



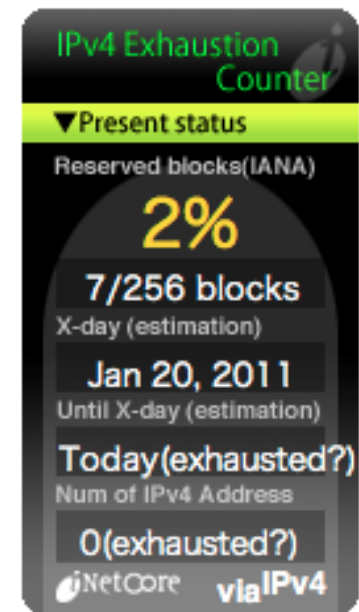
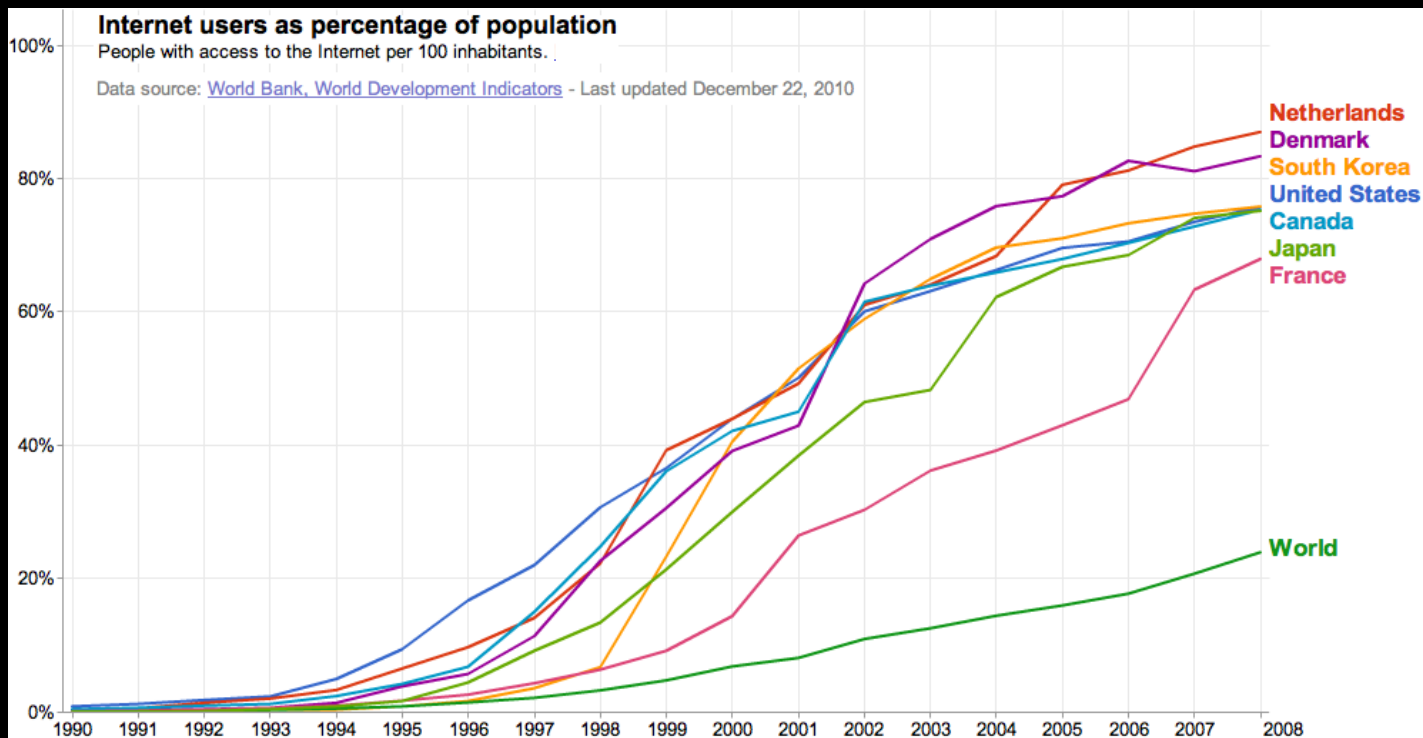
# Internet

From a network experiment that never ended (Vint Cerf)

- 1974: for the first time the word **internet** (*RFC 675 - Specification of Internet Transmission Control Program*) [note -> Open process!]
- 1981: the **TCP/IP** standard was ready to be adopted (*RFC 791,792,793*)

To a network for society

- 1989: WWW was born



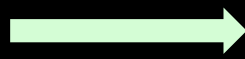
June 8<sup>th</sup> @ UvA

- Jan 2011 → IANA IPv4 address space depleted! →

Ipv6day.nl

# Internet is a Billion - Business!

Google	197
Amazon	83
Facebook	50
BAIDU	37
eBay	36
Yahoo	22
PriceLine	21
SalesForce	18
F5 Networks	11
CheckPoint	9
NetFlix	9
Expedia	7



guardian.co.uk Monday 3 January 2011

News | Sport | Comment | Culture | Business | Money | Life & style

News > Technology > Facebook

## Facebook's value swells to \$50bn after Goldman Sachs investment

Deal underlines Facebook's power and fuels rumours that Mark Zuckerberg is preparing a stock market flotation

e.g.:	Exxon Mobil	368
	Apple Inc.	333



1 miljard in 100\$ biljetten

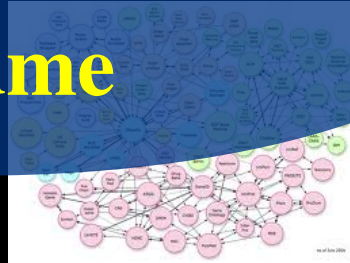
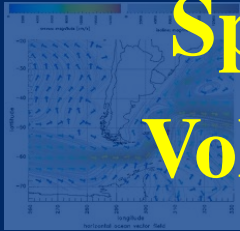
... more data!

Internet developments

Google

Speed  
Volume

DATA



Deterministic

Real-time



twitter



Scalable

Secure

Linked in



myspace

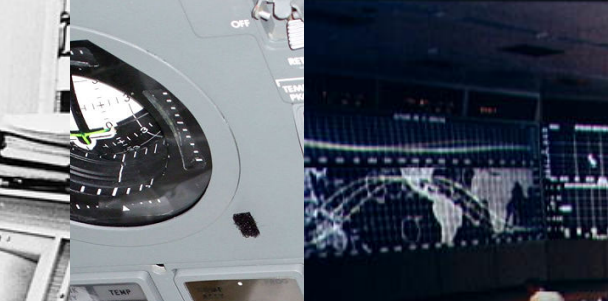
SchoolBANK

Hyves

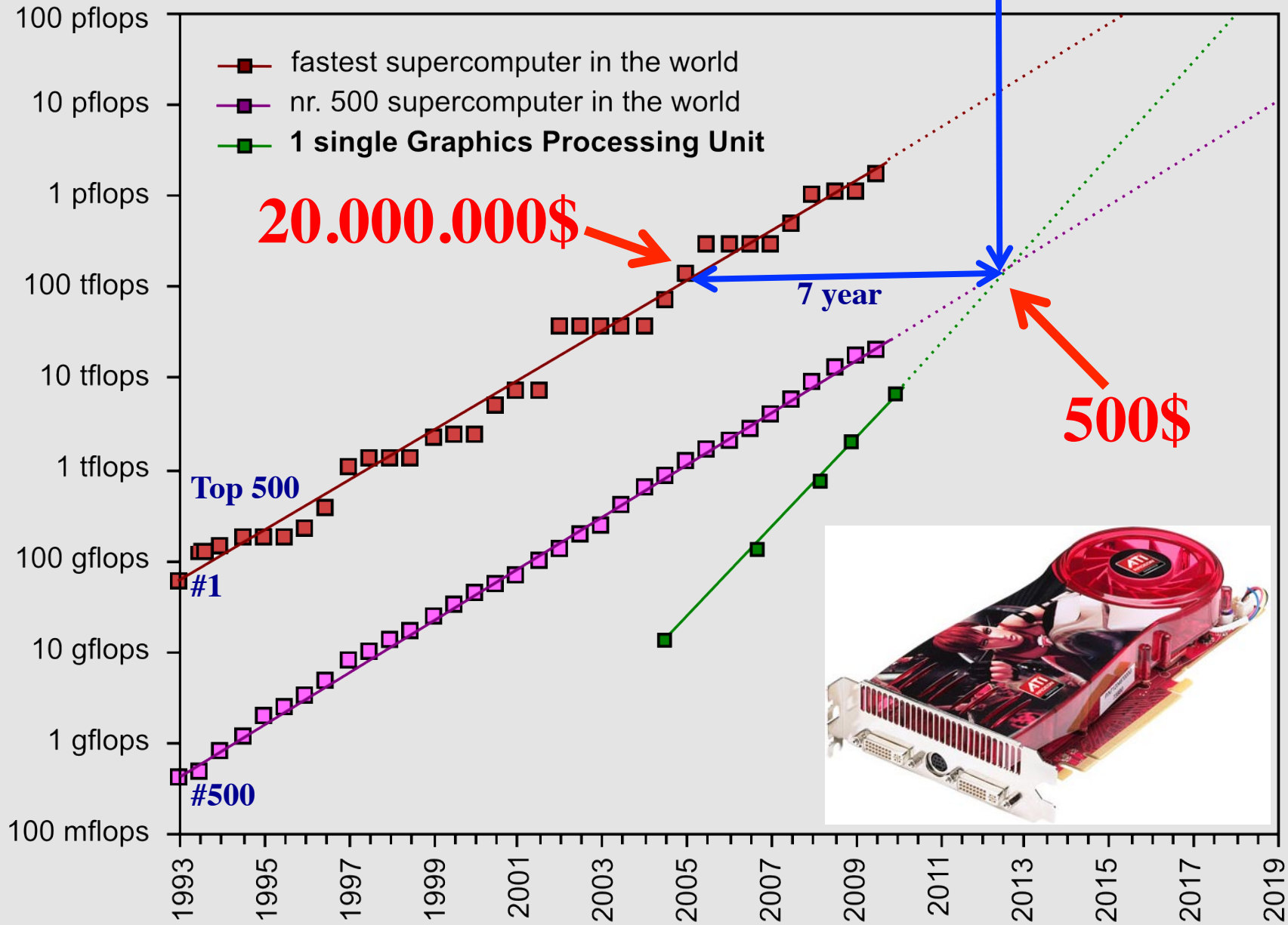
flickr



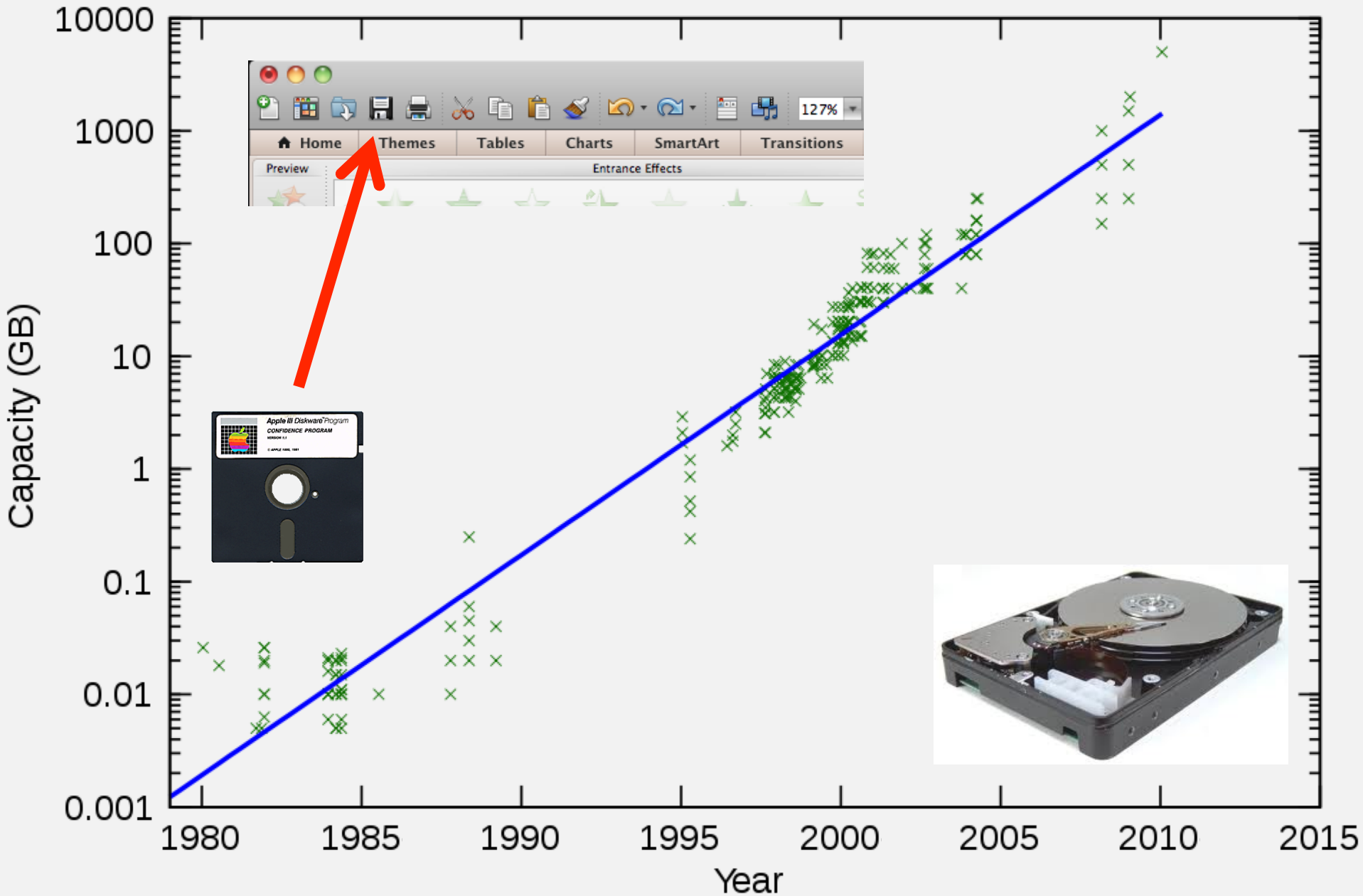
... more users!



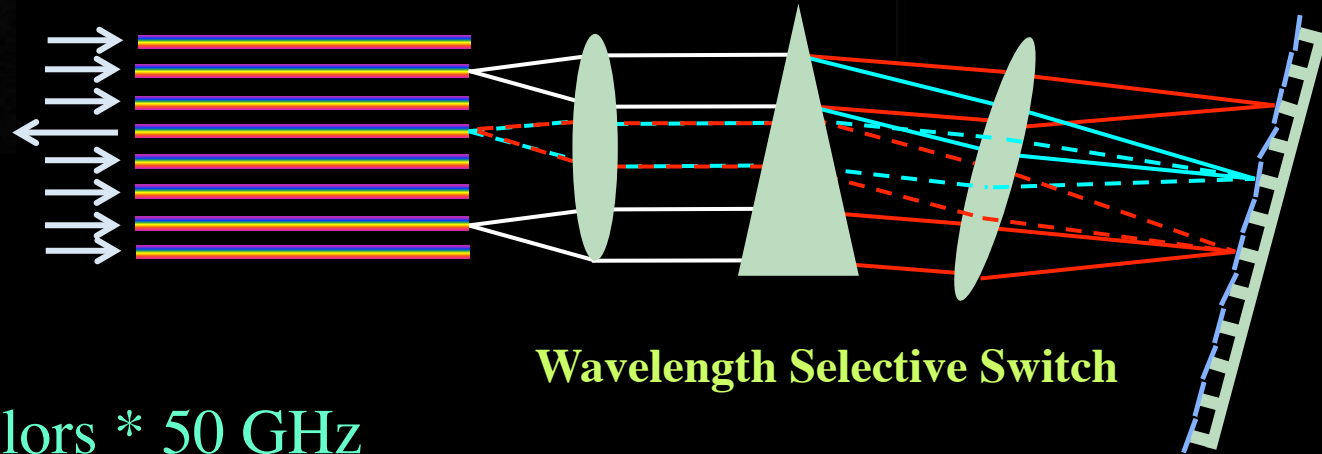
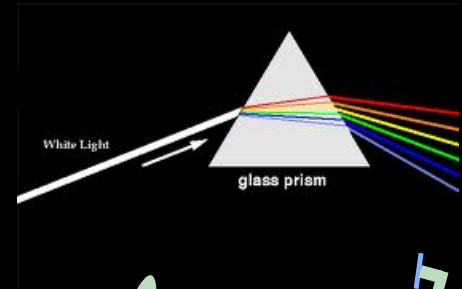
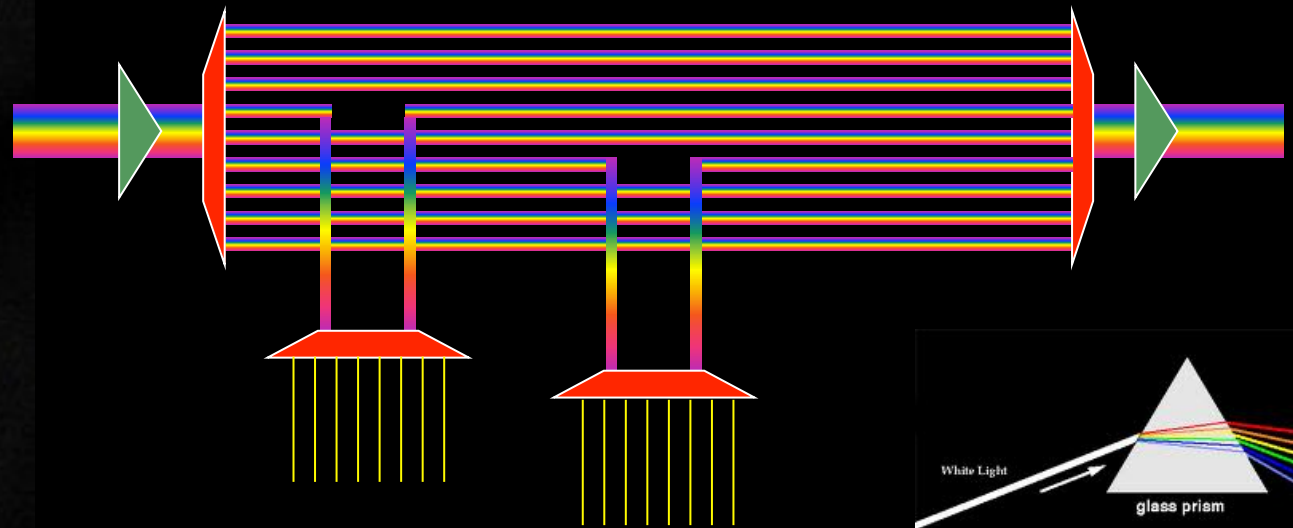
# GPU cards are disruptive!



# Data storage: doubling every 1.5 year!



# Multiple colors / Fiber



Wavelength Selective Switch

Per fiber:  $\sim 80-100$  colors \* 50 GHz

Per color: 10 – 40 – 100 Gbit/s

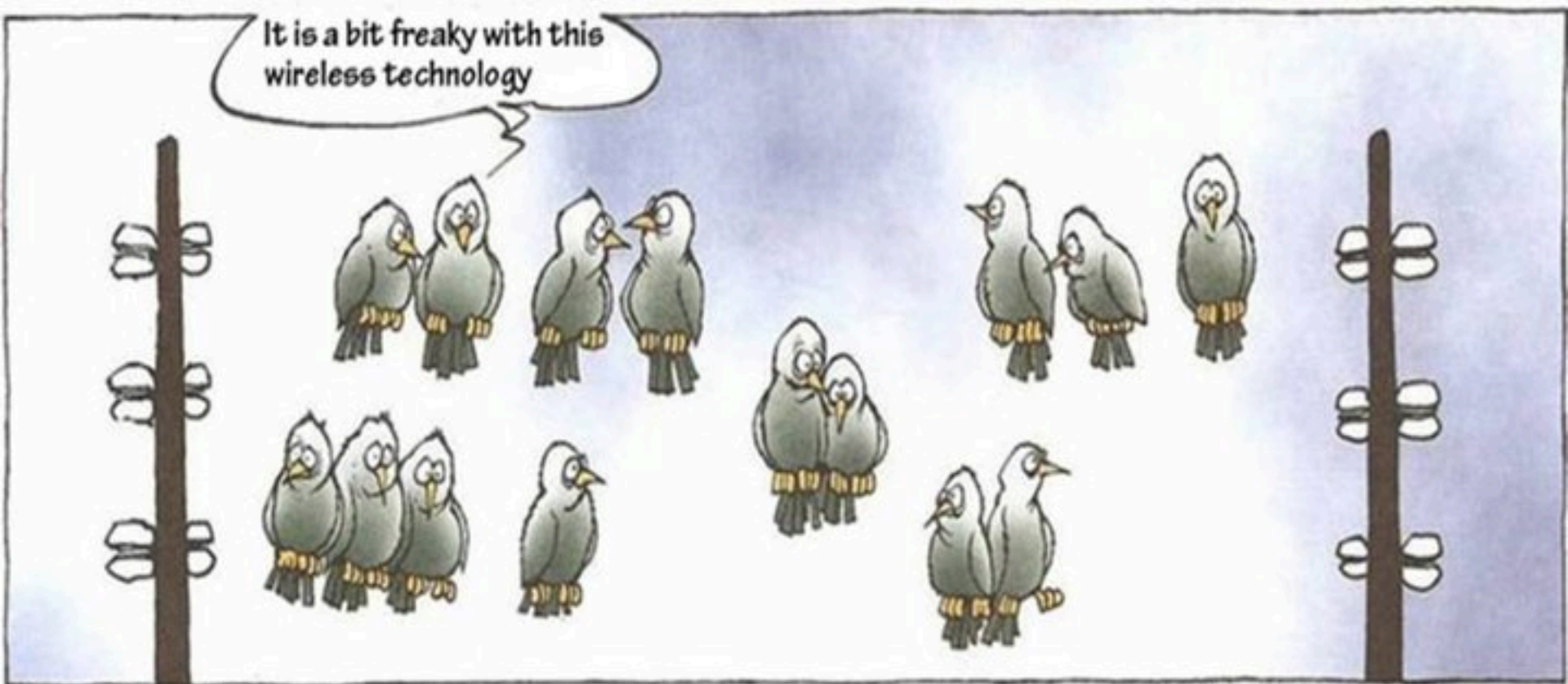
BW \* Distance  $\sim 2 * 10^{17}$  bm/s

New: Hollow Fiber!

➔ less RTT!



# Wireless Networks



COPYRIGHT : MORTEN INGEMANN

protocol LAN due to the easy comparison and convenience in the **digital home**. While consumer PC products has just started to migrate to a much higher bandwidth of 802.11n wireless LAN now working on next-generation standard definition is already in progress.

# SNE @ UvA

Speed  
Volume

Deterministic  
Real-time

Scalable  
Secure

Ijkdijk/Urban Flood

Medical

LifeWatch

CosmoGrid/eVLBI

CineGrid

EU-GN3/NOVI/Geysers

SURFnet/GLIF/Cloud

Green-IT

Privacy/Trust

Authorization/policy

Programmable networks

40-100Gig/TCP/WF/QoS

Topology/Architecture

Optical Photonic

X X

X

X

X X

X X

X

X

X

X

X

X

X

X

X

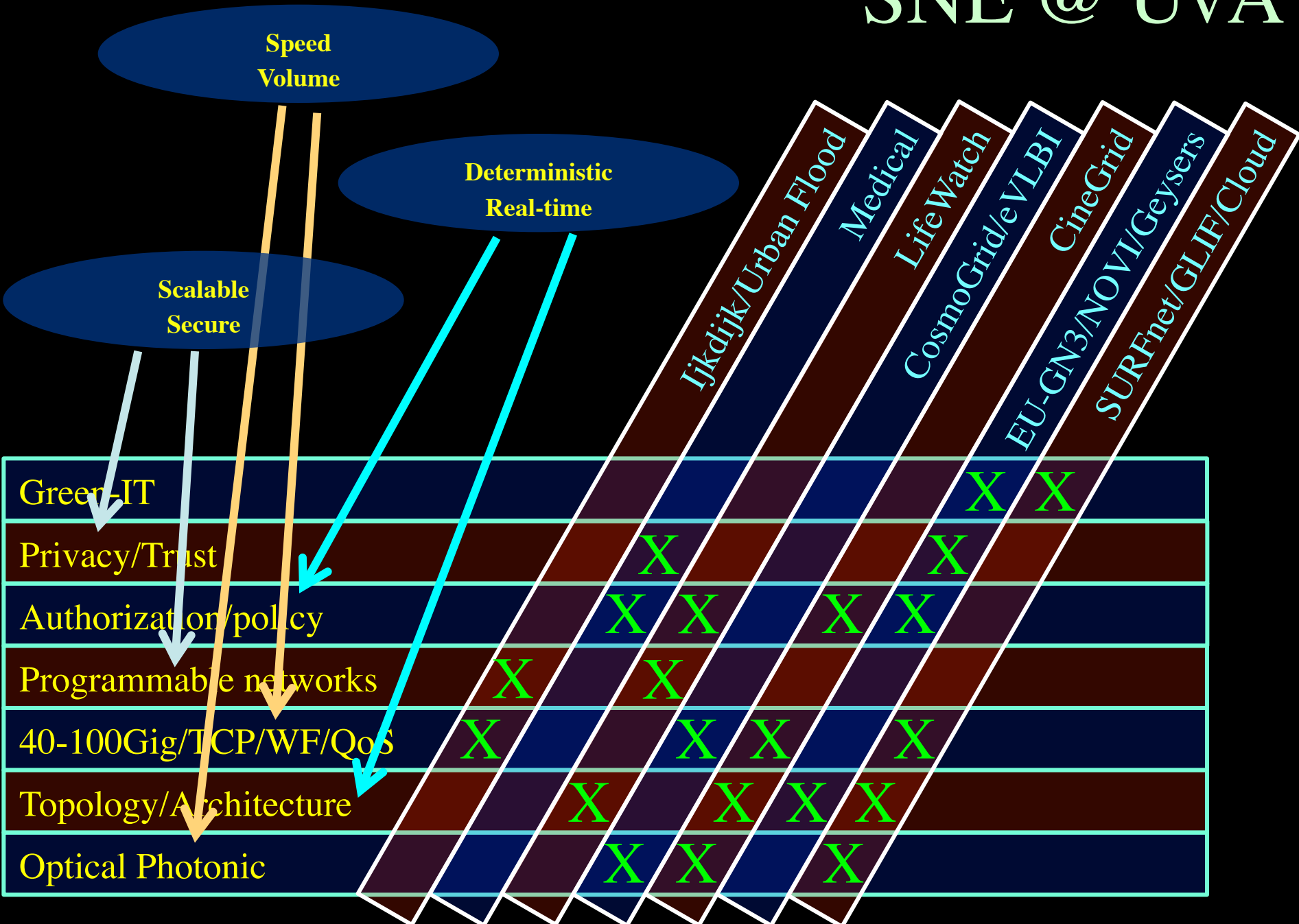
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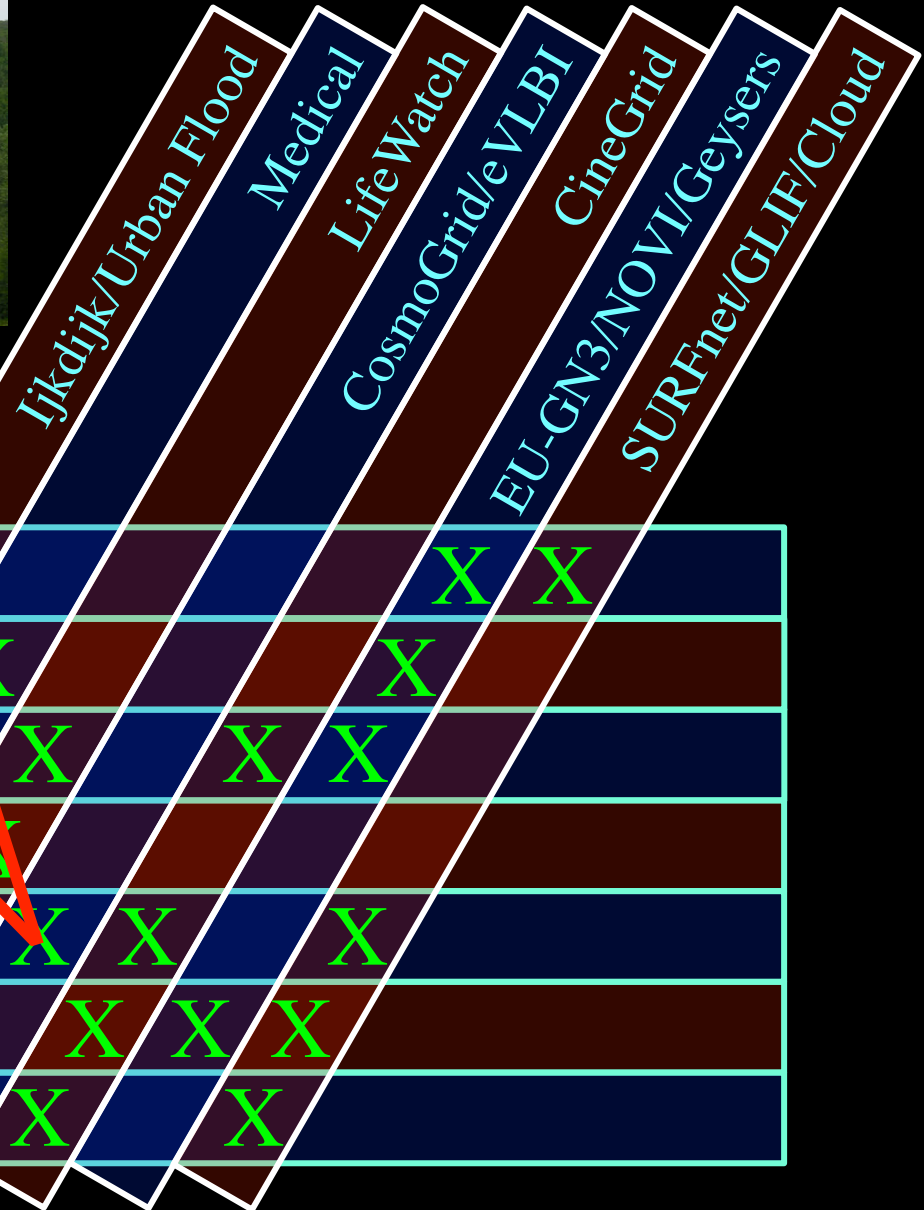
X

X

# SNE @ UvA

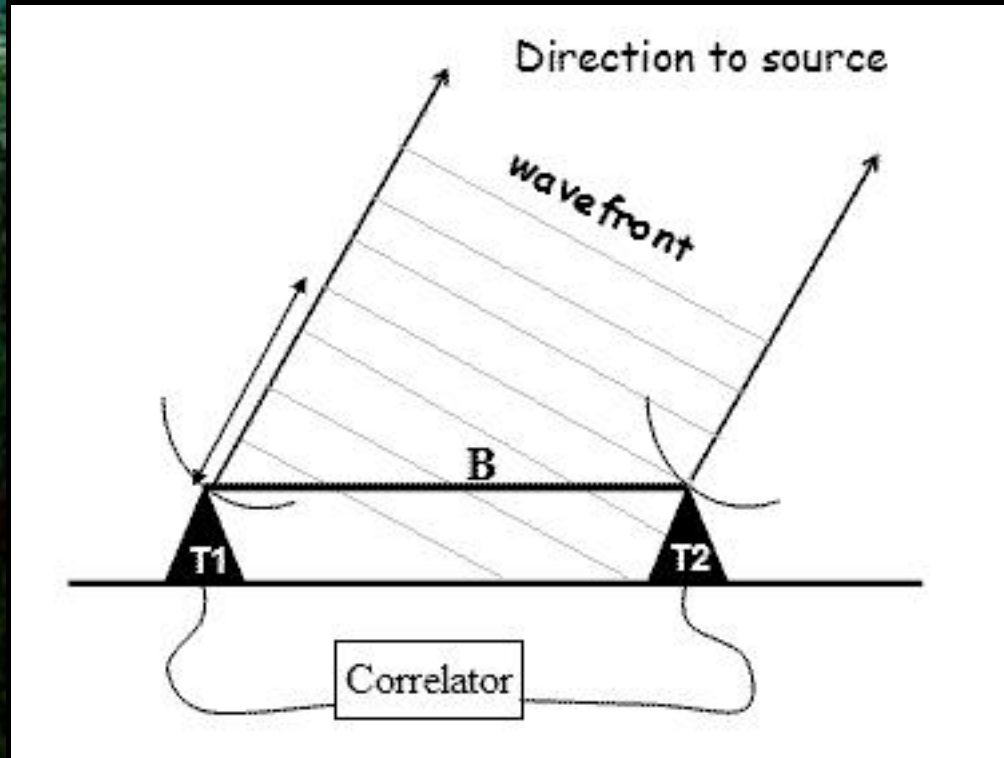


# SNE @ UvA



	Ijkdijk/Urban Flood	Medical	LifeWatch	CosmoGrid/eVLBI	CineGrid	EU-GN3/NOVI/Geysers	SURFnet/GLIF/Cloud
Green-IT					X	X	
Privacy/Trust		X			X		
Authorization/policy		X	X		X	X	
Programmable networks	X		X				
40-100Gig/TCP/WF/QoS	X		X	X		X	
Topology/Architecture		X		X	X	X	
Optical Photonic		X	X		X		

# e - Very Large Base Interferometer



# eVLBI: European VLBI Network

**Dec 4**

**Dec 5**

**Dec 6**

**Deadline for submitting eVLBI observing proposals**

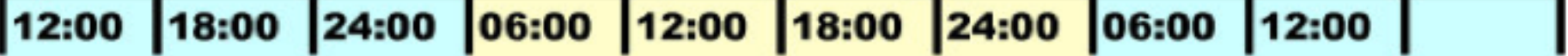
**Program committee decides if eVLBI science can be justified**



**eVLBI Observing Run**

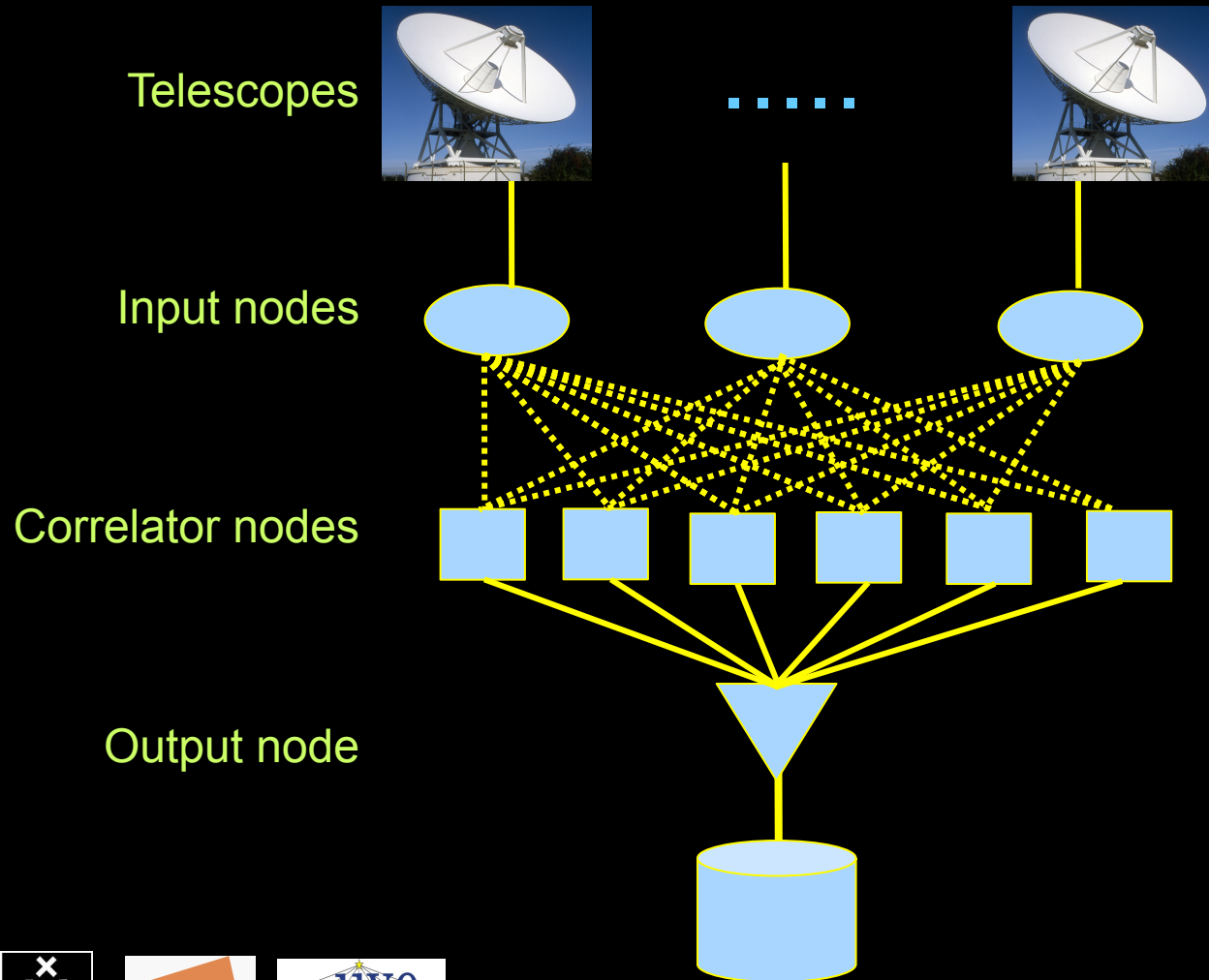
**Correlation at JIVE**

**Scientist downloads data from [www.jive.nl](http://www.jive.nl)**



# The SCARIE project

**SCARIE:** a research project to create a Software Correlator for e-VLBI.  
**VLBI Correlation:** signal processing technique to get high precision image from spatially distributed radio-telescope.



16 Gbit/s - 2 TfloP →  
**THIS IS A DATA FLOW PROBLEM !!!**

Research:

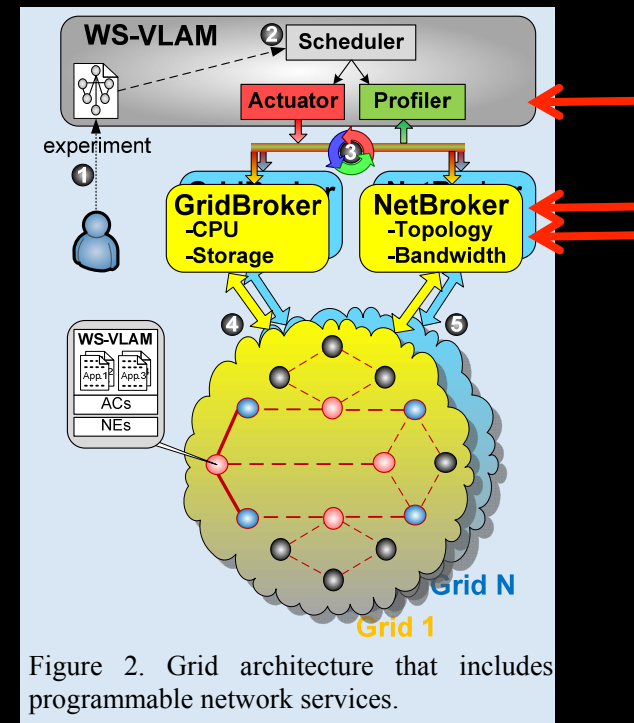
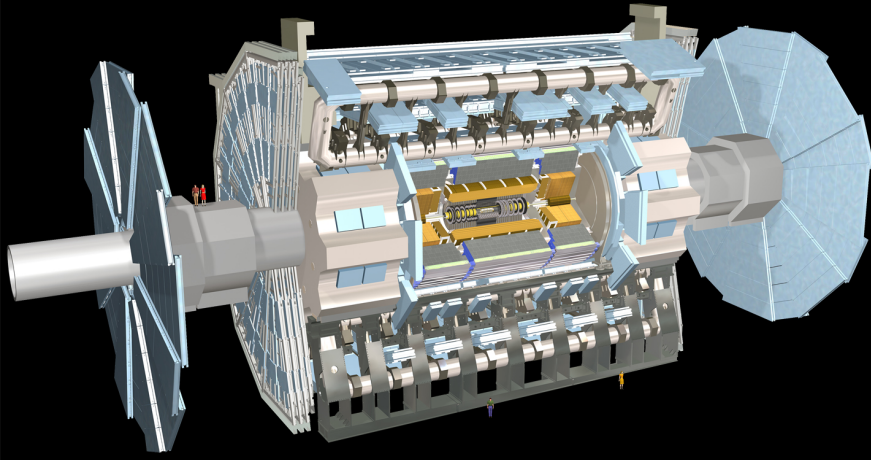


Figure 2. Grid architecture that includes programmable network services.



# SNE @ UvA



Ijkdijk/Urban Flood

Medical

LifeWatch

CosmoGrid/eVLBI

CineGrid

SURFnet/GLIF/Cloud

Green-IT

Privacy/Trust

Authorization/policy

Programmable networks

40-100Gig/TCP/WF/QoS

Topology/Architecture

Optical Photonic

X X

X

X

X X

X X

X

X

X

X X

X

X

X

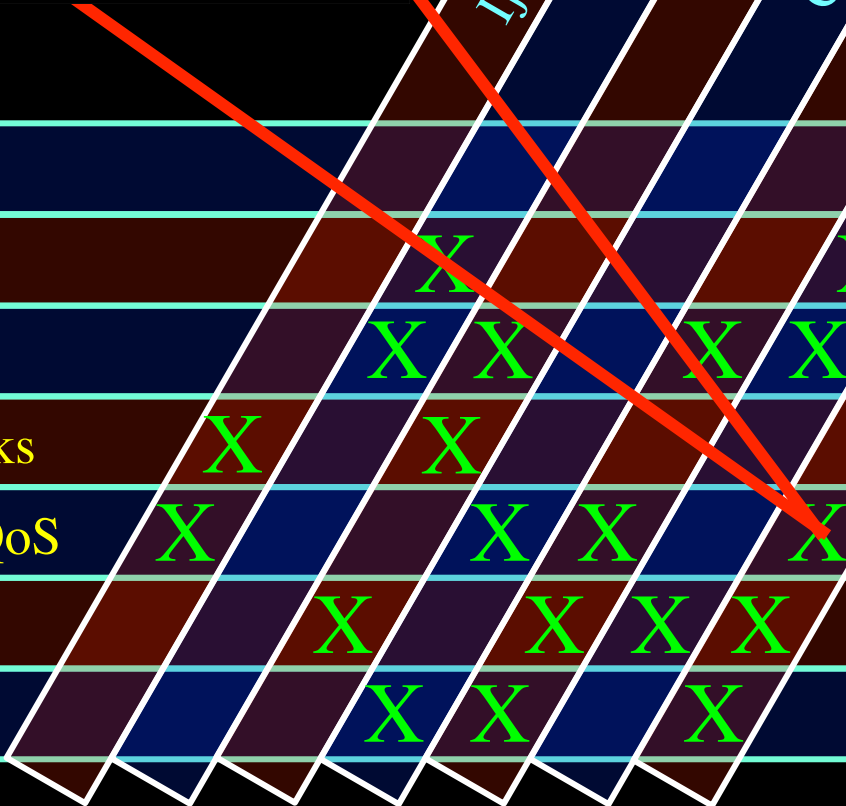
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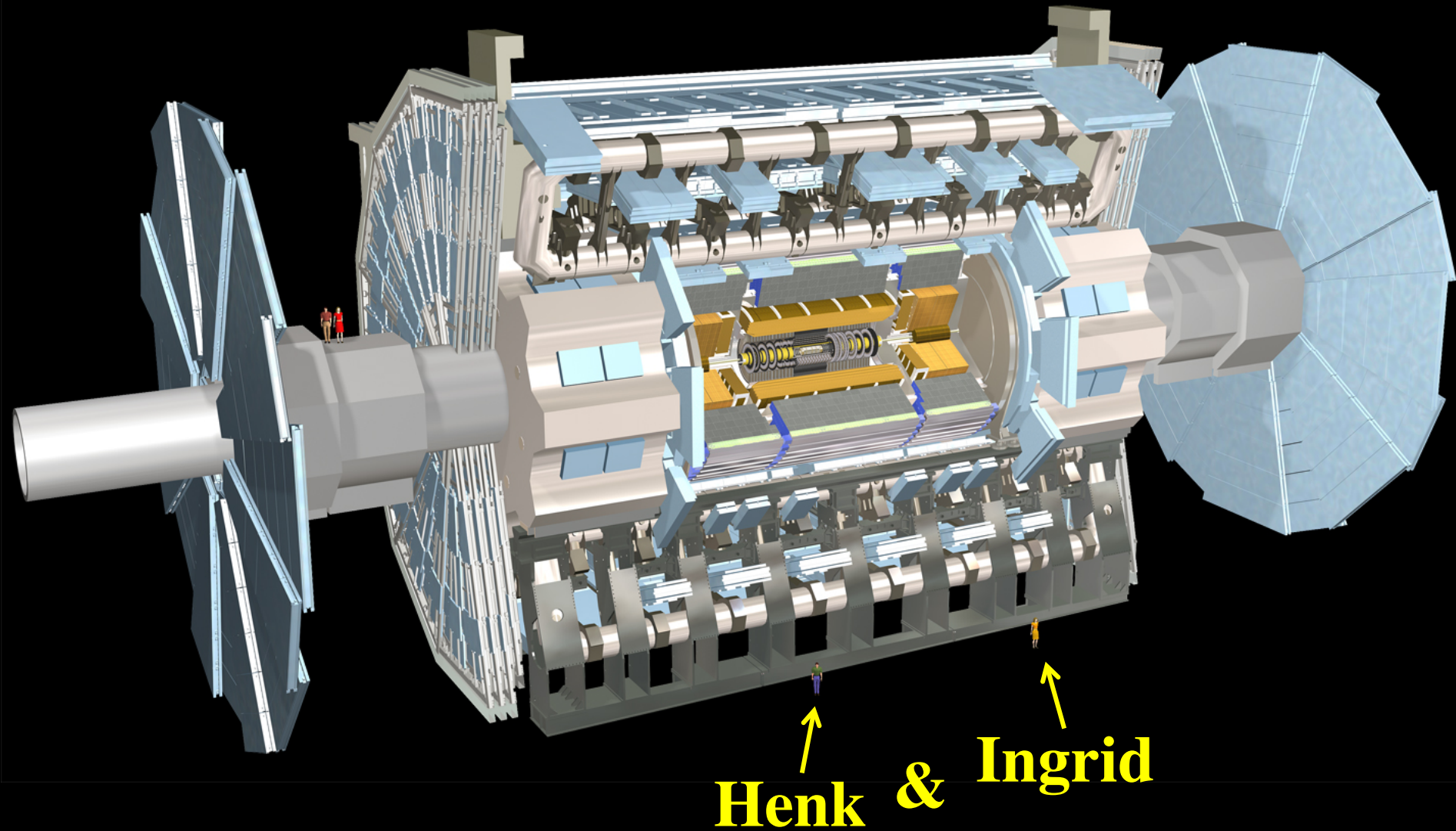
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# ATLAS detector @ CERN Geneve



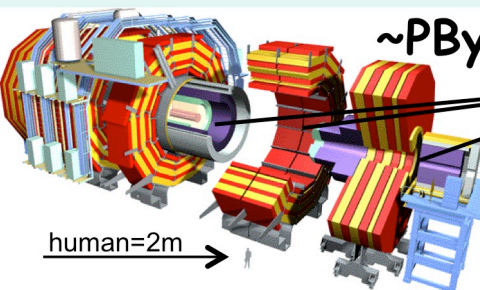
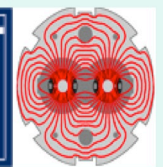
# ATLAS detector @ CERN Geneve





# LHC Data Grid Hierarchy

CMS as example, Atlas is similar



human=2m →

~PByte/sec

Online System

Tier 0 + 1

~100 MBytes/sec

100000 flops/byte

10 Pflops/s

event simulation



event reconstruction

Status 2002!

CMS detector: 15m X 15m X 22m  
12,500 tons, \$700M.

~2.5 Gbits/sec

Tier 1

Italian Regional Center

German Regional Center

NIKHEF Dutch Regional Center

FermiLab, USA Regional Center

...

analysis

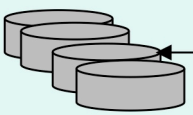
~0.6-2.5 Gbps

Tier 2 Center 1, Tier 2 Center 2, Tier 2 Center 3, Tier 2 Center 4, Tier 2 Center 5

Tier 2

Tier 3

Institute ~0.25TIPS, Institute, Institute, Institute



Physics data cache

100 - 1000 Mbits/sec



Workstations

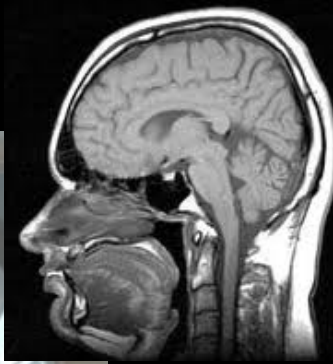
Tier 4

CERN/CMS data goes to 6-8 Tier 1 regional centers, and from each of these to 6-10 Tier 2 centers.

Physicists work on analysis "channels" at 135 institutes. Each institute has ~10 physicists working on one or more channels.

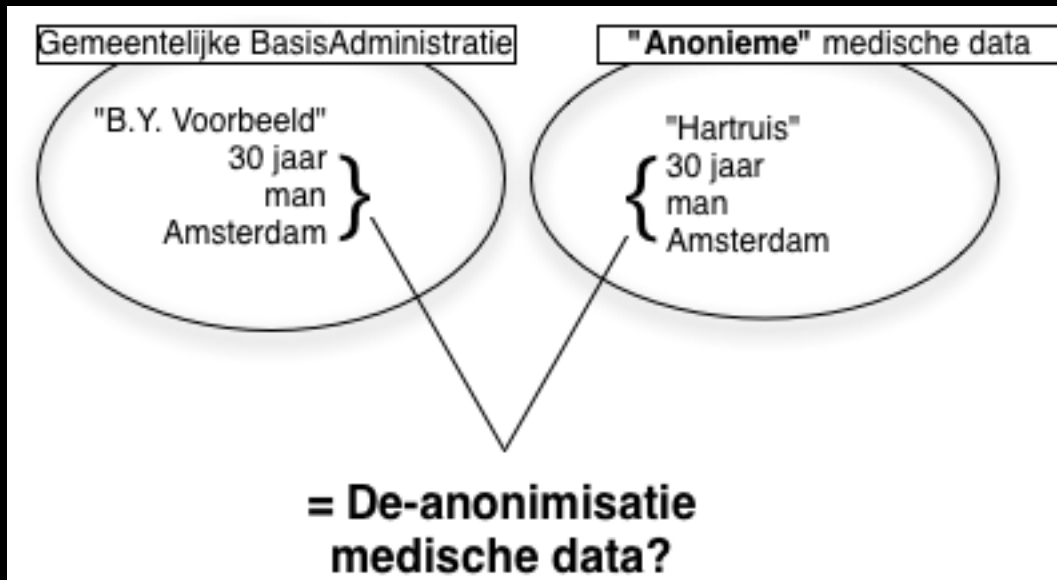
2000 physicists in 31 countries are involved in this 20-year experiment in which DOE is a major player.





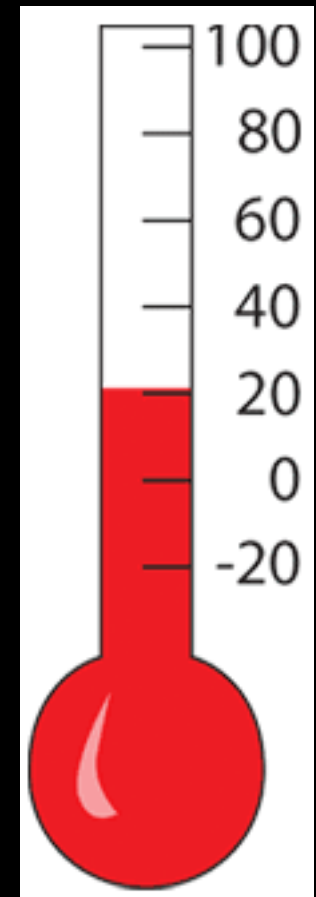
	Ijkdijk/Urban Flood	Medical	LifeWatch	CosmoGrid/eVLBI	CineGrid	EU-GN3/NOVI/Geysers	SURFnet/GLIF/Cloud
Green-IT						X	X
Privacy/Trust		X				X	
Authorization/policy		X	X		X	X	
Programmable networks	X		X				
40-100Gig/TCP/WF/QoS	X		X	X		X	
Topology/Architecture		X		X	X	X	
Optical Photonic		X	X		X		

# Anonimiteit of her-identificeerbaarheid



1. Empirische analyse van GBA
2. Kansrekening, bijv. kans op niet-uniciteit:

$$1 - \left(\frac{n-1}{n}\right)^{k-1}$$



Privacy  
thermometer!

# Education- Master SNE

- Open Source aanpak

☺ He takes  
Notice of us!



- Based on open and non-discriminatory standards
- Privacy and Security
- Digital security & forensics
- Advanced Internet infrastructure
- Master closely related to the research group!

DNSsec 

Secured by DNSSEC

Domain name:

**www.os3.nl**


is secured by DNSSEC.

Your computer is also secured by DNSSEC for this particular domain, so you are secured against domain name spoofing.



Trace: » Contents and links » InterNetwork

## Master Education S

SNE is the  University of Amsterdam master education in System and Network Engineering.

We focus on **O**pen **S**tandards, **O**pen **S**oftware and **O**pen **S**ecurity, hence the name **OS3**.

## Information

General information and testimonials are available at the

- [Introductory page](#)

More in depth facts can be found on our

- [Master SNE page](#)

## Contact

If you want to make a personal appointment to visit our education or to attend a lecture, please contact us via *info* at *os3 dot nl*.

You can visit our [facilities](#) at the Science Faculty of the University of Amsterdam located at the Science Park Amsterdam.

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Links



# SNE-Master

## • RP's

- 2005-21 Beveiliging banktransacties.
- 2005-30 SURFnet Intrusion Detection System (IDS).
- 2006-22 Beveiliging grote overheids organisatie: CERT procedures.
- 2006-24 Beveiliging grote overheids organisatie: Vertrouwd Toegangspad.
- 2007-23 CERT noodnet.
- 2007-32 Veiligheid van update mechanismen.
- 2007-41 Onderzoek naar de beveiliging van de wegwerp OV ritten kaart.
- 2008-18 Security and Reliability of Automated Waste Registration in The Netherlands.
- 2008-22 Detection of peer-to-peer botnets.
- 2008-33 Slimme meters.
- 2008-41 Security en privacy in het Landelijk Schakelpunt.
- 2009-02 Online Banking: Attacks & Defences.
- 2009-07 Browser Security.
- 2009-41 The DFRWS 2009 Challenge.
- 2010-07 Modern Age Burglars.
- 2010-15 Horse-ID.
- 2010-34 GPU-based password cracking.
- 2011-43 Passive LAN information gathering.
- 2011-08 PersLink Security.

Content Management

Web Site

Blogs

Email

PDF Conversion

Marketing

VMware vSphere

Internal Cloud



# Need for GreenIT

***Positive proof of global warming.***



**18th  
Century**

**1900**

**1950**

**1970**

**1980**

**1990**



# Turn Green Tech into Greenbacks

IT Certifications for Jobs That Make a Difference



## Uptime Institute Accredited Tier Designer

The Uptime Institute has long been a proponent for green data center design and implementation. Its certification course on data center design embeds green principles into the curriculum.



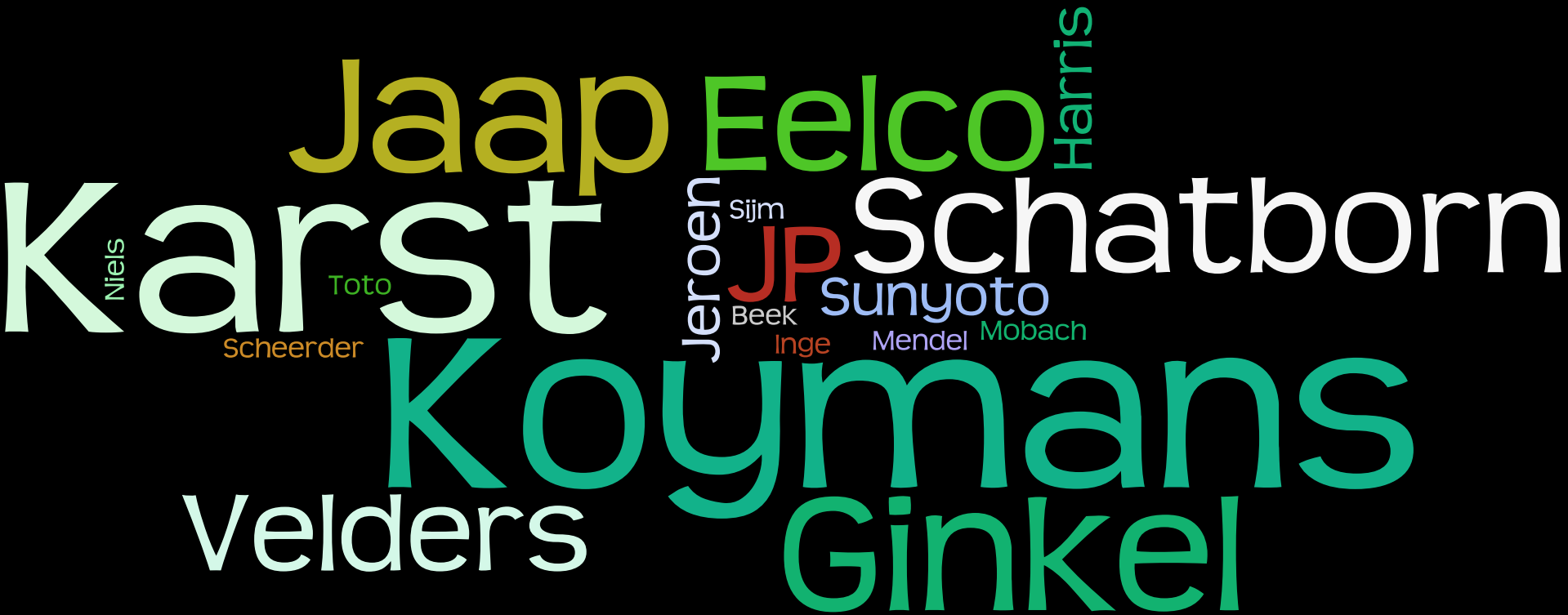
SUSTAINABILITY  
**Your Career**





# Master OS3!

(master sinds 2003 @ UvA)



A word cloud of names on a black background. The names are arranged in various sizes and orientations. The largest names are 'Karst', 'Koymans', and 'Schatborn'. Other prominent names include 'Jaap', 'Eelco', 'Ginkel', and 'Velders'. Smaller names include 'Niels', 'Toto', 'Scheerder', 'Jeroen', 'Sijm', 'JP', 'Beek', 'Inge', 'Mendel', 'Mobach', 'Sunyoto', and 'Harris'.

Niels  
Jaap  
Eelco  
Harris  
Karst  
Toto  
Scheerder  
Jeroen  
Sijm  
JP  
Beek  
Inge  
Mendel  
Mobach  
Sunyoto  
Schatborn  
Koymans  
Velders  
Ginkel



EU

SARA

SURF-ESRC

Pieken-in-de-Delta

SURFnet

FES UVVA

NWO

NWO-RCF