

# Nation-wide PACS system in Estonia

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SA Eesti Tervishoiu Pildipank

# Agenda

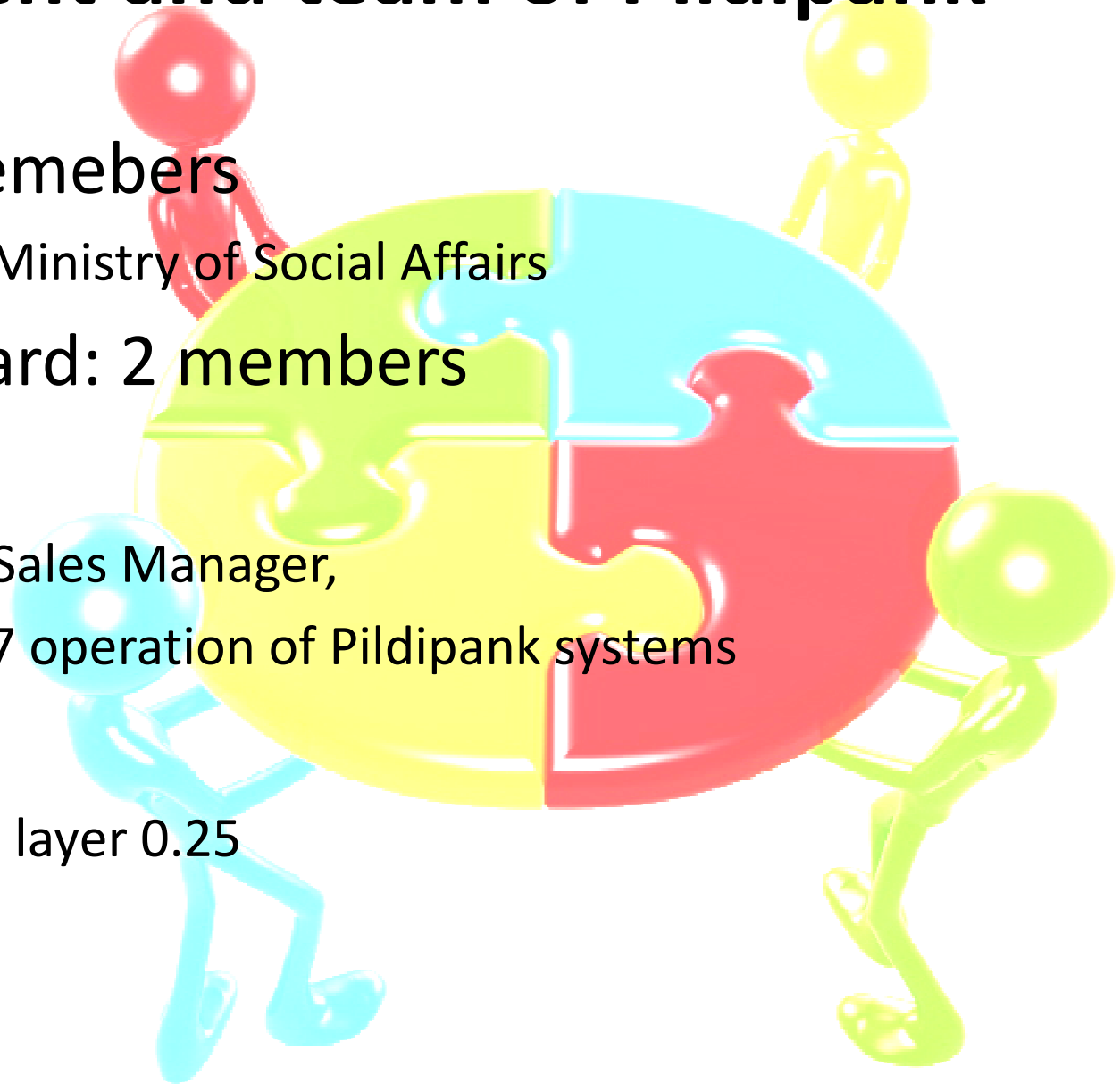
- Foundation of Estonian PACS - Pildipank
- Data handling in Pildipank (PACS, ECG, Pildipank portal)
- Users of Pildipank services
- Pildipank in numbers
- Future of Pildipank

# History of Pildipank

- Bitnet project
- Founded on 2006 by Tartu University Hospital (TUC) and North Estonia Medical Centre (NEMC)
- Purpose: to develop and manage the common environment for transmission, archiving and usage of medical images for all Estonian healthcare institutions in equal conditions
- Starting of ECG archiving on 2009

# Management and team of Pildipank

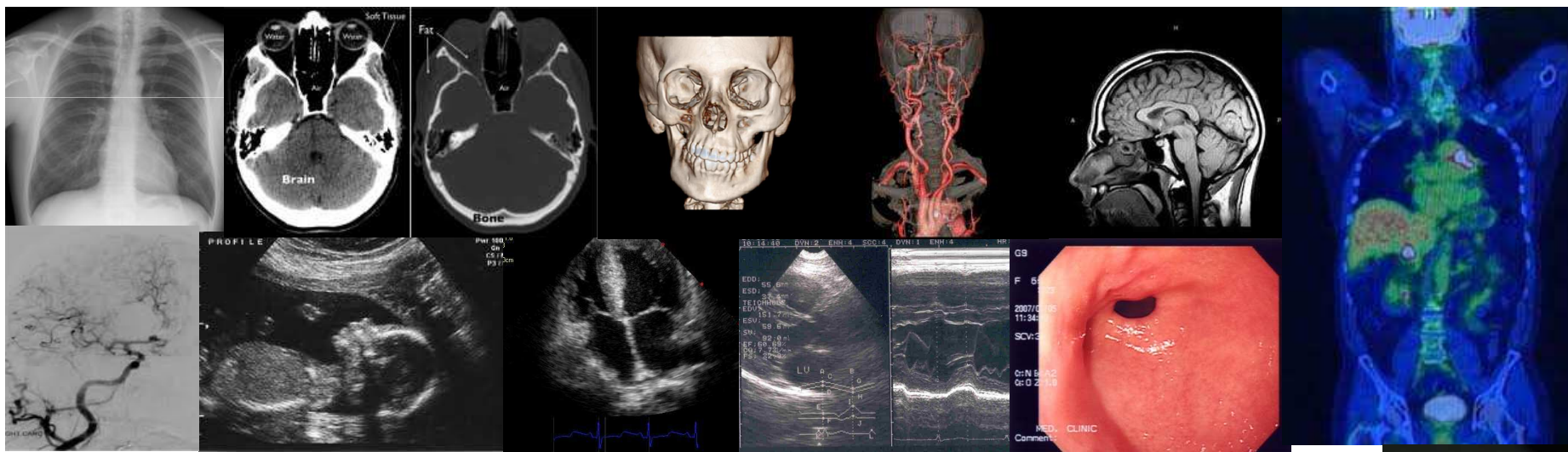
- Council: 3 members  
TUC, NEMC and Ministry of Social Affairs
- Executive Board: 2 members
- Specialists  
4 Engineers and Sales Manager,  
who assures 24/7 operation of Pildipank systems
- Other stuff:  
Accountant 0.25, layer 0.25



# Pildipank systems.

## Receiving of Images

- Pildipank PACS system is capable to receive DICOM images from most of modern imaging modalities (CR,CT,MR,US,ES,NM, etc)



- Old images digitized from old plain film
- Images of patient done by photocamera or operation theatre devices



# Connected modalities and other systems

- Modalities

- CR 118 (CR+DR+CRDX)
- RF 2+8 (2 FFPD+8 C-Arms)
- DX 10 (ortopantomographs)
- IO 2 (intraoral dental devices)
- MG 7
- XA 18 (9 angiographs+9 C-arms)
- CT 26
- NM 3
- PT 3
- MR 15
- US 59
- ES 49



Totally archives 320 devices, 13 different modalities and  
80 image reconstruction workstations

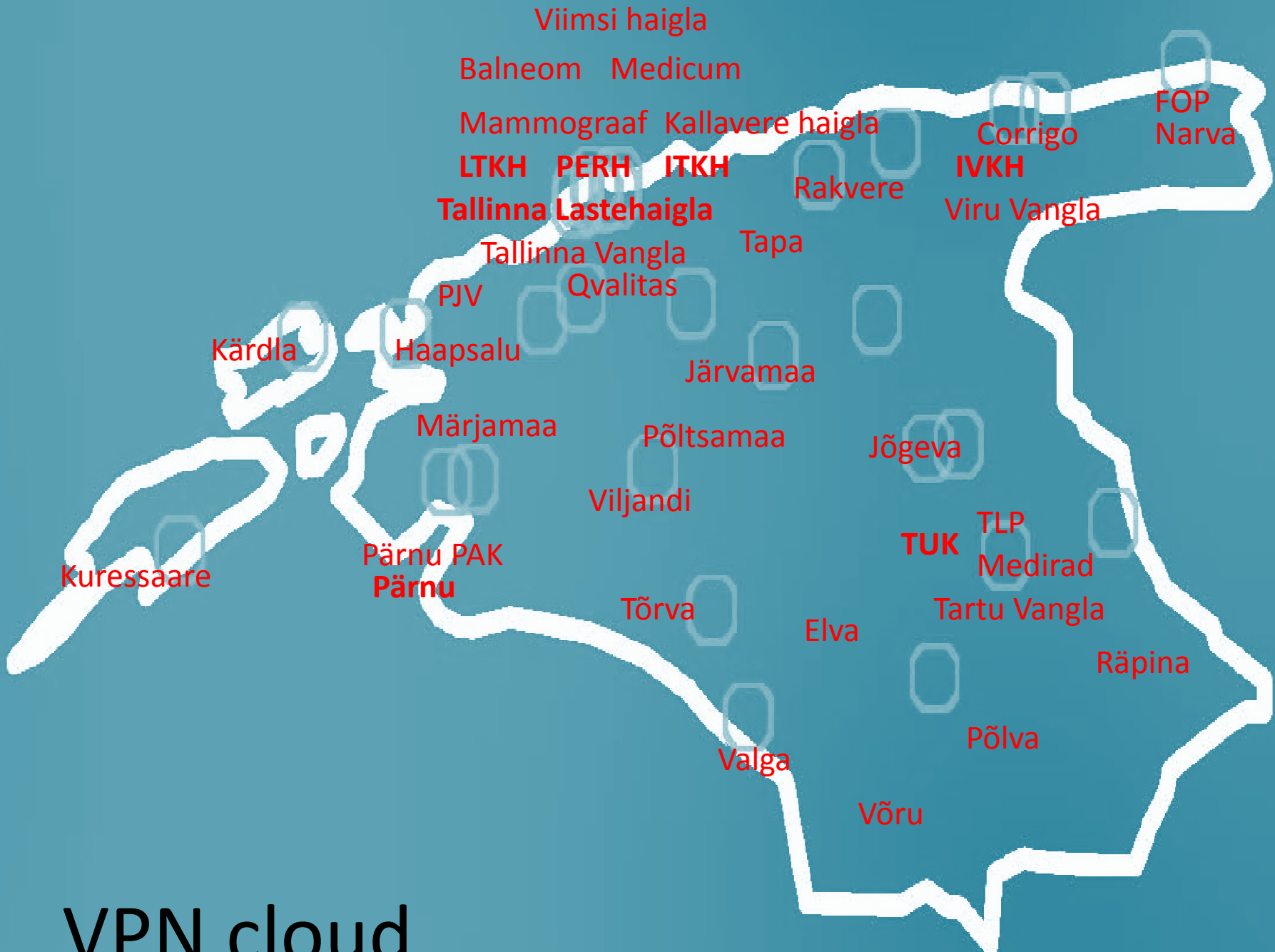
In April 2013 was archiving 400 devices

- Other PACS systems 5 (ITKH, LTKH, IVKH, Medicum, Mammograaf)

# Pildipank systems.

## Secure Data Networks

- Data communication between modalities and Pildipank is done using encrypted network channels (VPN)
- Encryption is done with:
  - Special hardware devices,
  - Special software solutions
  - Mobile Telecommunication System Operator solutions



VPN cloud



# Pildipank systems. Visualisation of Data

- WEB portal for General Practitioners
- WEB portal integration with HIS's
- WEB Viewer
- ECG Workstation (MUSE)
- DICOM Workstation
- PACS client



# WEB portal for GP's

- Integrated with
  - GP's IS
  - HIS
- Mini RIS
  - Ordering
  - Reporting
- Visualisation of ECG's and Radiology studies

Kuupäev f#	Selaitus	Modaliteet	Asutus	Vastus	kõik
<input type="checkbox"/> 11.04.2013 8:38	Röntgeniülevõtte alajäsemetest (iga järgmine ülevõtte) (kirjeldu	CR	ELVA	TELLITUD UURINGUD K7920 x 2 Röntgeniülevõtte alajäsemetest (iga järgmine ülevõtte) (kirjeldus) K7919...	LOE   VAATA
<input type="checkbox"/> 19.09.2011 10:57		IO	TUK		LOE   VAATA
<input type="checkbox"/> 8.06.2011 18:43	Intraoraalne hambaülevõtte	IO	TUC	Vastuseta uuring UURINGUD: 6059 x1 Intraoraalne hambaylevõtte	LOE   VAATA
<input type="checkbox"/> 2.05.2011 11:49	Intraoraalne hambaülevõtte	IO	TUC	Vastuseta uuring UURINGUD: 6059 x1 Intraoraalne hambaylevõtte	LOE   TELLI
<input type="checkbox"/> 28.02.2011 12:24	Intraoraalne hambaülevõtte	IO	TUC	Vastuseta uuring UURINGUD: 6059 x1 Intraoraalne hambaylevõtte	LOE   TELLI
<input type="checkbox"/> 3.02.2011 10:50	Röntgeniülevõtte rindkere piirkonnast (üks ülevõtte)	CR	TUK	Diaphragma kaarjas,hilused struktuurised.Kopsuväljad transpaarsesed,koldelis-infiltratiivseid muutus...	LOE   TELLI
<input type="checkbox"/> 11.06.2009 8:49		CR	ELVA		LOE   TELLI
<input type="checkbox"/> 23.01.2009 9:33		ECG Report			PDF
<input type="checkbox"/> 23.01.2009 9:02	Rindkere otseülevõtte	CR	TUK	Lülisamba kaelaosas lordoos lamenenud. Lüliskehade servad ja unkovertebraalnurgad teravenud. C5/6, C...	LOE   VAATA
<input type="checkbox"/> 7.02.2008 13:56		MR	TUC		LOE   TELLI
<input type="checkbox"/> 27.02.2007 10:40	Rindkere otseülevõtte	CR	TUK	Kopsud aktiivse koldeleiuata.	LOE   TELLI
<input type="checkbox"/> 27.02.2007 10:36		ECG Report		UNCONFIRMED	PDF
<input type="checkbox"/> 28.09.2006 21:38		CT	PERH		LOE   TELLI
<input type="checkbox"/> 16.01.2006 21:10		CR	TUC		LOE   TELLI
<input type="checkbox"/> 13.01.2006 17:36		CR	TUK		LOE   TELLI
<input type="checkbox"/> 7.11.2005 16:13		CR	TUK		LOE   TELLI
<input type="checkbox"/> 2.11.2004 9:58	Rindkere otseülevõtte	CR	DEFAULT	Diaphragmad kaarjad, lateraalsinused vabad. Kopsud koldeliste, infiltratiivsete muutusteta. Kopsujo...	LOE   TELLI
<input type="checkbox"/> 8.12.2003 14:54		CR	PERH		LOE   TELLI
<input type="checkbox"/> 1.01.2000 12:12		CT	PERH		LOE   TELLI

Kirjeid kokku: 19      Lehel 20

Vaata valitud uuringuid >

11.04.2013 8:38	1142013008	1142013008	1142013008
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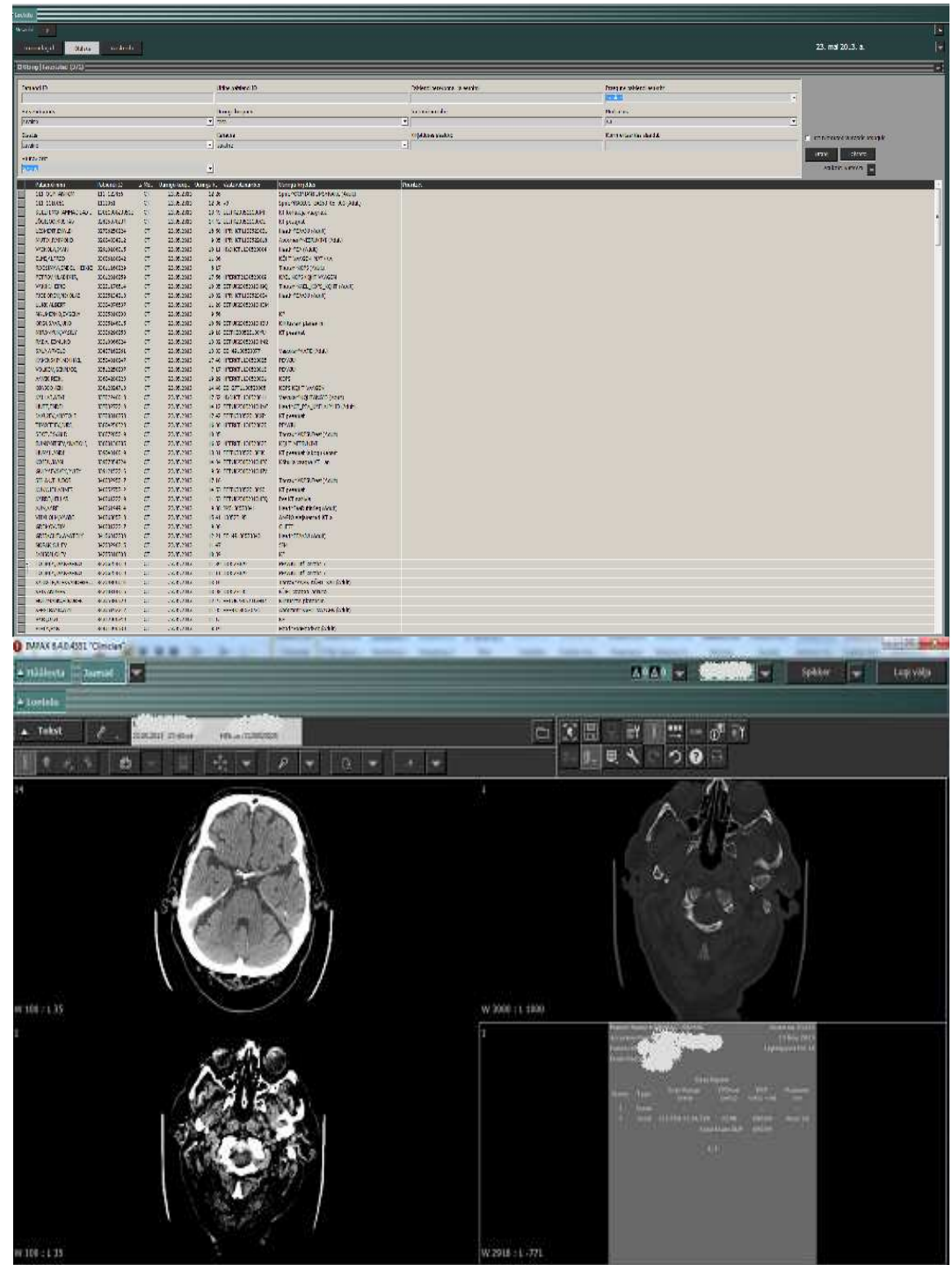
# WEB1000

- In country-wide usage since 2001
- Visualisation of DICOM images and simple image processing
- Access to the reports
- Pildipank system with biggest number of users
- Out of date system
- Will be replaced 2013

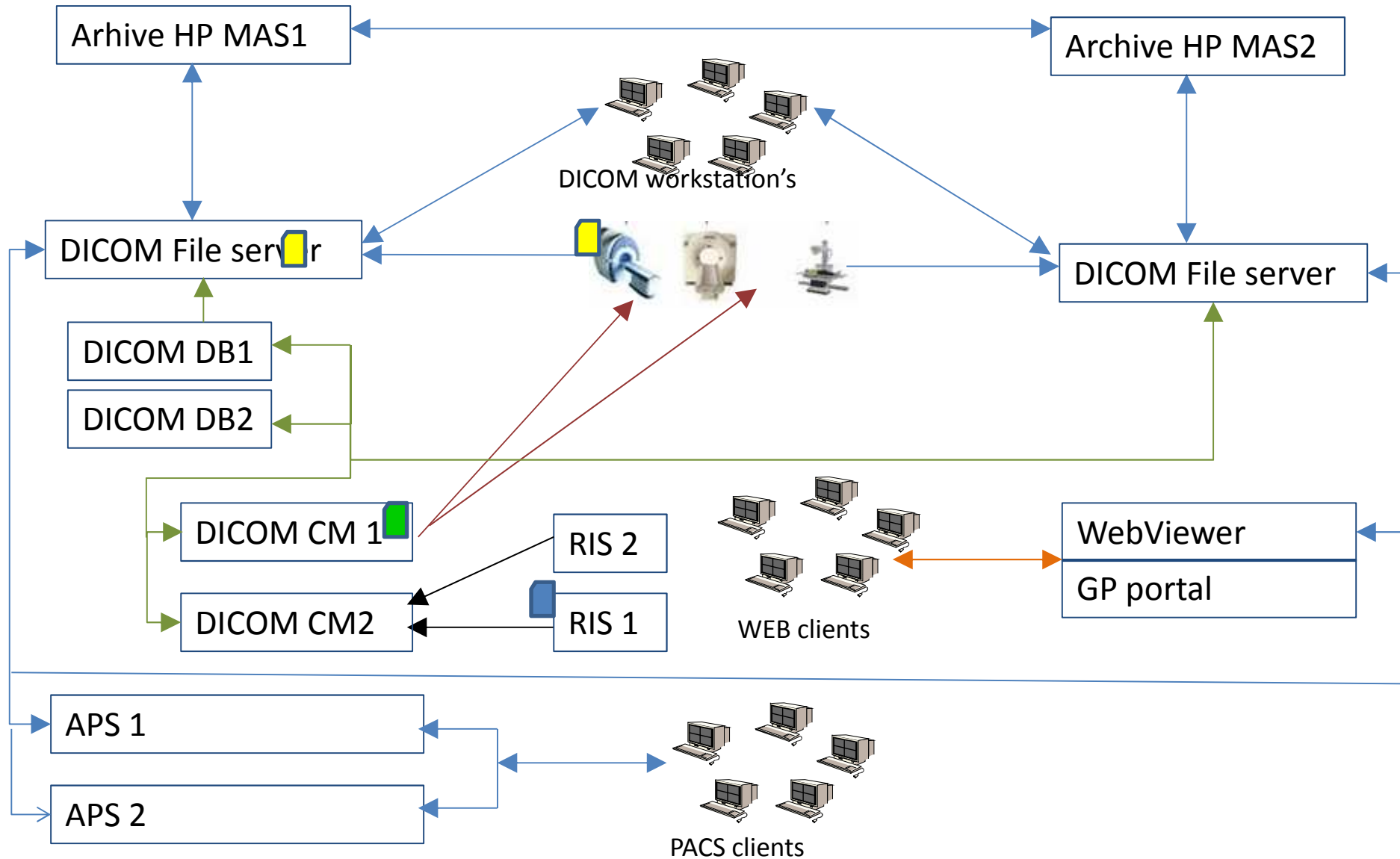
The screenshot displays the WEB1000 web application interface. The top section shows a navigation menu with options like 'Study', 'Thumbnail', 'Display', 'Report', and 'Conference'. Below this is a search bar and several filter dropdowns for 'Location', 'Date', 'Modality', and search criteria. A table lists patient records with columns for Patient Name, Patient ID, Accession Number, Study Date, Study Time, Department, Modality, Study Description, Images, Gender, and Image status. The bottom part of the interface shows a CT scan image of a chest, with a patient ID 'A215' and a window level '1231' visible. The interface includes various toolbars for navigation and image manipulation.

# Impax client

- In use since 2006 in 6 of 42 healthcare institutions (PERH, TÜK, Pärnu, ITK, Kuressaare, Valga)
- 2D and 3D image processing, prostheses planning functionality, teaching file, clinical conference functionality
- Validated diagnostic software

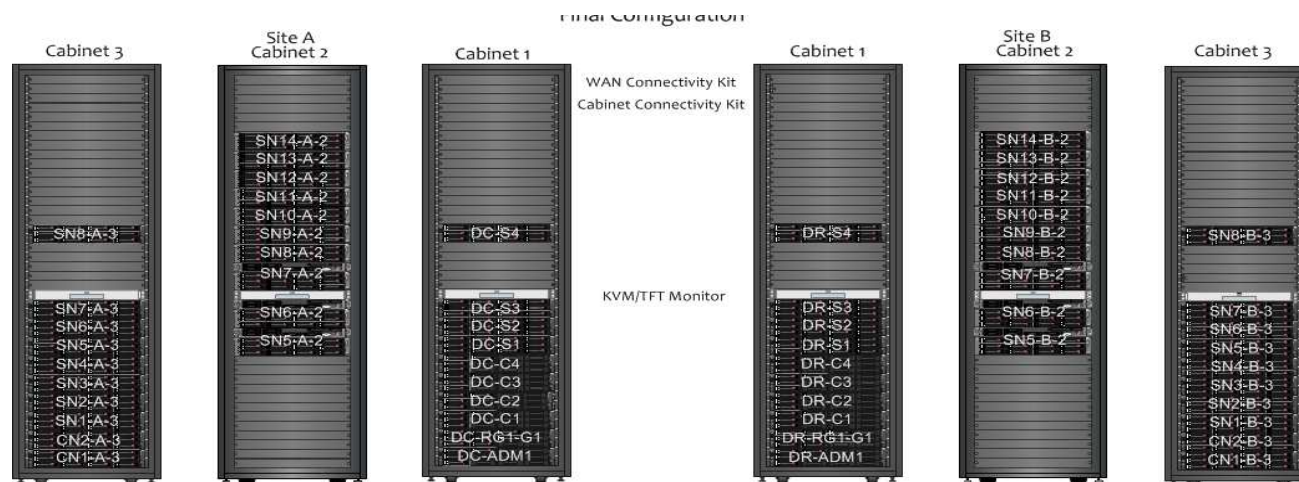


# Radiology workflow

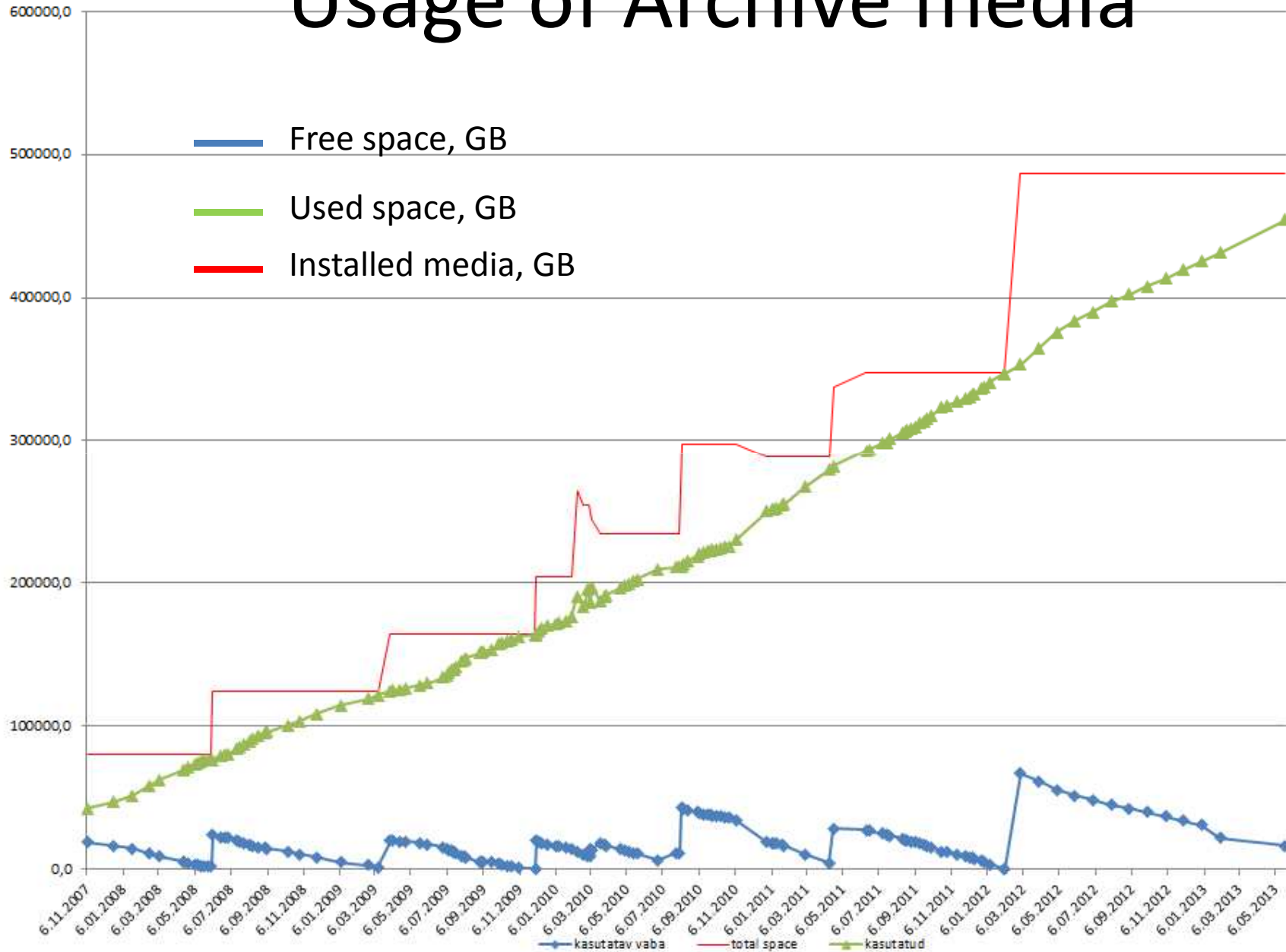


# Archive

- HP Medical Archive Solution
  - Disaster Recovery
  - Grid technology
  - Data Integrity (*hash*)
  - Expandable



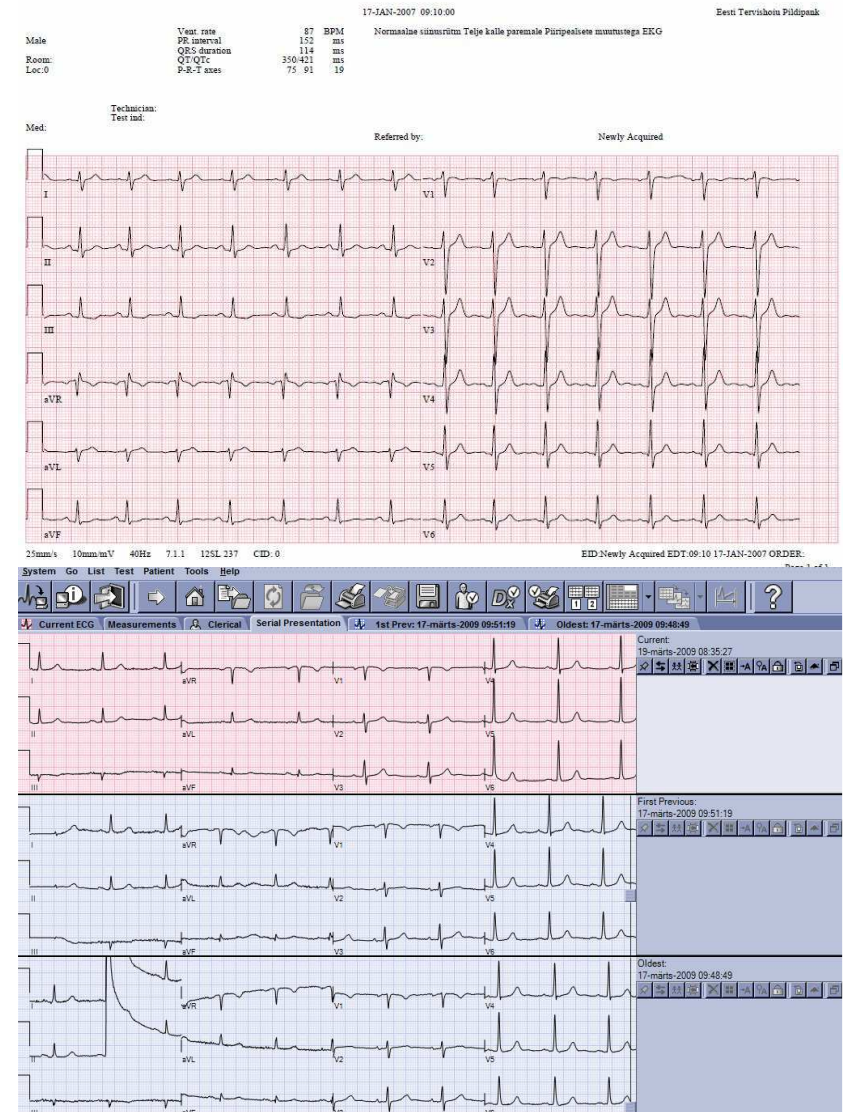
# Usage of Archive media



# Pildipank systems.

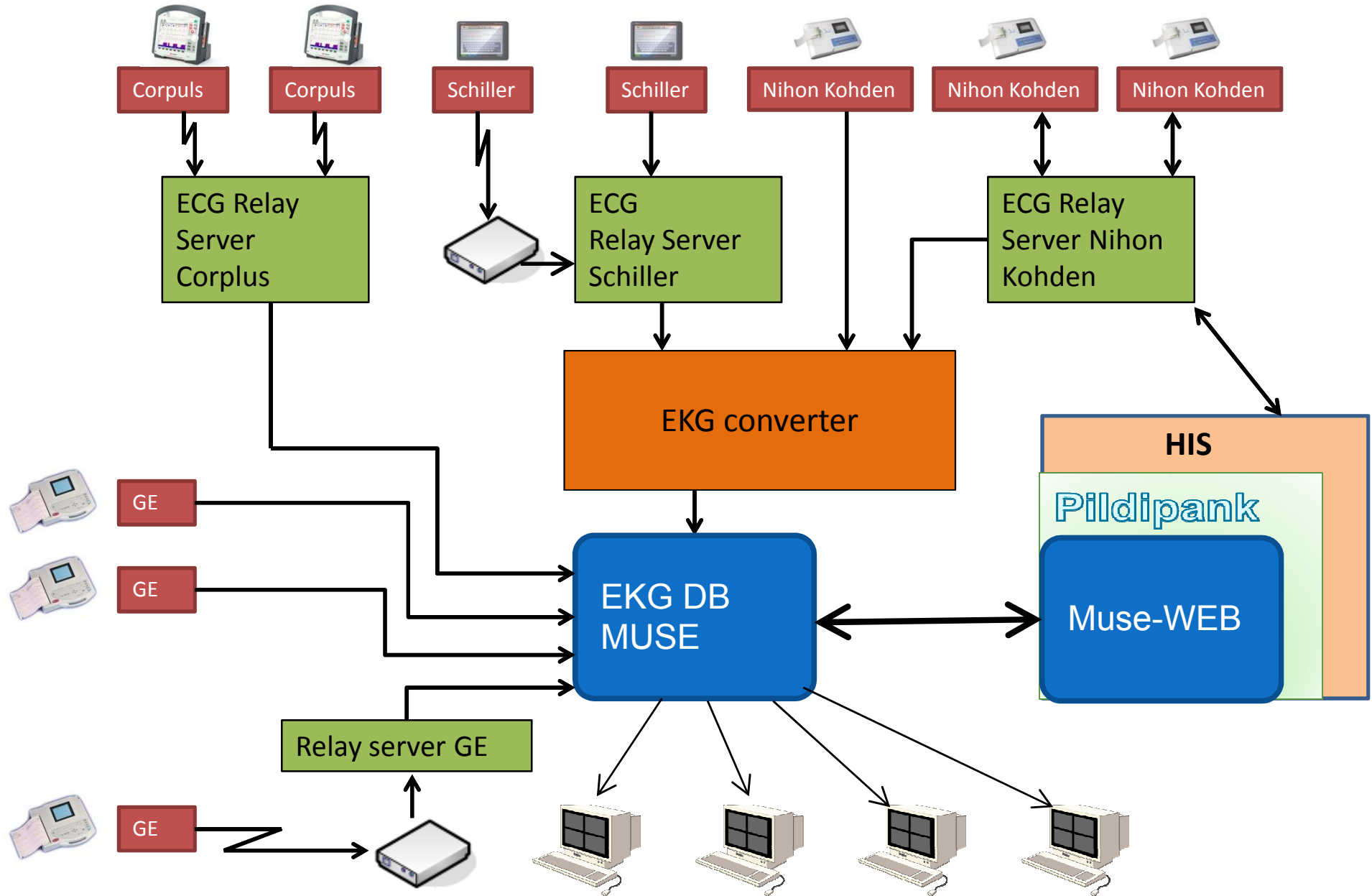
## Receiving and visualisation of ECG's

- System is capable to archive
  - Rest ECG
  - Stress ECG
  - Holter ECG
- Users
  - Hospitals
  - GP's
  - Ambulance
  - Paramedics of small remote islands
- Visualisation
  - WEB Viewer
  - GP's portal, integrated HIS's
- Processing
  - MUSE client



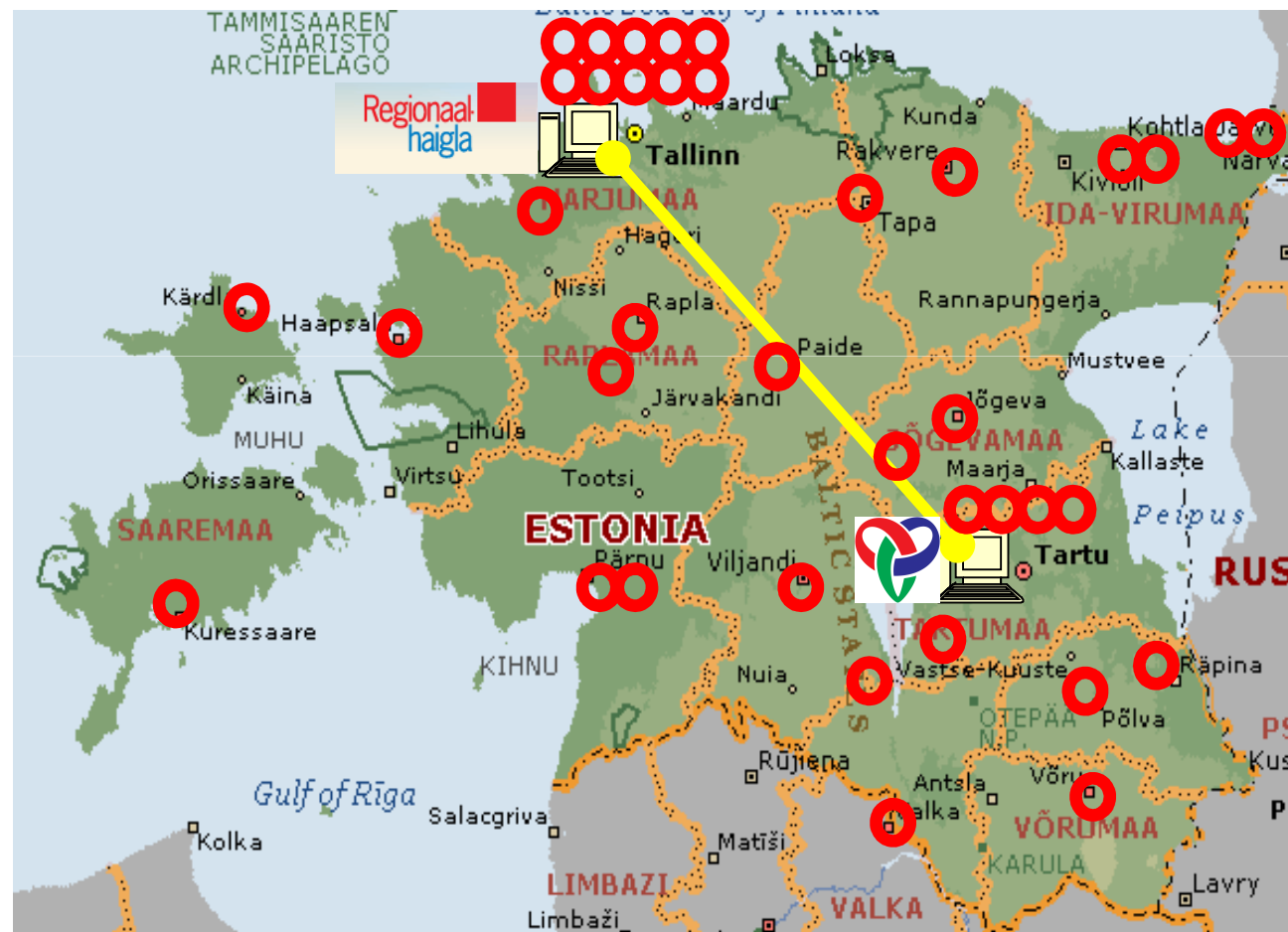


# Workflow of ECG Data?



# Pildipank users?

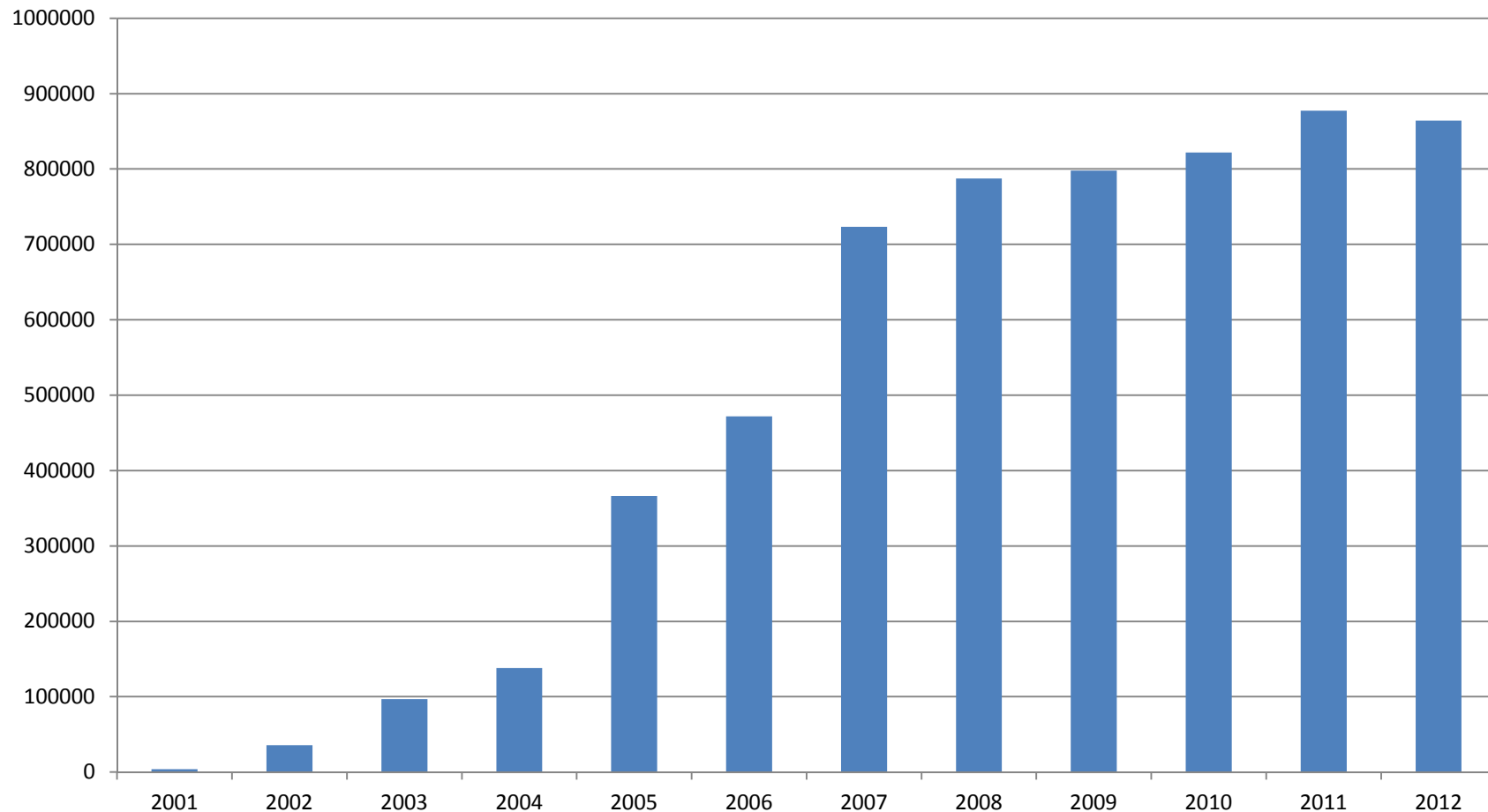
Institution	(%)
Põhja Eesti Regionaalhaigla	25,51
Tartu Ülikooli Kliinikum	22,70
Pärnu Haigla	5,54
Tallinna Lastehaigla	4,96
Narva Haigla	3,72
Rakvere Haigla	3,54
Viljandi Haigla	2,84
Ida-Tallinna Keskhaigla	2,74
Kuessaare Haigla	2,67
Ida-Viru Keskhaigla	2,55
Lõuna-Eesti Haigla	2,51
Lääne-Tallinna Keskhaigla	2,03
Järvamaa Haigla	2,02
Tartu Linnapolikliinik	1,78
Valga Haigla	1,56
Läänemaa Haigla	1,50
Kesklinna Tervisekeskus	1,27
Põlva Haigla	1,18
Jõgeva Haigla	1,11
Tallinna Diagnostikakeskus	0,98
Mammograaf	0,95
Balti Radiodiagnostika	0,70
Viimsi Haigla	0,64
Balneom	0,55
Medirad	0,49
Elva Haigla	0,49
Kallavere Haigla	0,46
Põltsamaa Tervisekeskus	0,43
Hiiumaa Haigla	0,43
Medicum	0,41
Märjamaa Haigla	0,32
Räpina Haigla	0,28
Tartu Vangla	0,23
Eesti Maaülikool Loomakliinik	0,23
Tõrva Tervisekeskus	0,18
Viru Vangla	0,18
Tapa Haigla	0,13
Corrigo	0,05
Tallinna Vangla	0,03
FOP	0,01



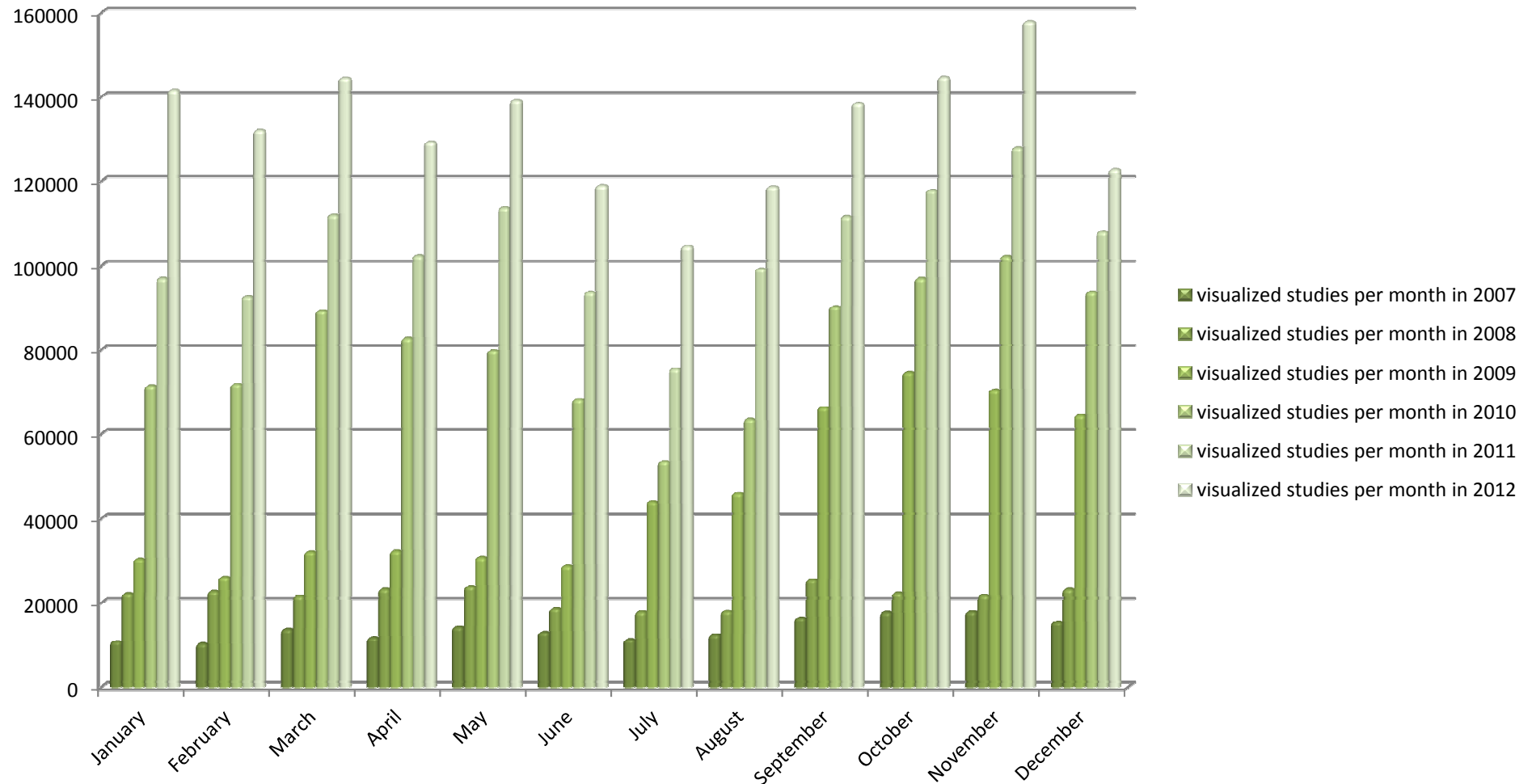
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# Pildipank in numbers

- At the end of 2012 were in Pildipank archive over 6 million studies, with stored data of 480 TB



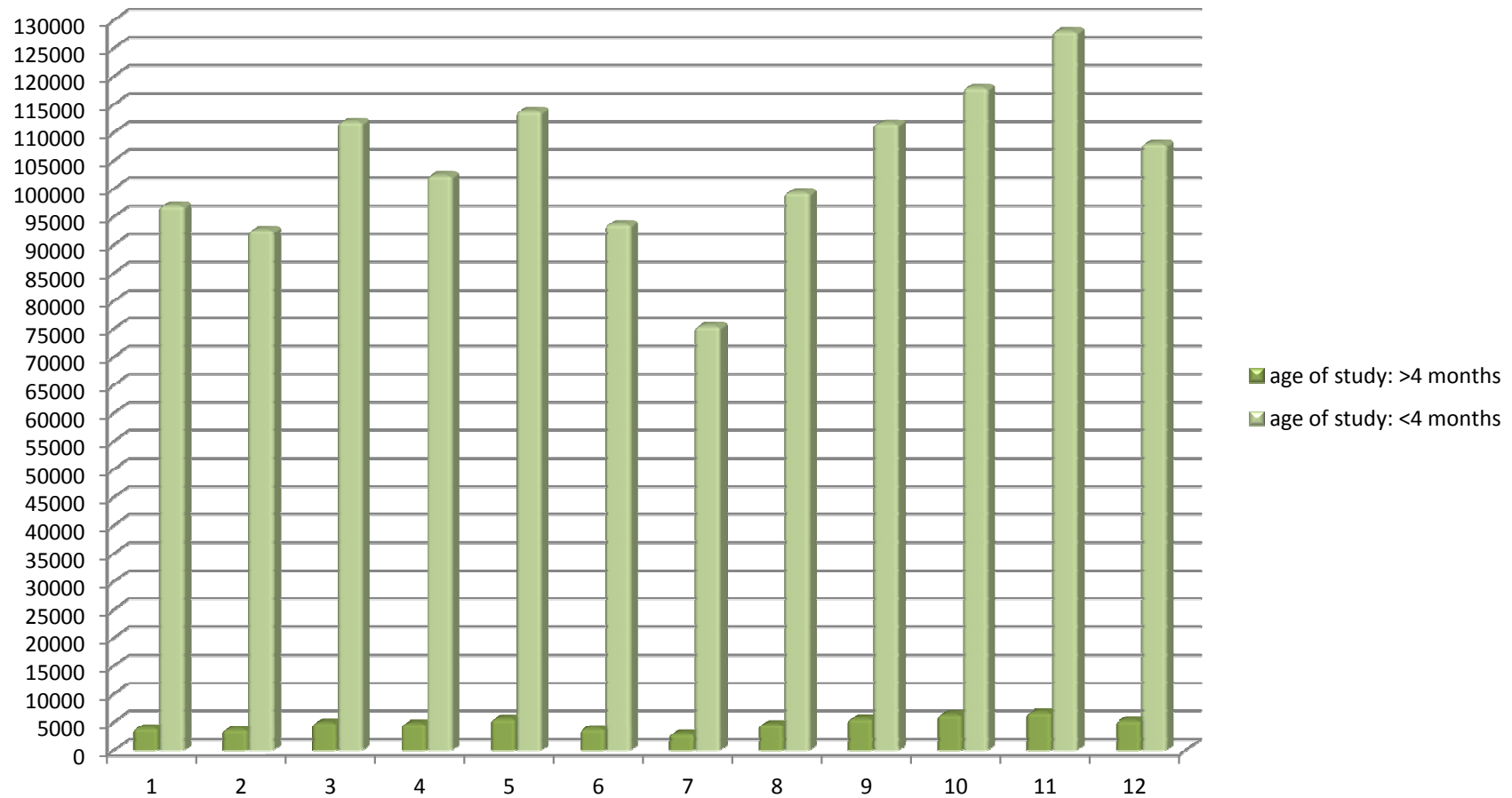
# Usage of GP's portal in 2007-2012



Total visualized studies in 2012 year: 1 593 000.

Biggest number of visualisations: 158 000 in November 2012

# Viewing of old studies by GP's on 2012?



# Pildipank users

- Radiologists
- Clinicians
- GP's
- Residents
- Students of medical faculty
- National Health Insurance Fund
- User accounts:
  - WEB 1000: 3760
  - Pildipank portal: 1330  
(713 personal, 536 system)
  - Impaxi client 499
  - DICOM workstations



# Investments in Pildipank 2013

- Hardware:
  - New servers: 112 000 EUR+ VAT
  - Short term storage: 108 000 EUR +VAT
  - Extension of long term archive: 212 000 EUR +VAT
- Software
  - Database cluster 10 000 EUR + VAT
  - Extension of input DICOM nodes from 2 to 4:  
93 000 EUR + VAT
- New webviewer
  - software 230 000 EUR + VAT
- Service fees 2013:
  - Maintenance of servers, archive, sotware: 104 000 EUR+km

2013 investments + maintenance fees: 869 000 EUR (13, 6 milj EEK) + VAT

# Pildipank future

- New webviewer for image visualisation:
  - Compatible with different OS's (Windows, Linux, iOS)
  - Compatible with different webviewer (IE, Mozilla, Chrome, Safari)
  - “ZERO *installation*” Installation of SW and app packages (Java, activeX) is not required,
  - Compatible with mobile devices (iPad, iPhone, Android)
- State archive for medical images
- Stronger influence by Data Protection Agency



iOS 6







**Thank you for your attention!**