

What is going on in Finland - Overview of Finnish LabIT



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Contents of the Presentation

- Introduction: The basic functions of LabIT
- Of Finnish Health Care and Clinical Laboratories
- Very short history of LabIT in Finland
- LabIT Market Status in Finland
- Current LabIT Model and Systems Architecture
- Some LabIT trends in Finland

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Introduction

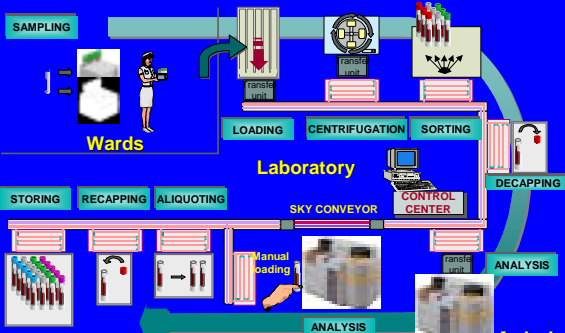
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The Main Functions of LabIT

- Lab Process Control and Optimization
 - Optimization of the workflow within the laboratory
- Systems Integration
 - Information exchange with other clinical or administrative systems
- Communication Channel
 - Easy communication between the laboratory and its customers

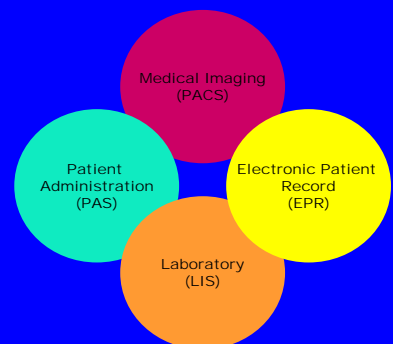
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Laboratory Work Process



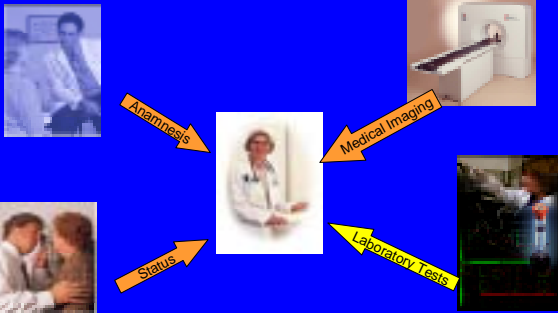
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The Core of Medical Informatics



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The Sources of Clinical Information

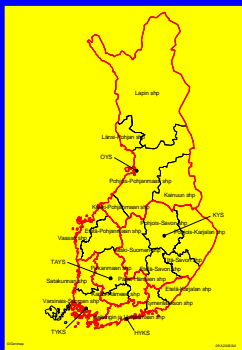


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Health Care and Clinical Laboratories in Finland

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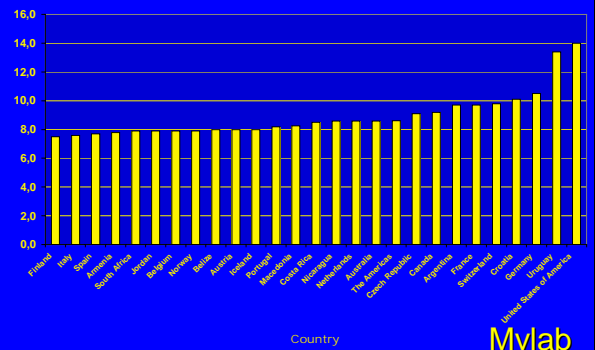
Public Health Care in Finland



- **Public Health Care System**
 - Based on Nordic welfare model
 - Organized by unions of municipalities
 - Divided to 21 hospital districts
- **Health Care Organizations**
 - 264 Health Centers (Primary Care)
 - 25 Regional Hospitals
 - 16 Central Hospitals
 - 5 University Hospitals
- **Trends**
 - Less hospitalization, more prevention
 - Lower the walls between primary care and specialized care
 - Seamless care chains and flow of information

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Health Care Costs in 1995 (% of GNP)



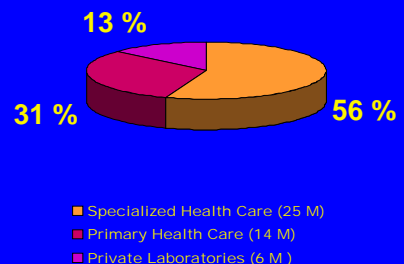
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Clinical Laboratory Characteristics

- **Overcapacity**
 - Over 1000 clinical laboratories in Finland (350 in UK)
 - Very profitable (private) business, very small laboratories
 - Reimbursement policy of Social Insurance Institute
- **Shortage of Manpower**
 - There will be too few laboratory physicians
 - Less and less laboratory technicians are graduating
- **More Competition**
 - Change of Law (1999): Public laboratories can provide services to patients from private sector
 - Signs of international competition can be seen

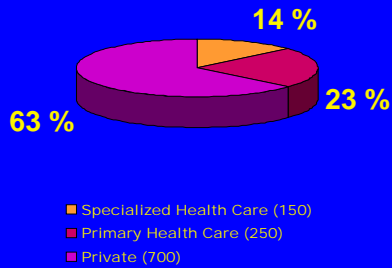
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Lab Tests in Finland (1999)



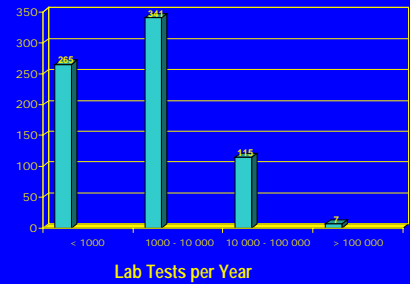
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Number of Clinical Laboratories in Finland (1999)



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Capacity Distribution of Private Laboratories



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Clinical Laboratory Trends

- Centralization
 - Regional and National Central Laboratories
 - Lab Factories: Automation and Robotics
 - Point-of-Care Testing (POCT) will be managed centrally
- Commercialization
 - Outsourcing of public laboratory services
 - Now: Separate Public Enterprises (owned by public health care organizations)
- Consolidation
 - Number of laboratories is dropping fast
 - Nationwide laboratory chains are emerging
 - Consolidated Clinical Laboratories of Finland Corporation??
- Consumerism
 - Direct Access Testing (DAT) - lab investigations without physicians
 - Home/Self Testing (POCT)

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A Very Short History of LabIT in Finland

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Lab Information Management Evolution

- Pioneer Era (1965-1975)
 - Tampere Central Hospital (TCH) Lab System (1968, IBM 1130)
 - Helsinki University Central Hospital (HUC) LIS 1 (1970, IBM 1800)
 - Punched cards, Fortran, A/D lab instrument interfaces (Helsinki)
- National Standardization Era (1975-1980)
 - New University and Central Hospitals (Oulu UH, Lahti CH,...)
 - National LIS Committee (1974): National LIS Model
 - OCR, FAS programming language, lab workstations
 - Aide from Overseas: Costar -> Finstar (EPR to HMOs, also Lab)
- Co-operation Era (1980-1990)
 - National MUSTI-project (University Hospitals, University of Kuopio, Large IT-Companies): National Integrated Hospital Information System
 - Multilab LIS developed by HUCH as part of MUSTI-project
 - Distributed Terminals, MUMPS, US Veterans' Administration Tools
 - Extensive Commercial Deployment (Digital-Kommundata-Mylab)

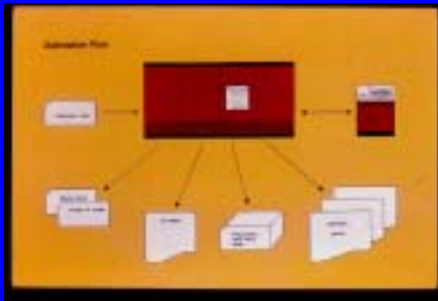
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Lab Information Management Evolution 2

- Commercial Era (1990-2000)
 - Mylab Corporation develops its LIS-product family with (University) Hospitals and Reference laboratories: focus on large laboratories
 - TietoEnator enters to Health Care Market by acquiring State Computing Centre: Sinuhe and Efficca product lines for primary health care and (small) laboratories
 - Workstation/server systems, RDB-technology, Lab Automation
 - Most large and medium sized laboratories are computerized
- Competition Era (2000-)
 - Lab and LIS markets cap, competition between the laboratories
 - New players enter to LIS-market (Software Point, small dot.coms)
 - Battle in a limited market: TietoEnator vs. Mylab
 - Harbingers of international competition (Wilnor, COXA, GE buys Instrumentarium)
 - Web-based LIS emerges

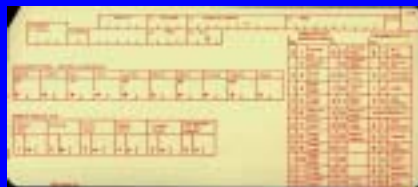
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First Generation LIS in Finland (Tampere 1968 & Helsinki 1970)



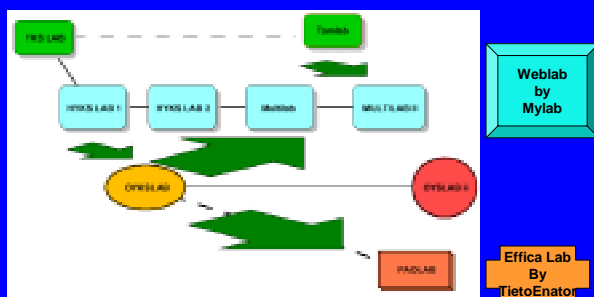
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Punched cards as information carriers



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Lines of LIS in Finland



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LabIT Market in Finland

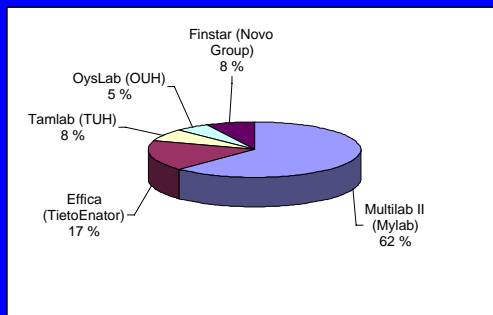
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Major LabIT Market Players

- University Hospitals
 - Tampere University Hospital is still using own home-made system
 - Oulu University Hospital is replacing its own system with a commercial LIS
 - Helsinki, Kuopio, and Turku UH co-operate with Mylab Corp.
- Private IT-enterprises
 - Mylab - only company with focus on Clinical LabIT
 - TietoEnator - the IT industry giant is very active in health care, lots of HCIT acquisitions lately in Scandinavia, Lab/LIS only a minor part
 - White Lake Software Point - "Scandinavian leader in Environmental and Industrial laboratory info systems" is penetrating to clinical LabIT market
- Private Health Care Enterprises
 - Health Care Companies gaining more control over IT-companies
 - Lab Consortia are looking for strategic alliances with (Lab) IT-companies

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LIS Market Shares (by Lab Tests in 2000)



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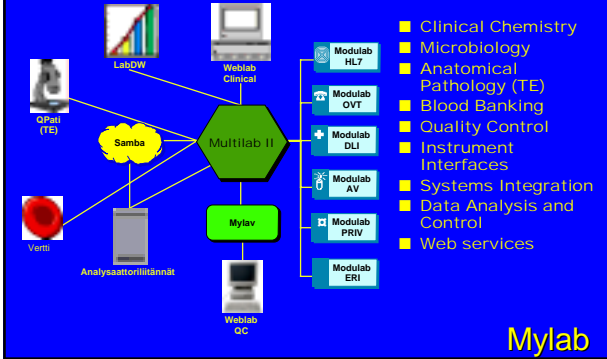
Mylab Market Share (in Public Sector)



Hospital District	Popul.
HUS	1390000
Varsinais-Suomen shp.	453000
Pirkanmaa shp.	448000
Pohjois-Pohjanmaa shp.	369000
Keski-Suomen shp.	284000
Pohjois-Savon shp.	252000
Satakunta shp.	231000
Kanta-Hämeen shp.	207000
Etelä-Pohjanmaa shp.	196000
Kymenlaakson shp.	183000
Pohjois-Karjala shp.	173000
Vaaasa shp.	166000
Päijät-Hämeen shp.	165000
Etelä-Karjala shp.	150000
Lapin shp.	123000
Etelä-Savon shp.	107000
Kainuun shp. ja ehj.	86000
Keski-Pohjanmaa shp.	78000
Lansi-Pohjan shp.	68500
Itä-Savon shp.	66500
Ahvenanmaa	26000
Summary	5182000
Mylab Market Share	66.7 %

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Mylab LIS Product Portfolio



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Dominant LabIT Architectures and Functions in Finland

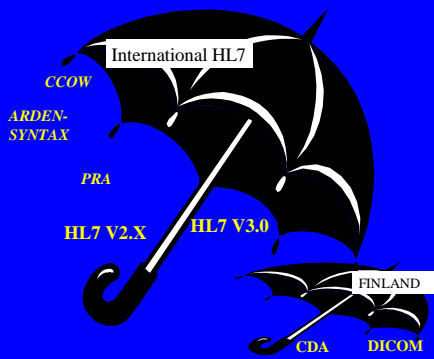
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Health Care Systems Integration Forum

- HL7 Finland Association
 - Founded in 1995
 - Ca. 80 Members: Some 50 Health Care Enterprises, Hospital Districts, Authorities, etc.
 - Purpose: Promote systems integration in health care
- Activities
 - Localization of HCIT standards (HL7 & others)
 - Technical SIG Committees (Lab, Dicom, etc.)
 - Help Desk and training courses
 - International follow-ups and contacts
 - WWW-server and monthly web-magazine
 - Document Archive and link collection

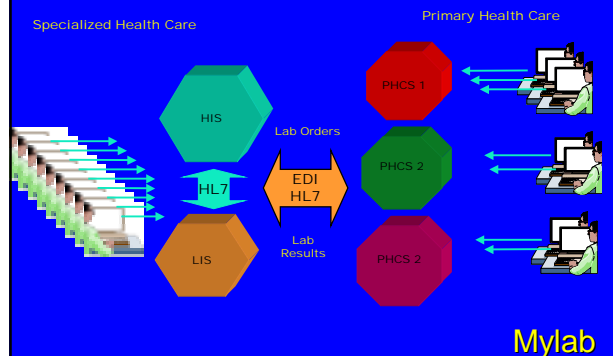


HL7 Finland Standards



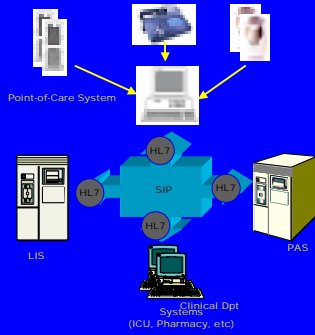
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Health Care Info Systems Architecture



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Hospital Systems Integration



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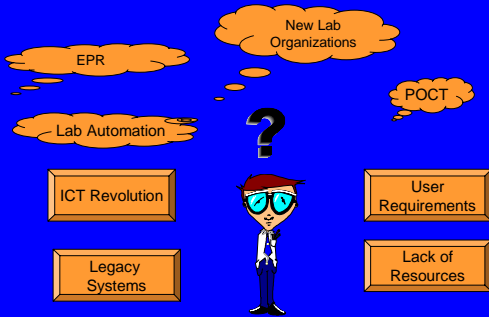
Problems with Current HCIT/LabIT



- **Technology**
 - Partly outdated
 - No throw-away systems anymore
 - Too widely spread to be replaced
 - Maintenance costs are high
- **People**
 - Too few HCIT/LabIT-experts
 - New little time to learn new IT-tools
- **Demand**
 - Growing and getting more complicated
- **Money**
 - IT-investments in HC are low compared to other industries

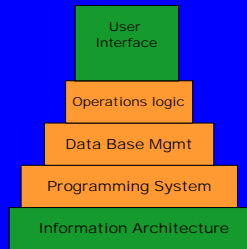
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LIS Vendors are in trouble



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How to give a face-lift to a LIS

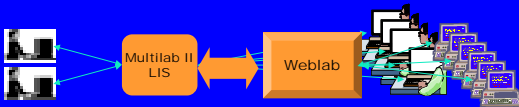


- **Legacy System**
 - Rich Functionality
 - Reliable and fast
 - Scalable and Parameterized
 - Outdated User Interface
 - Obsolete Architecture
- **Modernize piece by piece**
 - Change the User Interface (GUI)
 - Utilize Mainstream Web-architecture

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Where to start the Web-revolution?

- **Laboratory**
 - Experienced Users
 - Well-defined process
 - Controlled Data Entry
 - Bar Code Labels
 - Instrument Interfaces
- **Wards and Clinics**
 - Inexperienced users
 - Increasing internet knowledge
 - Selective data entry (orders)
 - Reports (Graphics, colors)
 - Ad-hoc inquires



Give web-access to the customers and your lab business booms!

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Weblab - Internet Based Lab Connection (since 1997, 20 years ago)



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Current LabIT Trends in Finland

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Emerging LabIT Features in Finland

- Lab Instrument Net-Interfaces and Autovalidation
- Laboratory Production Analysis and Control
- New laboratory information systems architecture
- Workstation level systems integration (EPR + LIS)
- Web services

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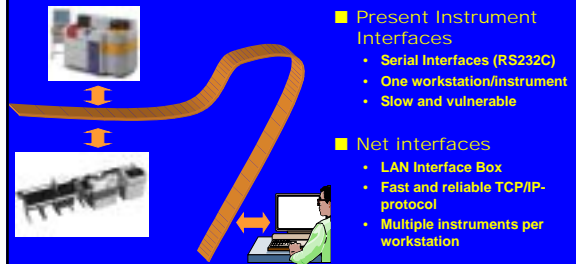
Lab Instrument Interfaces



- Present Methods
 - Traditional Uni- and bi-directional Interfaces
- New features
 - Lab Automation Interfaces (Modular)
 - Net Interfaces (TCP/IP)
 - Lab Results Autovalidation

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Web-interfaces

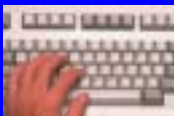


- Present Instrument Interfaces
 - Serial Interfaces (RS232C)
 - One workstation/instrument
 - Slow and vulnerable
- Net interfaces
 - LAN Interface Box
 - Fast and reliable TCP/IP-protocol
 - Multiple instruments per workstation

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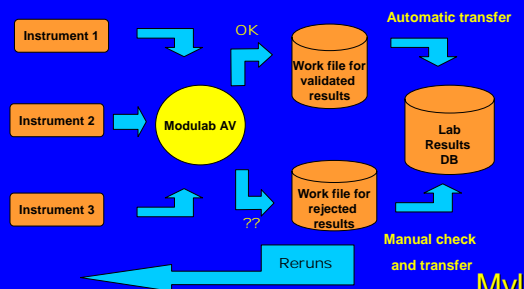
Automatic Lab Results Validation

- Present method
 - All results from instruments are stored in work lists/files
 - Automatic Real-time QC checks
 - Manual results validation
- Autovalidation (Modulab AV)
 - Real-time QC checks + rule based rationality checks
 - Validated results will be sent automatically to customers/clinicians
 - Rejected results will be checked by lab personnel



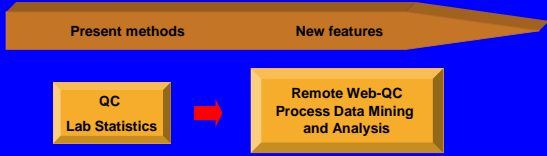
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Results Autovalidation



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Lab Production Control and Analysis



- Present Methods
 - Traditional real-time QC
 - Laboratory operations statistics
- New features
 - Remote Web-based real-time QC Graphics ("Paper mill analogy")
 - Laboratory Process Data Mining and Analysis

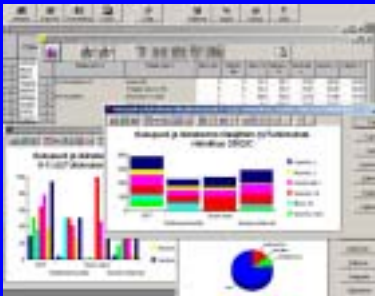
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Weblab QC - Graphical QC Monitor

QuickTime™ and a Graphics driver are needed to see this picture.

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LabDW - Lab Specific Data Mining Tool



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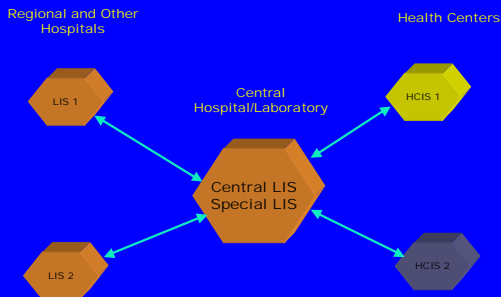
Consolidated LabIT Architecture



- Present Methods
 - Every laboratory has its own laboratory information systems (LIS)
 - EDI/MHL7 communication links between the systems
- New features
 - One LIS serves multiple organizations ("Virtual LIS")
 - Regional or National LIS set-up, managed by trusted operators (ASP model)
 - Web-based Customer Interface

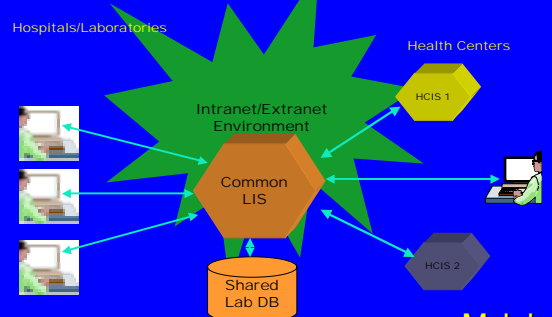
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Vanishing Systems Architecture



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Emerging Systems Architecture



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Towards Consolidated Systems



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Systems Integration and Web Services



Present methods

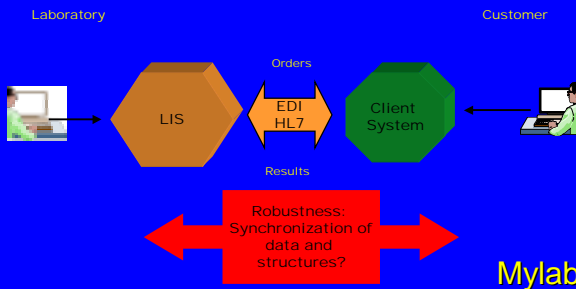
- Information is copied between the systems
- Message based integration, EDIFact and HL7 standards

New features

- Information is stored and processed in separate systems/servers
- Virtual integration at workstations - Web browser based GUI
- Self-sufficient XML messages for archiving purposes

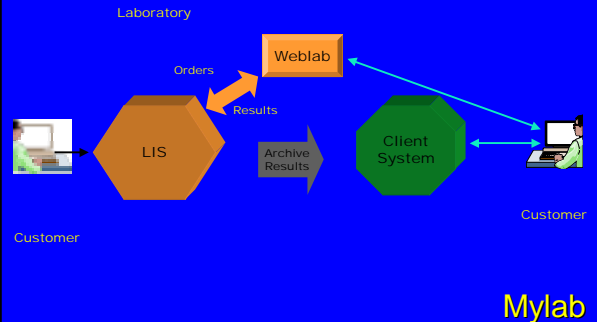
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Present Operations Model



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Emerging Operations Model

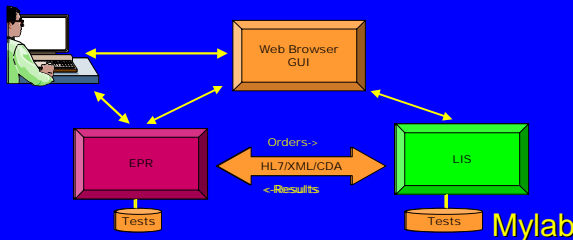


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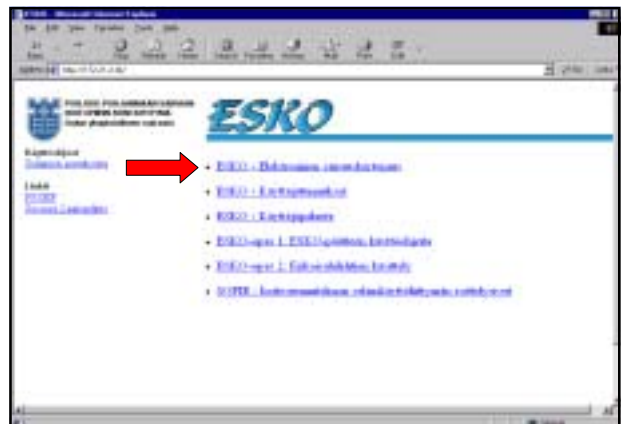
Laboratory and Electronic Patient Record

EPR - Present Big Thing in Finland

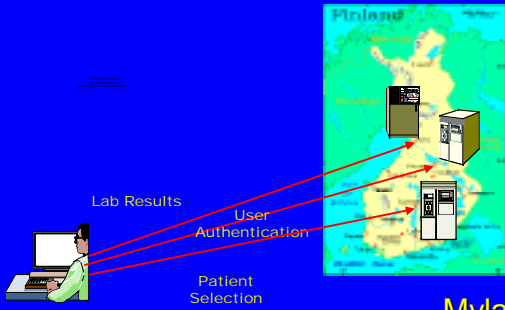
- Miranda (Medici Data)
- ESKO (OVS)
- Pegasos (Novo Group)
- Efficia EPR (TietoEnator)
- Qkeri/Mustinet (TietoEnator)
- Doctorex (Mehiläinen AB)



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Clinical Workstation Integration



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Internet-banks



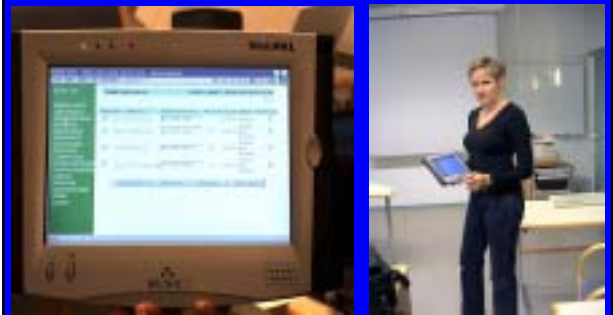
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Internet-laboratories



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State-of-the-Art LIS User Interface



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**The best way to forecast
the future is to make it!**