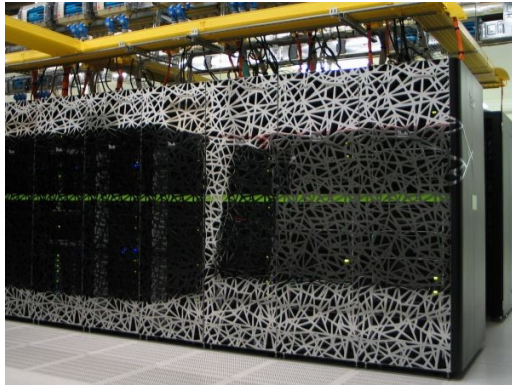# Remote visualization
&
SURFsara visualization infrastructure

Paul Melis
(paul.melis@surfsara.nl)

Local visualization

```
1.980000
0.027228
-0.013616
1.990000
0.038601
-0.015680
1.990000
0.050290
-0.017887
2.000000
0.062348
-0.020251
2.010000
…
```

SURF SARA

Copy data to local institute (scp, rsync, ftp, Dropbox, SURFdrive, etc.)

```
1.980000
0.027228
-0.013616
1.990000
0.038601
-0.015680
1.990000
0.050290
-0.017887
2.000000
0.062348
-0.020251
2.010000
…
```

files → **Data source** → raw data → **Enrichment** → derived data → **Mapping** → visual object → **Render** → image

"Data takes ages to transfer!"
"Too much data to store locally!"
"GPU too slow!"
"Laptop caught fire!"

URF SARA

Remote visualization (VNC)


```
1.980000
0.027228
-0.013616
1.990000
0.038601
-0.015680
1.990000
0.050290
-0.017887
2.000000
0.062348
-0.020251
2.010000
…
```

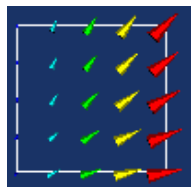files   raw data   derived data   visual object   desktop
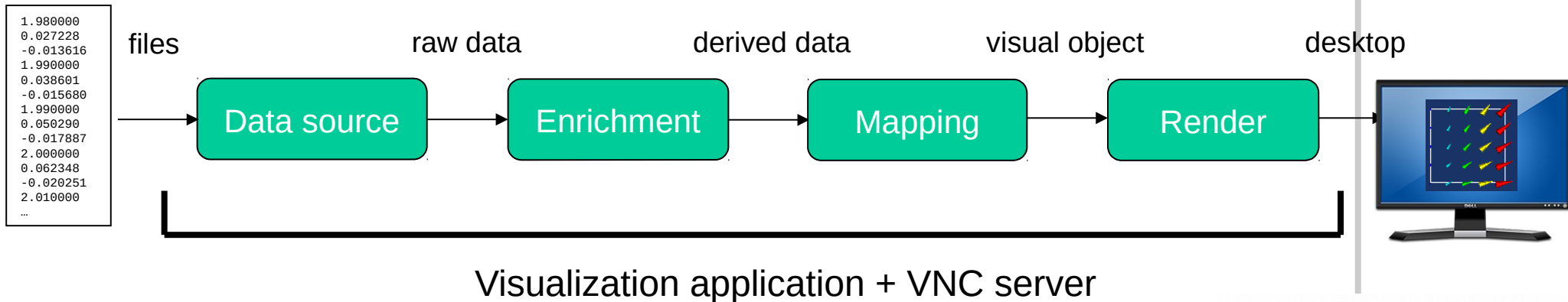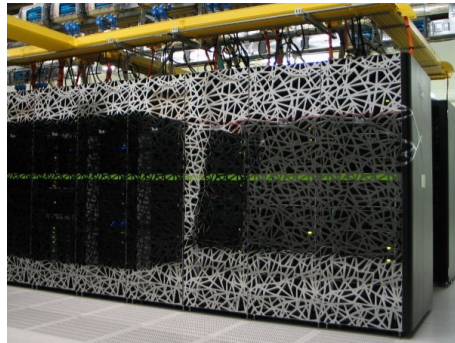
| Data source | → | Enrichment | → | Mapping | → | Render |

Visualization application + VNC server

ParaView "desktop delivery mode"

ParaView server

files | raw data | derived data | visual object | image

```
1.980000
0.027228
-0.013616
1.990000
0.038601
-0.015680
1.990000
0.050290
-0.017887
2.000000
0.062348
-0.020251
2.010000
…
```
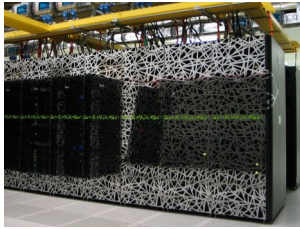
Data source → Enrichment → Mapping → Render
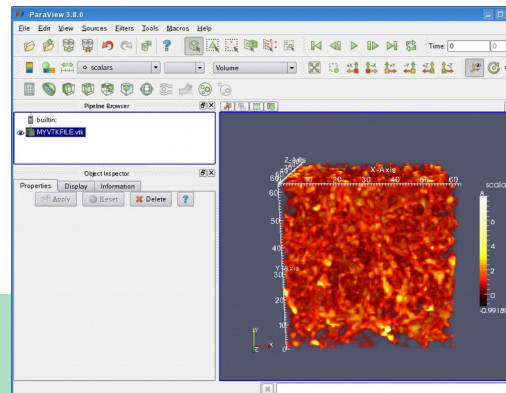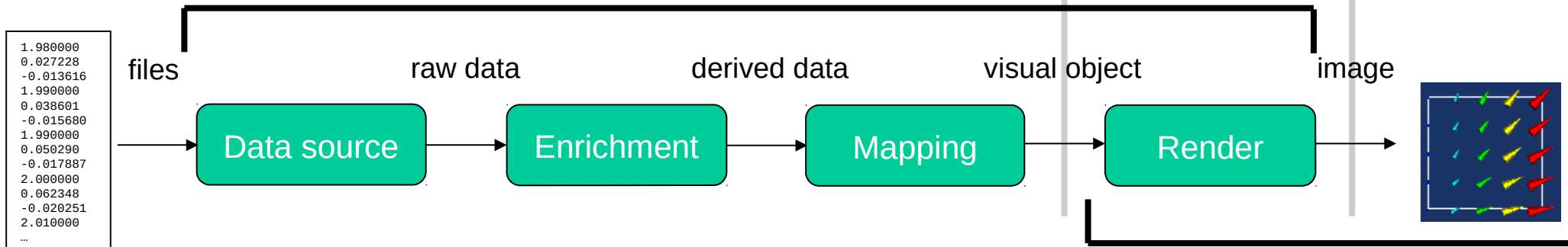
ParaView client
(connected to server)
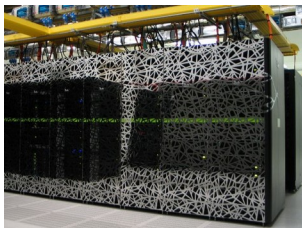
Jupyter notebook
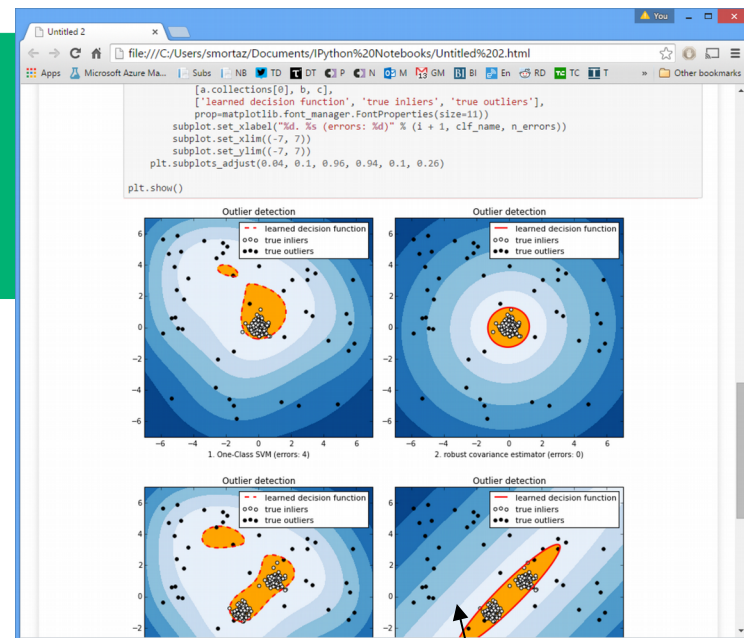
Jupyter notebook server

files   raw data   derived data   visual object   images

```
1.980000
0.027228
-0.013616
1.990000
0.038601
-0.015680
1.990000
0.050290
-0.017887
2.000000
0.062348
-0.020251
2.010000
…
```

| Data source | → | Enrichment | → | Mapping | → | Render |

Web browser

Remote visualization use cases

- Own laptop/PC not powerful enough
- Data already stored at SURFsara HPC system (Cartesius, Lisa, etc)
- Parallel rendering of large datasets needed
- Collaboration (share remote VNC desktop)
- Rendering of animations
- In-situ visualization of running simulations

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SURFsara systems available for remote/interactive visualization

| System	GPUs	Access	Available software	Notes
Cartesius (supercomputer)	132x Tesla K40m (2 per node)	NWO	ParaView, VisIt, Blender Will install on request!	Need to explicitly request GPU access
HPC Cloud (cloud cluster)	24x GRID K2 (2 per node)	SURF e-Infra*	Responsibility of the user. Tools will need to be installed within the VM.	Need VM with: - NVIDIA drivers - VNC server
Lisa GPU cluster (compute cluster)	?	UvA, SURF e-Infra	(Q2 2018)	In the process of being installed

* https://e-infra.surfsara.nl/

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More information

- Visualization on SURFsara HPC systems:
    - https://userinfo.surfsara.nl/
    - Also information on setting up ParaView server, VMs with GPU support
- Ask SURFsara helpdesk
    - E-mail: helpdesk@surfsara.nl
    - Phone: 020 800 1400 (office hours)
    - Support questions on Lisa, Cartesius, HPC Cloud, etc
- For visualization topics you can also always contact us directly:
    - visualization@surfsara.nl

Time for lunch...
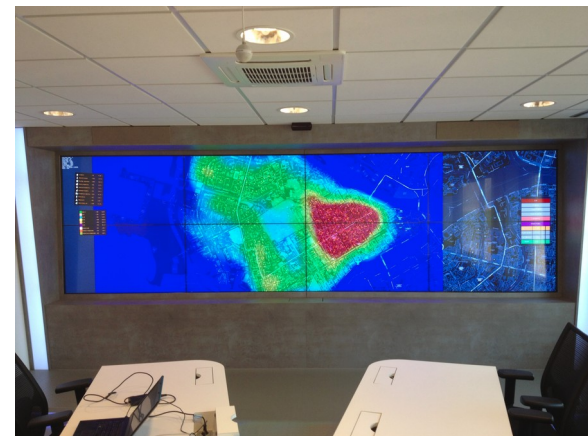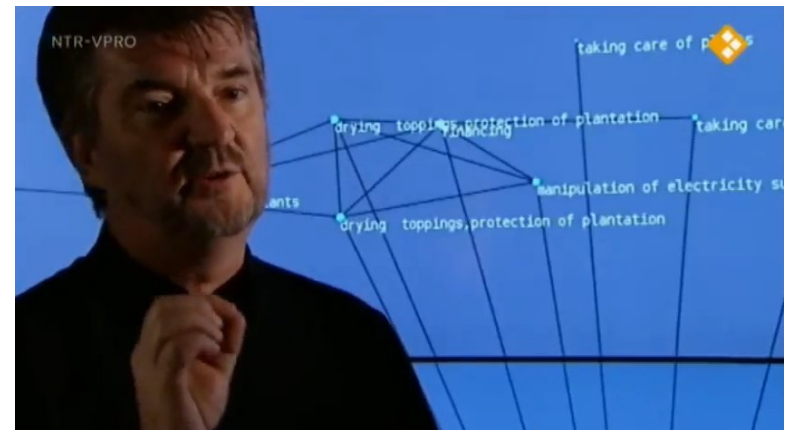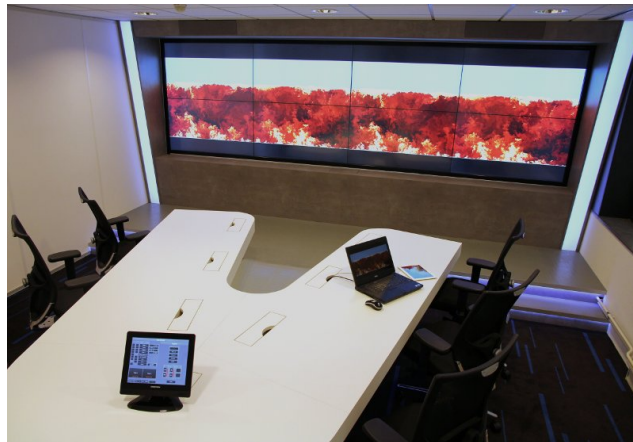
Collaboratorium

Collaboratorium
SURF Science Park Building, Amsterdam
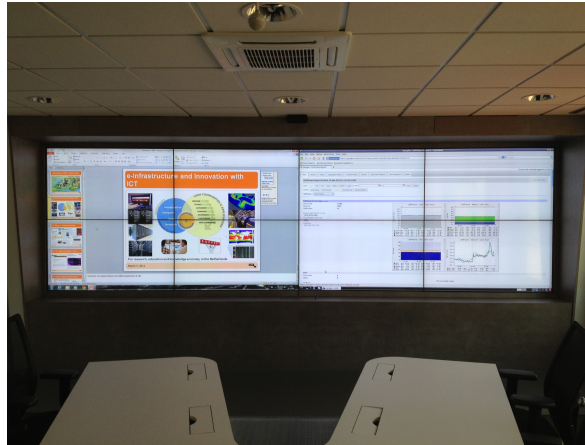
- Aimed at collaboration among small group

  - Rooms fits **8-10 people**

  - Both local and remote collaboration

- (High-end) visualization usage

  - High-resolution applications with touch interaction

  - Use remote visualization for image generation

- In principle **freely** available for researchers

  - Located across the street at SURFsara!

  - Prior reservation needed, contact **collaboratorium@surfsara.nl**

- Shared usage with Netherlands eScience Center

Features

- High-resolution video-wall (8x FullHD, 16 Megapixel)

- "Bring your own device" and display on video wall, even side-by-side

- 6-point multitouch interaction

  - Custom software to map touch interaction to different devices

- Polycom video-conferencing set (H.323), Skype

- 3D stereo projection

- Linux full destkop (SURFsara), Windows 10 full destkop (NLeSC)

- 10 Gbit/s networking to outside world, including SURFsara data center

SURF SARA

Collaboratorium use case

- Presentations

- Demonstrations

- Tutorial hands-on sessions

- Video-conferencing

- Long-distance collaboration

- Live data analyses using SURFsara HPC system

- High-resolution visualization

- Student projects

SURF SARA

4K mobile setup & VR headset

- UltraHD/4K screen (mobile)

- Windows 8, multi-touch

- Available for testing.
  Because not all software runs in 4K resolution without issues or surprises ☺
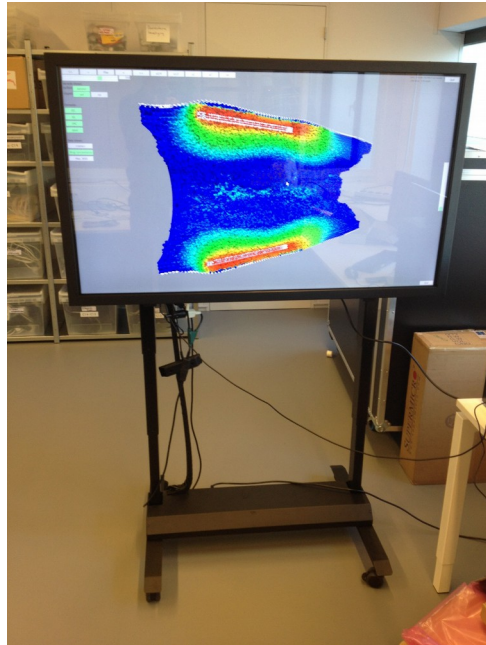
- Oculus Rift DK2

- Evaluating usability for scientific visualization (with UvA)

- May '16: HTC Vive instead of Rift

SURFsara visualization course - Evaluation form

1st Part - Introduction (Paul)

Was the presented material clear?	NO ☐☐☐☐☐ YES
Was there something missing from the contents? If so, please specify	NO ☐☐☐☐☐ YES

....

Other remarks (presenter style, pacing, slides, examples shown, etc.)

....

2nd Part - Scientific Visualization, ParaView (Paul)

Was the presented material clear?	NO ☐☐☐☐☐ YES
Did you find the hands-on exercises useful?	NO ☐☐☐☐☐ YES
Was there something missing from the contents? If so, please specify	NO ☐☐☐☐☐ YES

....

Other remarks (presenter style, pacing, slides, examples shown, etc.)

....

3rd Part - Information Visualization, Jupyter Notebook (Casper)

Was the presented material clear?	NO ☐☐☐☐☐ YES
Did you find the different forms of visualization shown useful?	NO ☐☐☐☐☐ YES
Did you find working with the notebook useful?	NO ☐☐☐☐☐ YES
Was there something missing from the contents? If so, please specify	NO ☐☐☐☐☐ YES

....

Other remarks (presenter style, pacing, slides, examples shown, etc.)

....

4th Part – Remote visualization & infrastructure (Paul)

Was the presented material clear?	NO ☐☐☐☐☐ YES
Would you consider using remote visualization at SURFsara?	NO ☐☐☐☐☐ YES
Was there something missing from the contents? If so, please specify	NO ☐☐☐☐☐ YES

....

Other remarks (presenter style, pacing, slides, examples shown, etc.)

....

Overall

Did the course contents match your expectations? If not, please specify.	NO ☐☐☐☐☐ YES

....
....

Does the course contents provide benefit for your daily work/research?	NO ☐☐☐☐☐ YES
Would you consider the course to be at entry level?	NO ☐☐☐☐☐ YES
Would you recommend the course to others?	NO ☐☐☐☐☐ YES

Overall grade for the course (1-10)   ....

Other remarks/suggestions

....
....
....
....
....
....

Thanks for all the attention...

Good luck visualizing!