 59.30 s
m	16.0	SCHED=none	LOG=station	PRES	951.6 mb DEC 28d10m
		TSYS: WA	WB	PC	PD
		CABLE	0.000402087s	AZ	80.0000 EL. 12.0000
				IL	84 24 0

Chat log:
[alexander*] hallo
[oper] hello
[alexander*] how are you
[oper] fine, how can i help you?
[alexander*] the schedule has changed
[alexander*] please drudg it again
[oper] ok, thanks!
[alexander*] thank you

Mark 5 capacity

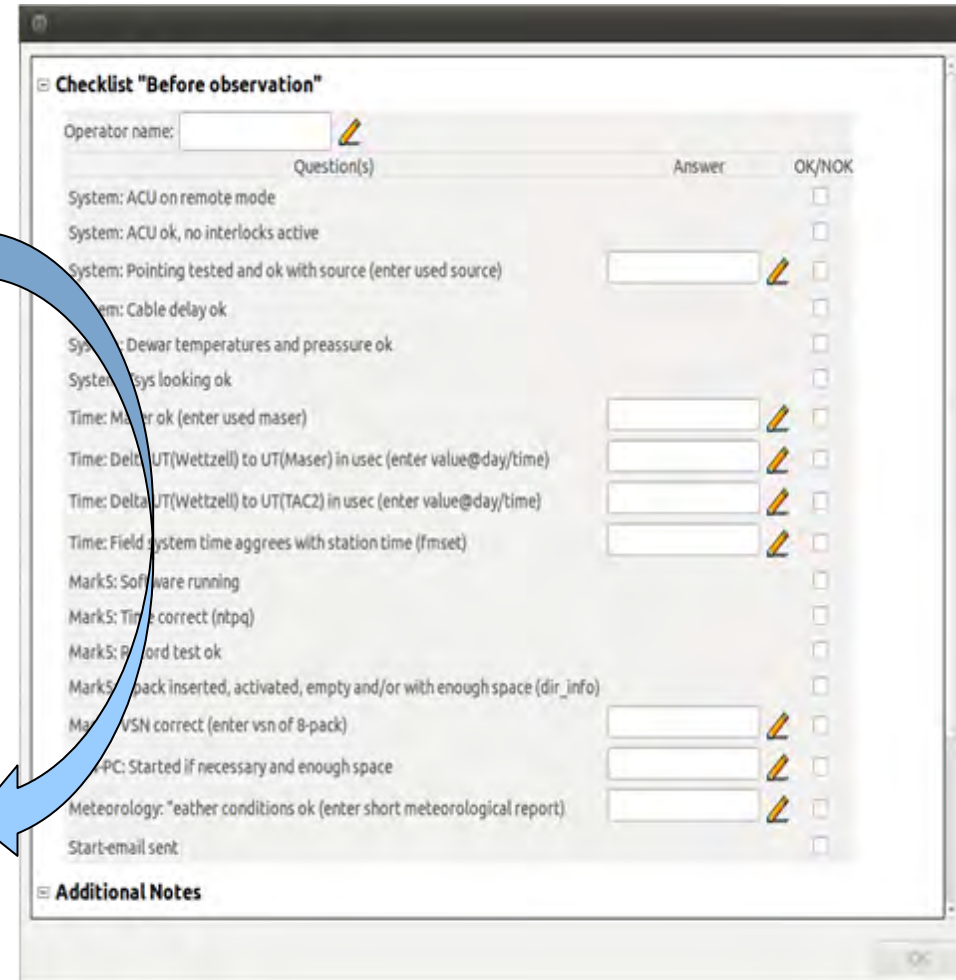
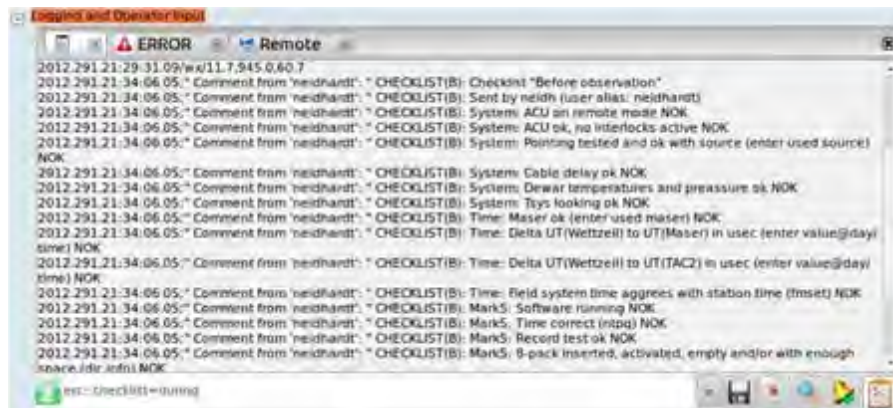
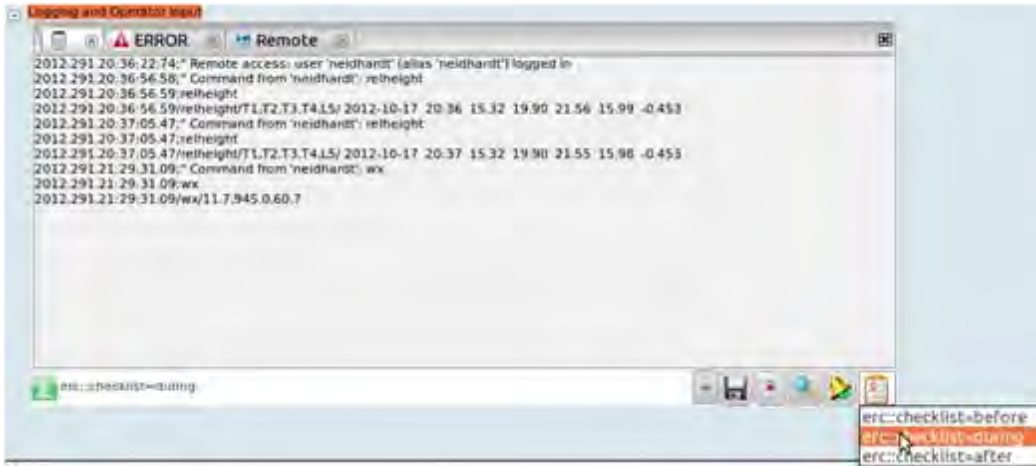
System temperatures

Chat

Connection status

Features

Checklists



Features

Station specific system monitoring (HTML or plain text)

WETTZELL(station)

User status
Status Monitor:

```

WETTZELL 2012.291.21.29.46 UT      TEMP 11.6 C azel 0
MODE RATE 21:34:31 NEXT          HUMID 61.0 % RA 06h27m 44.74 s
m 8.00 SCHED=none LOG=station    PRES 945.1 mb DEC 38d01m (-1)
TSYS: IFA IFB IFC IFD          CABLE 0.0003s AZ 60.0000 EL 25.0000
47 150 37 0
NO CHECK: v1 v2 v3 v4 v5 v6 v7 v8 v9 v10 v11 v12 v13 v14 v15 if fm n i3
    
```

Logging and Operator Input

```

ERROR Remote
2012.291.20:36:22.74;" Remote access: user 'neidhardt' (alias 'neidhardt') logged in
2012.291.20:36:56.58;" Command from 'neidhardt': relheight
2012.291.20:36:56.59;relheight
2012.291.20:36:56.59;relheight/T1,T2,T3,T4,L5/ 2012-10-17 20:36 15.32 19.90 21.56 15.99 -0.453
2012.291.20:37:05.47;" Command from 'neidhardt': relheight
2012.291.20:37:05.47;relheight
2012.291.20:37:05.47;relheight/T1,T2,T3,T4,L5/ 2012-10-17 20:37 15.32 19.90 21.56 15.99 -0.453
2012.291.21:29:31.09;" Command from 'neidhardt': wx
2012.291.21:29:31.09;wx
2012.291.21:29:31.09;wx/11.7,945.0,60.7
    
```

SysMon Data

Sensor	Value	Unit
Rel. height	-0.454	mm
Temp1	15.13	deg. C
Temp2	19.73	deg. C
Temp3	20.86	deg. C
Temp4	15.97	deg. C

M5Capacity

SystemTemperature	MonPCal	
46.8412 (IF1)	619.9450 (IF2)	
37.1645 (IF3)	0.0000 (IF4)	
Freq	TS-U	TS-L
1 102.99	50.7257	0.0000
2 142.99	53.6536	0.0000
3 342.99	50.3305	0.0000
4 482.99	42.7416	0.0000
5 102.89	37.8211	0.0000
6 202.89	38.1567	0.0000
7 262.89	35.6053	0.0000
8 282.89	37.2365	0.0000
9 192.99	37.2365	0.0000
10 202.99	37.2365	0.0000
11 237.99	37.2365	0.0000
12 277.99	85.5789	0.0000
13 297.99	85.3911	0.0000
14 302.99	93.1434	0.0000

MCI

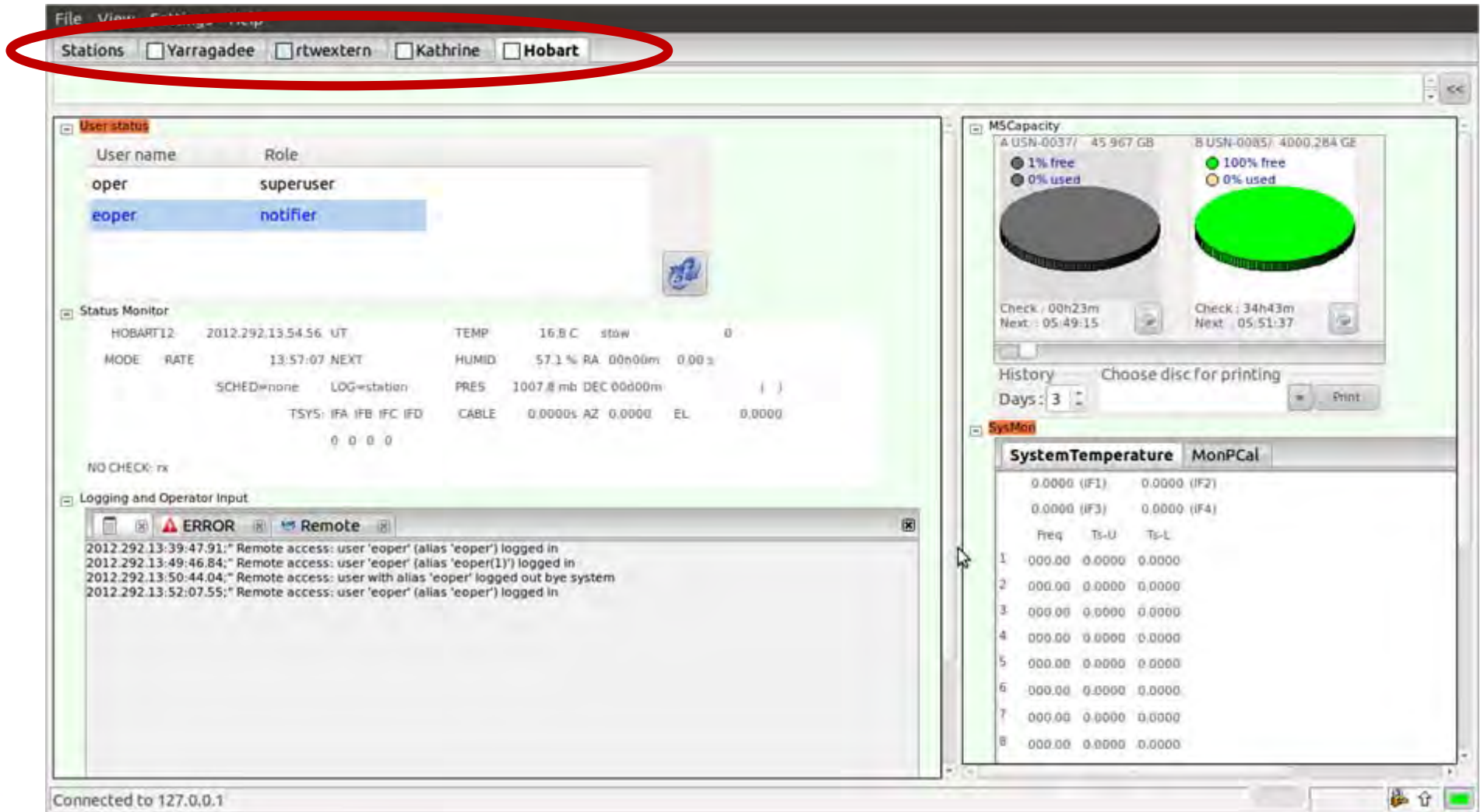
Data for science and analysis

Data for system operations

Data for diagnosis

Features

Parallel control of several telescopes



The ideas behind ...

NEXPRoS

Novel EXplorations Pushing Robust e-VLBI Services

The solution: e-RemoteCtrl

Security

Features

Test bed and e-RemoteCtrl network

Test bed and e-RemoteCtrl network



Thank you

The software is available on the Web page <http://www.econtrol-software.de>

See also our demo today!!!

