



Third international workshop on interim-PET in lymphoma

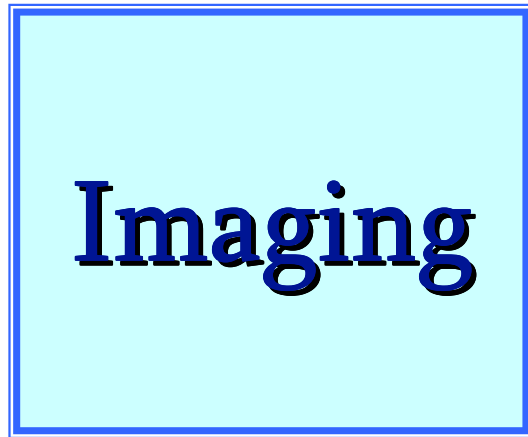
Menton (France), Palais de
l'Europe,
September 26-27th, 2011



Imaging exchange
Chauvie S

Imaging Exchange

- *Diagnosis/report exchange*



Imaging



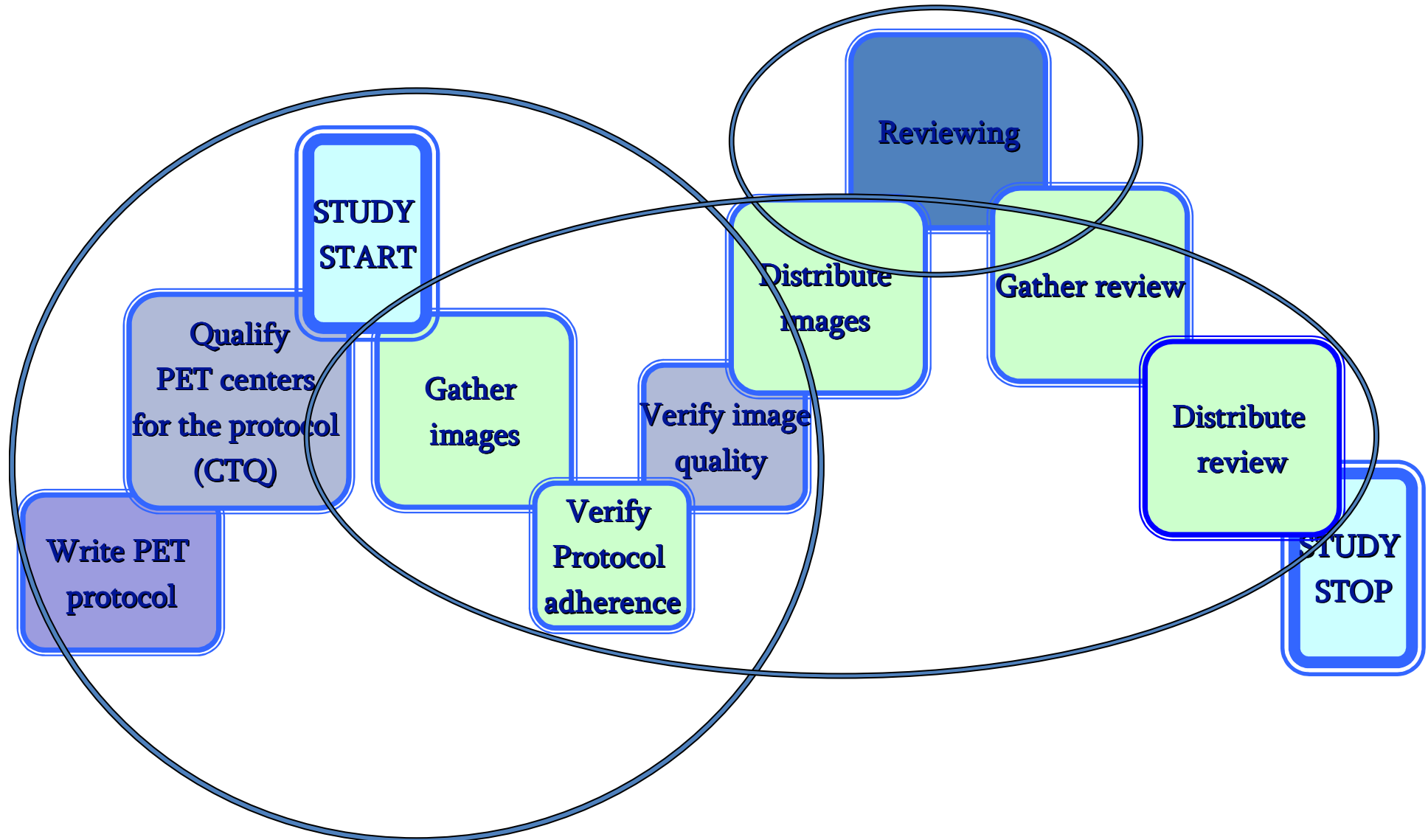
Review

Data

Thought



Imaging in clinical trial



Clinical Trial Qualification (CTQ)

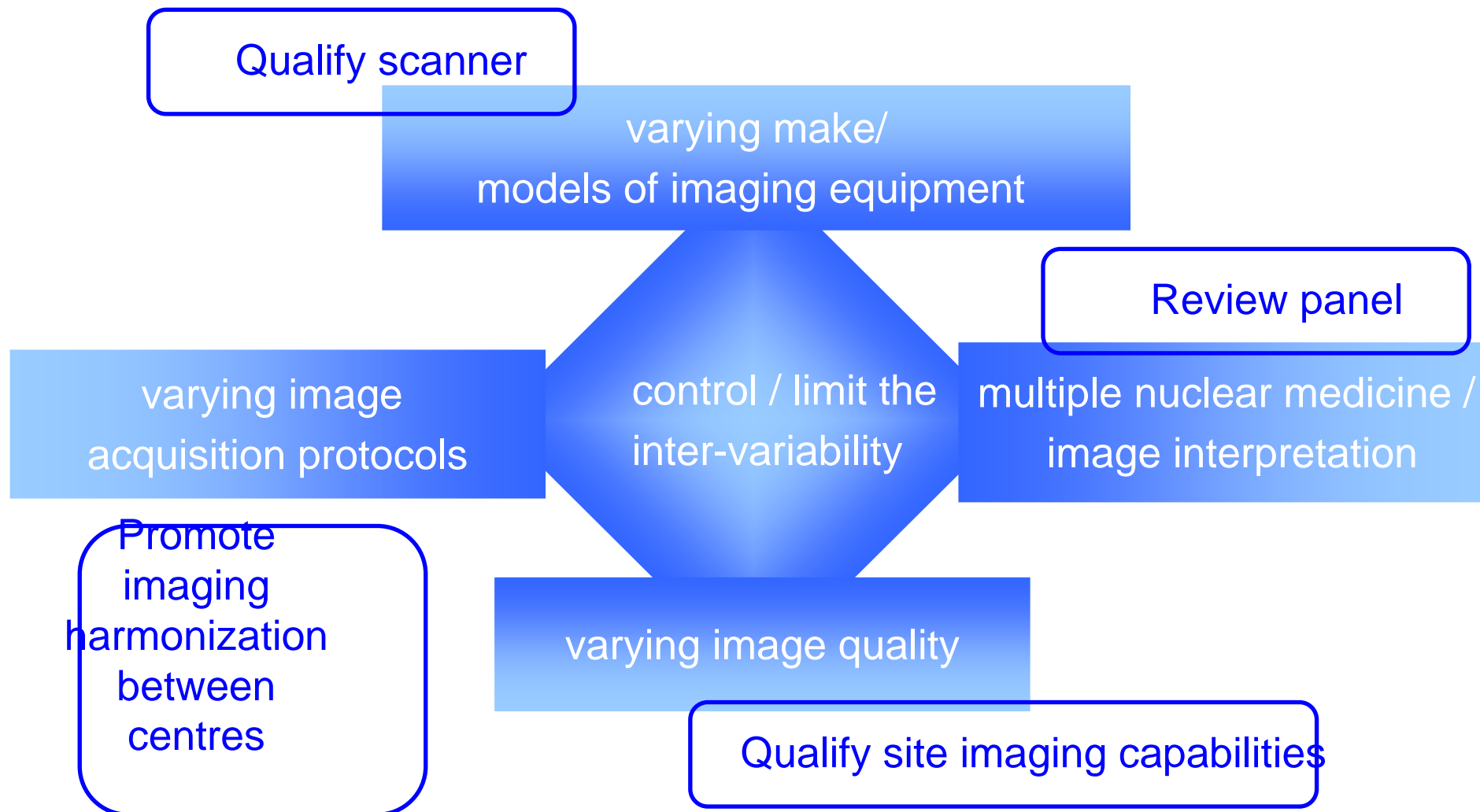


Image Management

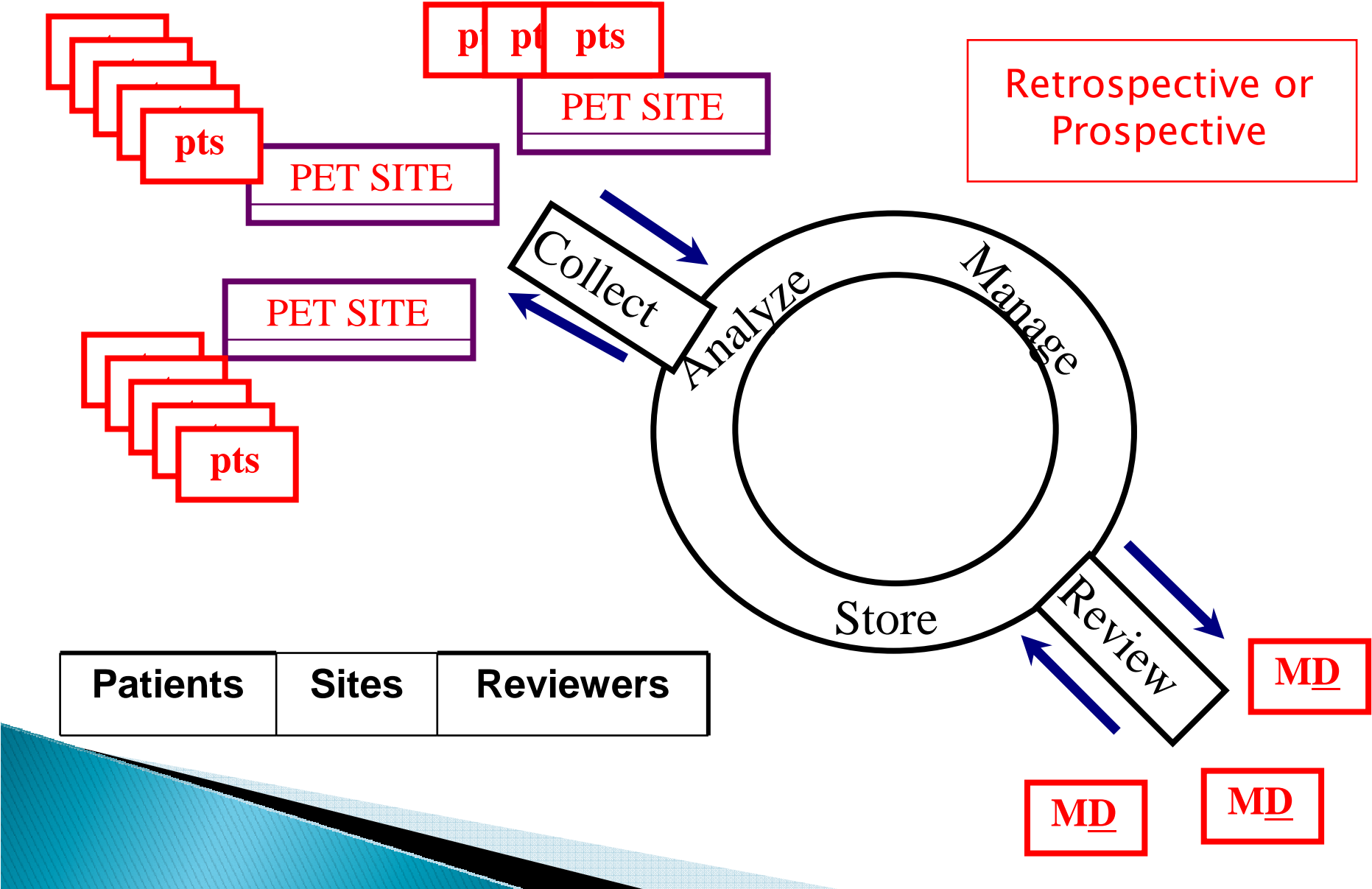


Image Reviewing in clinical trial

WEB viewers:

- Learning curve
- Quality of monitors
- Limited access (e.g. ~ 5 reviewers/system)
- Speed of connection
- Need SW installation
- Cost

▶ Dedicated HW:

- Learning curve
- Unlimited access
- Optimal quality
- Fast connection
- Need SW&HW installation

Very costly

▶ Do it yourself:

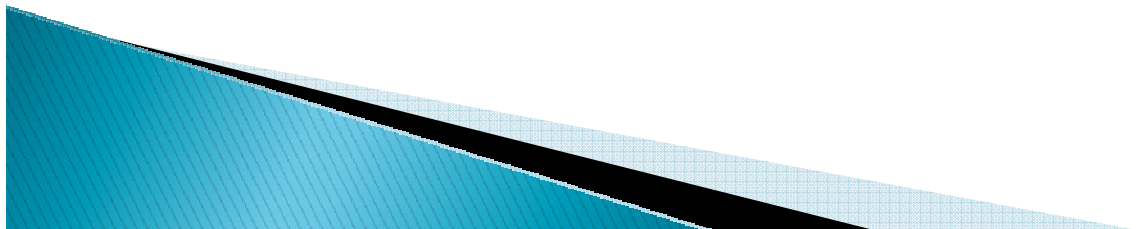
- No learning curve
- Unlimited access
- Optimal quality
- Fast connection
- No need of SW&HW installation
- Time consuming

Setup an imaging CT

Centres: which standardization?

Patients: how to exchange images?

Review: what viewer to use to ?



Clinical Study

Retrospective, 3 centres 120 patients 2 reviewers

Centres: which standardization?

verify DICOM inter-operability

Patients: how to exchange images?

via ftp-http-CD-DVD-USB

Review: what viewer to use to?

do it yourself

Prospective Clinical Trial

Prospective with time constraints, 100 centres, 700 patients, 7 reviewers

Centres: which standardization?

verify DICOM inter-operability

assure standardization

Patients: how to exchange images?

via http

Review: what viewer to use to?

do it by yourself

HD IVS

CTQ

HD0607

Verify DICOM compatibility.

Assure image quality for
visual assessment

Verify DICOM compatibility.

Soft CTQ:

Send IQ phantom

Send QA/QC program

PET Protocol

Assure image quality for
visual assessment

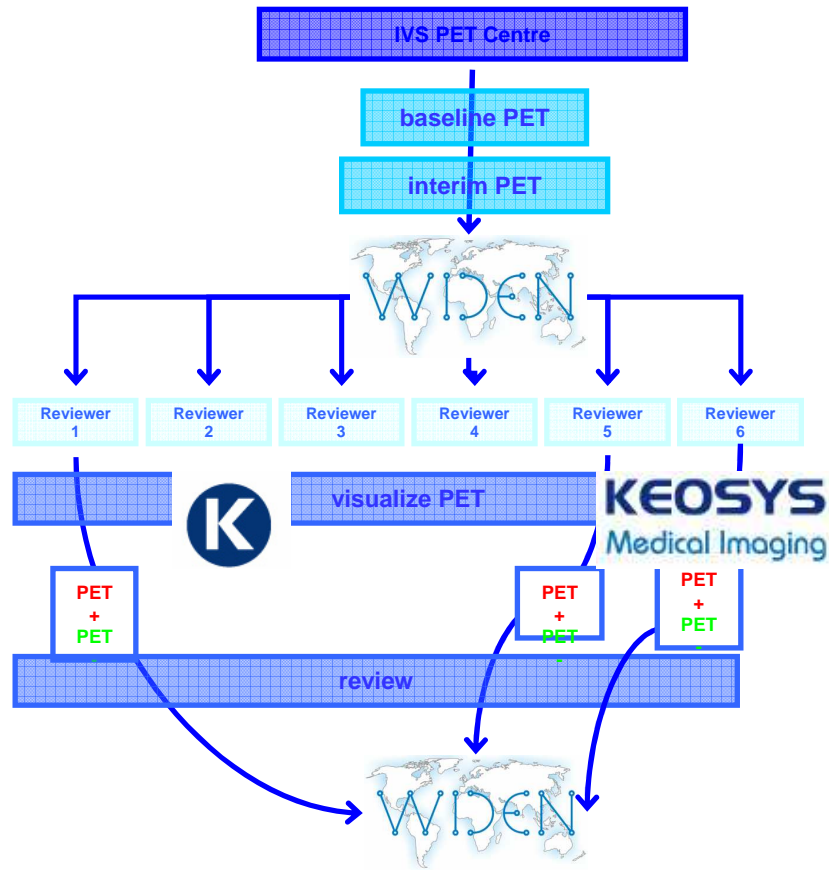
2 examples

HD IVS

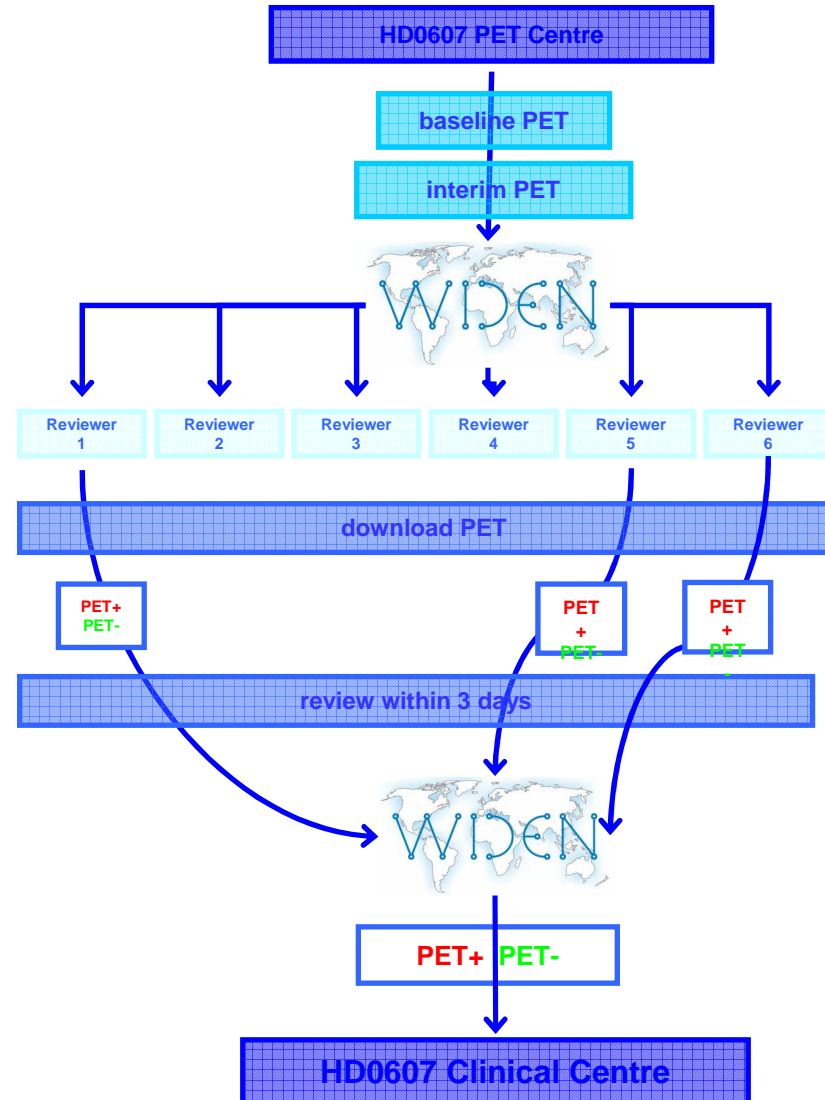
HD0607

Reviewing

HD IVS

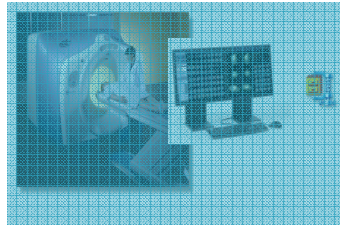


HD0607

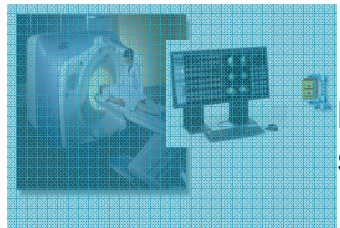


Imaging exchange

HD0607

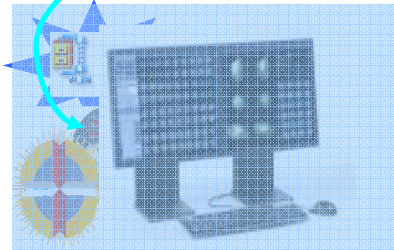
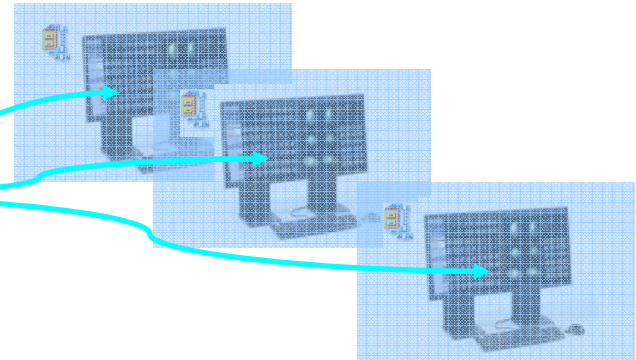
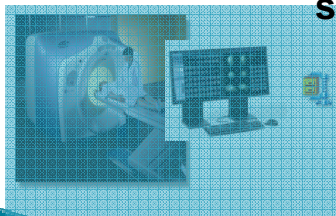


https



https

https



VLAN

**HD
IVS**



dedicated VPN



HD0607

Upload
time to
INFN
server

The average
(median) time
per scan upload
and download
were 14'33"
(3'23") and 6'56"
(3'34")
respectively.

System load



HD IVS

Upload
time to
Keosys
server

Bottleneck
5 PET-
CT/day

Total time:
100 days
20 weeks

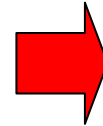
average (median) PET scan size were 133.3 MB (120.7 MB), ranging from 51.2 MB to 469.8 MB.

Reviewing in IVS

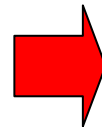
400 patients enrolled



336 patients with PET/CT scans uploaded & quality controlled



261 patients with PET/CT scans approved & sent to review



Reason for PET scan exclusion

- Absence of CT images 22
- Absence of baseline PET 25
- Absence of interim PET 1
- CT slices missing 3
- PET slices missing 10
- Poor quality scans 6
- Miscellaneous 8

• REVIEWERS

- Sally Barrington - London - UK
- Alberto Biggi- Cuneo - I
- Michele Gregianin - Padova - I
- Martin Hutchings- Copenhagen - DK
- Lale Kostakoglu - New York - USA
- Michel Meignan - Paris - F



KEOSYS
Medical Imaging

Review results acquired and statistical analysed

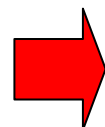


Reviewing in HD0607

360 patients enrolled



123 patients with PET/CT scans uploaded & quality controlled

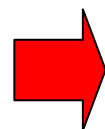


Reason for PET scan exclusion

- Absence of CT images 0
- Absence of baseline PET 0
- Absence of interim PET 0
- CT slices missing 0
- PET slices missing 0
- Poor quality scans 0
- Miscellaneous 0



123 patients with PET/CT scans sent to review



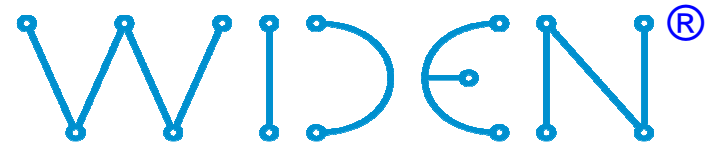
• REVIEWERS

- Alberto Biggi - Cuneo
- Agostino Chiaravalloti - Roma
- Federico Fallanca - Milano
- Umberto Ficola - Palermo
- Ugo Paolo Guerra - Bergamo
- Michele Gregianin - Padova

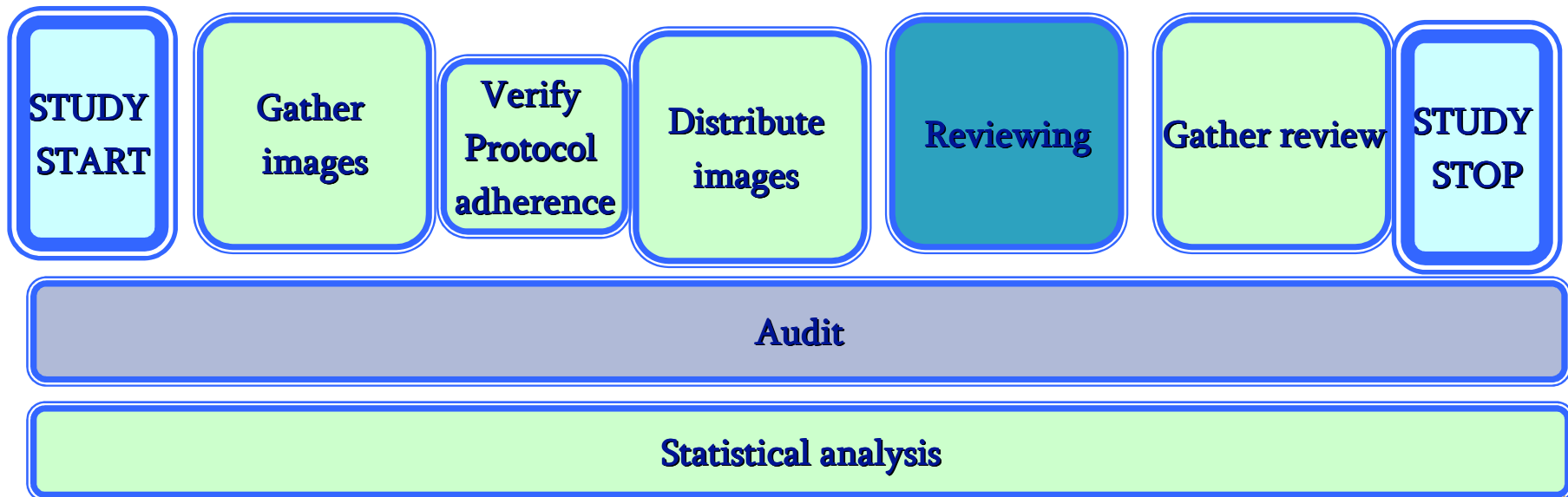


Review results acquired and statistical analysed





Web-based Image and Diagnosis Exchange Network



is a spin-off of the University of
Torino and in progress with...

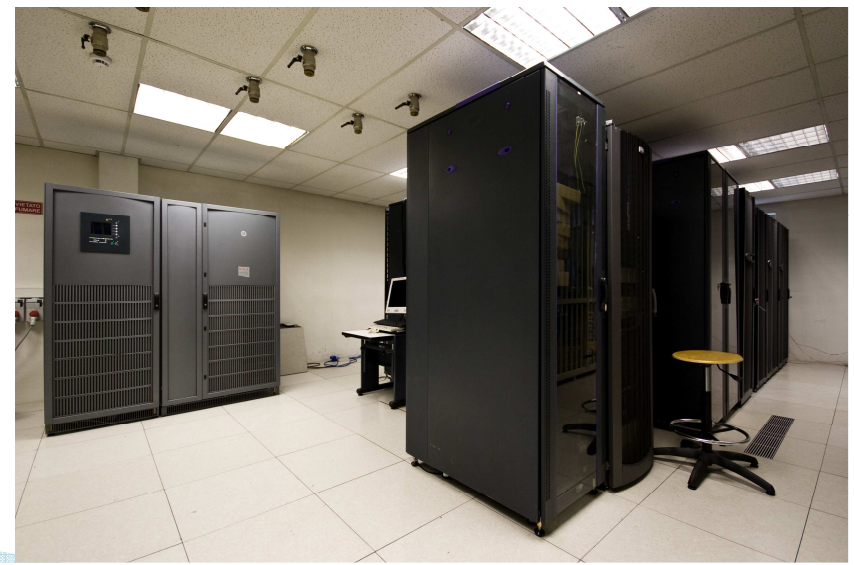
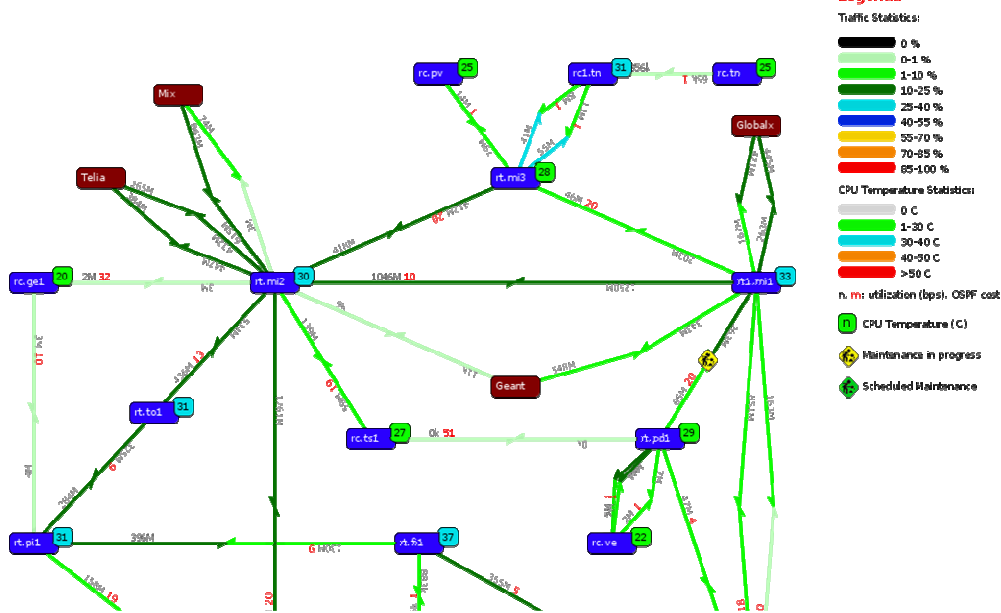
UNIVERSITÀ
DEGLI STUDI
DI TORINO
ALMA UNIVERSITAS
TAURINENSIS

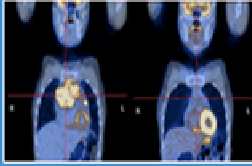


WEB approach

- To be user friendly: as an internet page
- To permit fast image exchange: through TCP/IP network
- To assure security of patients' data: anonymisation and internet banking security
- To be cheap: freeware SW, no HW needed
- To bypass "hospital network": use internet
- To be universal: as internet...

GARR Network Information Center
Last update: 05:34 am, 22 February 2011





GITIL

Gruppo Italiano Terapie Innovative nei Linfomi

Login into site

Login

Email:

Password:

Login

[[Forgot password](#)]

INFO

You need to login in order to access the site's resources.

Copyright © 2007-2009 Cuneo & INFN

<https://magic5.to.inf.it/gitil>

Case ID	Type	Downloaded on	Valid until	Download	Your result
_missing	-	17/09/2008	01/01/1970	-	-
_missing	-	14/08/2008	01/01/1970	-	-
_missing	Baseline	06/06/2008	01/01/1970	-	-
_missing	-	05/06/2008	01/01/1970	-	-
_missing	Baseline	06/02/2009	01/01/1970	downloaded	no

[Change your password]

Upload in progress

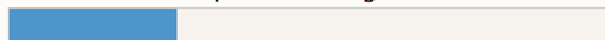
If you have difficulties visualizing the images on your computer, you can use the following programs: [DicomWorks](#) or [MIPAV](#)

Submitted cases:

You haven't submitted any cases yet.

Upload new case files

Upload In Progress



Percent Complete:	28%
Files Uploaded:	0 of 1
Current Position:	356 / 1287 KBytes
Elapsed Time:	00:00:03
Est Time Left:	00:00:10
Est Speed:	89 KB/s.

All fields are required!

The Case ID should contain only alphanumeric characters and no spaces!

- Type:
- Test (Fake)
 - Baseline

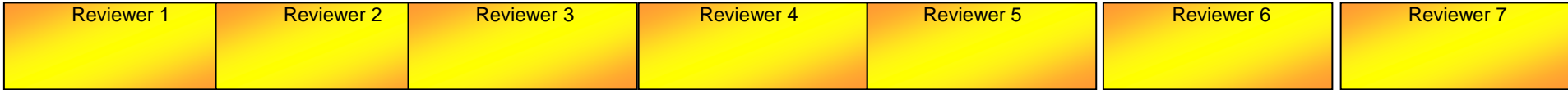
How to insert the diagnostic
How to change your password

RESOURCES

- Accredimento tomografo PET-TAC
- Criteri generali per partecipare allo studio multi-centrico
- Esecuzione esame PET-TAC
- iPET interpretation criteria - biggi
- Modulo accreditamento tomografo PET-TAC Mod. A
- newsHD0607-Firenze 21 Marzo 2009

ADMIN

To access the administrator resources, [click here](#).



reviewers receive e-mail and SMS with links



Inbox - Outlook Express

File Edit View Tools Message Help

Create Mail Reply Reply All Forward Print Delete Send/Recv Find

Inbox

Folders	Received	Subject
Outlook Express	24/01/2008 9.34	cerello@to.infn.it
	24/01/2008 9.05	Cyrril Burger (PMOD)
	24/01/2008 8.37	valentina d'Alesio
	24/01/2008 8.29	Alex Stancu
	23/01/2008 22.42	Cyrril Burger (PMOD)
	23/01/2008 22.02	Alex Stancu
	23/01/2008 17.50	elspcs@elsevier.com
	23/01/2008 16.53	Roberto Cirio
	23/01/2008 15.47	Emiliano Spezi
	23/01/2008 14.47	Roberto Cirio

From: Alex Stancu To: chauvie Stephane Cc: Piergiorgio Cerello
Subject: Re: site linfomi

ok, since you are not receiving any mails, in order to test the download process, here are some links:

<http://magic5.to.infn.it/site/linfo/accept.php?fid=beb4965cb9a0e5647f1041db075b512c>
<http://magic5.to.infn.it/site/linfo/accept.php?fid=01da56ef74e8378c174cb1404cea44df>
<http://magic5.to.infn.it/site/linfo/accept.php?fid=4249c0cf9a310ad591c985d2ef81b3b2>
<http://magic5.to.infn.it/site/linfo/accept.php?fid=50347b308d2654f2b563f32ac1fcc374>
<http://magic5.to.infn.it/site/linfo/accept.php?fid=09561d1080378b3c8f68f21239b499dc>

the files below are the ones that you have uploaded. since you are the up-loader, you are not allowed to download them, however, you can download the files above.

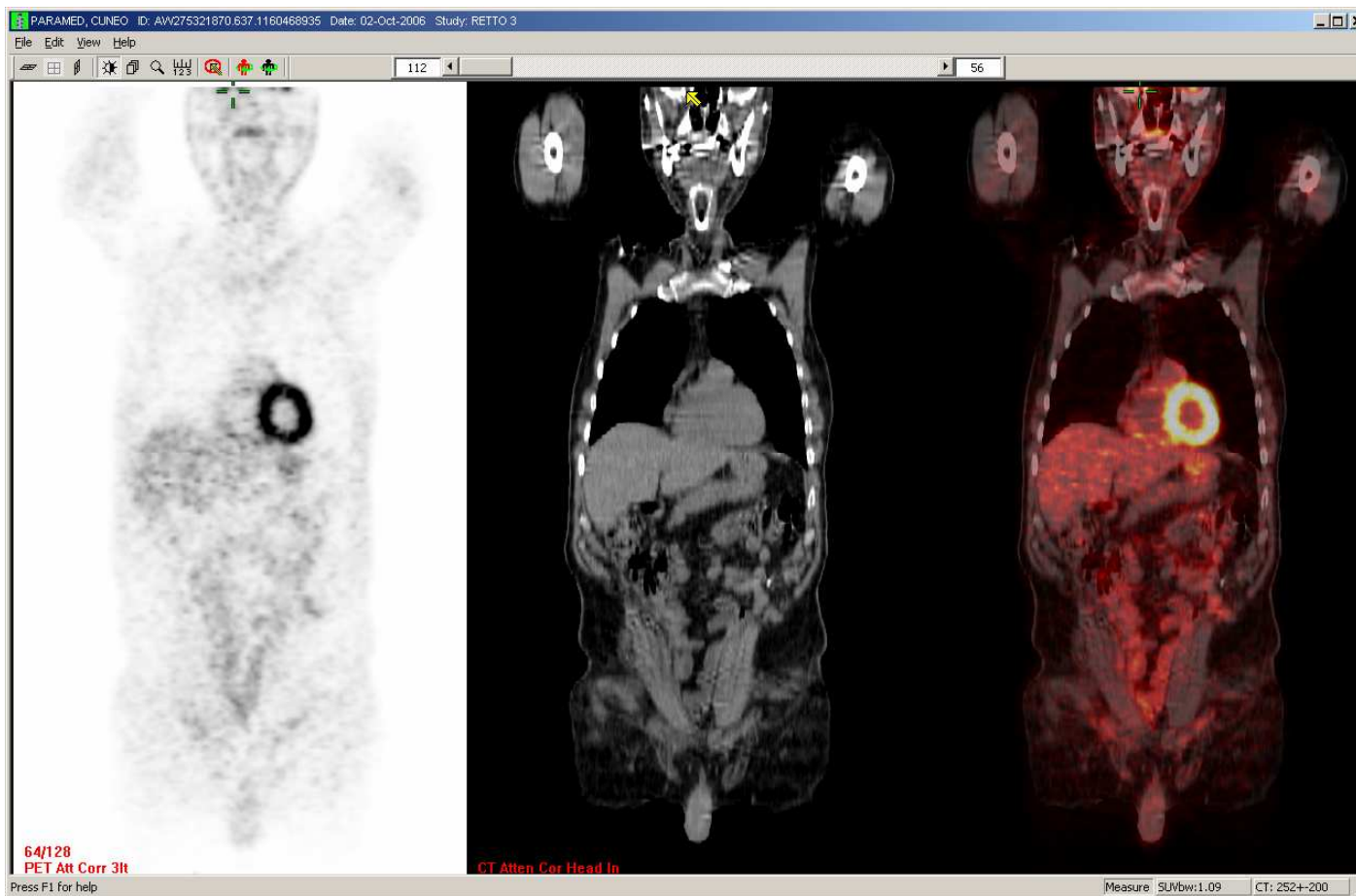
<http://magic5.to.infn.it/site/linfo/accept.php?fid=87aa43f5df51c82ffdf650ef0461bb46>
<http://magic5.to.infn.it/site/linfo/accept.php?fid=e148534ba7b2ca130adc5039bba91a86>

for testing purposes you can use also the user test@test.com with the password **test**

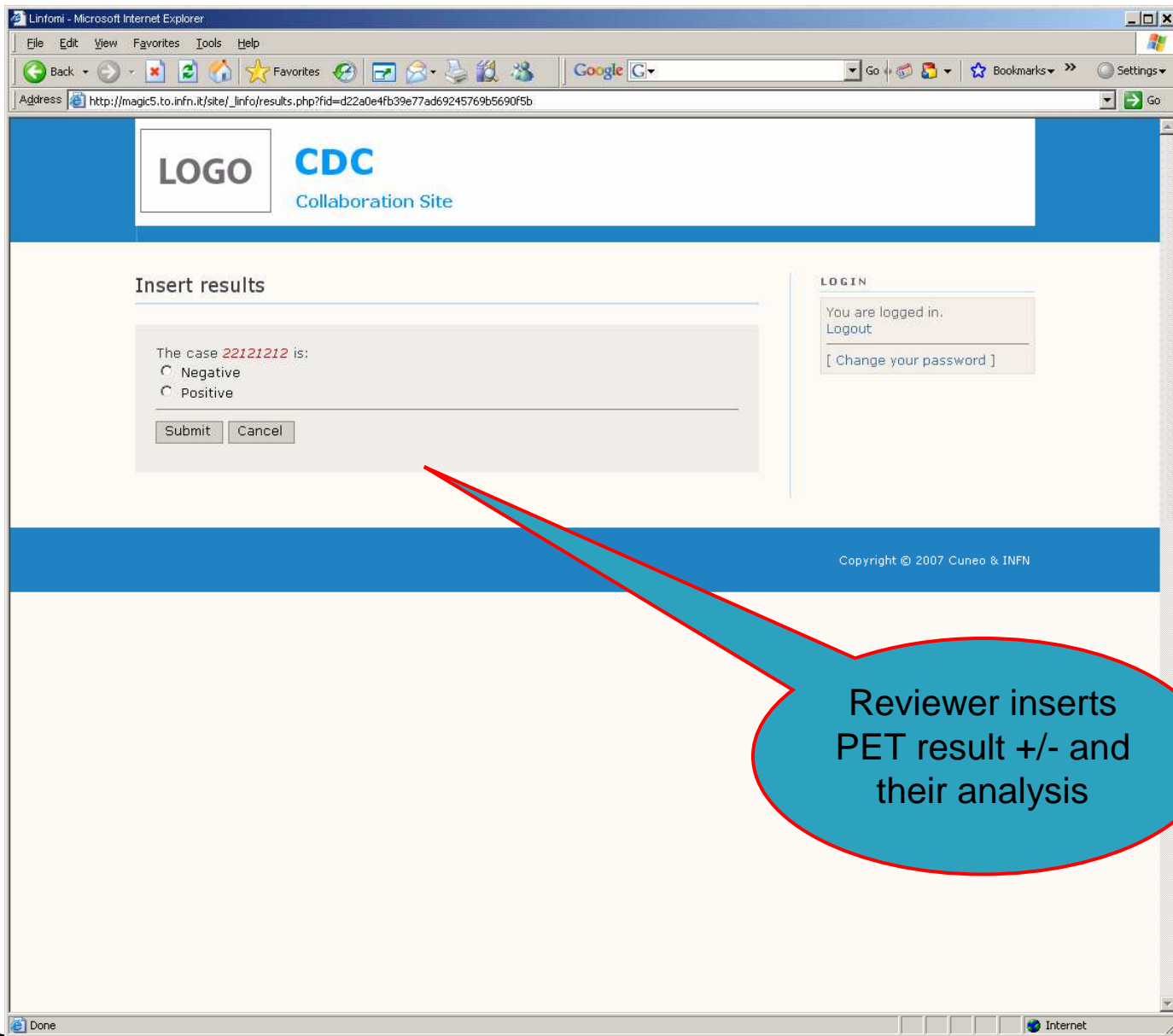
On Jan 24, 2008 9:52 AM, chauvie Stephane <chauvie_s@csnadales.unige.it> wrote:

67 message(s), 8 unread Working Online

PET reviewers use their own SW to evaluate images



Within 3 working days



Reviewer inserts
PET result +/- and
their analysis

Haematologist receive
e-mail and SMS with PET results

The image shows a screenshot of an Outlook Express inbox window. The interface includes a menu bar (File, Edit, View, Tools, Message, Help), a toolbar with icons for Create Mail, Reply, Reply All, Forward, Print, and Delete, and a left-hand pane for Folders. The main pane displays a list of received emails. One email from Alex Stancu is highlighted. Below the list, the details of the selected email are shown, including the sender, recipient, and subject. The email content contains several URLs and a note about testing purposes. To the left of the Outlook window is a Nokia smartphone displaying a social media interface with various notifications and a keyboard.

Received	From	Subject
24/01/2008 9.34	cerello	Re: site linfomi
24/01/2008 9.06	Cyrril Burger (PMOD)	Re: Dr. Kaufmann :-)
24/01/2008 8.37	Yves d'Alesio	R: consiglio spassionato
24/01/2008 8.29	Alex Stancu	Re: site linfomi
23/01/2008 22.42	Cyrril Burger (PMOD)	Dr. Kaufmann :-)
23/01/2008 22.02	Alex Stancu	site linfomi
23/01/2008 17.50	elspcs@elsevier.com	Elsevier Health Science Periodicals - January 23, 2008
23/01/2008 16.53	Roberto Cirio	Seminario della Scuola di Specializzazione in Fisica Sanitaria
23/01/2008 15.47	Emiliano Spezi	The UK forum for users of Monte Carlo Neutron, Electron and Gamma r.
23/01/2008 14.47	Roberto Cirio	

From: Alex Stancu **To:** chauvie Stephane **Cc:** Piergiorgio Cerello
Subject: Re: site linfomi

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- <http://magic5.to.infn.it/site/linfo/accept.php?fid=01da56ef74e8378c174cb1404cea44df>
- <http://magic5.to.infn.it/site/linfo/accept.php?fid=4249c0cf9a310ad591c985d2ef81b3b2>
- <http://magic5.to.infn.it/site/linfo/accept.php?fid=50347b308d2654f2b563f32ac1fcc374>
- <http://magic5.to.infn.it/site/linfo/accept.php?fid=09561d1080378b3c8f68f21239b499dc>

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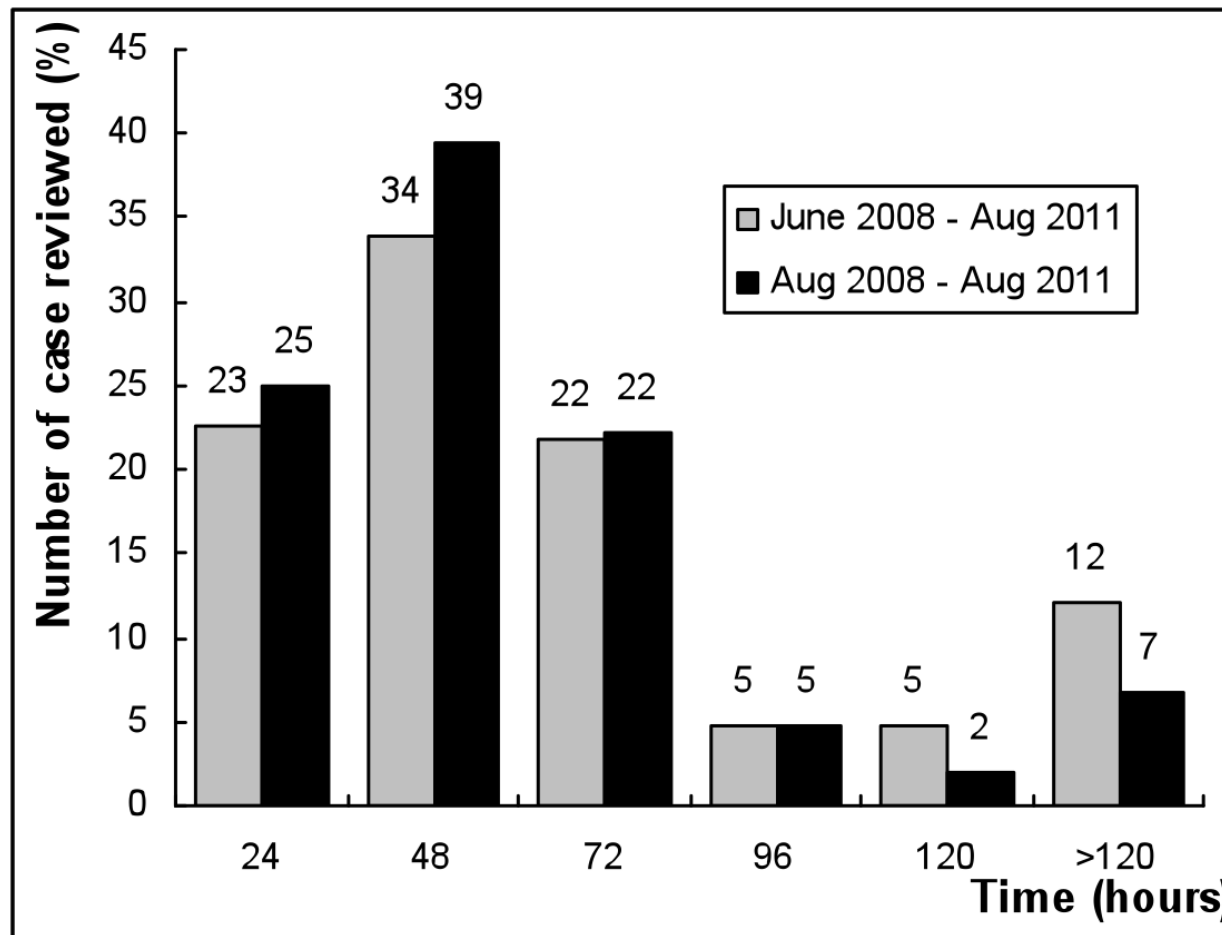
- <http://magic5.to.infn.it/site/linfo/accept.php?fid=87aa43f5df51c82ffdf650ef0461bb46>
- <http://magic5.to.infn.it/site/linfo/accept.php?fid=e148534ba7b2ca130adc5039bba91a86>

for testing purposes you can use also the user test@test.com with the password **test**

On Jan 24, 2008, 9:52 AM, chauvie Stephane <chauvie_s@ospedale.univr.it> wrote:

67 message(s), 8 unread Working Online

Review time



The **average (median) time** frame between the files upload by the submitting centre and the availability of the review results was **54h 24' (39h 42')**. 7% of the scans were reviewed among in days 4 and 5; 7% of the cases were reviewed after the fifth day. In cases of a delayed scan review beyond three days the delay depended on the presence of a week-end or other holiday time.

Expert panel evaluation of agreement

IVS

1	0.73	0.77	0.78	0.75	0.73
0.73	1	0.75	0.75	0.70	0.71
0.77	0.75	1	0.83	0.77	0.77
0.78	0.75	0.83	1	0.84	0.84
0.75	0.70	0.77	0.84	1	0.78
0.73	0.71	0.77	0.84	0.78	1

Cohen's Kappa Binary

0.61–0.80 substantial
>0.81 almost perfect

Krippendorff's Alpha = 0.758 binary score (4 threshold)
= 0.352 1-5 scoring system

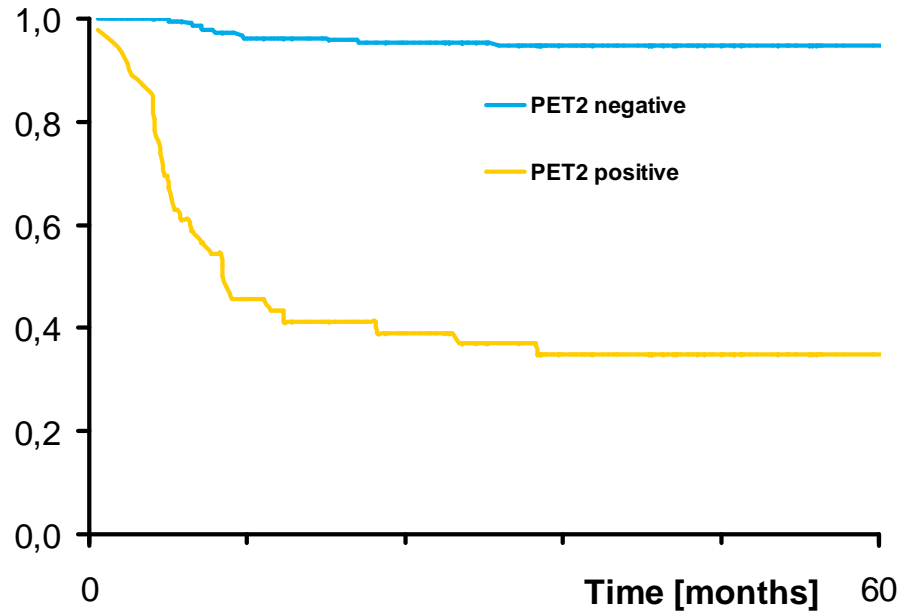
**HD
0607**

1	1.00	0.88	1.00	0.88	0.88
1.00	1	0.94	0.92	0.94	0.94
0.88	0.94	1	0.92	1.00	1.00
1.00	0.92	0.92	1	0.92	0.90
0.88	0.94	1.00	0.92	1	1.00
0.88	0.94	1.00	0.90	1.00	1

Krippendorff's Alpha = 0.803 binary score (4 threshold)
0.442 1-5 scoring system

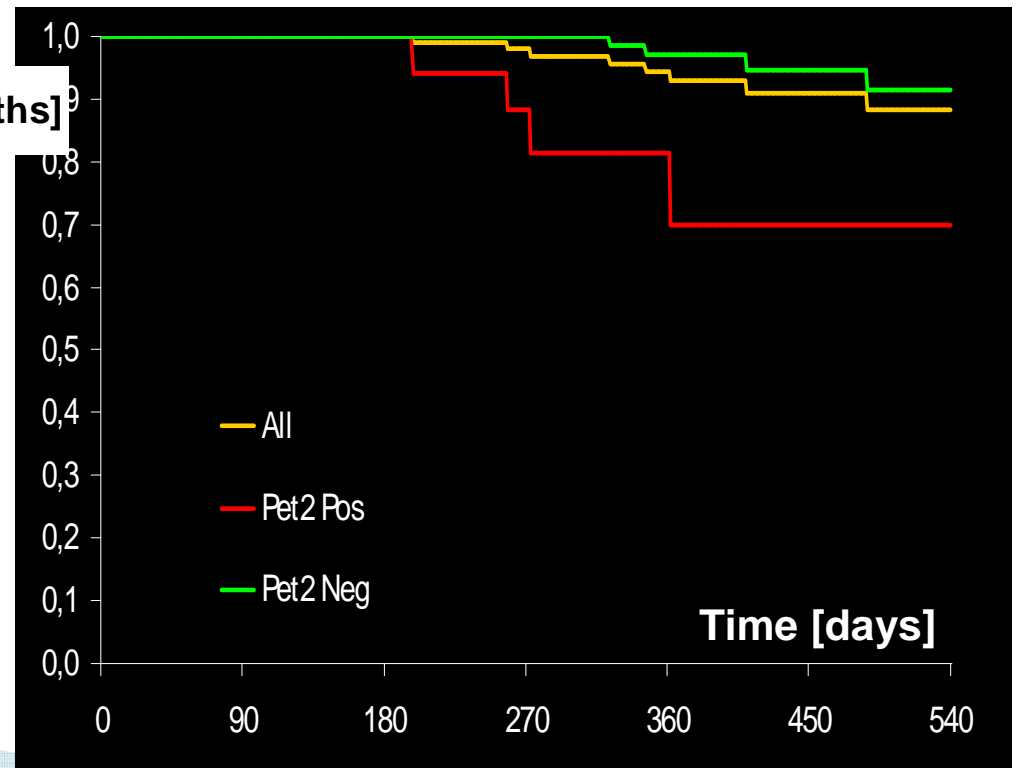
0 is chance
1 is perfect agreement

Failure Free Survival



FFS IVS (N=261)

FFS GITIL (N=122)



▶ **Conclusion:**

- Many approach exist
- Use the one tailored to your needs

