

vl·e



virtual laboratory for e·science

- The meaning of “e” in **e-Science** is...
  - electronic
  - enhanced



- A search for **e-Science** and **health** on Google returns...
  - 3,060 hits
  - 30,600 hits
  - 306,000 hits



# e-Science in Health

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# Outline

- Intro
  - e-\*, grids, VL-e and all that
- Health applications in VL-e
  - Virtual Lab for functional MRI
  - Workflow
  - High performance computing
- Message To Go



# “e” = enhanced

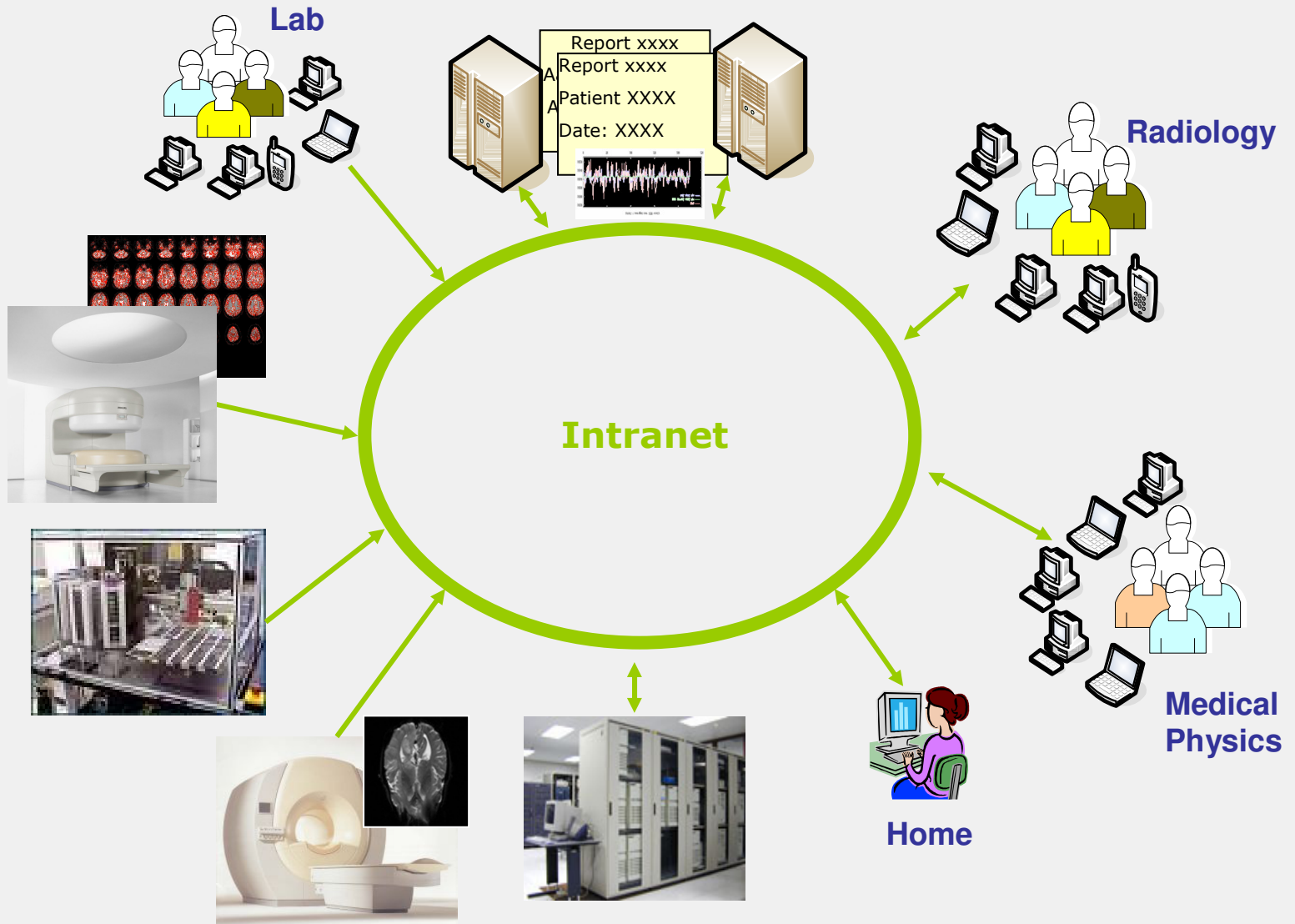
“carried out by **communities** that span disciplines, laboratories, organizations and national boundaries.

involving geographically **distributed and heterogeneous resources.**

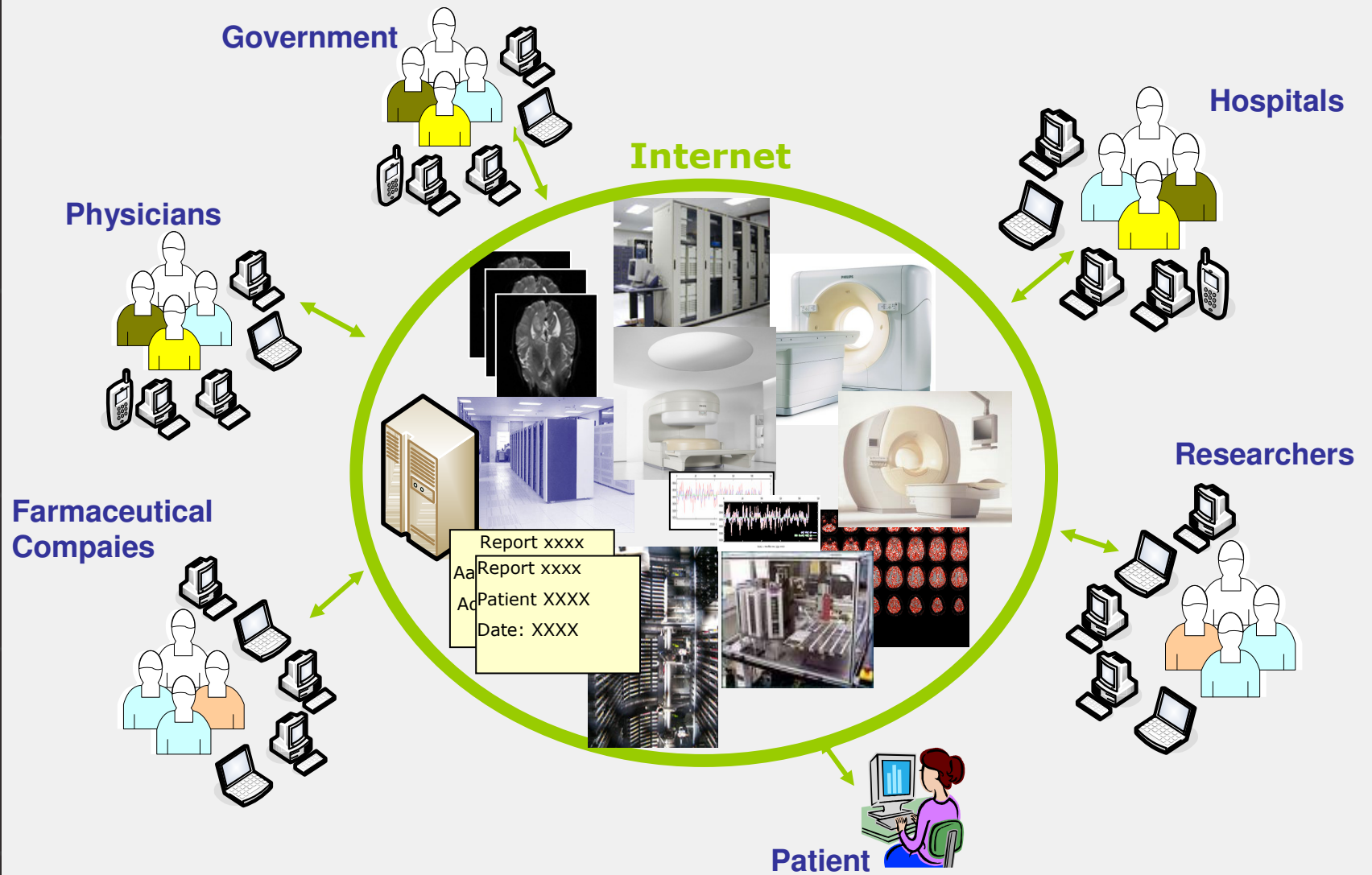
carried out via **collaborations** in which **information and computing technology plays a vital role.**”

*Adapted from IEEE International Conference on e-Science and Grid Computing*

# Examples: Local



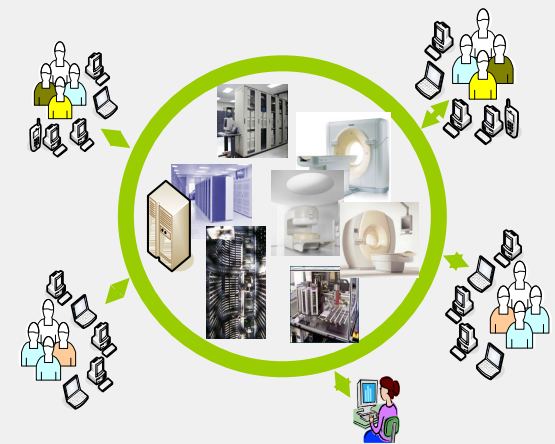
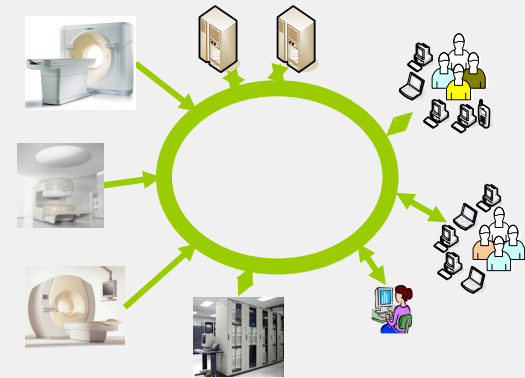
# Examples: Global





# HowTo...

- Transport data
- Handle large datasets
- Exchange data
- Search for data
- Control user access
- Account for usage
- Guarantee privacy
- Run remote computations
- Handle large and complex experiments
- Exchange work practices

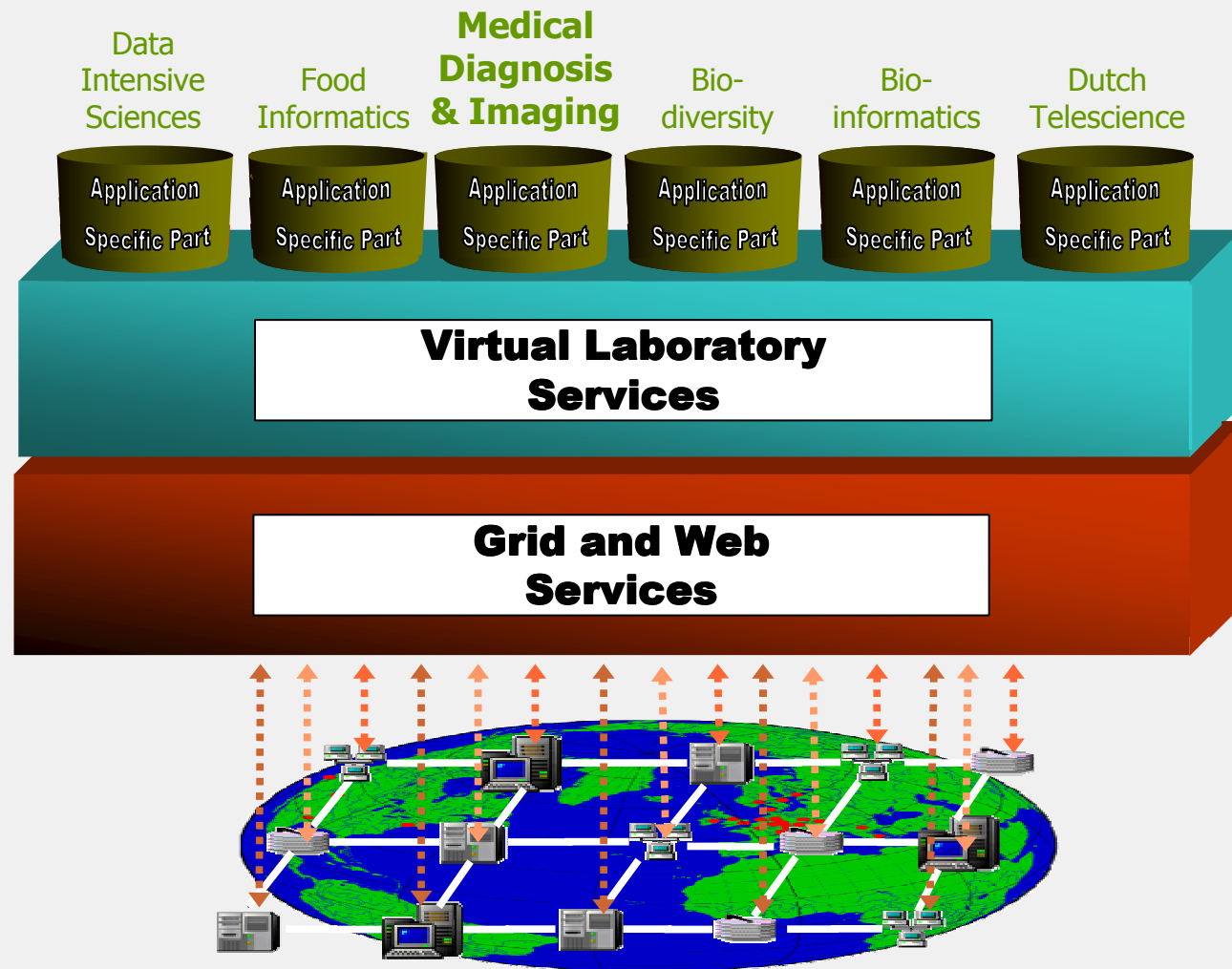


# e-\* & Grids

- “Grids represent **one of the key computing paradigms that enable** the creation and management of a **Cyber-infrastructure** for **realization of *e-almostanything***.”
- My favorite definition of “grids”:
  - It’s all about sharing distributed resources and the open **protocols** that enable it
  - More than technology!



# Virtual Laboratory for e-Science VL-e Vision



# HowTo... ..in VL-e

Transport data

Grid FTP  
Reliable File Transfer System

Control user access  
Account for usage

Grid Security Interface  
Virtual Organizations

Run remote computations

Globus Toolkit  
EGEE middleware

Handle large and complex  
experiments

Nimrod-G  
Workflow management

Handle large data  
Exchange programs

Storage Resource Broker  
Service Oriented Architecture

Search for data

AIDA (booth #31)



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# VL-e (Medical) Team & Co



## AMC (SP 1.3)

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G. den Heeten, F. Hoefnagels, C. Lavini,  
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J. Snel, R. Voorn, F. Vos, R. Willemse



## Informatics UvA

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R. Belleman, M. Scarpa, A. Ozsoy (SP 2.1)  
B. Ó Nualláin (SP 2.1)



## Philips (SP1.3 & P 4)

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R. de Boer, R. van Driel, F. Hoogenraad



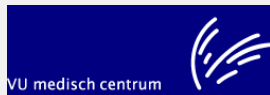
## SARA (SP 4)

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J. Adriaanse, B. Stolk, E. Seinstra



## NIKHEF (SP 4)

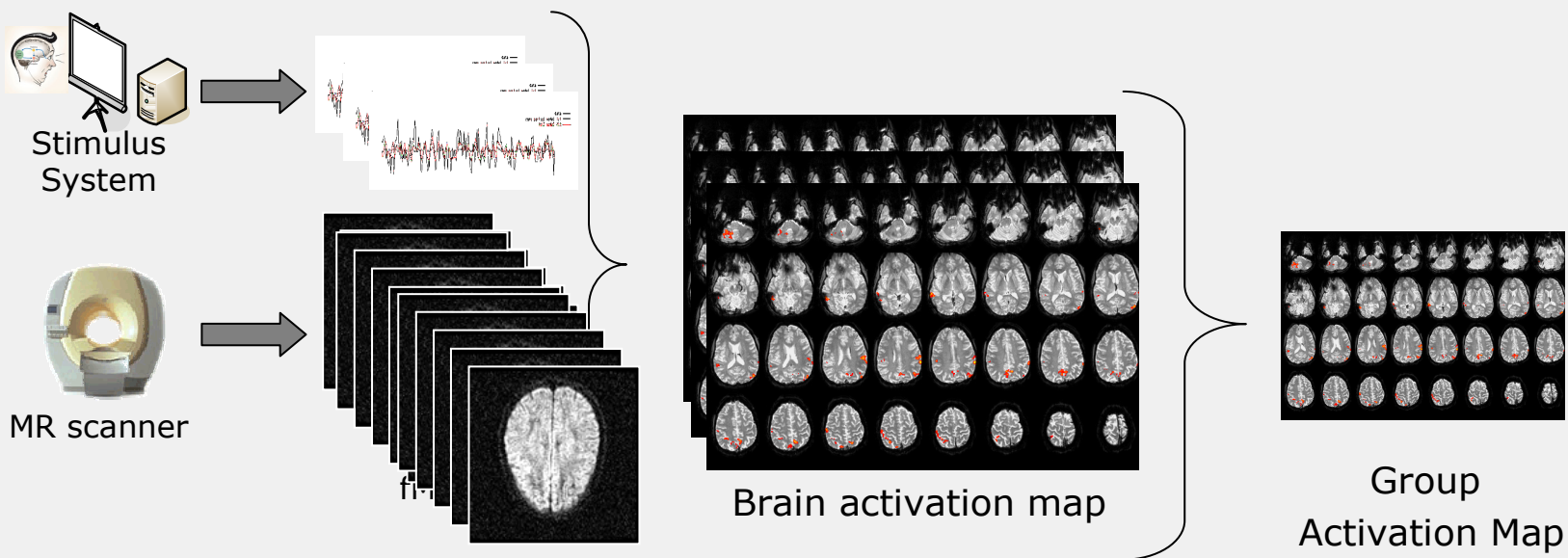
D. van Dok, J. J. Keijser, D. Groep, [grid-support@nikhef.nl](mailto:grid-support@nikhef.nl)



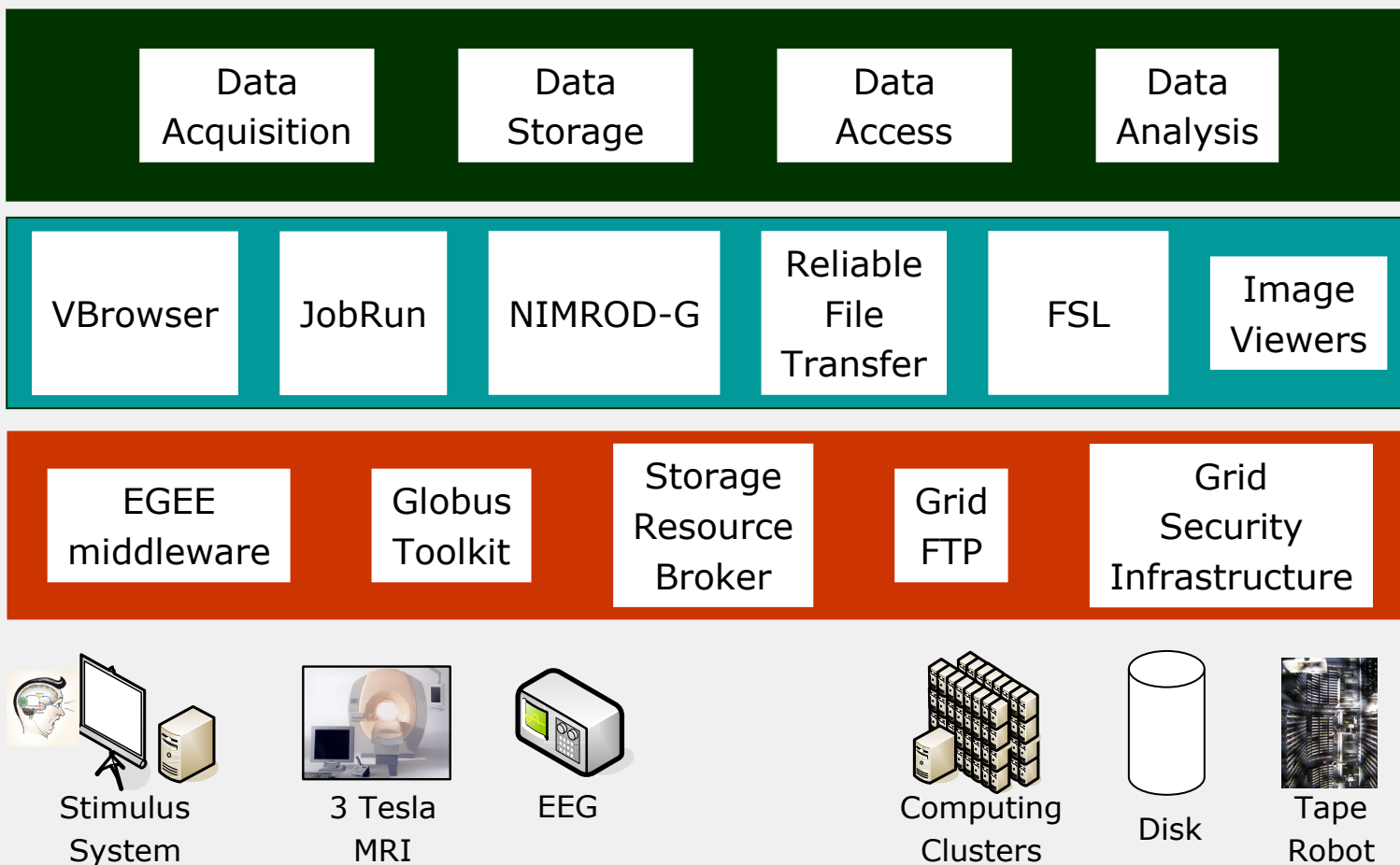
## VUMC (SP 1.3)

K. Cover, B. van Dijk, J. Sluijmer, H. Vrenken

# Example 1: e-Neuroscience Virtual Lab for Functional MRI

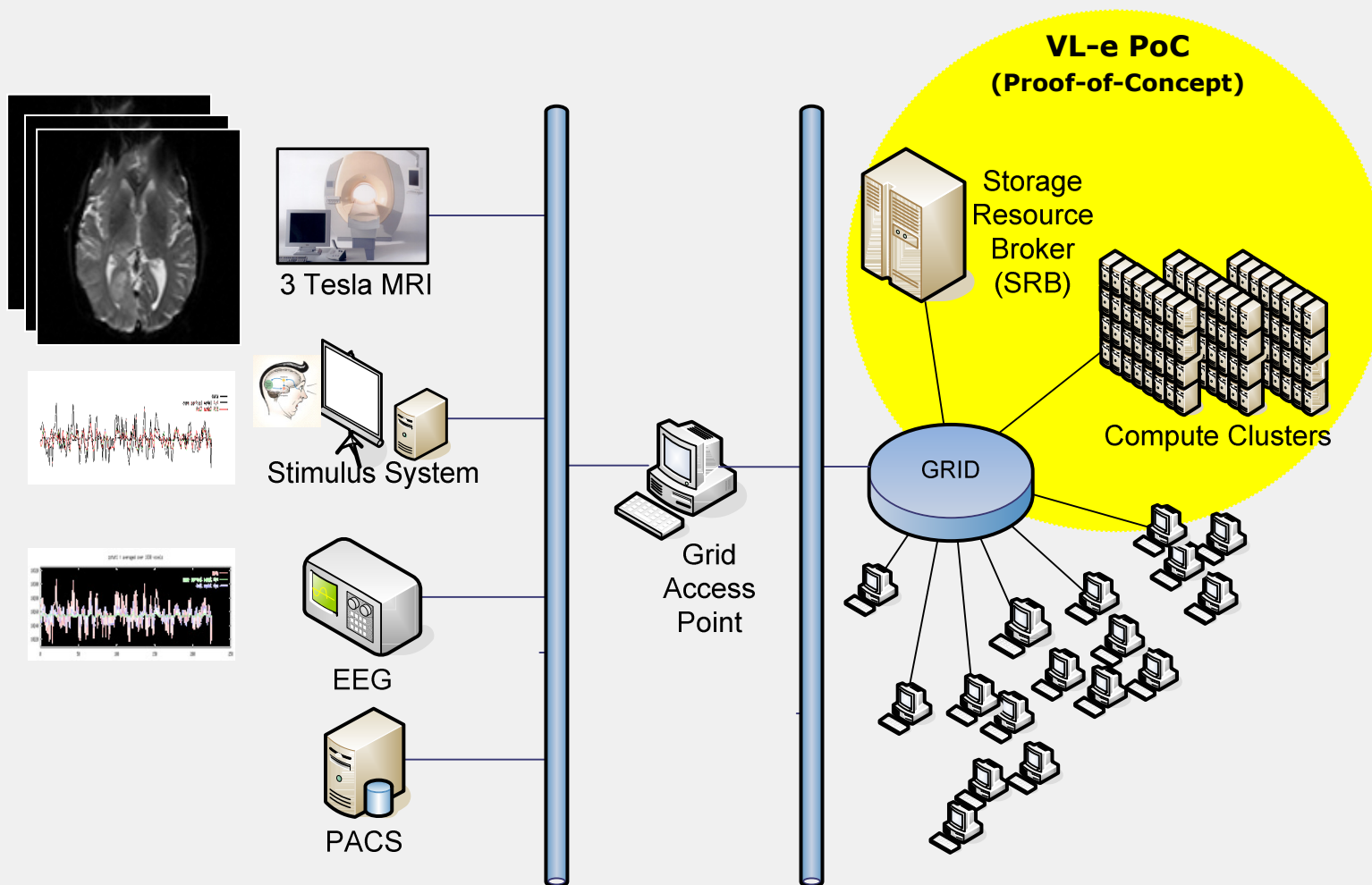


# Virtual Lab for fMRI

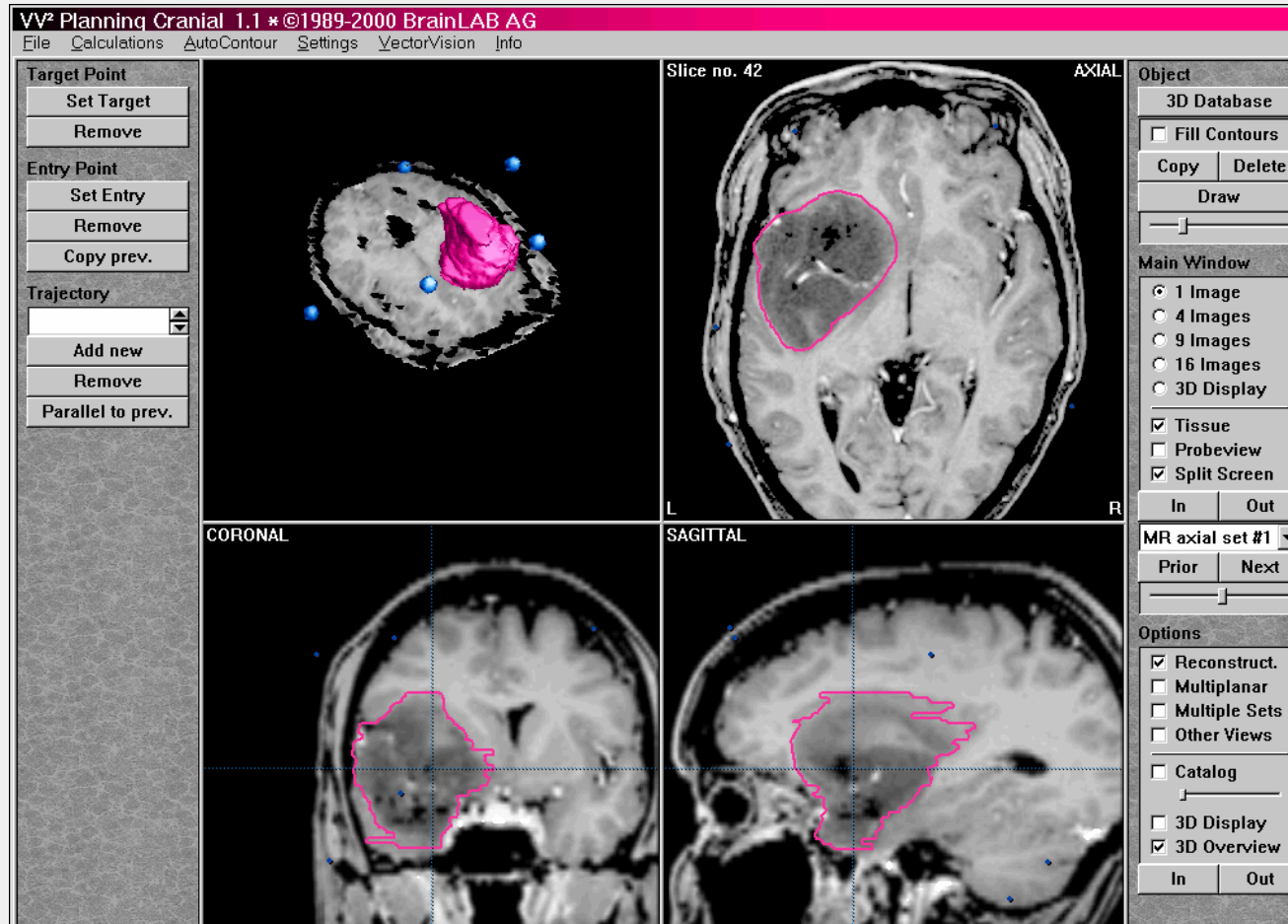




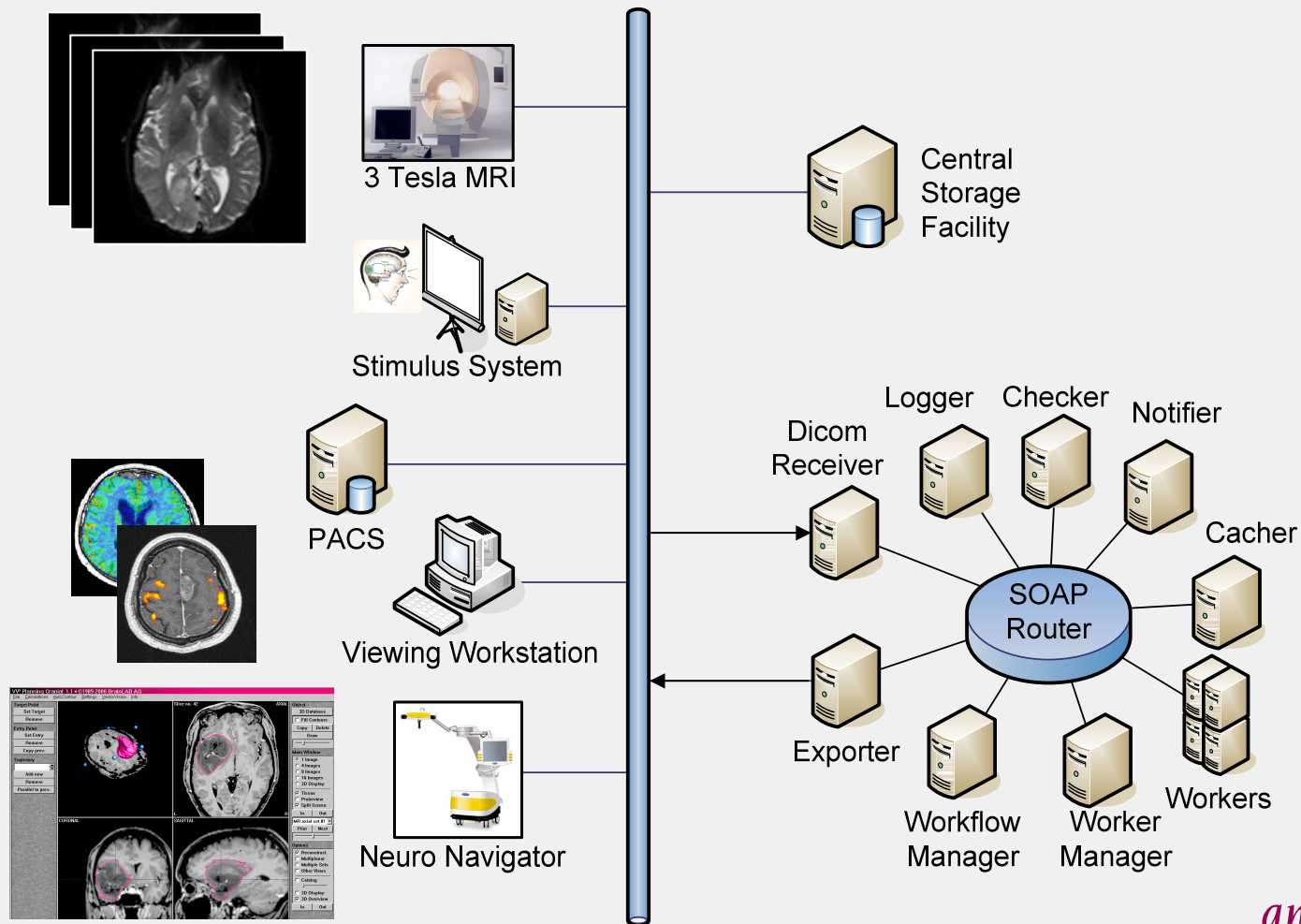
# VL-fMRI: Architecture



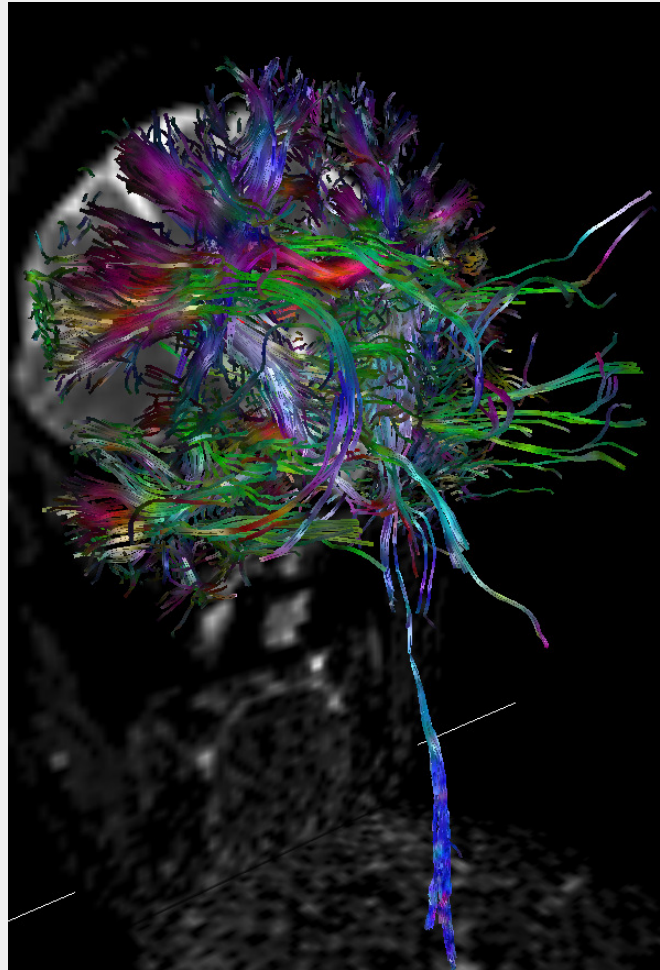
# Example 2: Workflow Management Neurosurgery Planning



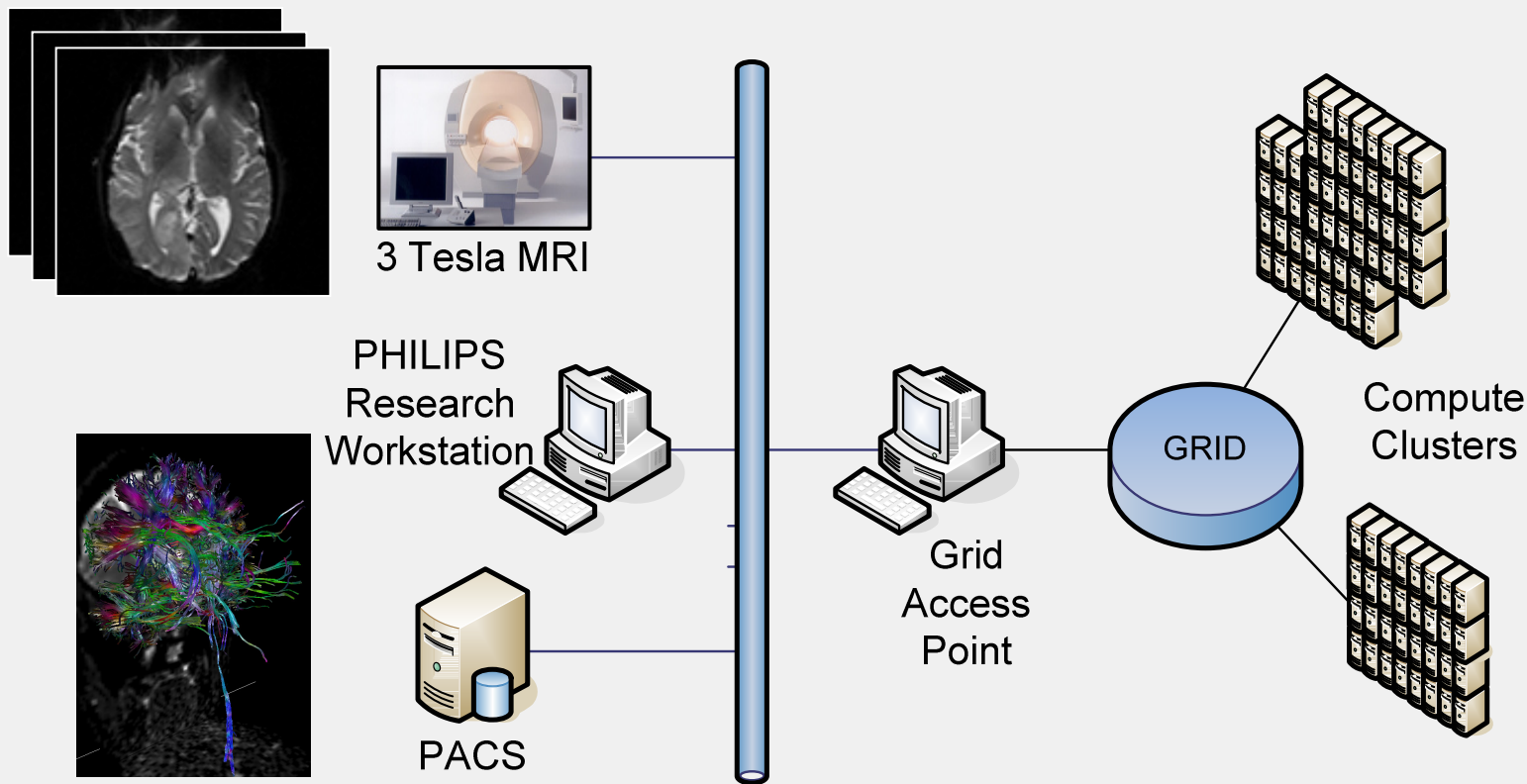
# Example 2: Workflow Management Neurosurgery Planning



# Example 3: HPC Tracking of White Matter Fibers from Diffusion Tensor Imaging (DTI)



# Example 3: HPC Tracking of White Matter Fibers from Diffusion Tensor Imaging (DTI)



# Example N: Future?

“Researchers impressed by Google's medical diagnoses”

*The Independent, 10 November 2006*

“Google-like Process For Mammogram Images Speeds Up Computer's Second Opinions”

*Science Daily, July 2006*



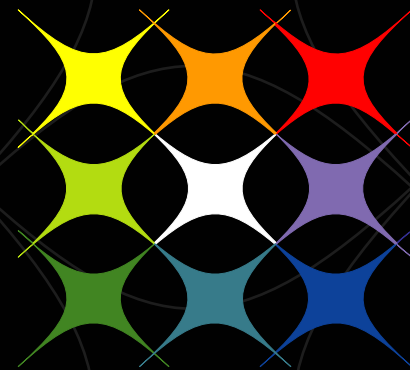
# Messages To Go...

- e-Science infrastructures are becoming reality
- VL-e Medical is “tasting” possibilities for e-Science on Health
- Talk to us on booth #21



# THANK YOU!

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vl-e

<http://www.vl-e.nl/>