

# **MR lezing**

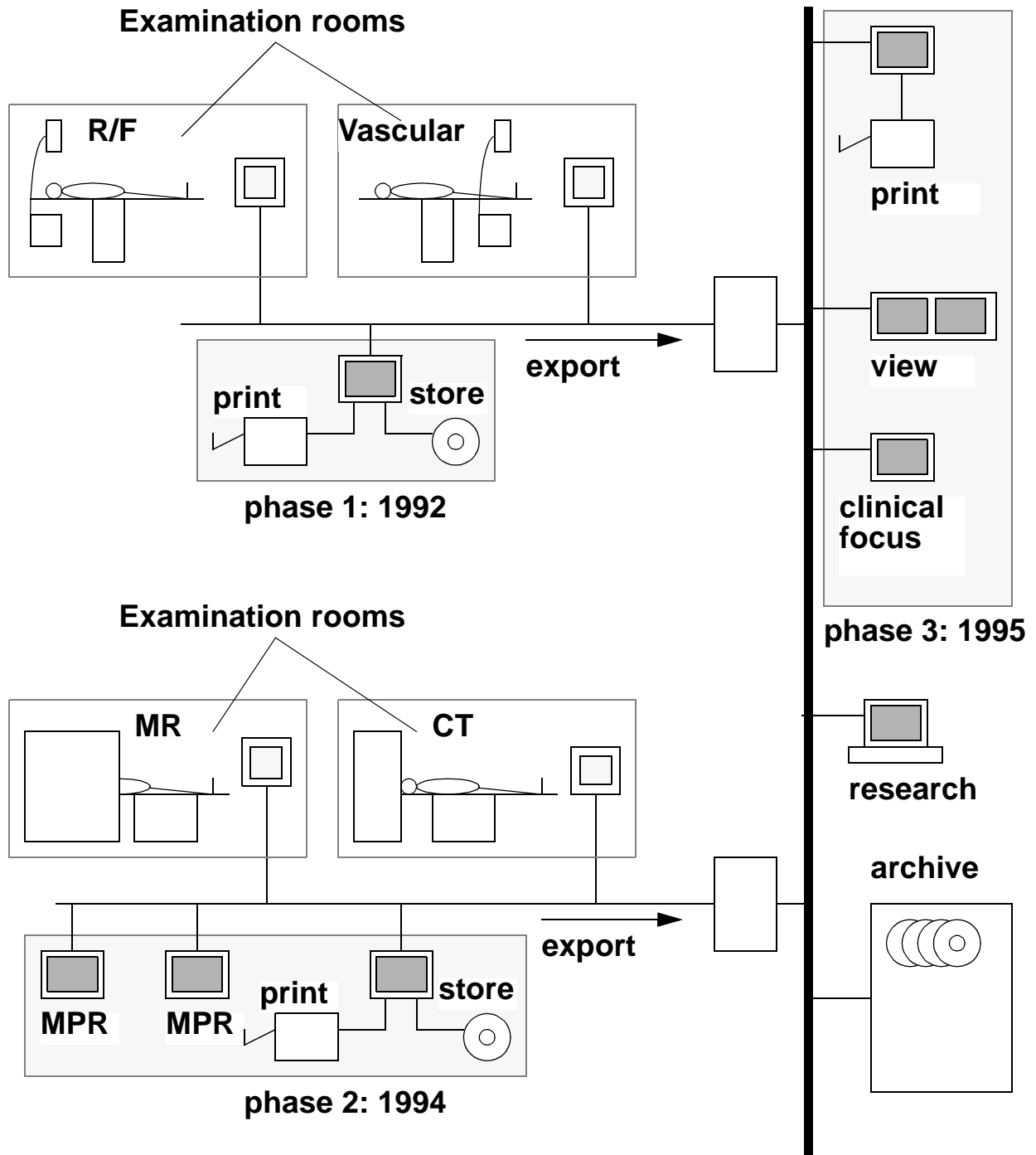
## **Re-use in Workstation Products**

**By**

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**Philips Medical Systems  
Common Digital Systems**

# EasyVision family of products



## Product types:

- Modality productivity enhancers:

- + Easyvision R/F
- + Easyvision RAD
- + Easyvision CT/MR

street price ca 50 k\$, high added clinical value; sales directly related to modality sales

- Clinical Focus:

- + Neurovision
- + Image Guided Surgery

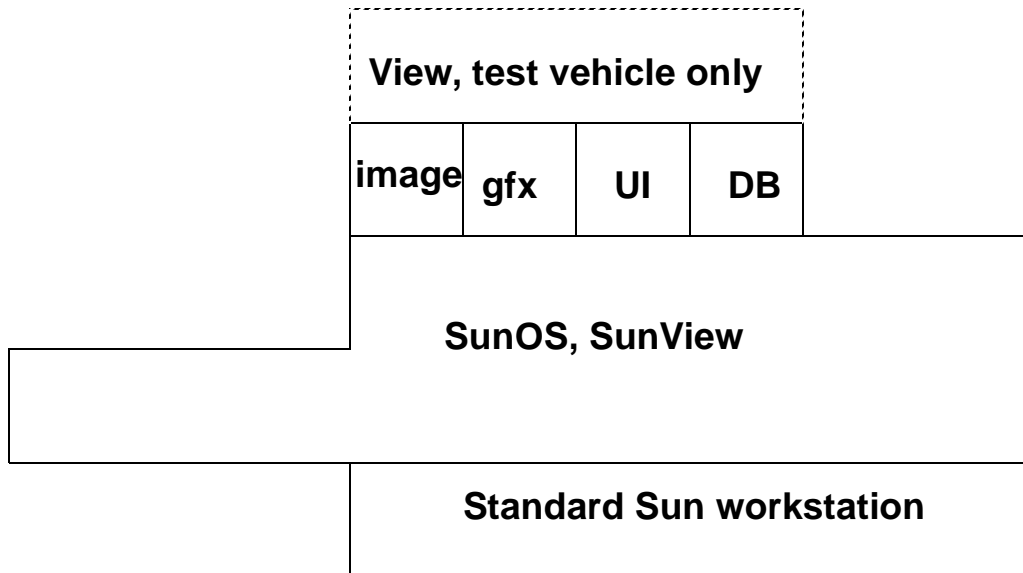
street price ca 100 k\$, very high added clinical value; sales limited to specialist areas

- “PACS” workstations

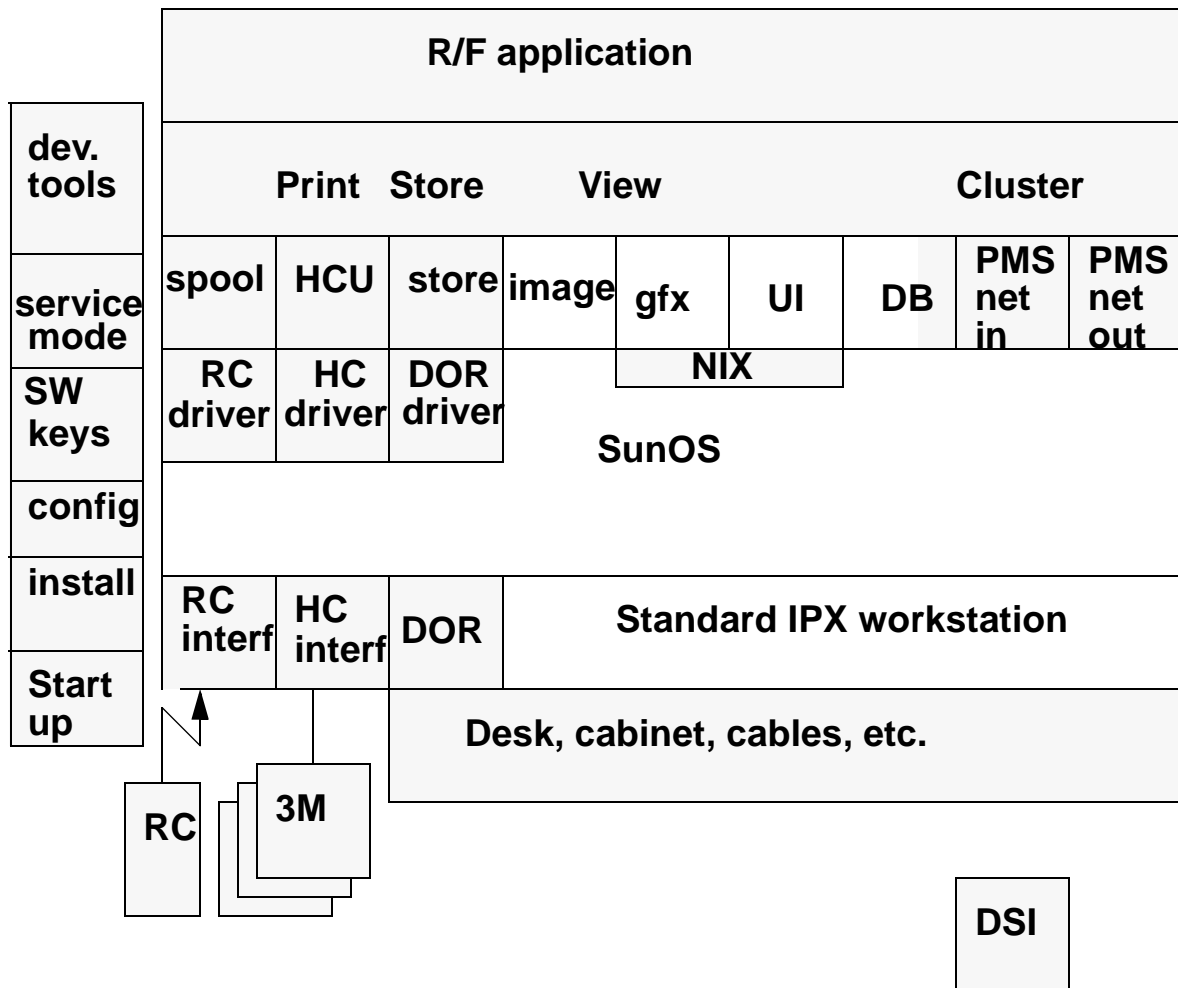
- + Teleradiology Workstation
- + Critical Care Workstation
- + Multi modality review station

street price ca 25 k\$, low added value, low margin; sales potentially very high

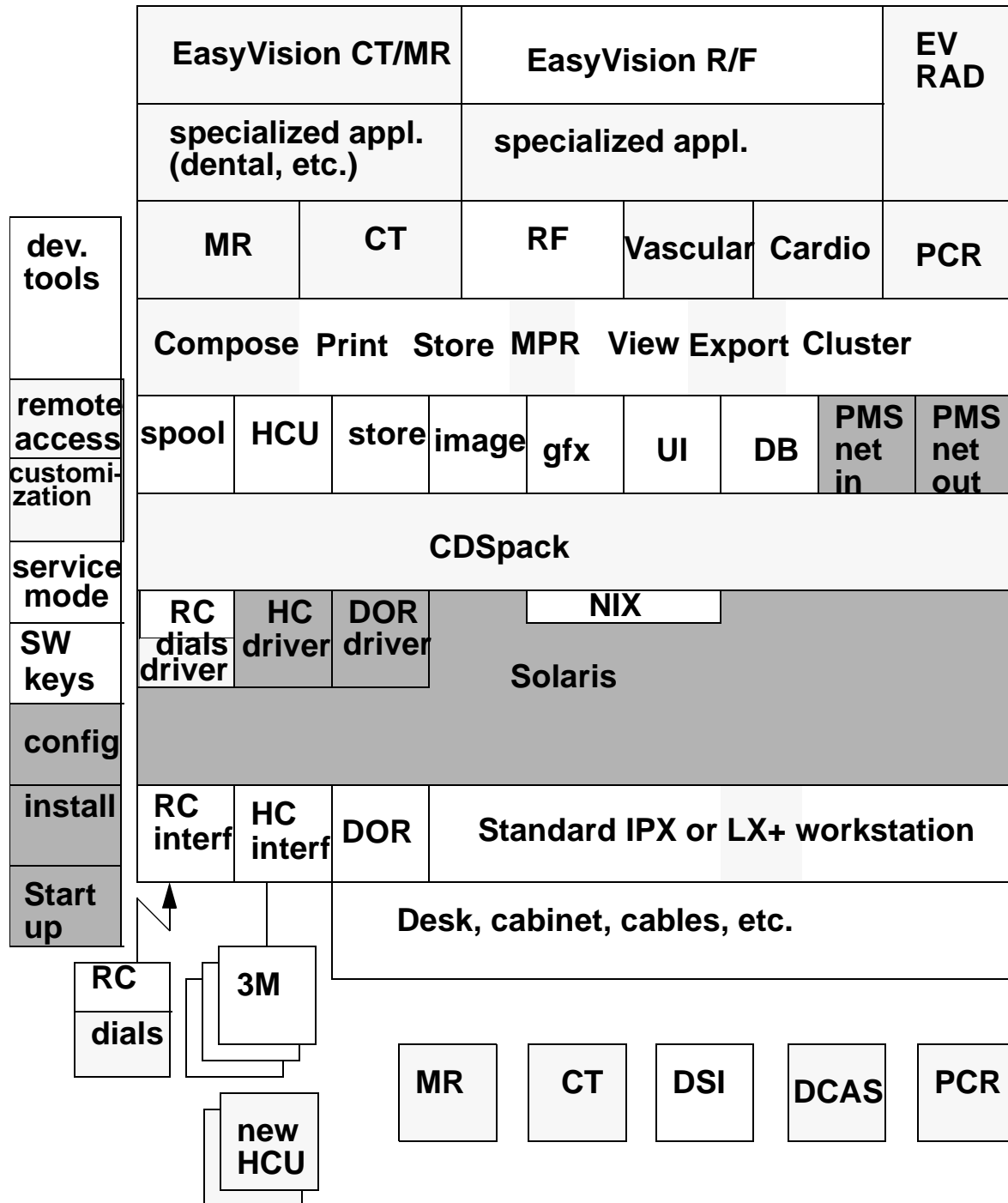
## september 1991



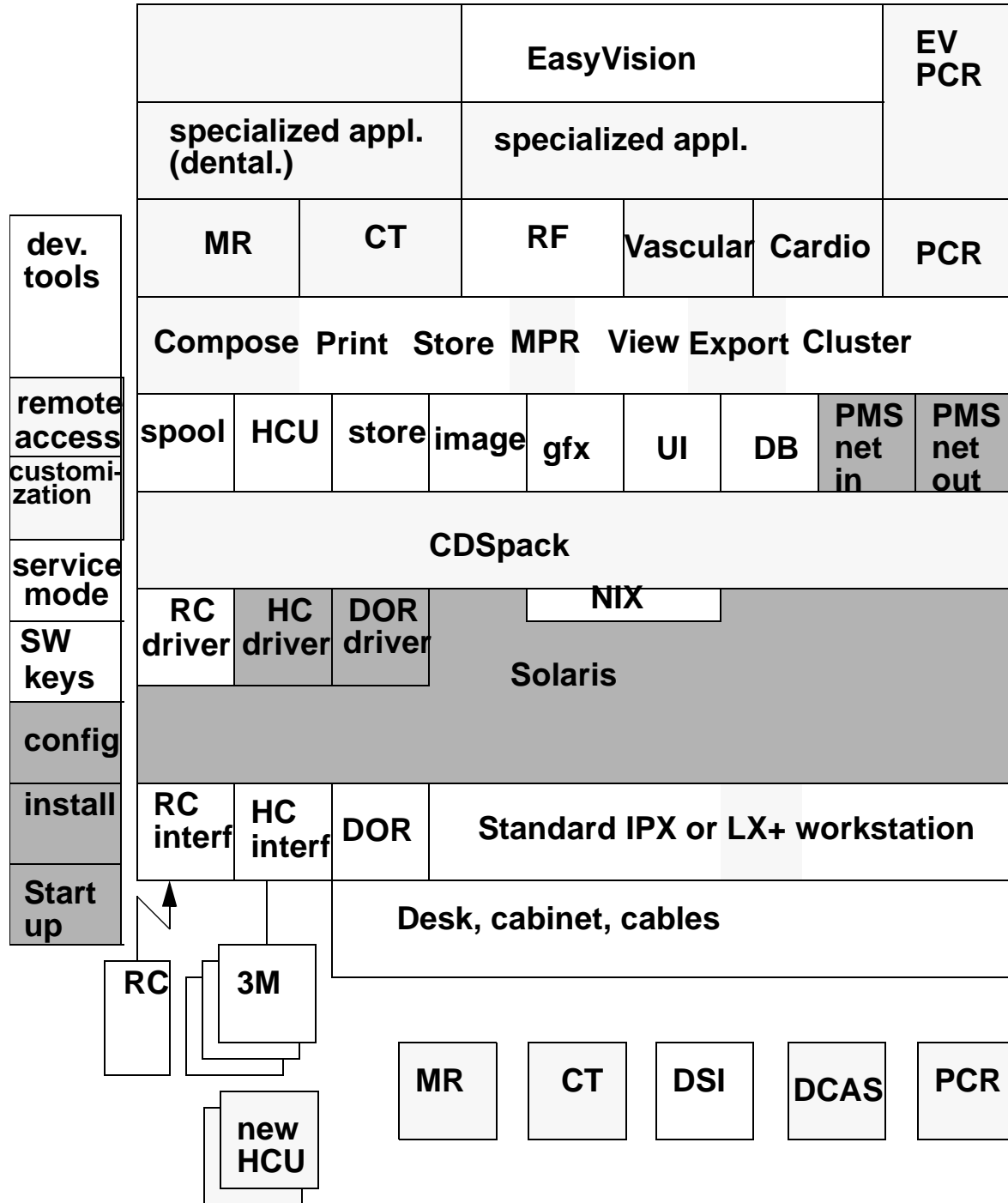
# september 1992



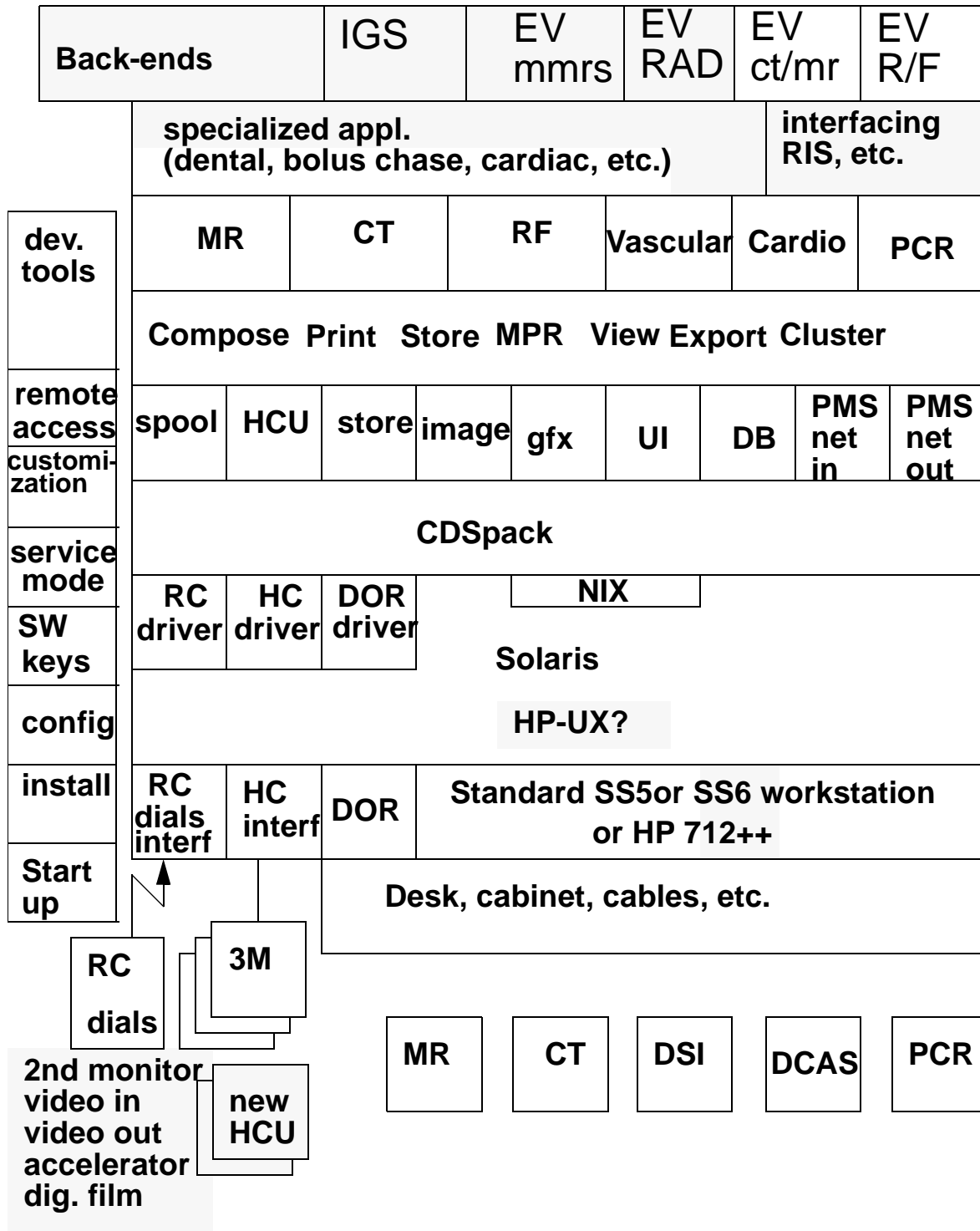
# june 1994



# june 1994

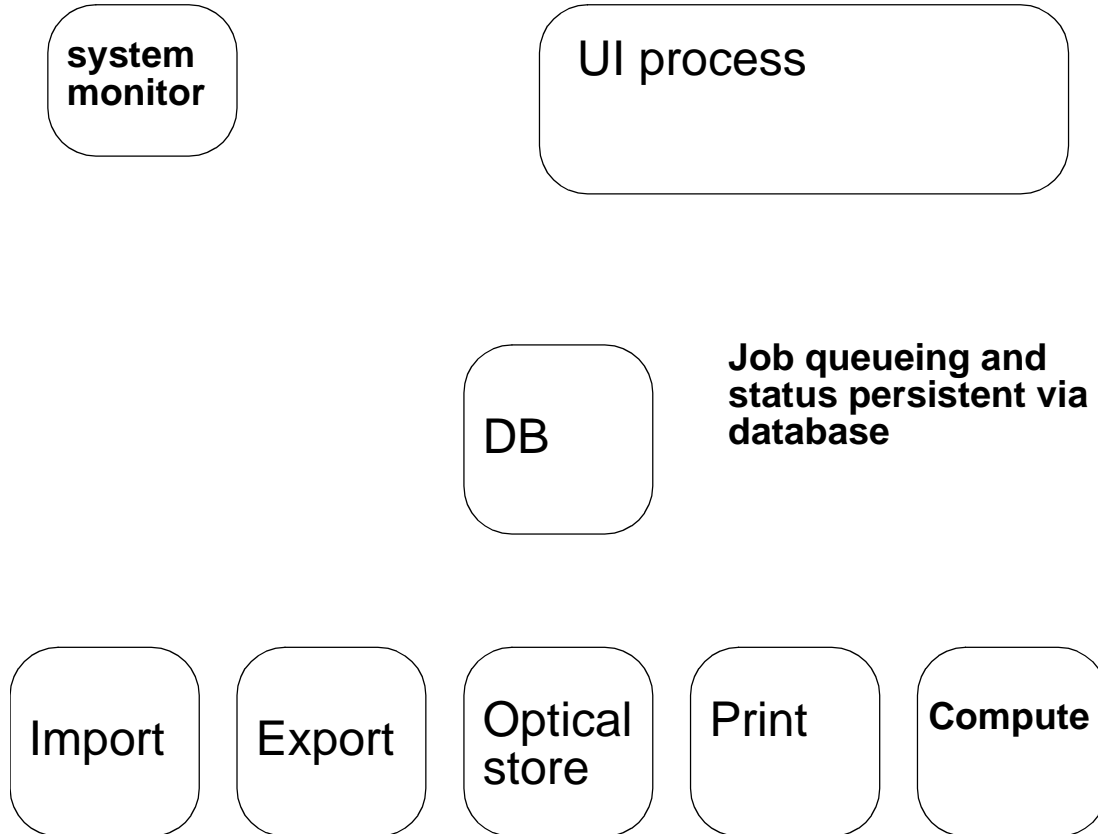


# 1995/1996





# Process structure



# How to extend

## New modality:

- Data model (storage and access structure)
- Import mapping and conversion
- Configuration definitions
- presentation:
  - + data base
  - + image selection
  - + image annotation (monitor & film)
  - + info/text page

## New clinical application:

- facility (User Interface)
- protocol print

# How to extend, other vendors

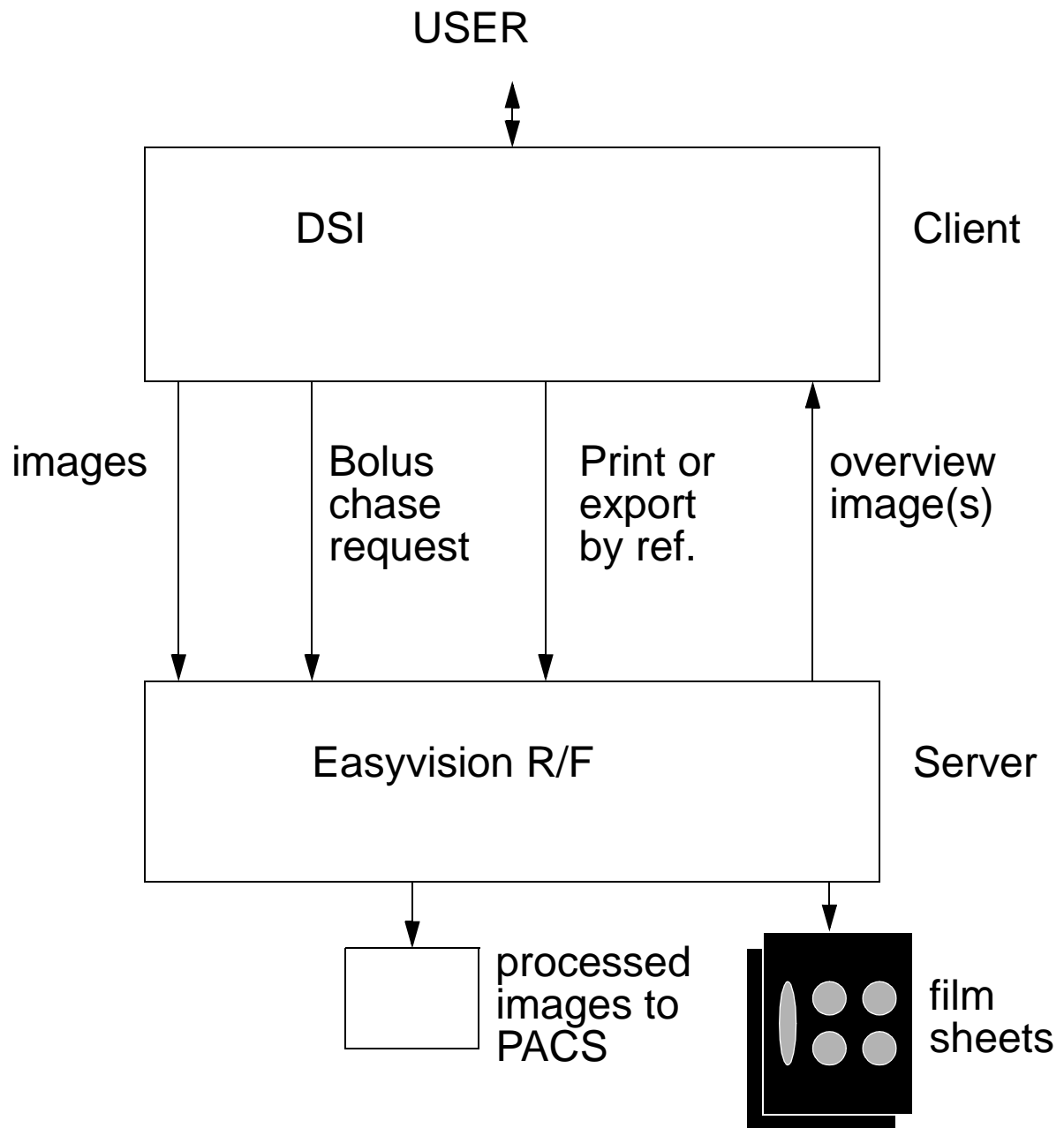
## New modality vendor (via DICOM):

- Customization data element semantics
- Validation

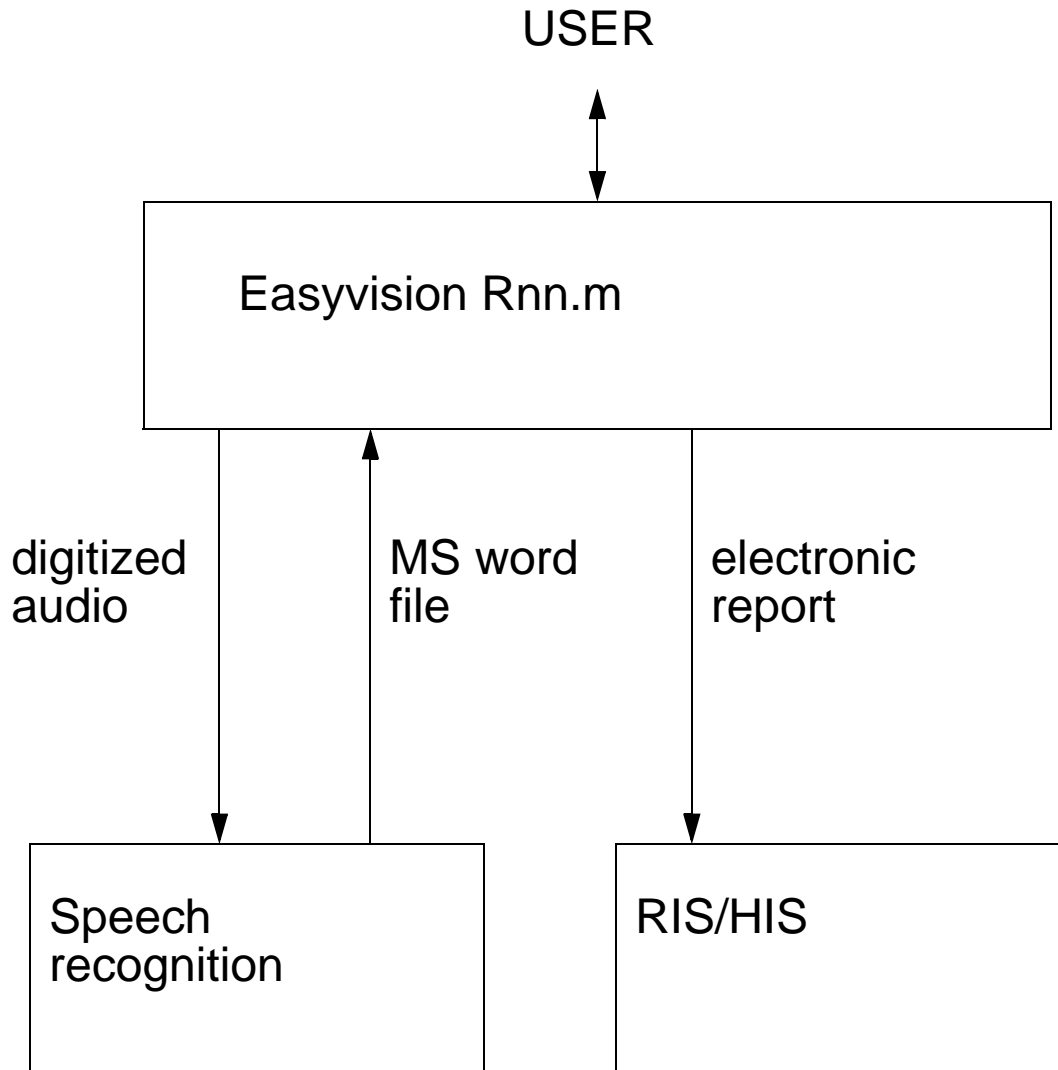
## New “PACS” vendor (via DICOM):

- Customization data element semantics
- Customization export:
  - + matrix size
  - + nr of bits
  - + processing
  - + graphics representation
- Validation

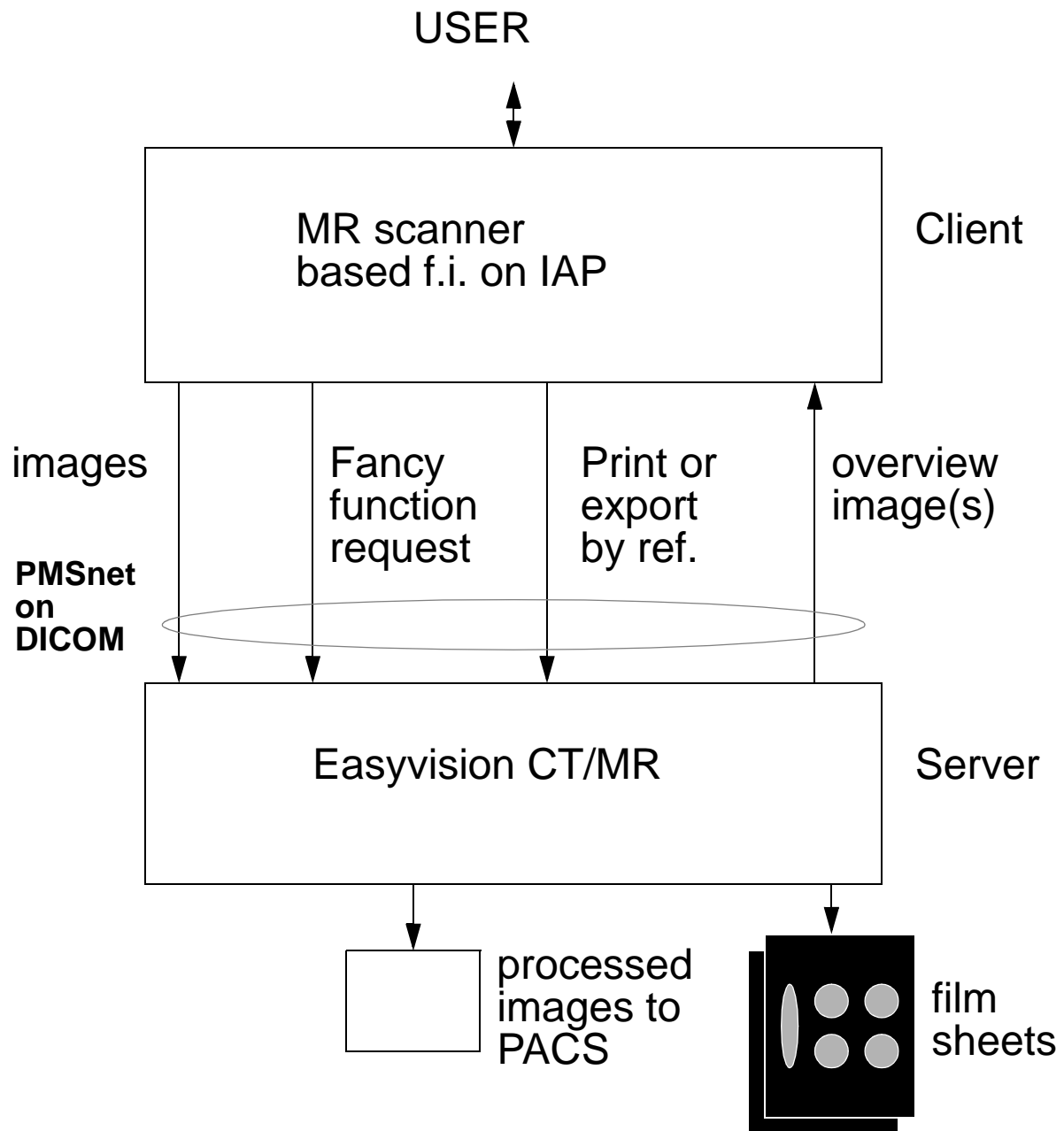
# Distributed applications



# Distributed applications



# Distributed MR&CDS applications



# PMSnet, DICOM

PMSnet, DICOM =

network + protocol + data dictionary + services + model

Services are:

- world wide standardized (store, query, etc.) multi-vendor
- PMS standardized (print, file, export) multi-modality
- Bi lateral agreed (CT: print via port number and fixed data elements)
- Unilateral supported (for instance: Muller! -> print)

# Services in PMSnet/DICOM

## Uni- and Bi-lateral services:

- simple
- fulfill many demands
- low implementation effort
- low functionality

## Standardized services:

- allow for full model:
  - + Film low
  - + Print Job Muller finished
  - + Feedback on film output
- client side needs more code to benefit from full model.



# **PMSnet on DICOM =**

DICOM +

PMS services +

detailed data dictionary +

detailed model

## Status CDS:

- Transition from sequential development to parallel development

- Technology Improvement Plan: start phase 2

Interfacing, further manageability

- Software Process Improvement:
  - + Strive for improved manageability, maintain innovation rate  
(requirement management, planning, etc.)
  - + SW development environment  
(DDTS, Clearcase?)
  - + Quantification (Metrics)  
(QAC?, project TU Delft)
  - + Documentation

# Major phases

- Phase 1 (modularization):
  - + Cleanup most obvious modules
  - + First division in separate packages
  - + Equalization of internal data model and PMS Data Dictionary
  - + PMSnet, PMSdor, complete new
  - + analysis (modularity, notifications, properties)
  
- Phase 2 (Interfacing):
  - + Further modularity restructuring
  - + Prototyping interface
  - + Advanced development interface
  - + Prepare external interface
  - + Explore real time extensions(e.g. Threads)

## Major phases 2

- Phase 3 (Internal benefit, standardization)
  - + Explore C++
  - + Explore X
  - + Implement 1D viewing
  - + Use external interface
  
- Phase 4 (external benefit)
  - + Decide on C++, X use
  - + Use platform by non CDS clients

# Status june 1994

- Modularity
  - + CDS pack independent of rest SW
  - + SW archive divided in “groups”, dependencies are analyzed and reduced
- Property management
  - + file structure streamlined
- SPI support library
  - + Implementation finished
  - + Increased performance and functionality
  - + Much less code
  - + Configuration simpler
- PMSdor, PMSnet redesigned
- Solaris 2
- HP: viewing ported, plan for product porting

- Cardio graphics:
  - + additional functionality
  - + “cold” graphics removed
  
- Data representation:
  - + XDR based self describing object format
  
- Data base:
  - + improved performance
  - + support for spooled services
  
- Process structure:
  - + import and export servers-> network server
  - + spoolers and UNIX command server removed
  
- Memory usage:
  - + ASW: 20% reduction (UNIX 20% increase)
  
- Documentation:
  - + System level OK