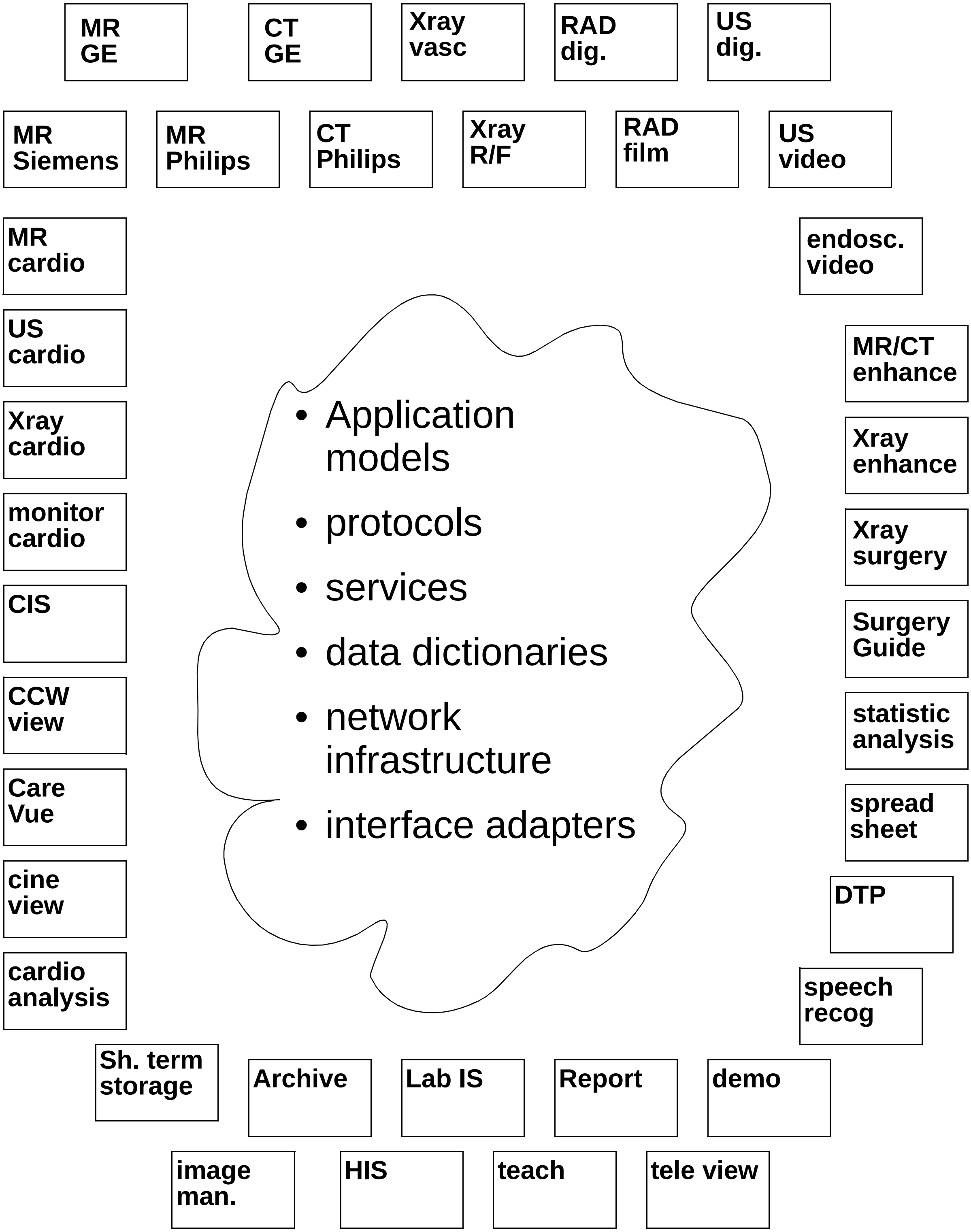
Health care world >> PMS catalogue



MR GE

CT GE

Xray vasc

RAD dig.

US dig.

MR Siemens

MR Philips

CT Philips

Xray R/F

RAD film

US video

MR cardio

US cardio

Xray cardio

monitor cardio

CIS

CCW view

Care Vue

cine view

cardio analysis

endosc. video

MR/CT enhance

Xray enhance

Xray surgery

Surgery Guide

statistic analysis

spread sheet

DTP

speech recog

Sh. term storage

Archive

Lab IS

Report

demo

image man.

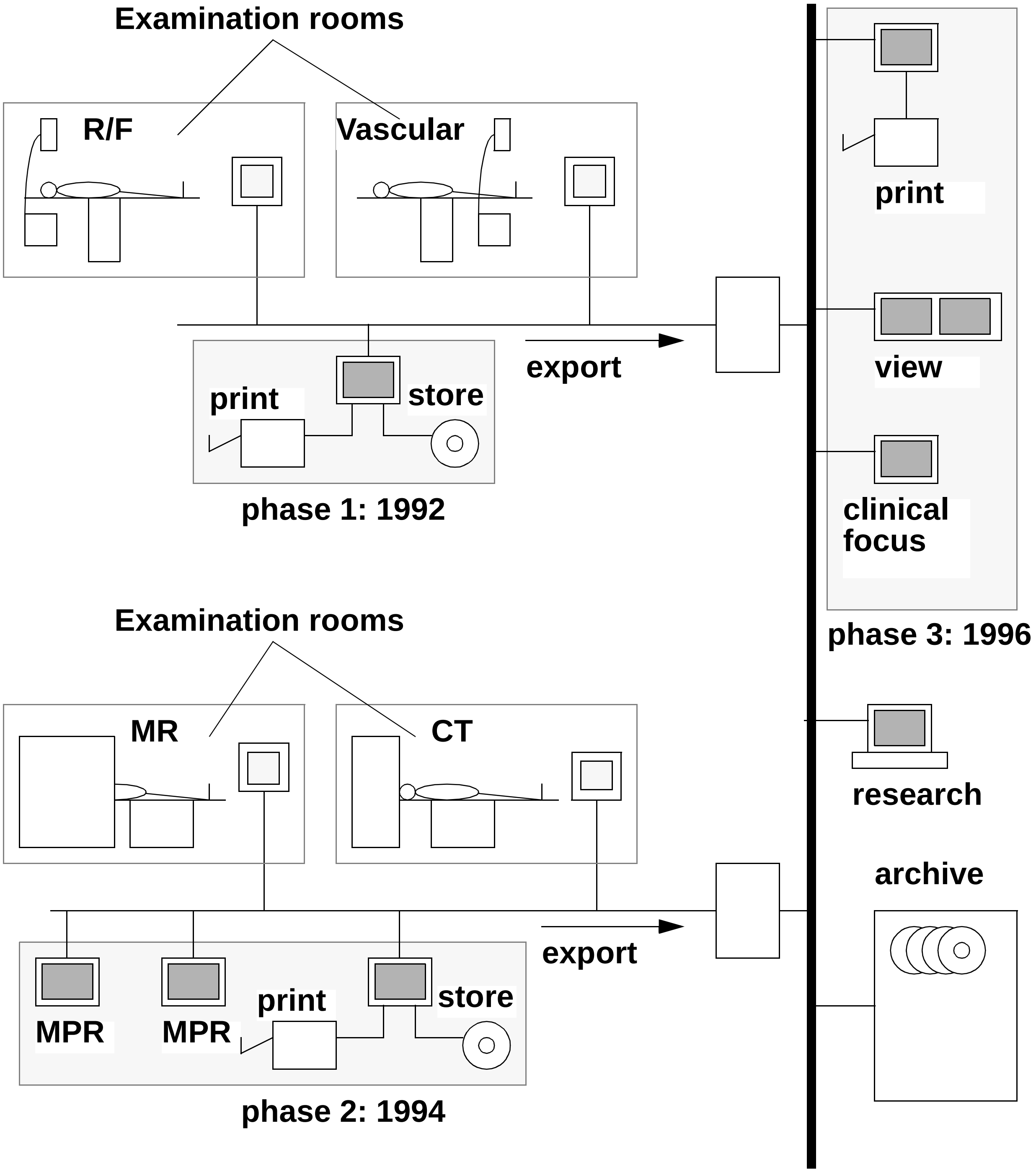
HIS

teach

tele view

- Application models
- protocols
- services
- data dictionaries
- network infrastructure
- interface adapters

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

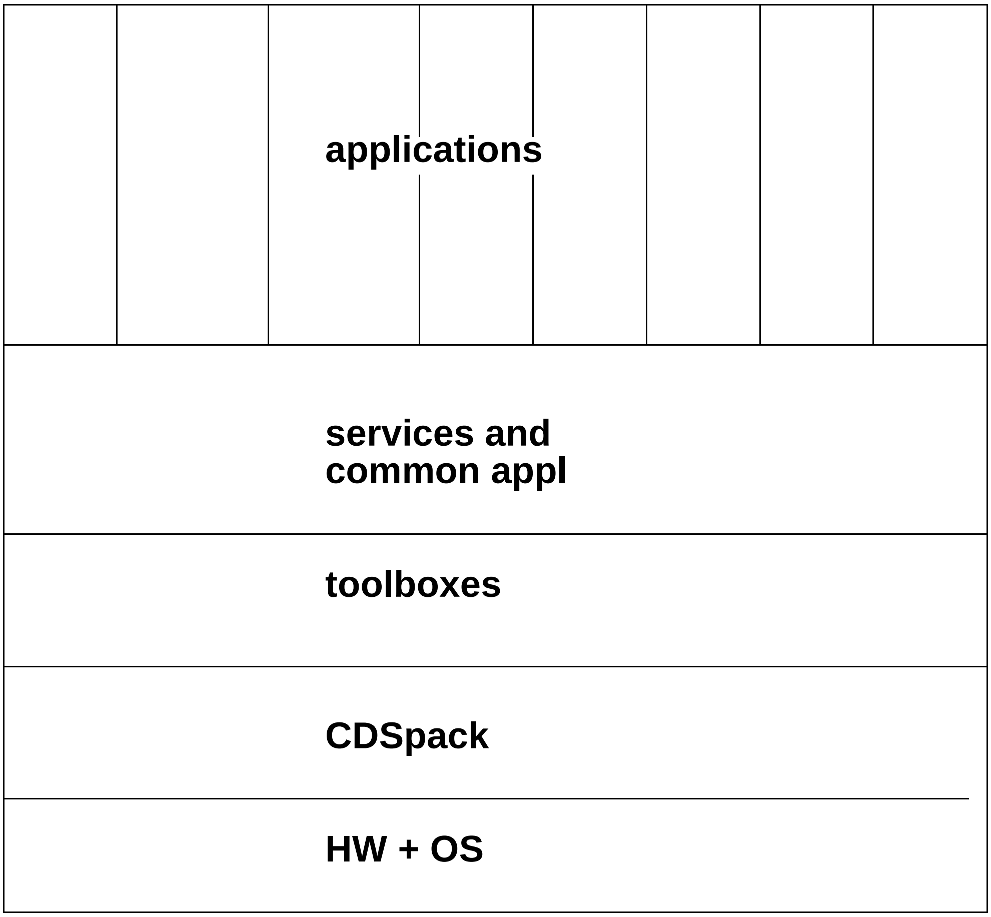
- Clinical Focus:
  - Neurovision
  - Image Guided Surgery

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

Simplified layers



applications

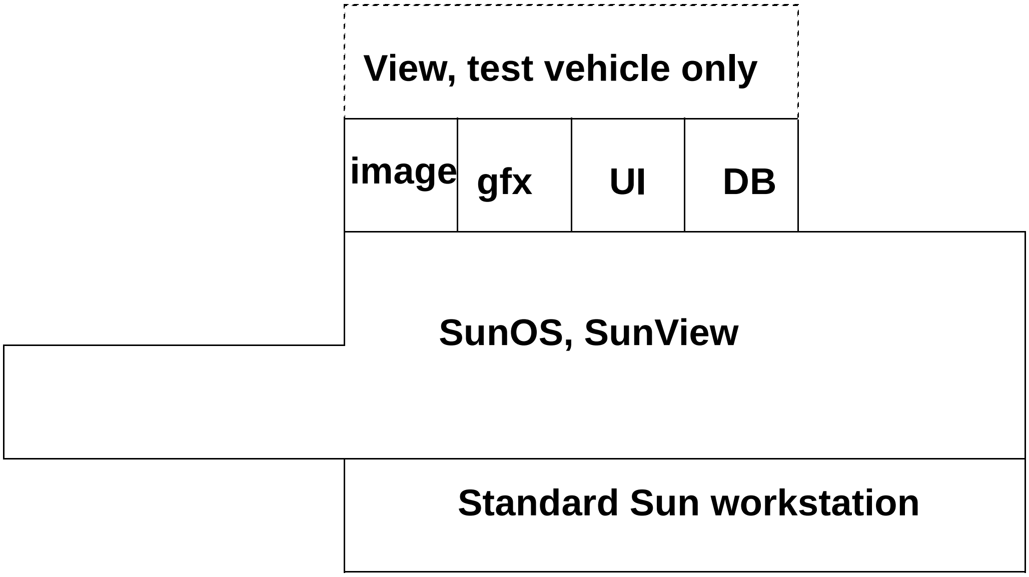
services and
common appl

toolboxes

CDSpack

HW + OS

september 1991



View, test vehicle only

image

gfx

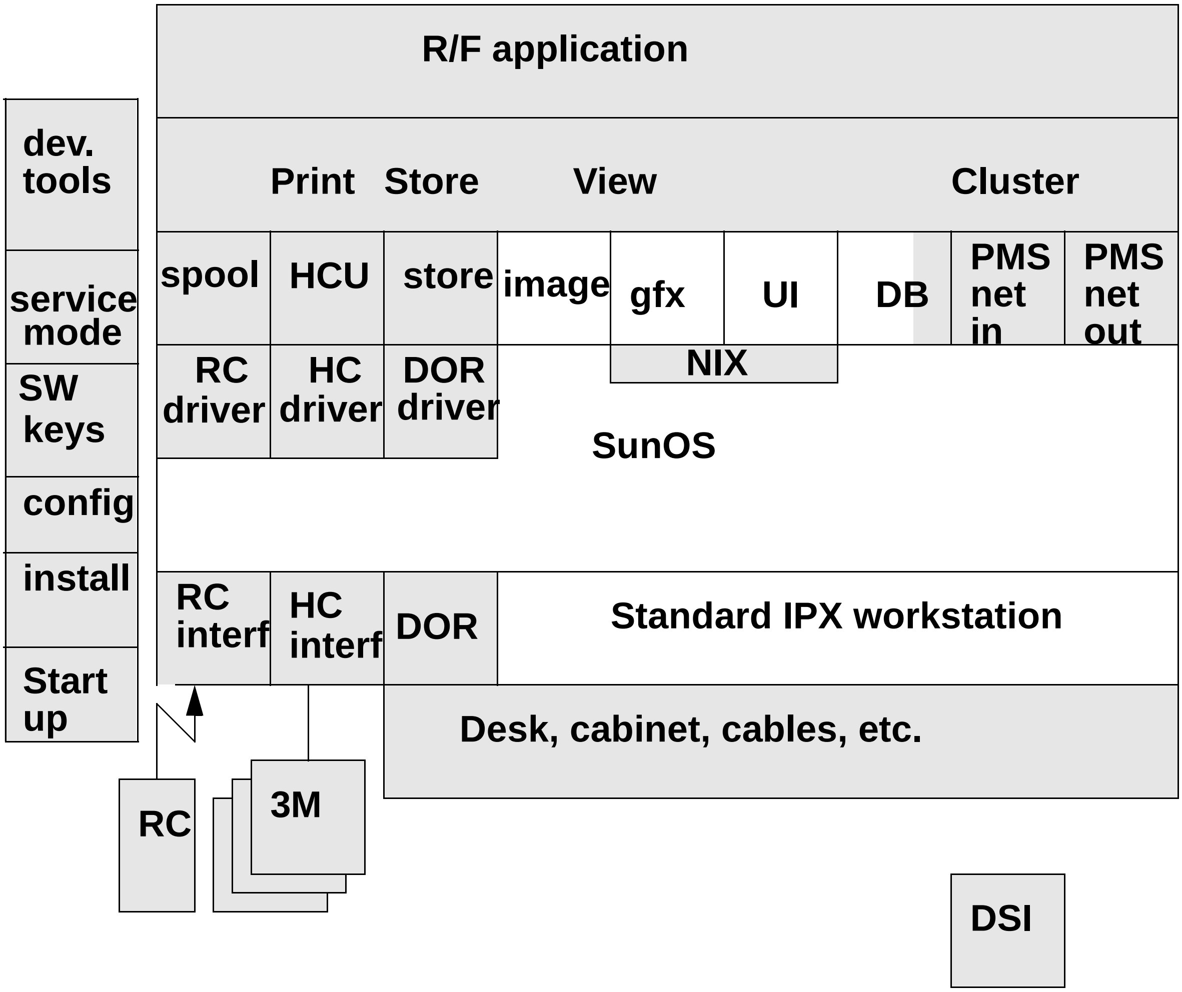
UI

DB

SunOS, SunView

Standard Sun workstation

september 1992



R/F application

Print Store View Cluster

spool HCU store image gfx UI DB PMS net in PMS net out

RC driver HC driver DOR driver NIX

SunOS

RC interf HC interf DOR Standard IPX workstation

Desk, cabinet, cables, etc.

dev. tools

service mode

SW keys

config

install

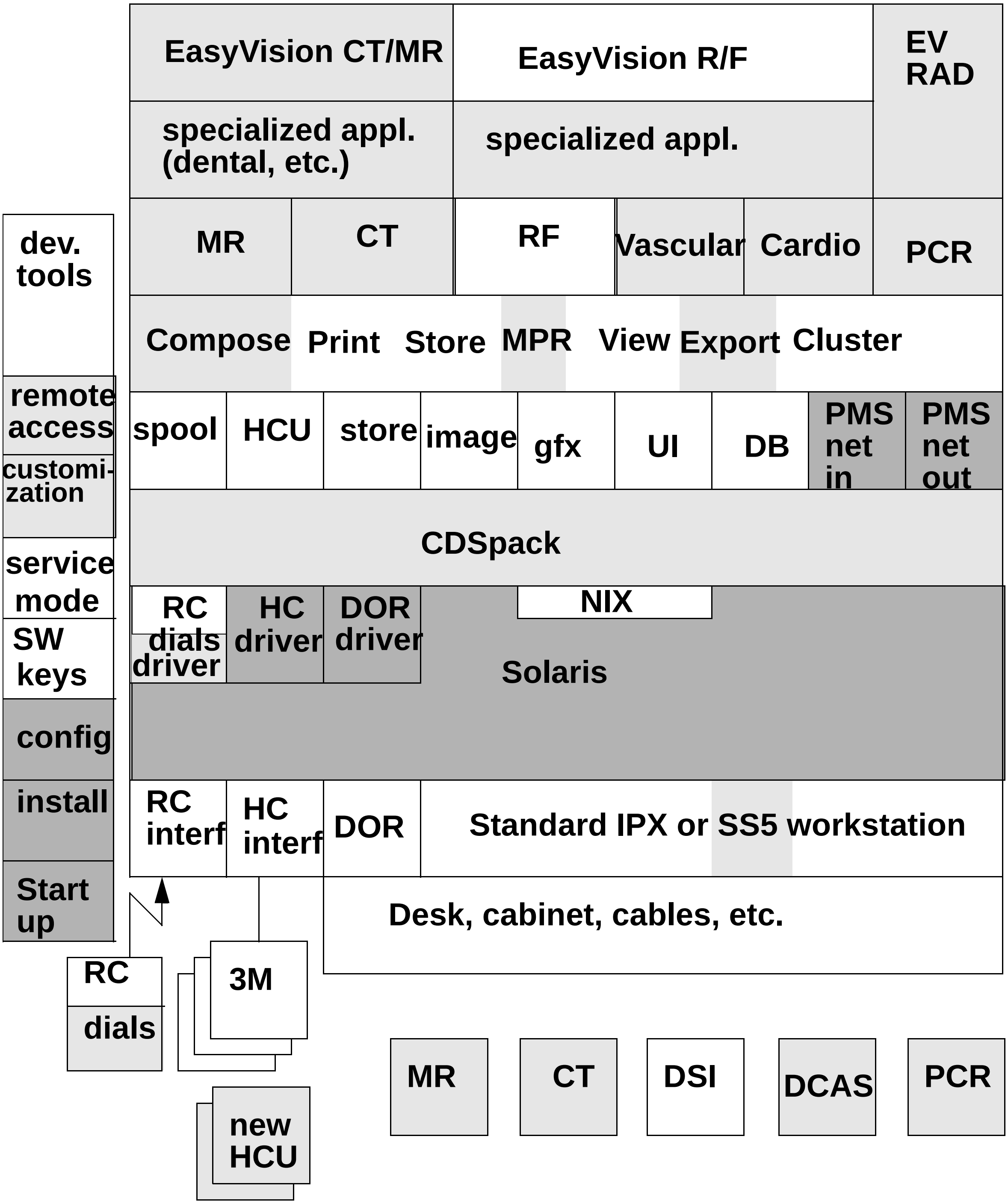
Start up

RC

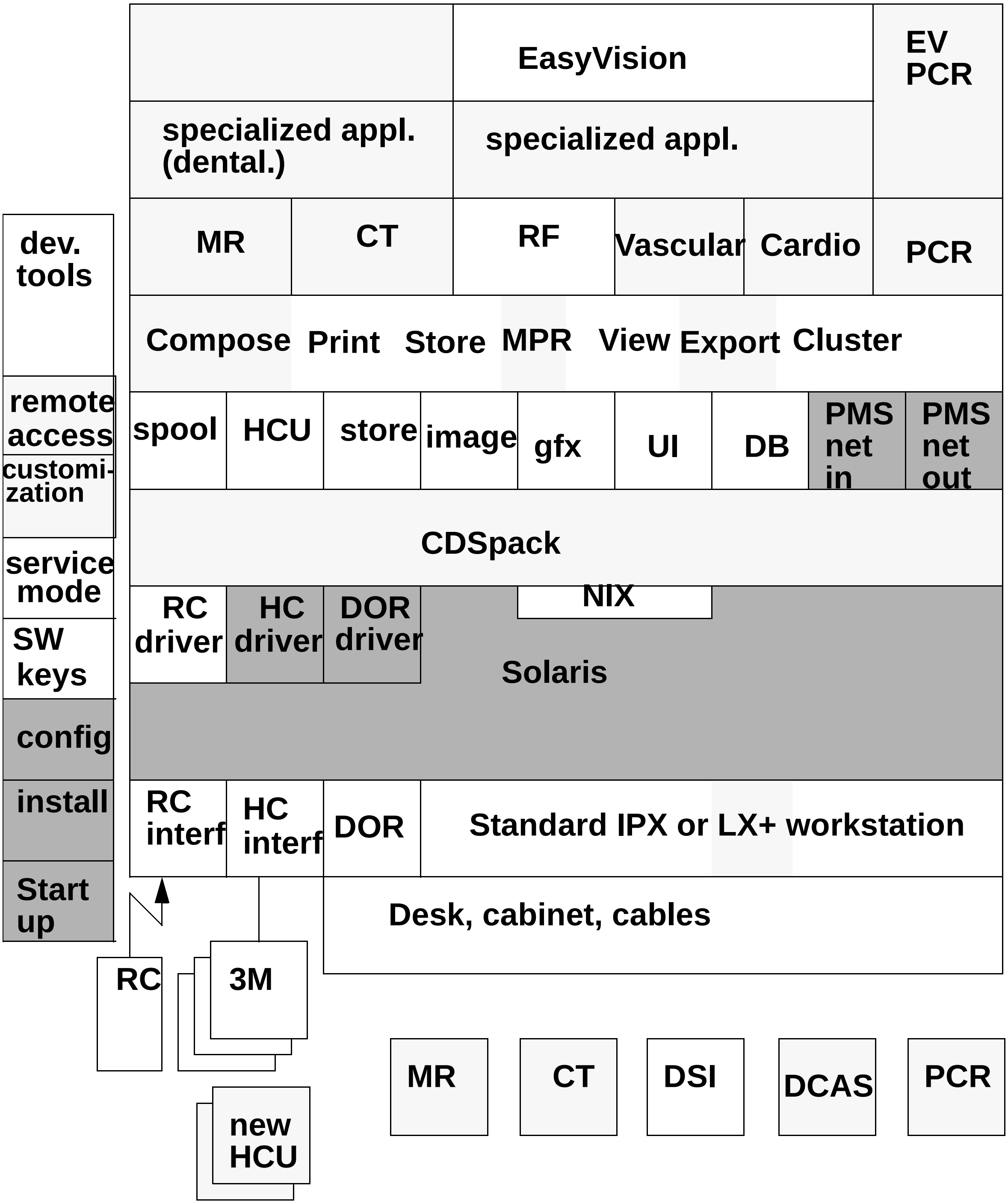
3M

DSI

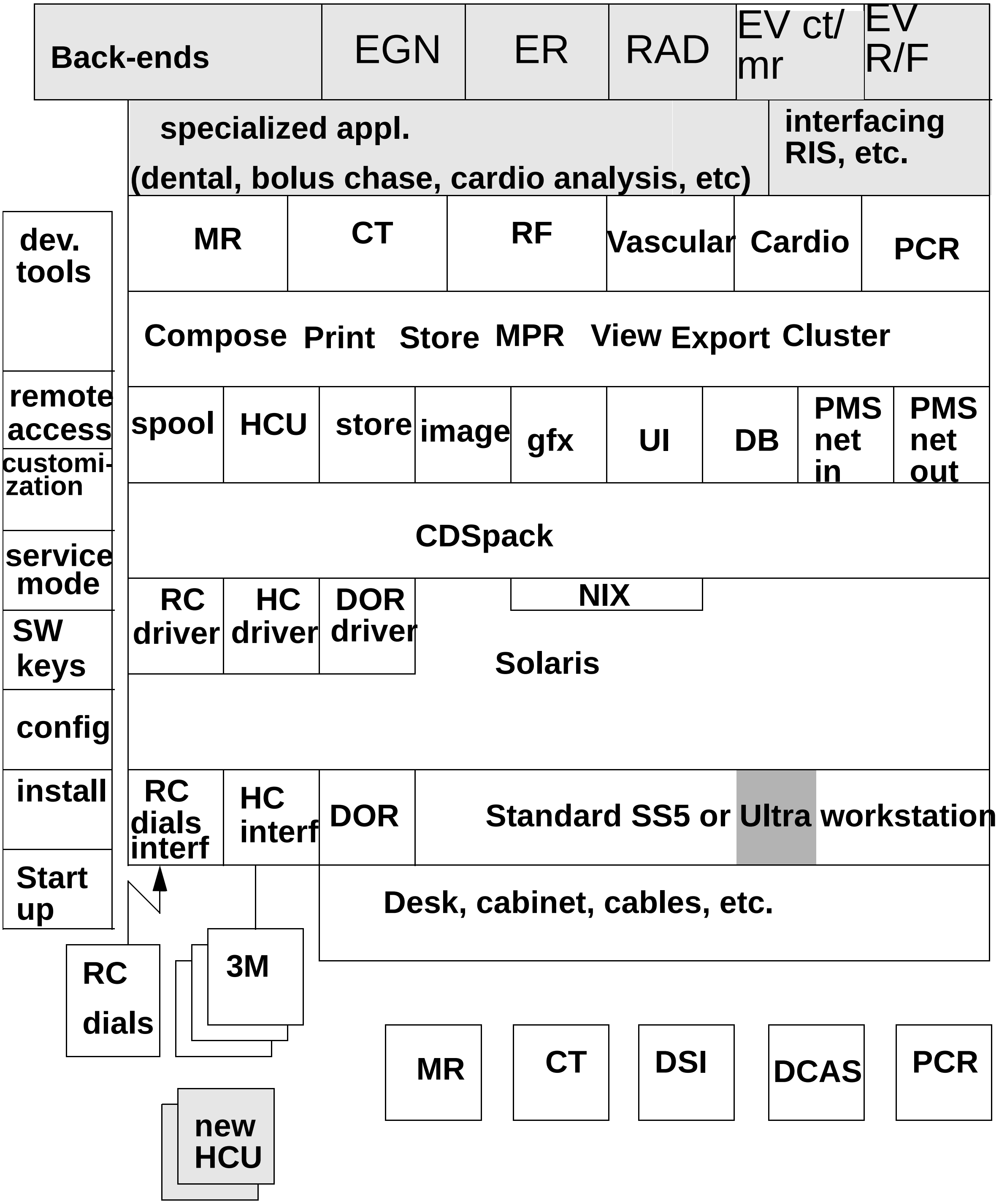
june 1994


EasyVision CT/MR
EasyVision R/F
EV RAD
specialized appl. (dental, etc.)
specialized appl.
MR
CT
RF
Vascular
Cardio
PCR
dev. tools
Compose
Print
Store
MPR
View
Export
Cluster
remote access
customi-zation
spool
HCU
store
image
gfx
UI
DB
PMS net in
PMS net out
CDSpack
service mode
SW keys
RC dials driver
HC driver
DOR driver
NIX
Solaris
config
install
RC interf
HC interf
DOR
Standard IPX or SS5 workstation
Start up
Desk, cabinet, cables, etc.
RC
dials
3M
new HCU
MR
CT
DSI
DCAS
PCR

june 1994


EasyVision
EV PCR
specialized appl. (dental.)
specialized appl.
dev. tools
MR
CT
RF
Vascular
Cardio
PCR
Compose
Print
Store
MPR
View
Export
Cluster
remote access
customi-zation
spool
HCU
store
image
gfx
UI
DB
PMS net in
PMS net out
CDSpack
service mode
NIX
RC driver
HC driver
DOR driver
Solaris
SW keys
config
install
RC interf
HC interf
DOR
Standard IPX or LX+ workstation
Start up
Desk, cabinet, cables
RC
3M
MR
CT
DSI
DCAS
PCR
new HCU

1996



Back-ends | EGN | ER | RAD | EV ct/mr | EV R/F

specialized appl. (dental, bolus chase, cardio analysis, etc) | interfacing RIS, etc.

MR | CT | RF | Vascular | Cardio | PCR

Compose Print Store MPR View Export Cluster

spool | HCU | store | image | gfx | UI | DB | PMS net in | PMS net out

CDSpack

RC driver | HC driver | DOR driver | NIX | Solaris

RC dials interf | HC interf | DOR | Standard SS5 or Ultra workstation

Desk, cabinet, cables, etc.

dev. tools | remote access | customi-zation | service mode | SW keys | config | install | Start up

RC dials | 3M | new HCU

MR | CT | DSI | DCAS | PCR

A look into the future

From box to function:

- customer wants any function on any location/time, not limited by “random” product or box boundaries

In parallel with:

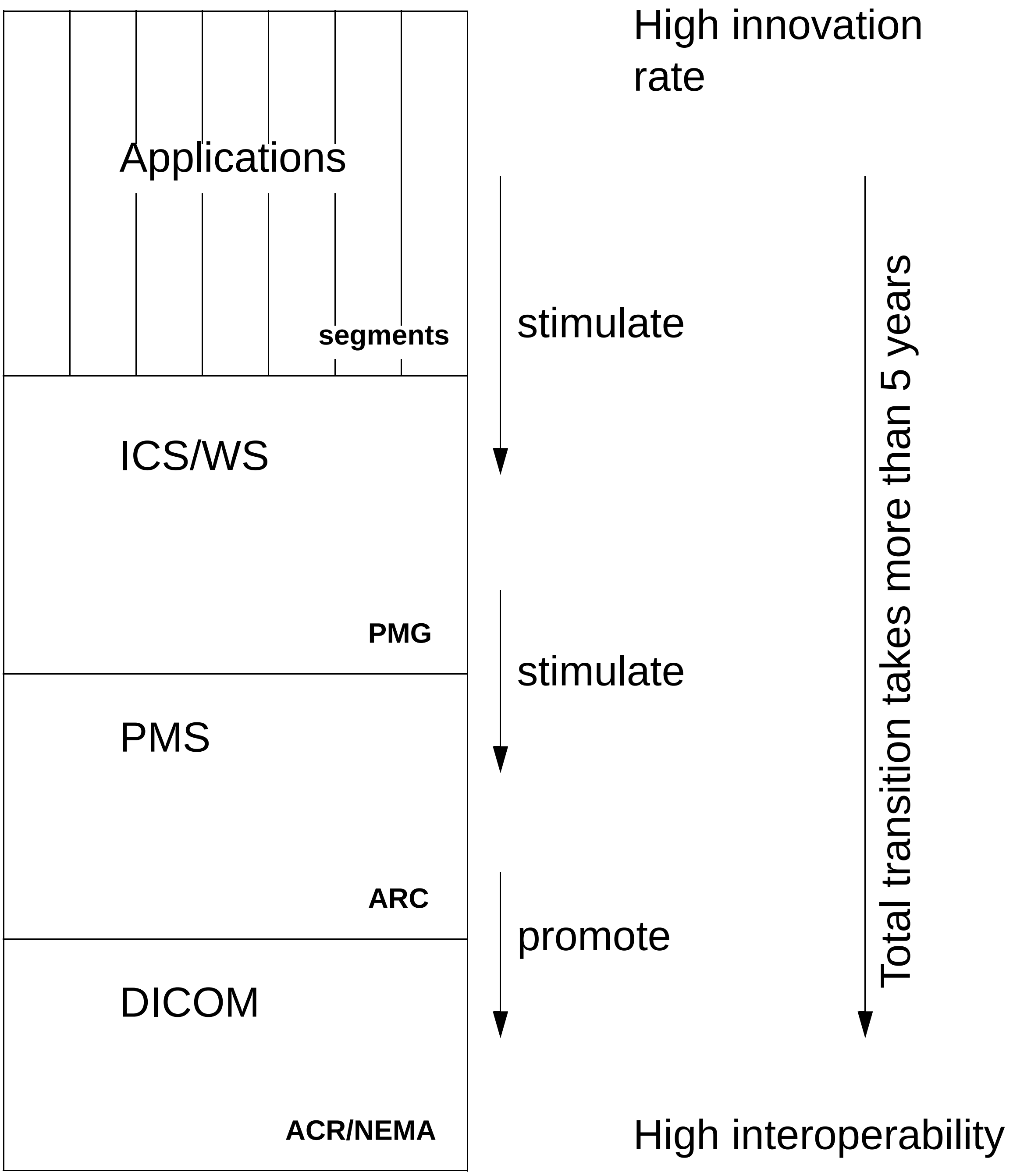
- large number of clinical applications
- integration of health care function
- break down in manageable projects / teams, lifecycle independency
- finite number of skilled development personnel

(R)evolution in 25 years

Table 1:

	1980	1995	2005
integration level	generator stand	department	health care
time to market	2-5 year	1-2 year	0.5 year
code size complete product	10^4-10^5	10^6	10^7-10^8
memory size	96 kB	96 MB	? GB
CPU power	0.1 MIPS	100 MIPS	? GIPS
dev group size	10-50	50-200	?
of which ASW	2-10	20-60	?

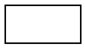
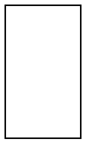
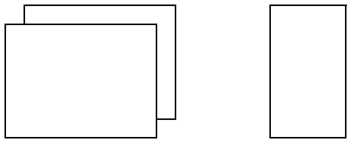
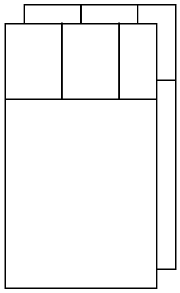
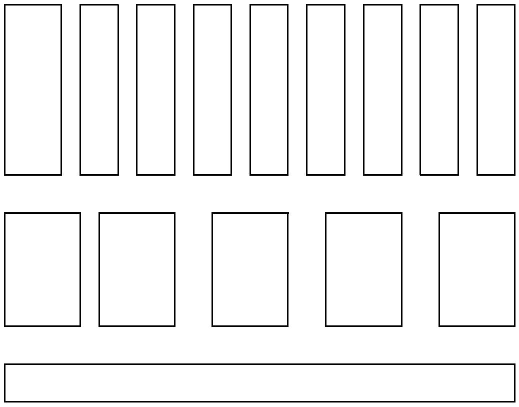
Information model



EasyVision in 2000

- More than 100 independent applications
- Interoperating fluently with other EV applications
- Interoperating fluently with other vendors
- Interoperating fluently with other health care applications (Information systems, etc.)
- SW only
- Running on at least UNIX and NT platforms
- Distributed development process
- Consolidation and cross fertilization process
- Platform for innovative applications in image handling, analysis, clinical focus.

Extrapolation CDS SW.

		# appl	Mega lines
1991		0	0.1
1992		2	0.35
1994		8	0.6
1996		32	1.5
1999		100	5

Adding an application

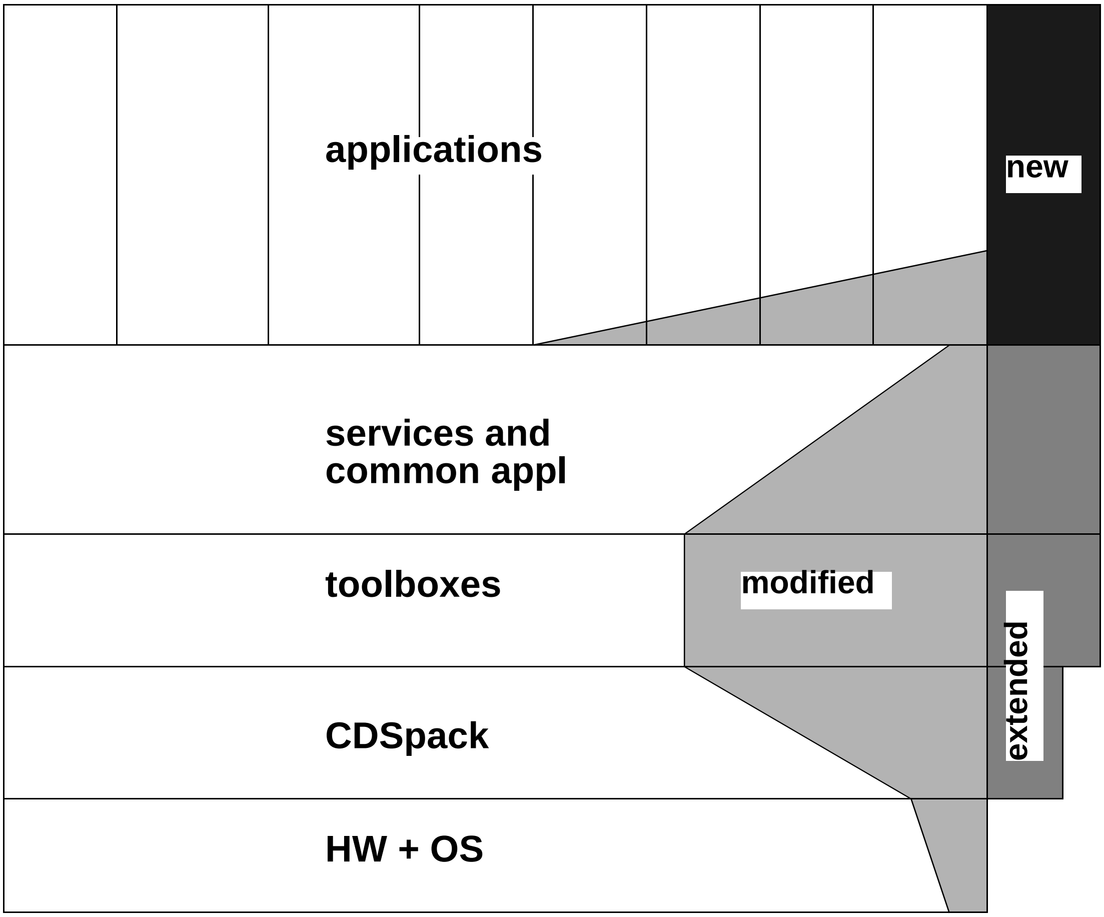


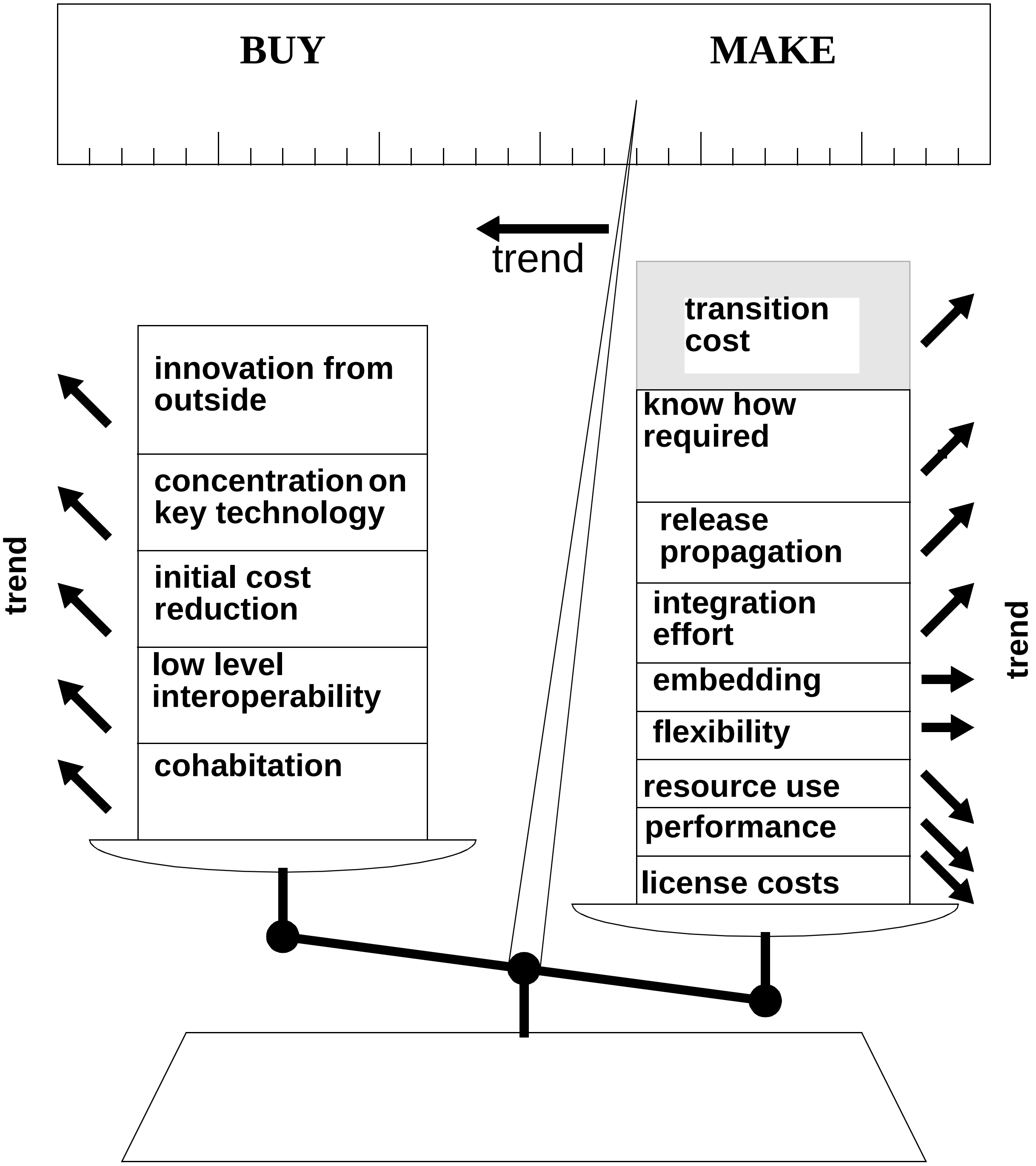
Table 2: Efficiency through re-use

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

EasyVision technology:

- Standard (Sun) workstation
- Unix (Solaris 2.x)
- Off the shelf hardware peripherals

  only exception: Hardcopy Interface board
- Home made:
  - + data base engine
  - + higher level communication protocols
  - + windowing environment
  - + GUI
  - + graphics
  - + Image processing library
  - + notification, call back scheduling
- Entirely OO based:
  - + Objective-C
  - + 1000 classes



BUY:

- innovation from outside
- concentration on key technology
- initial cost reduction
- low level interoperability
- cohabitation

MAKE:

- transition cost
- know how required
- release propagation
- integration effort
- embedding
- flexibility
- resource use
- performance
- license costs

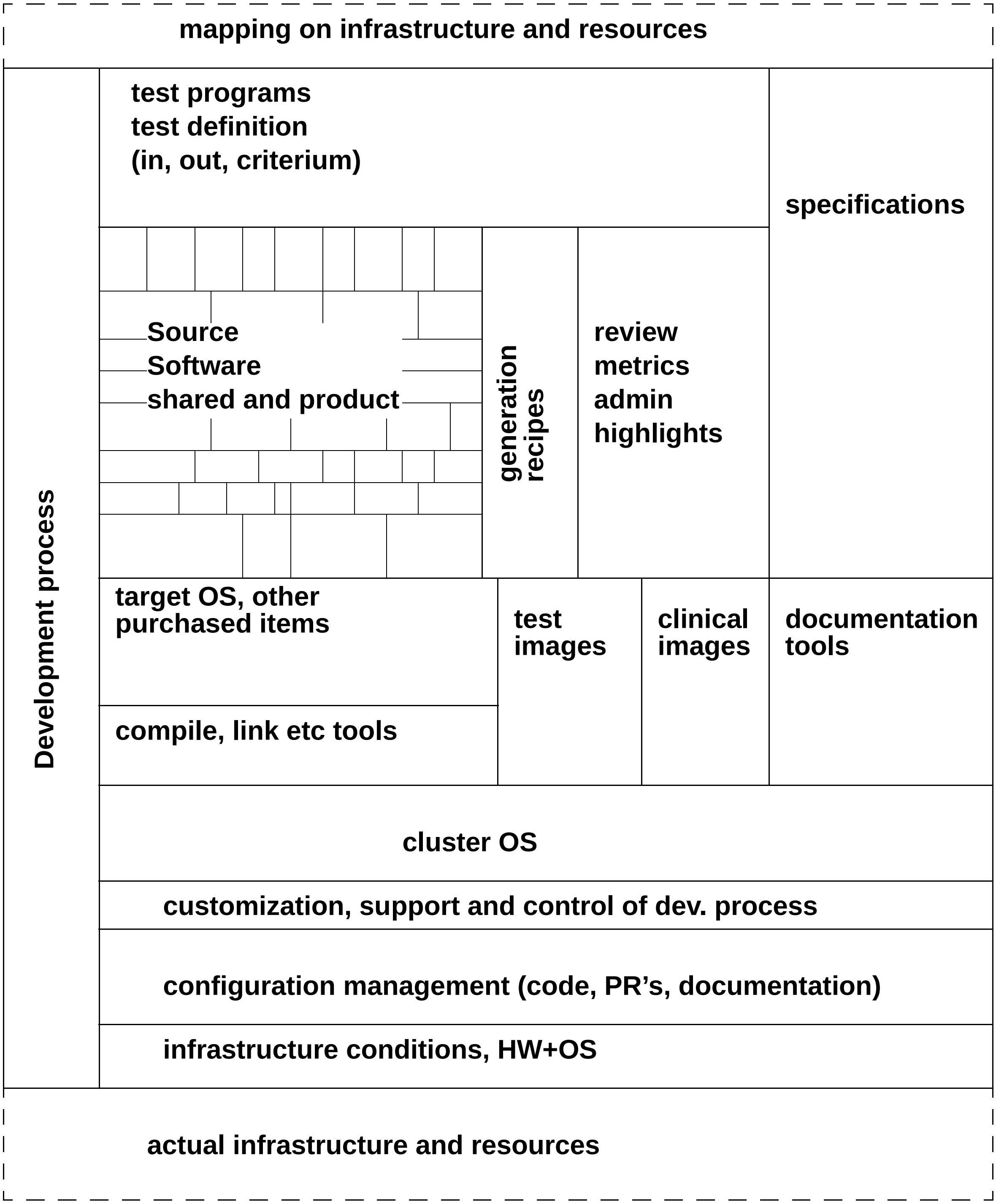
Buy, potential components:

- Operating system
- Communication
- Data base engine
- User interface and related utilities
- Graphics and related utilities
- Image processing
- 3D rendering
- Foundation classes
- Installation
- Licensing, SW keys
- Security, a.o. encryption
- Multi media, virtual reality peripheral support
- etc.

Easyvision development method:

- prototype
  - + clinical feedback
  - + technological feasibility
- evaluate
  - + well defined specification
  - + outline design
- engineering
  - + coding, testing
  - + alpha, beta test

The platform as deliverable



mapping on infrastructure and resources

Development process

test programs
test definition
(in, out, criterium)

specifications

Source
Software
shared and product

generation
recipes

review
metrics
admin
highlights

target OS, other
purchased items

test
images

clinical
images

documentation
tools

compile, link etc tools

cluster OS

customization, support and control of dev. process

configuration management (code, PR’s, documentation)

infrastructure conditions, HW+OS

actual infrastructure and resources

Technological changes, opportunities

- Corba, SOM, OLE, ...
- Java, ...
- Windows NT, Windows 95, OS 2
- Taligent, Spring, ...
- SW only products
- Multi media (HW+SW)

Re-use levels

- Concepts
- Development Process
- Interoperability architecture
- Functional specifications
- User interface
- Algorithms
- Design
- Verification (test suite, spec)
- Skills
- Copy implementation, code
- Implementation, code
- Application modules