

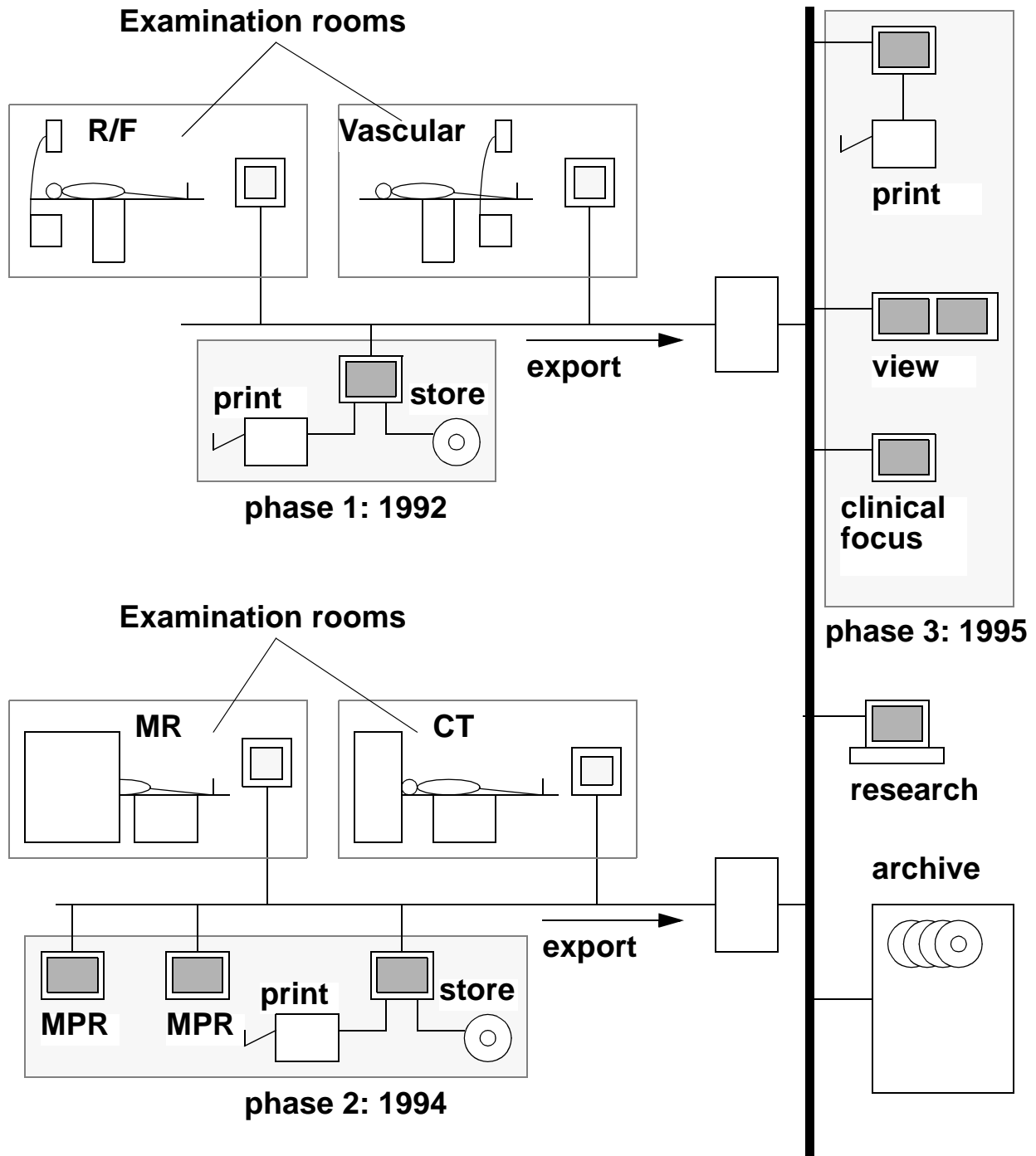
**OO experiences  
in  
Medical Workstation Products**

**By**

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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

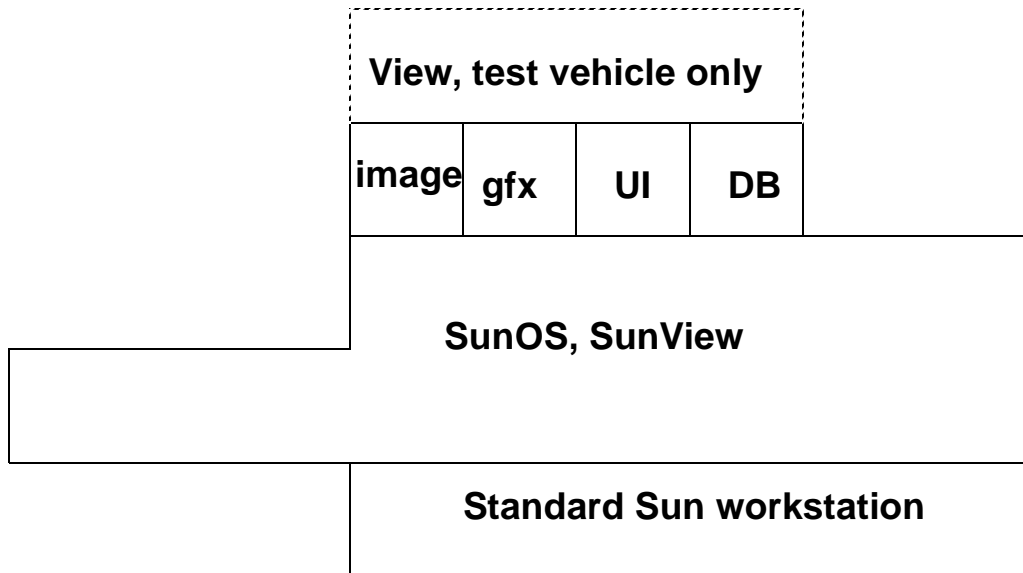
street price ca 100 k\$, very high added clinical value; sales limited to specialist areas

- “PACS” workstations

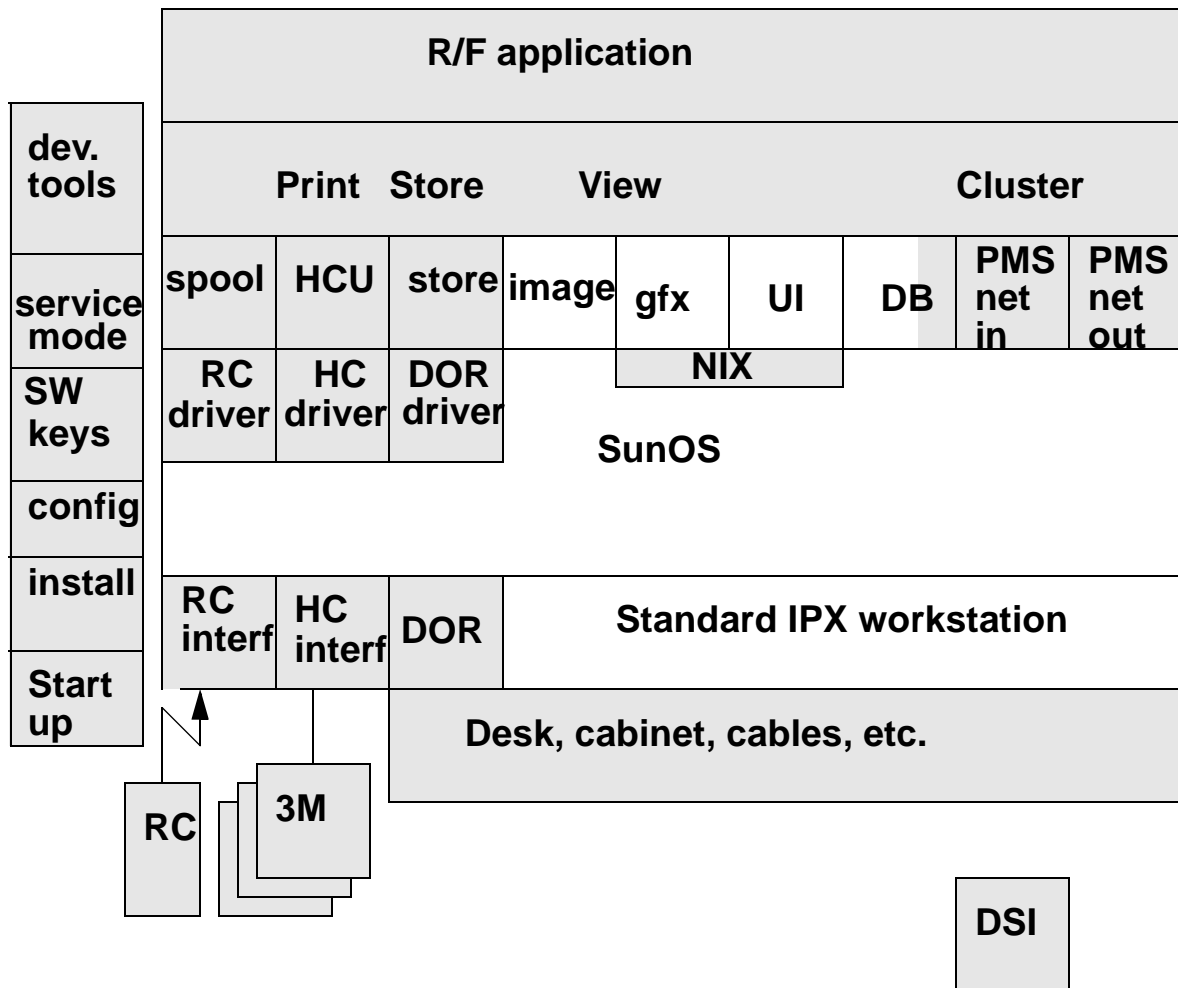
- + Teleradiology Workstation
- + Critical Care Workstation
- + Multi modality review station

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

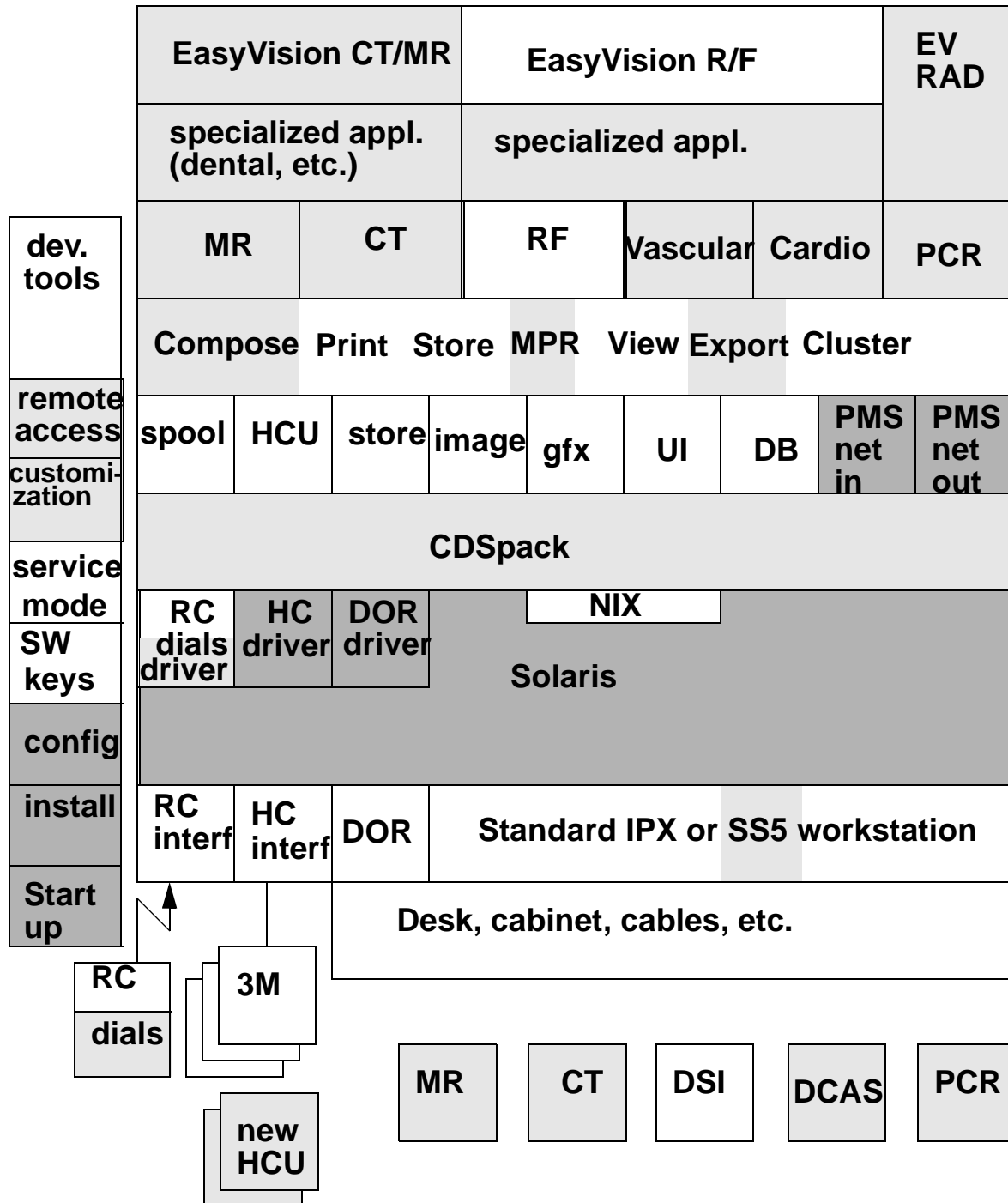
## september 1991



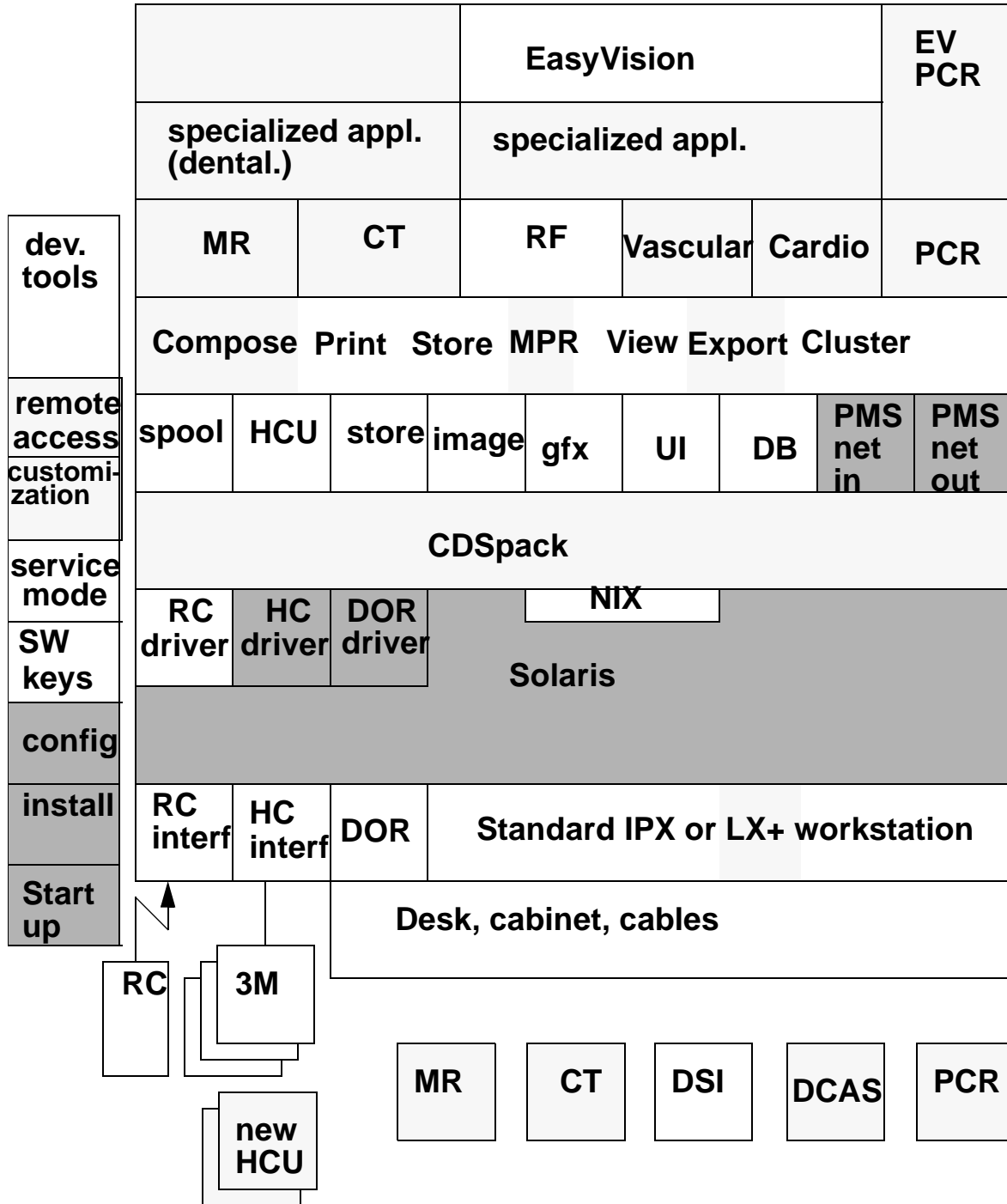
# september 1992



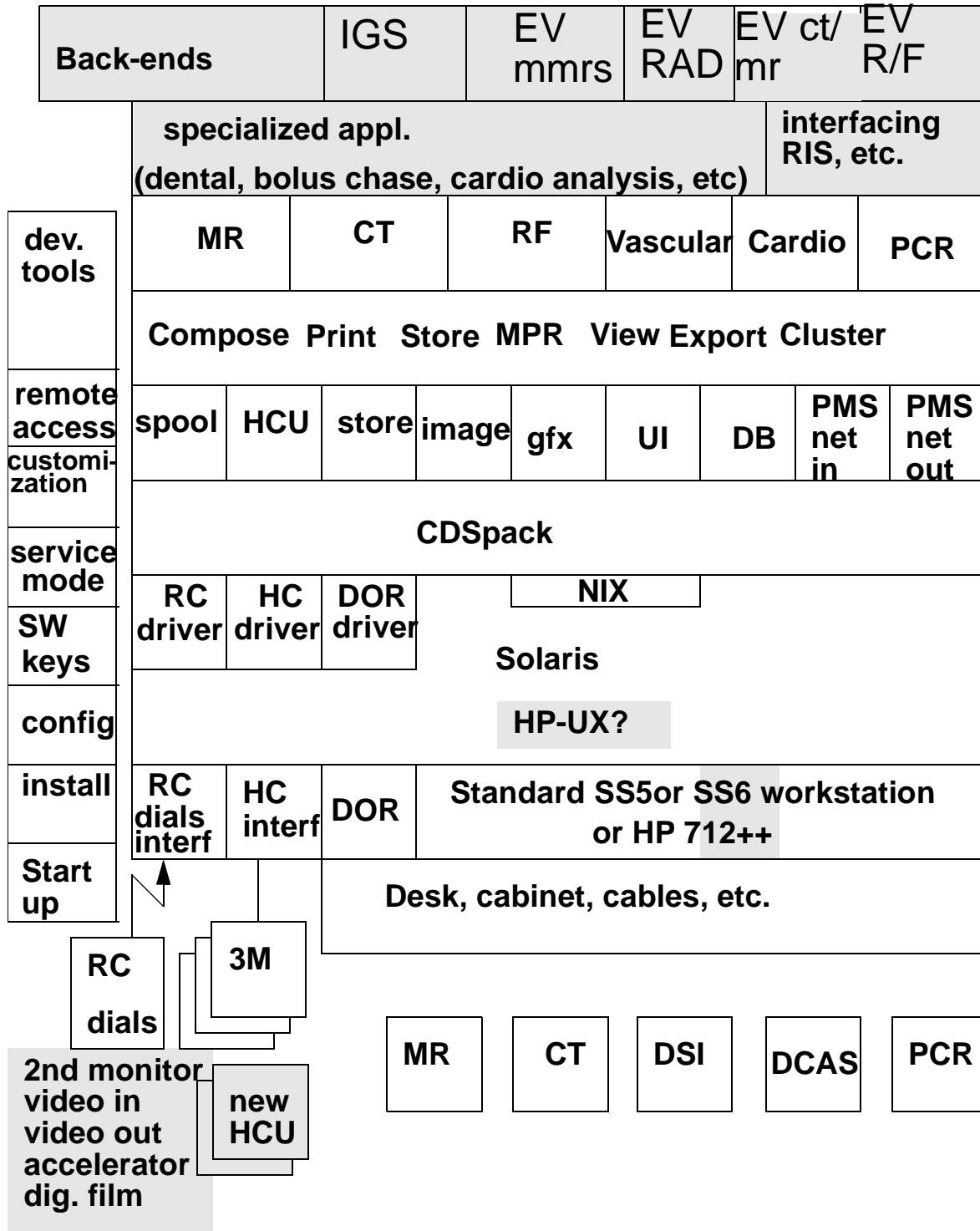
# june 1994



# June 1994



# 1995/1996





**Table 1: Efficiency through re-use**

	1992	1993	1994	1995	1996
number of products and applications					
products	1	3	5	9	13
inputs, a.o. modalities	1	5	10	15	
applications	1	4	8	16	32
people					
infrastructure			20+15	21+16	22+16
application			27	35	41
total		52	62	72	79
efficiency					
people per product		17	12	8	6

## To OO or not to OO

Characteristics of the Easyvision application are:

- Large variety in input images
  - +  $256^2$ ,  $480^2$ ,  $512^2$ ,  $1024^2$ , non square, etc.
  - + 8, 10, 12 bits
  - + CT, MR, X-ray Image Intensifier
- Large variety in application requirements
- Large variety in use

**Easyvision is impossible without OO**

# Learning Curve

## Phase 1:

**Make something in the OO way**

**Result: We understand OO!**

# Learning Curve

## Phase 2:

**Modify the something of phase 1**

**How ugly, lets redesign**

**Result: Now we really understand OO**

# **Learning curve**

## **Phase 3:**

**Modify the something of phase 2**

**Jeeee, it is still ugly, lets redesign**

**Result: Now we finally understand OO**

# Learning curve

- Do it
- Plan for a long learning curve
  - + Do not sell (promise) re-use;  
If you are quite good you may see  
(controlled, reproducible) re-use after ca. 3  
years
- Do not hesitate to throw away early implementations;

Plan (budget) these redesigns

# Method

## Easyvision development method:

- prototype
- evaluate
- engineering

**No formal analysis/design/  
documentation method!**

## Formal methods:

- work for small projects only
- playground for academics :-)

## C++ ??

Objective-C is:

- Much simpler
- More powerful

## Conclusion: Use C++

- C++ is de facto standard
- all new tool developments are C++ based



## OO is not so new after all...

- Many “conventional” designs use OO-like techniques by intuition
- OO languages support the OO mechanisms, hence  
+ line count reduction
- Call back-scheduling idem

## To OO or not to OO, TWO (2).

- It is not an easy transition
- The change will take years:
  - + don't wait with the start
- BUT, you don't have a choice:
  - + the projected growth of complexity in any system (TV or Numerical Control or medical imaging equipment) is too large for conventional methods