

# From Industrial Experience to System Architecting Know-how

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## Abstract

The system design process in an industrial setting is illustrated by the development flow of a Medical Imaging Workstation. The role of the architect and the architecting method is explained.

The goals of the Gaudí project are elaborated. In summary the goal is to develop systems architecting as a discipline. Questions addressed are: How to do research in this field? What are the challenges to do the research in a scientific way. The education of architects is also part of the development of this discipline. Although a lot of activity has already been done in related fields a lot still has to be done to develop the discipline Systems Architecting.

### Distribution

This article or presentation is written as part of the Gaudí project. The Gaudí project philosophy is to improve by obtaining frequent feedback. Frequent feedback is pursued by an open creation process. This document is published as intermediate or nearly mature version to get feedback. Further distribution is allowed as long as the document remains complete and unchanged.

September 6, 2020

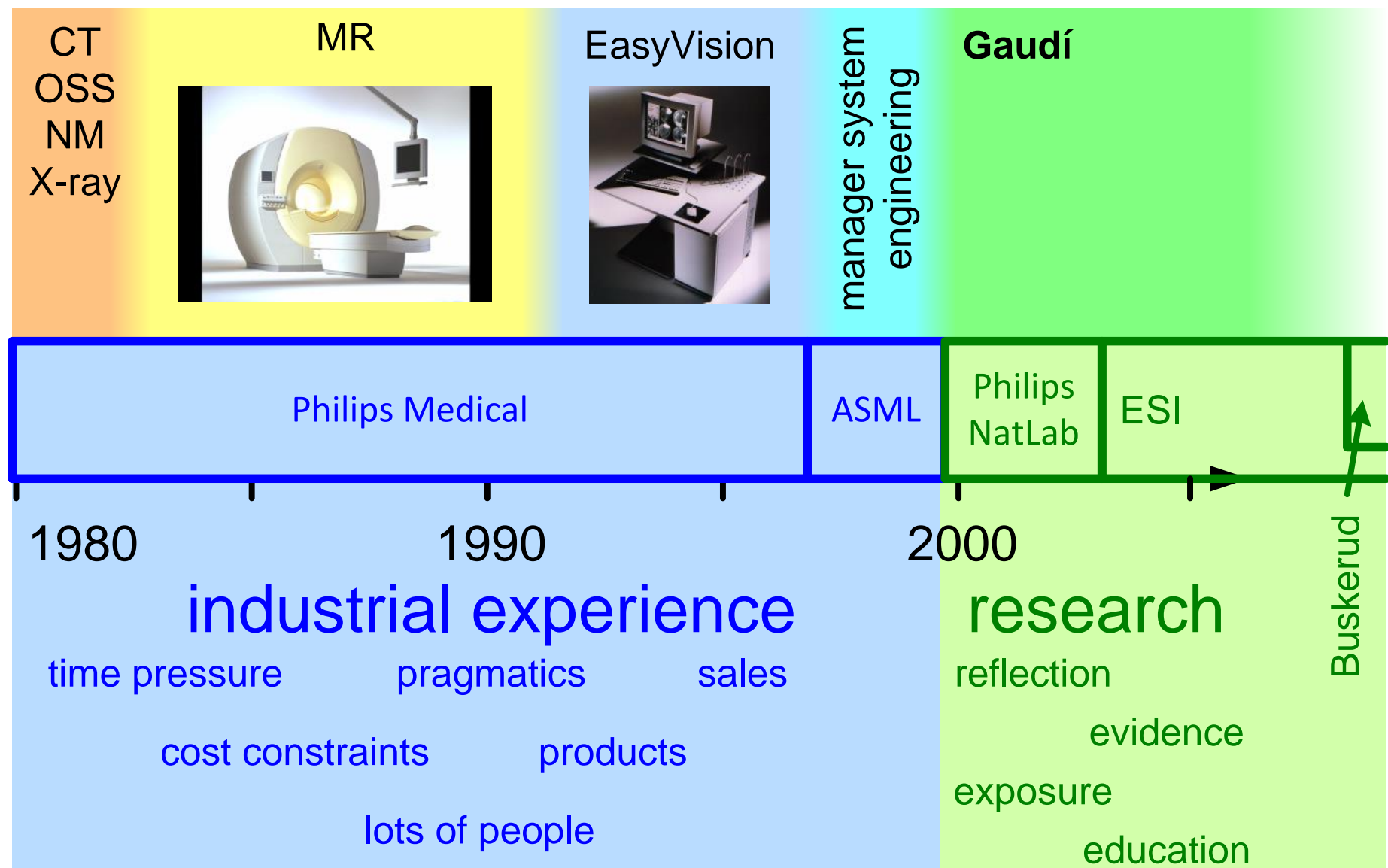
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logo

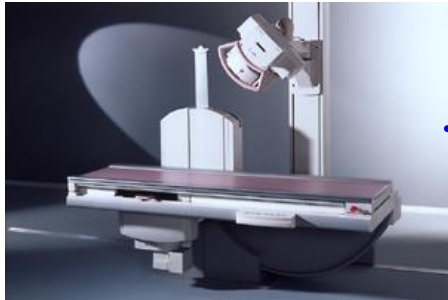
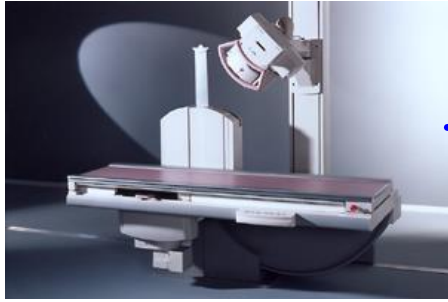
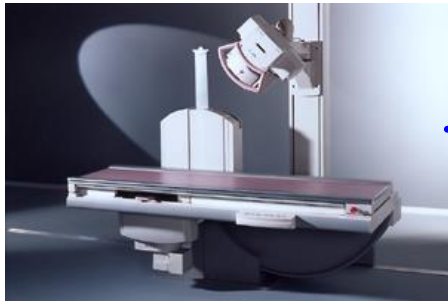
TBD

# From Industry to Research

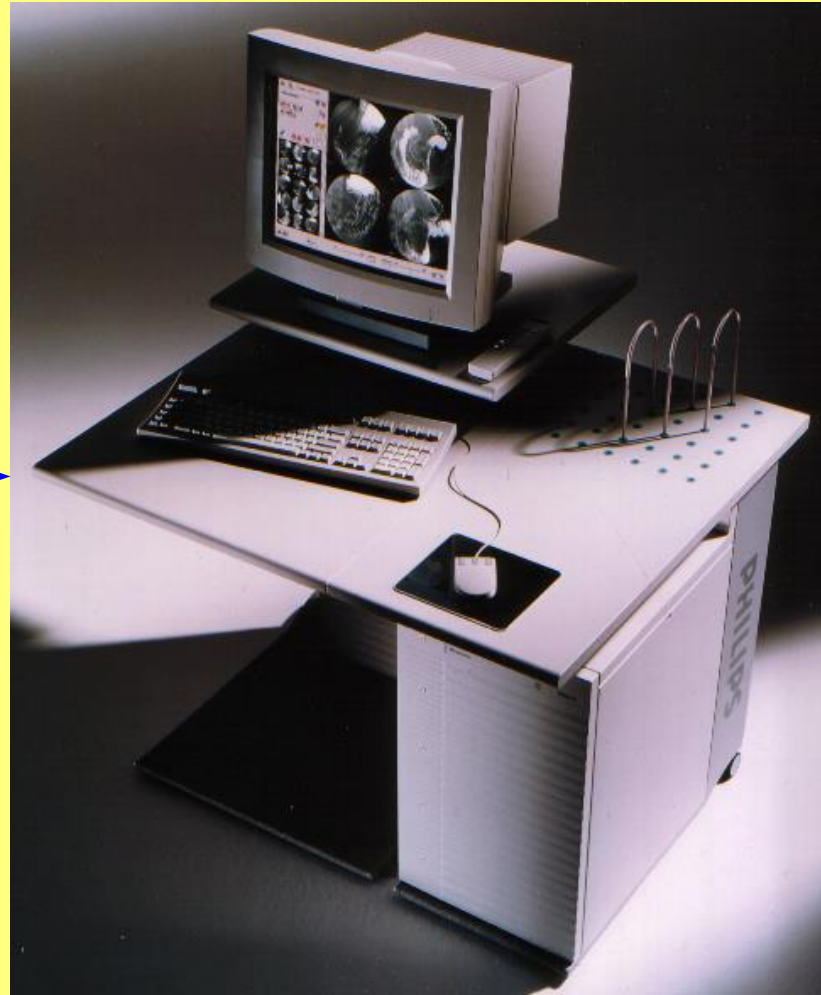


- Consolidate existing Systems Architecting Methods  
*evaluate, reflect, generalize*
- Make the Systems Architecting art more accessible  
*case descriptions*
- Enable the education of (future) System Architects  
*curriculum, course material*
- Research new or improved Systems Architecting Methods  
*industry as laboratory*

# Easyvision serving three URF examination rooms



URF-systems

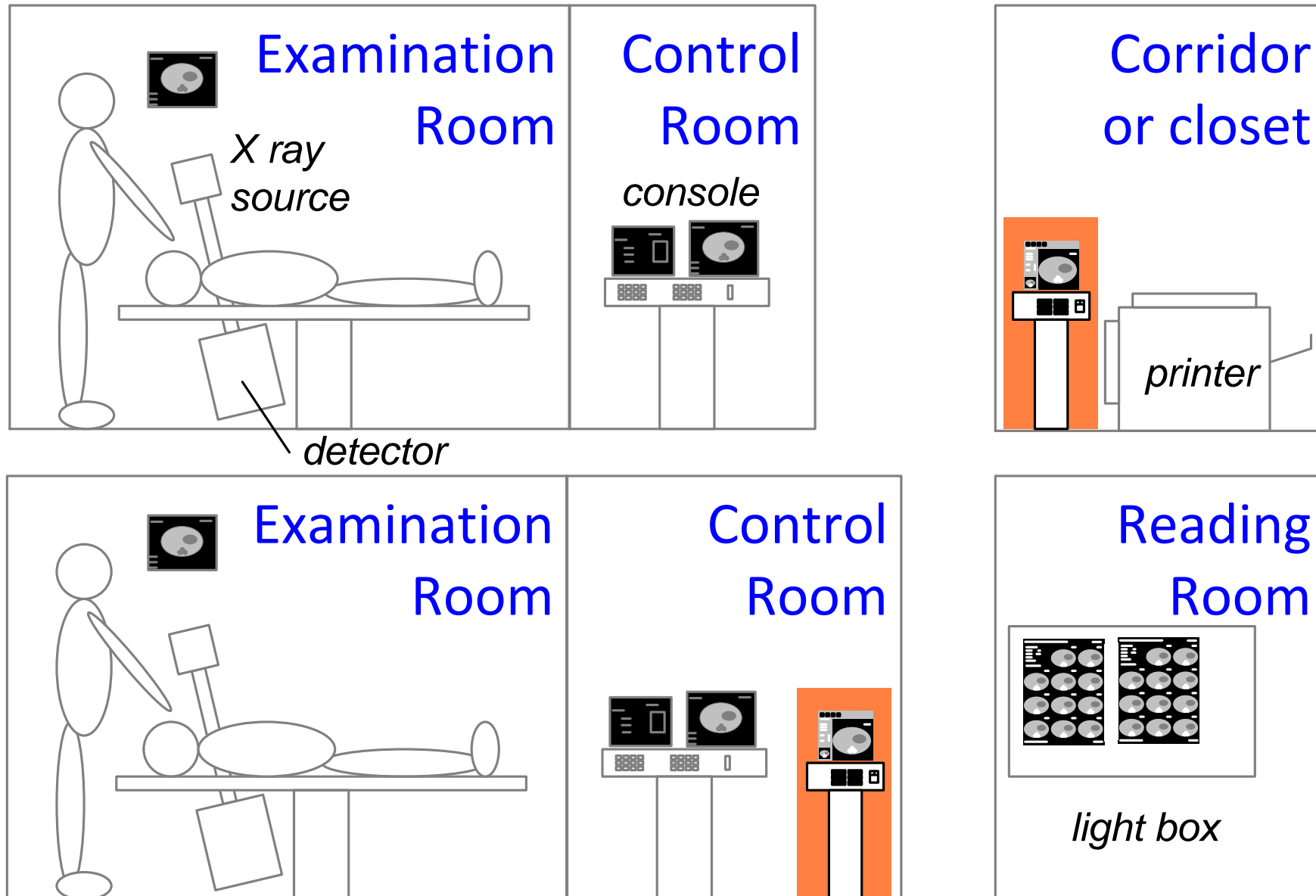


EasyVision: Medical Imaging Workstation

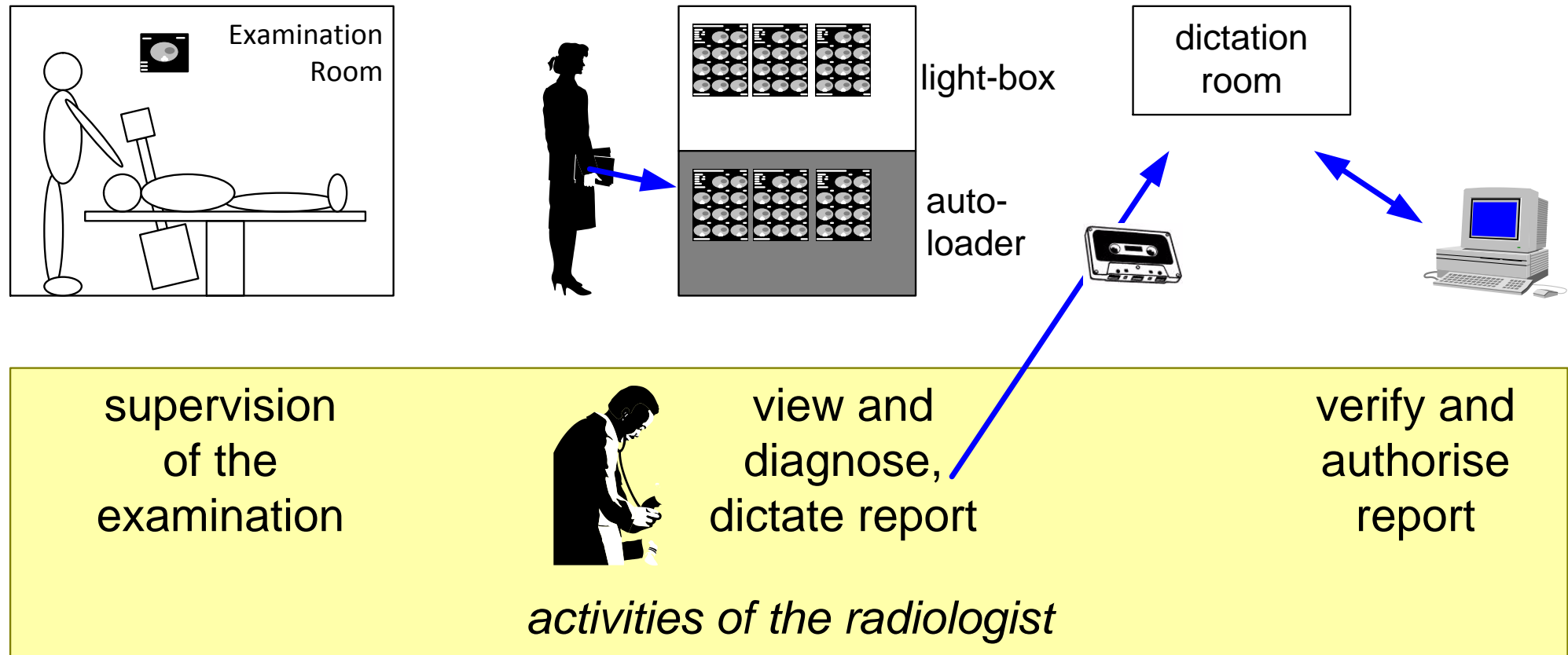


typical clinical  
image (intestines)

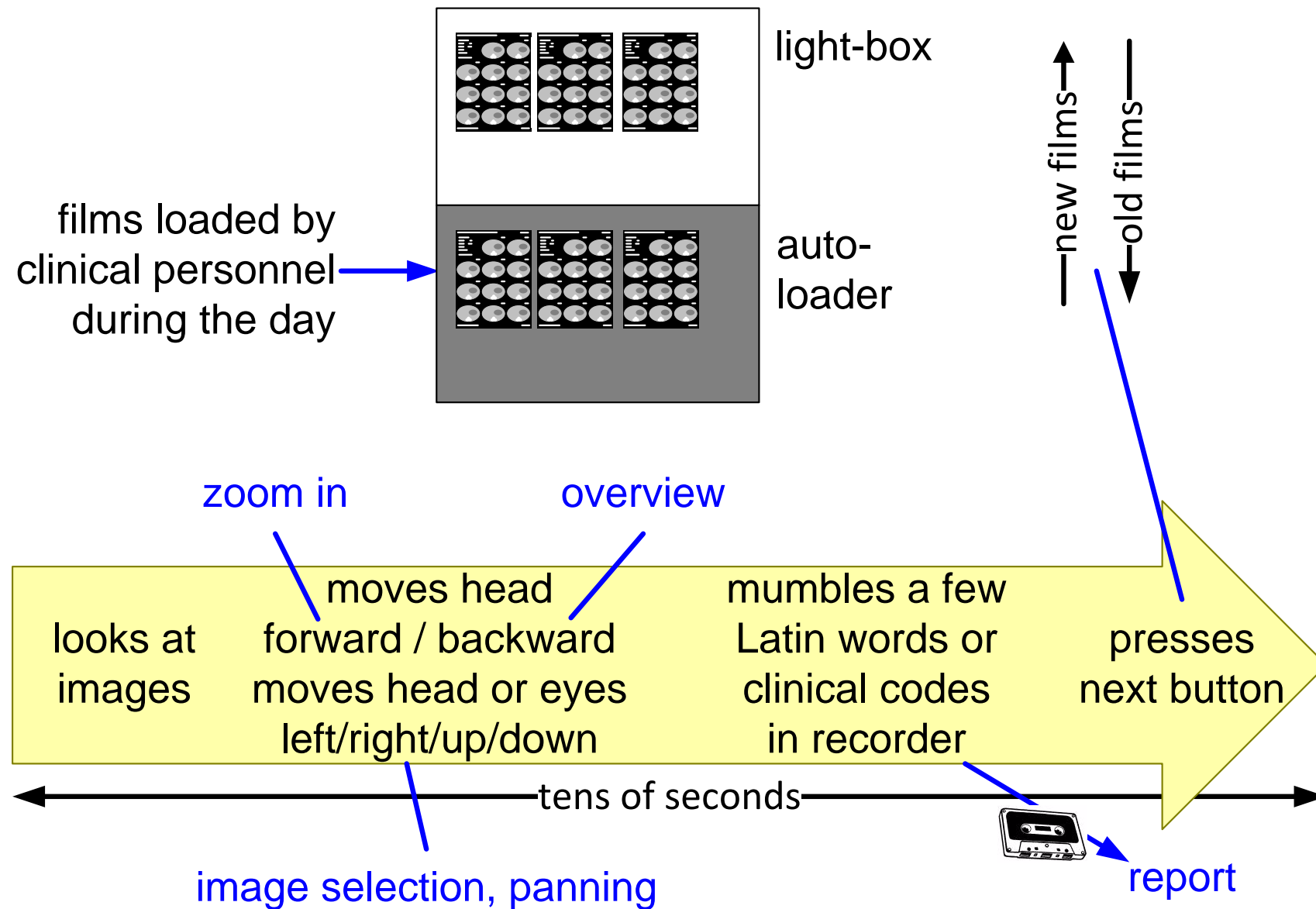
# X-ray rooms with Easyvision applied as printserver



# Radiologist workspots and activities



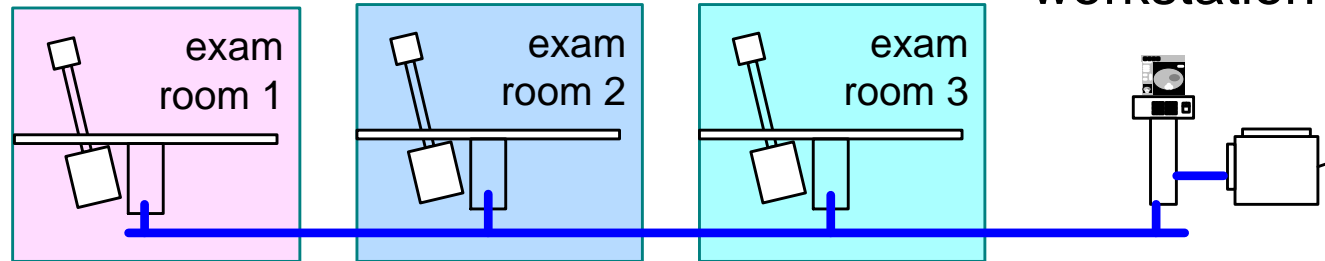
# Diagnosis in tens of seconds



# Typical case URF examination

3 examination rooms connected to

1 medical imaging  
workstation + printer

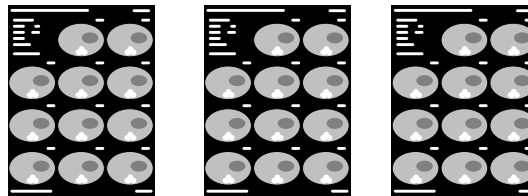


examination room: average 4 interleaved examinations / hour

image production: 20  $1024^2$  8 bit images per examination



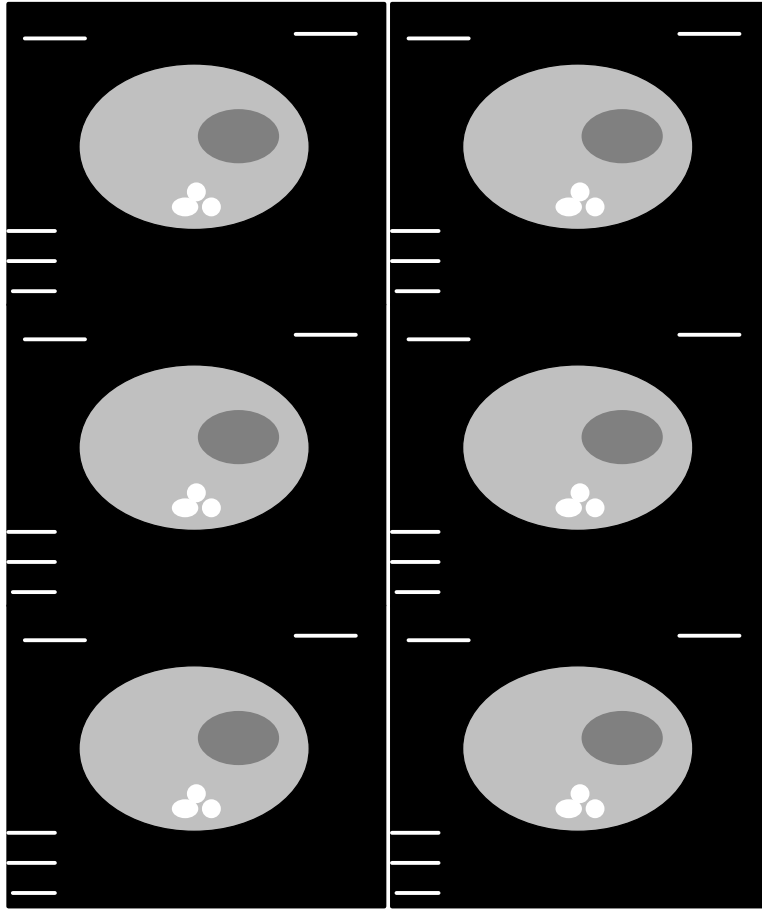
film production: 3 films of 4k\*5k pixels each



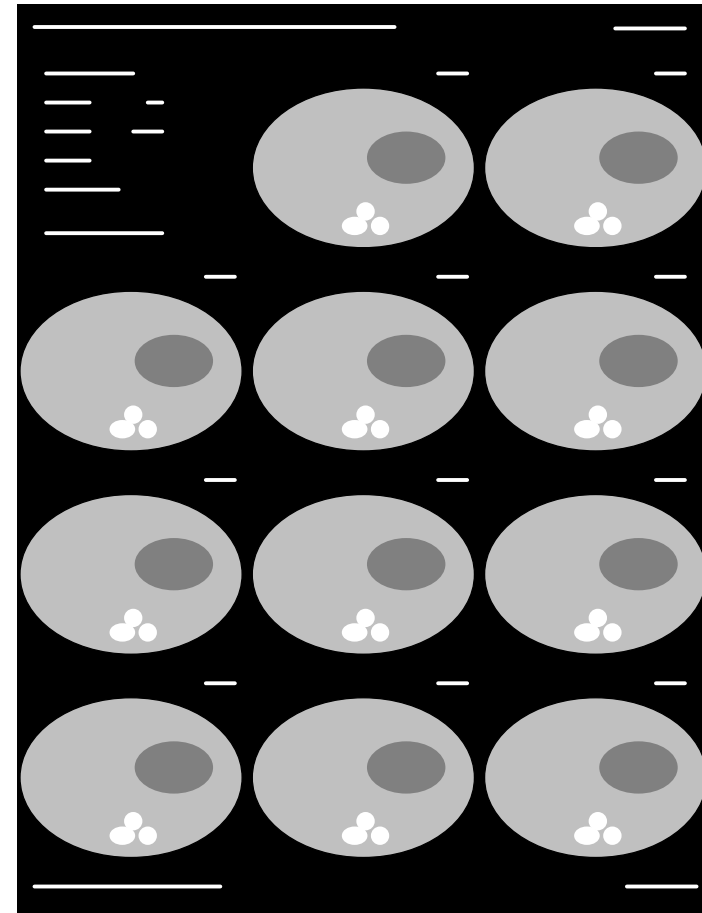
high quality output  
(bi-cubic interpolation)



# Comparison screen copy versus optimized film



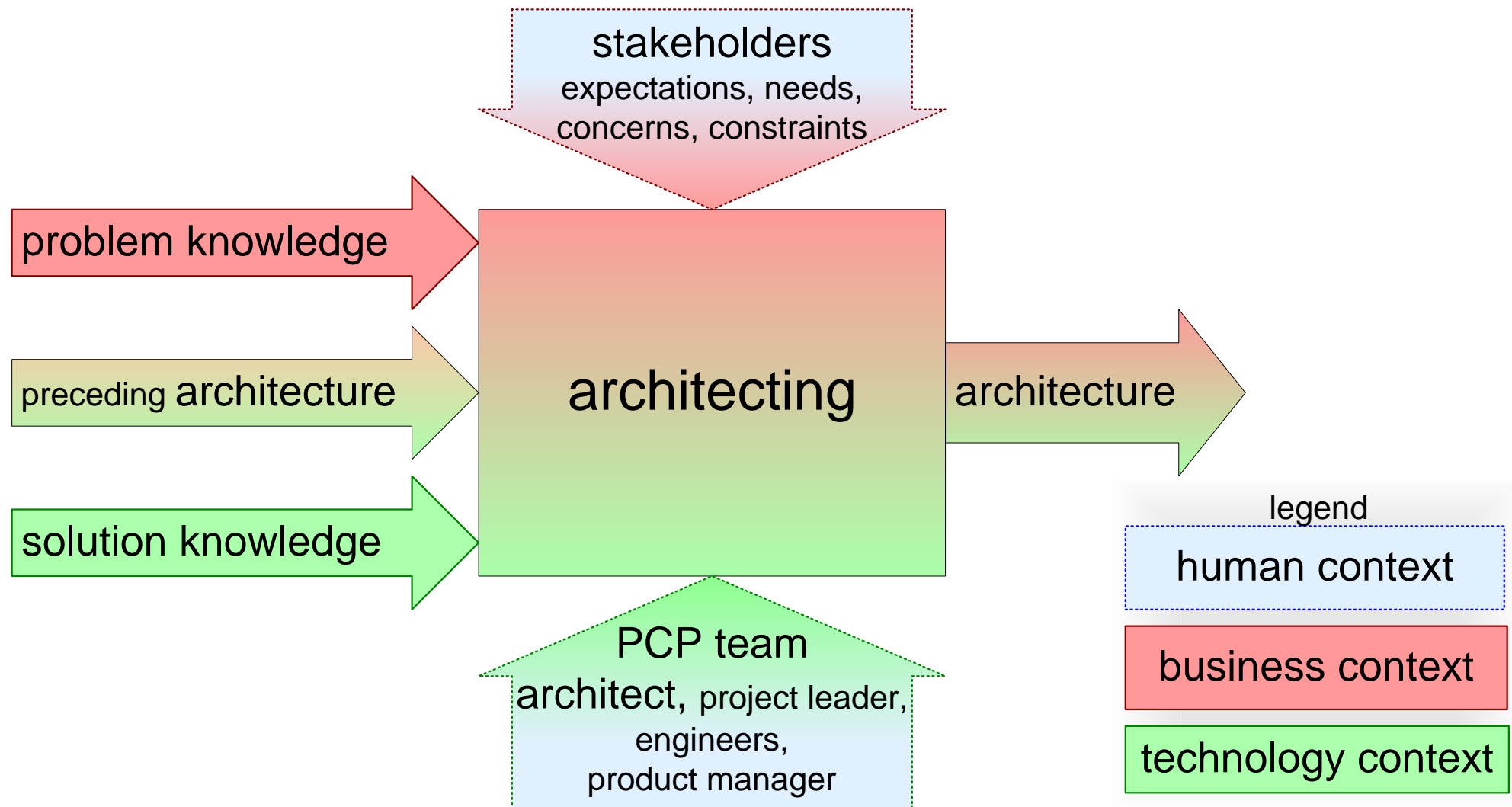
old: screen copy



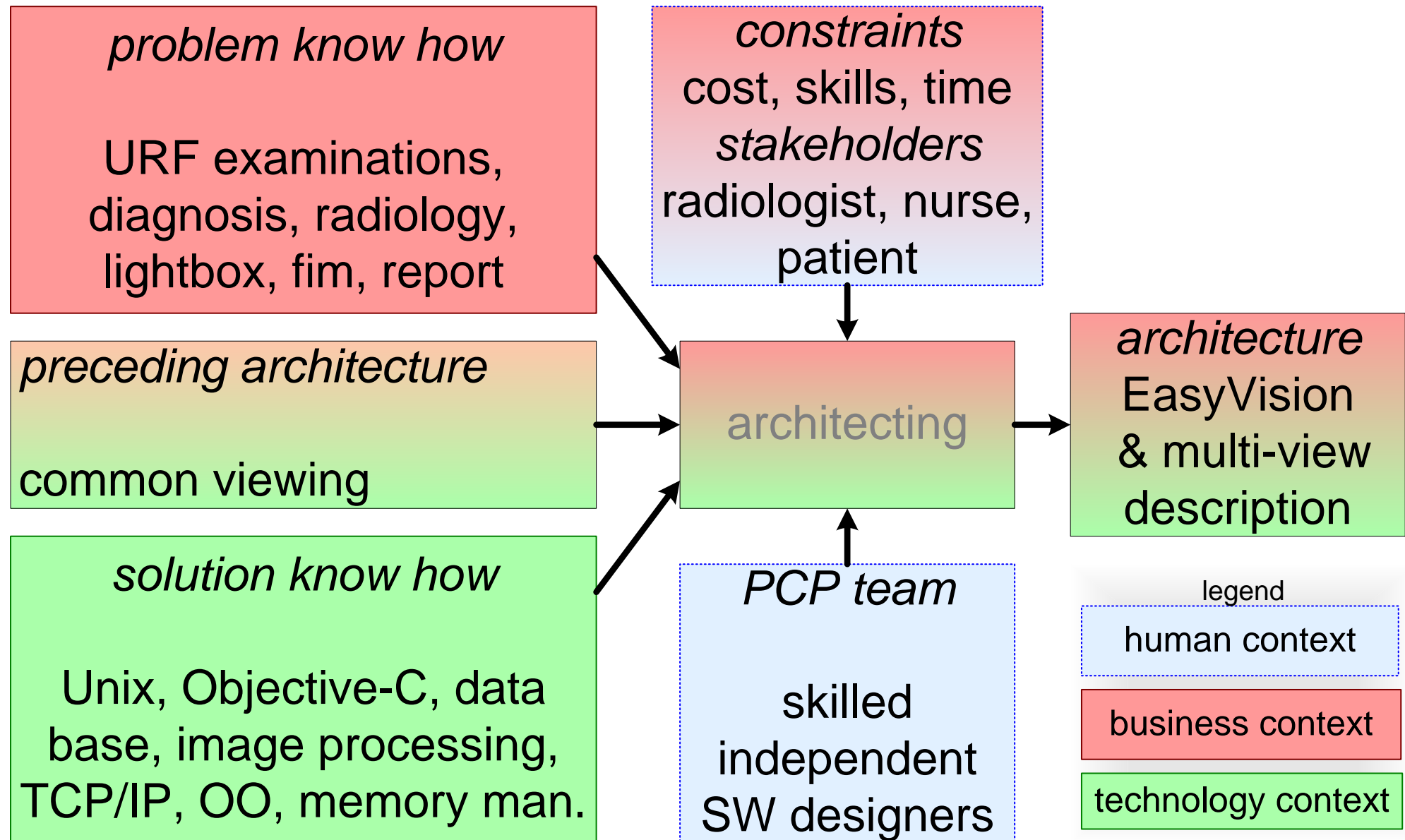
new: SW formatting

20 to 50% less film needed

# Architecting = creating an architecture

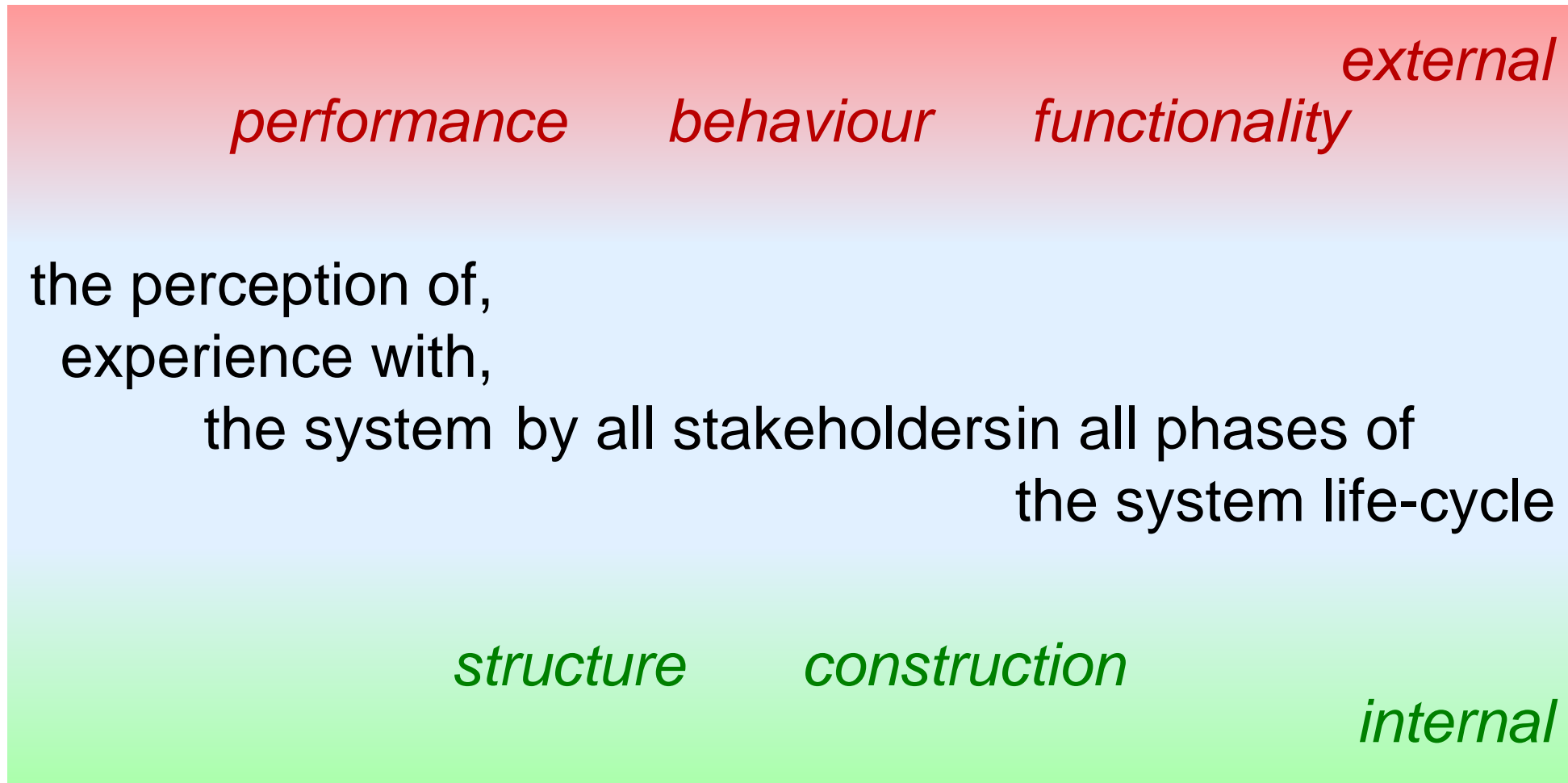


# Architecting EasyVision



# Architecture = tangible <sub>(internal)</sub> + intangible <sub>(external)</sub>

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# EasyVision Architecture

*external*

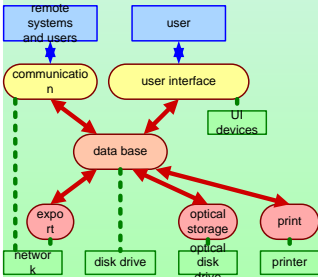
*3 exam rooms      3 films/exam      contrast      autoprint      autostorage*  
*clinical details*

the perception of,  
experience with,  
the system

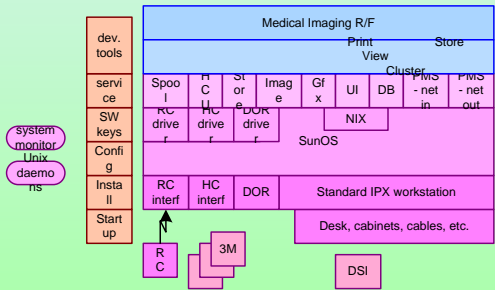
by all stakeholders

in all phases of  
the system life-cycle

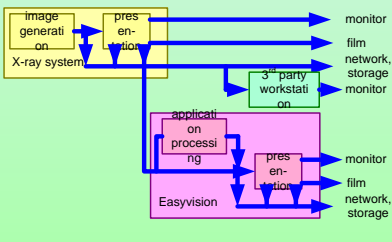
*SW  
processes*



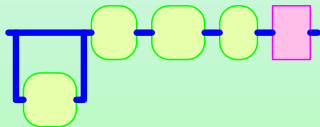
*construction  
decomposition*



*image  
quality  
context*



*processing  
pipeline*

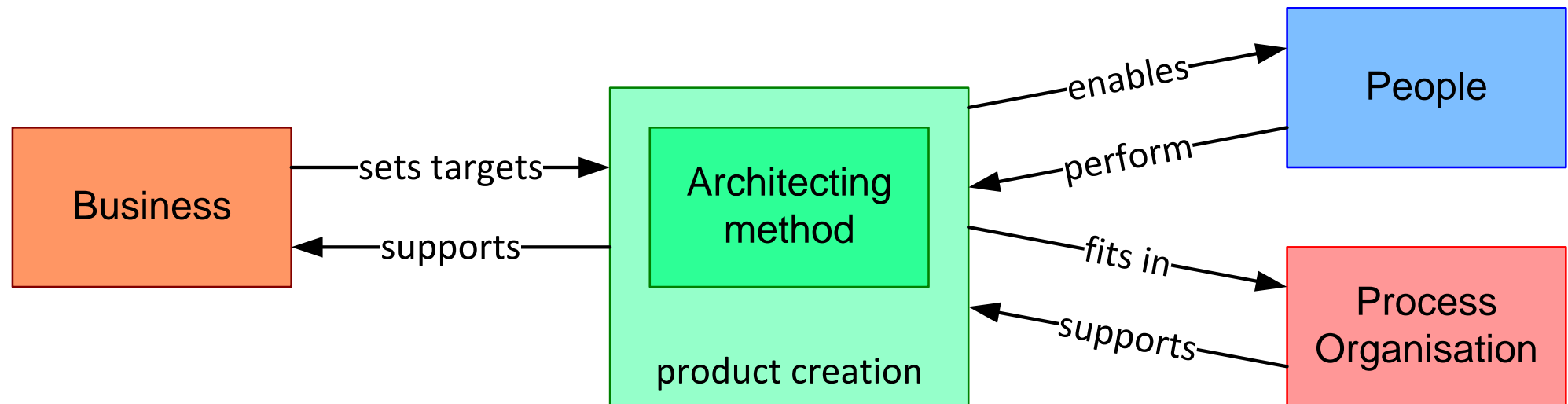


*internal*

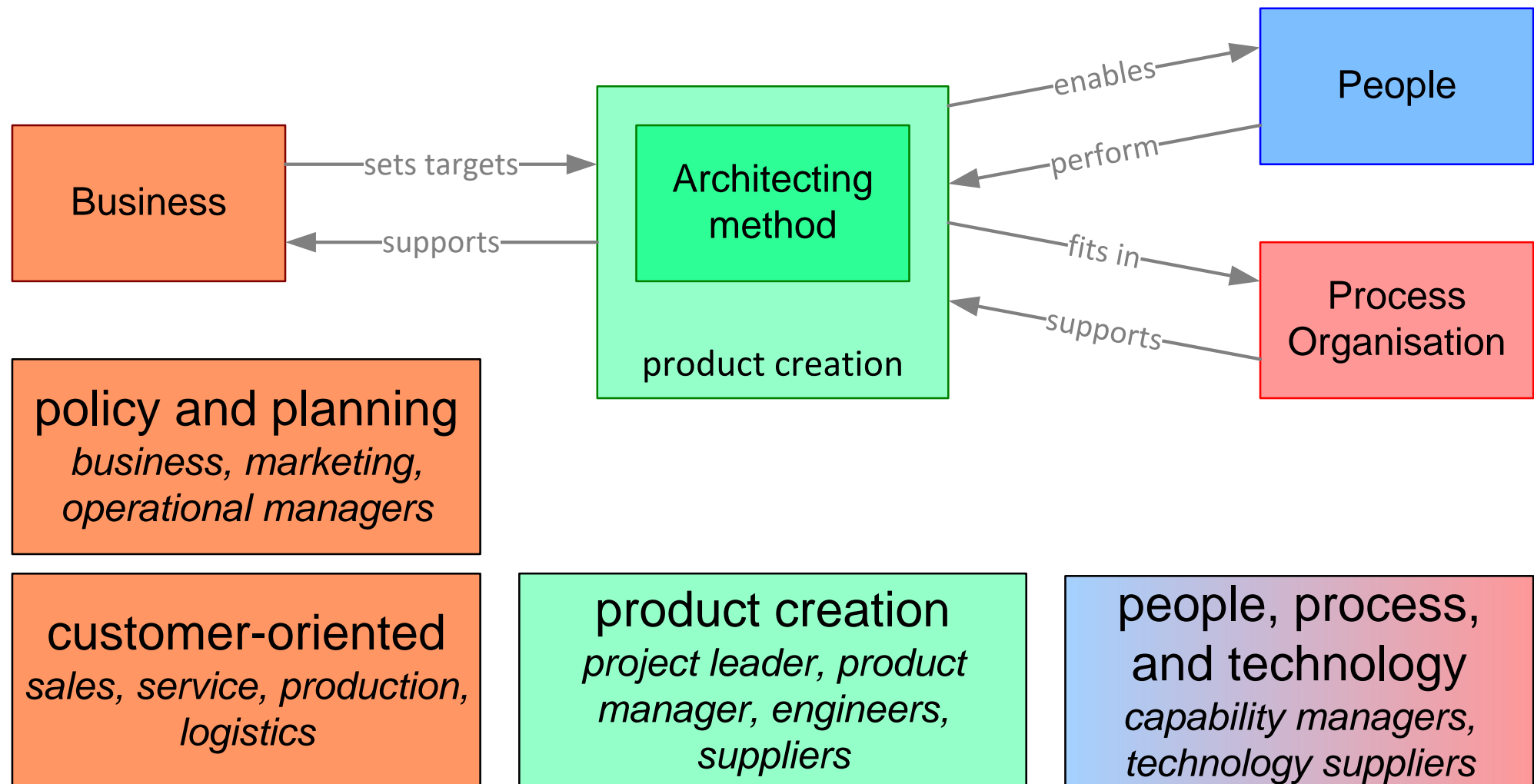
*memory  
budget*

memory budget in Mbytes				
	code	obj data	bulk data	total
shared code	11.0			11.0
UI process	0.3	3.0	12.0	15.3
database server	0.3	3.2	3.0	6.5
print server	0.3	1.2	9.0	10.5
DOR server	0.3	2.0	1.0	3.3
communication server	0.3	0.2	4.0	6.3
UNIX commands	0.3	0.5	0	0.5
compute server	0.3	0.5	6.0	6.8
system monitor	0.3	0.5	0	0.8
ASW total	13.4	12.6	35.0	61.0
UNIX Solaris 2.x				10.0
file cache				3.0
total				74.0

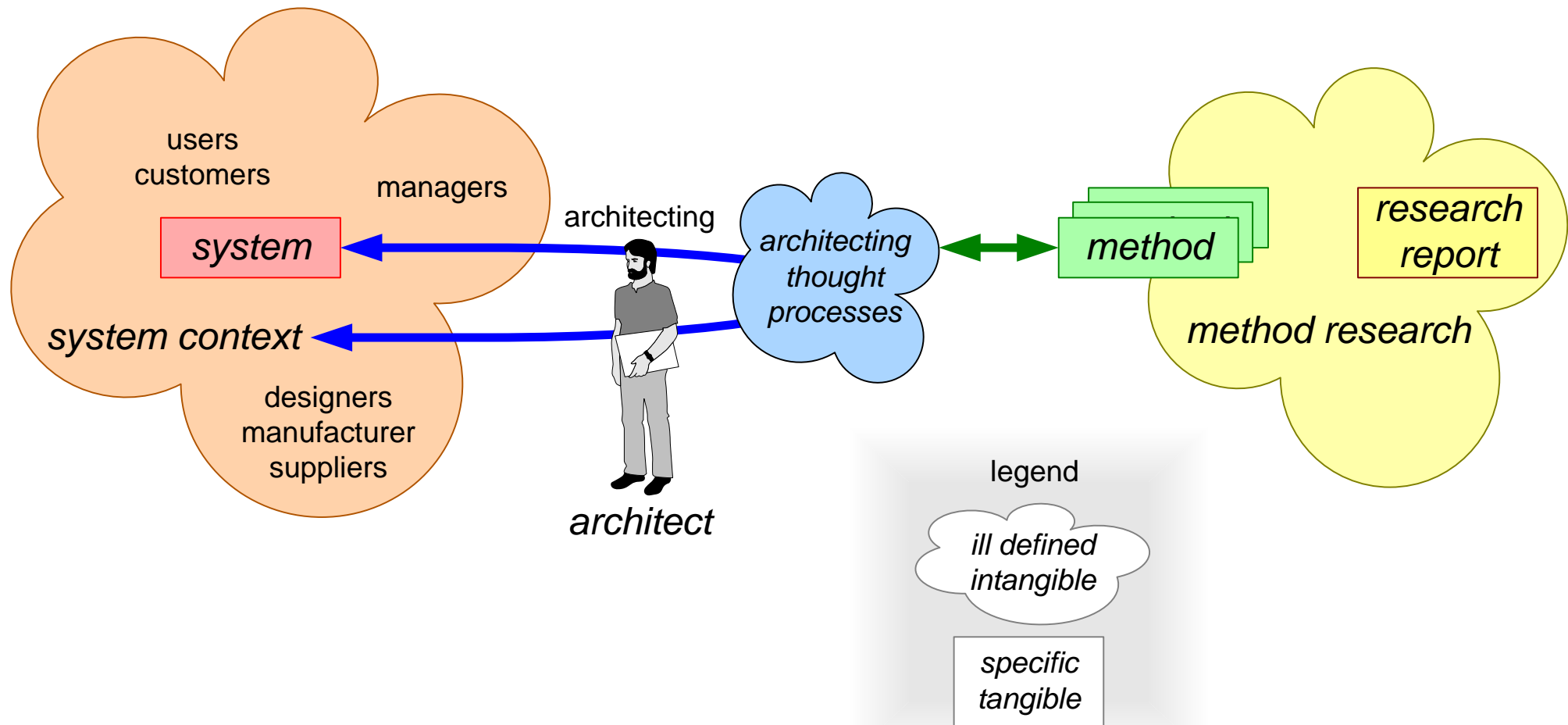
# The business context of architecting methods



# Internal stakeholders

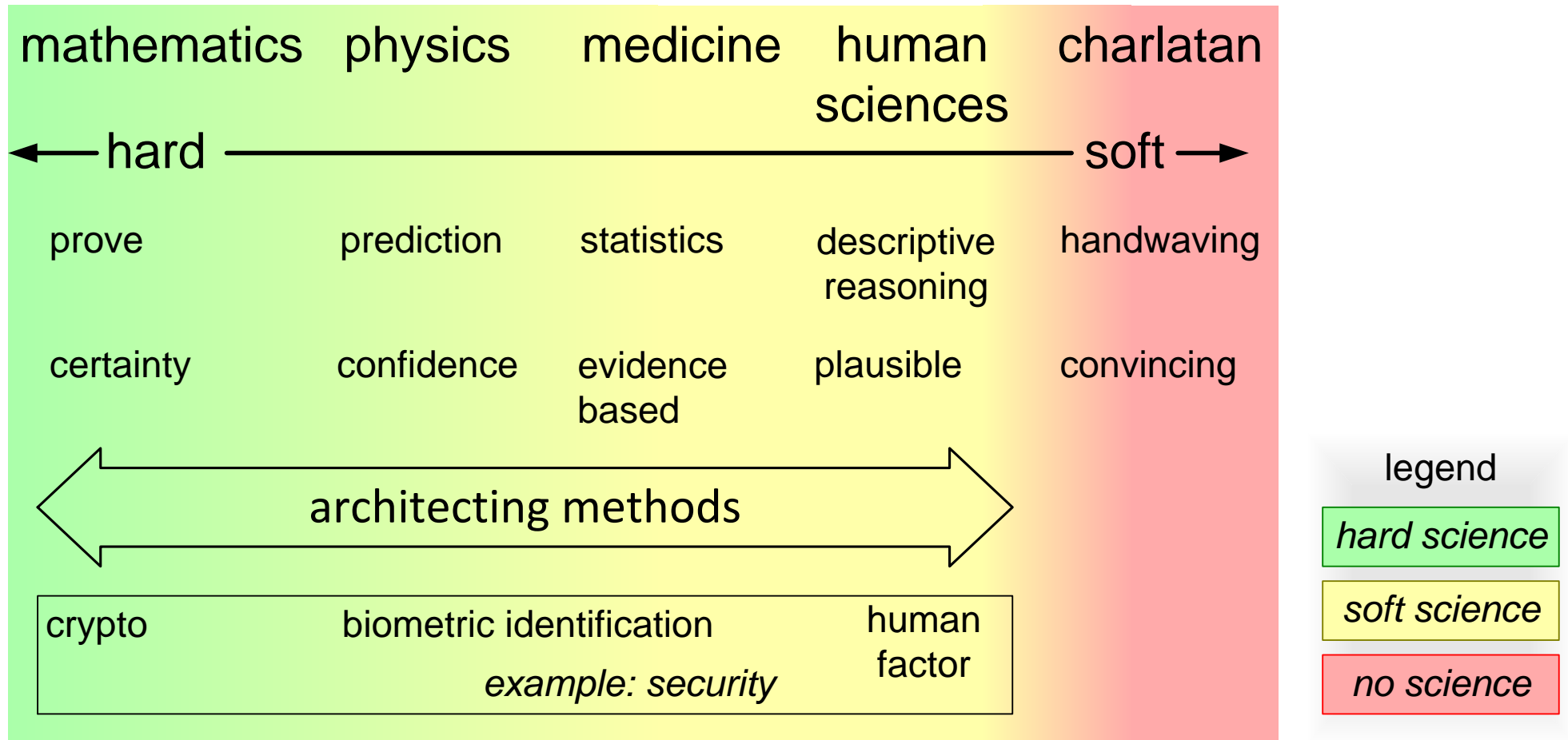


# Context of Architecting Method Research

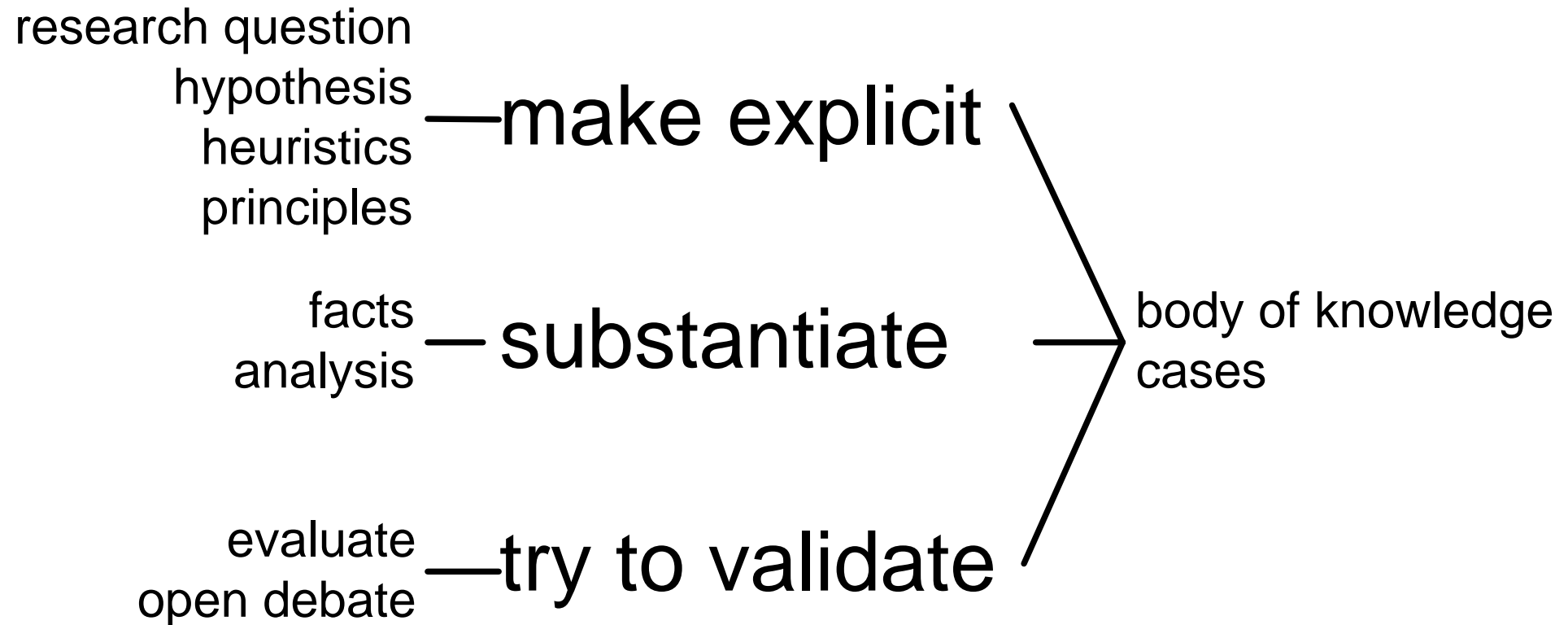




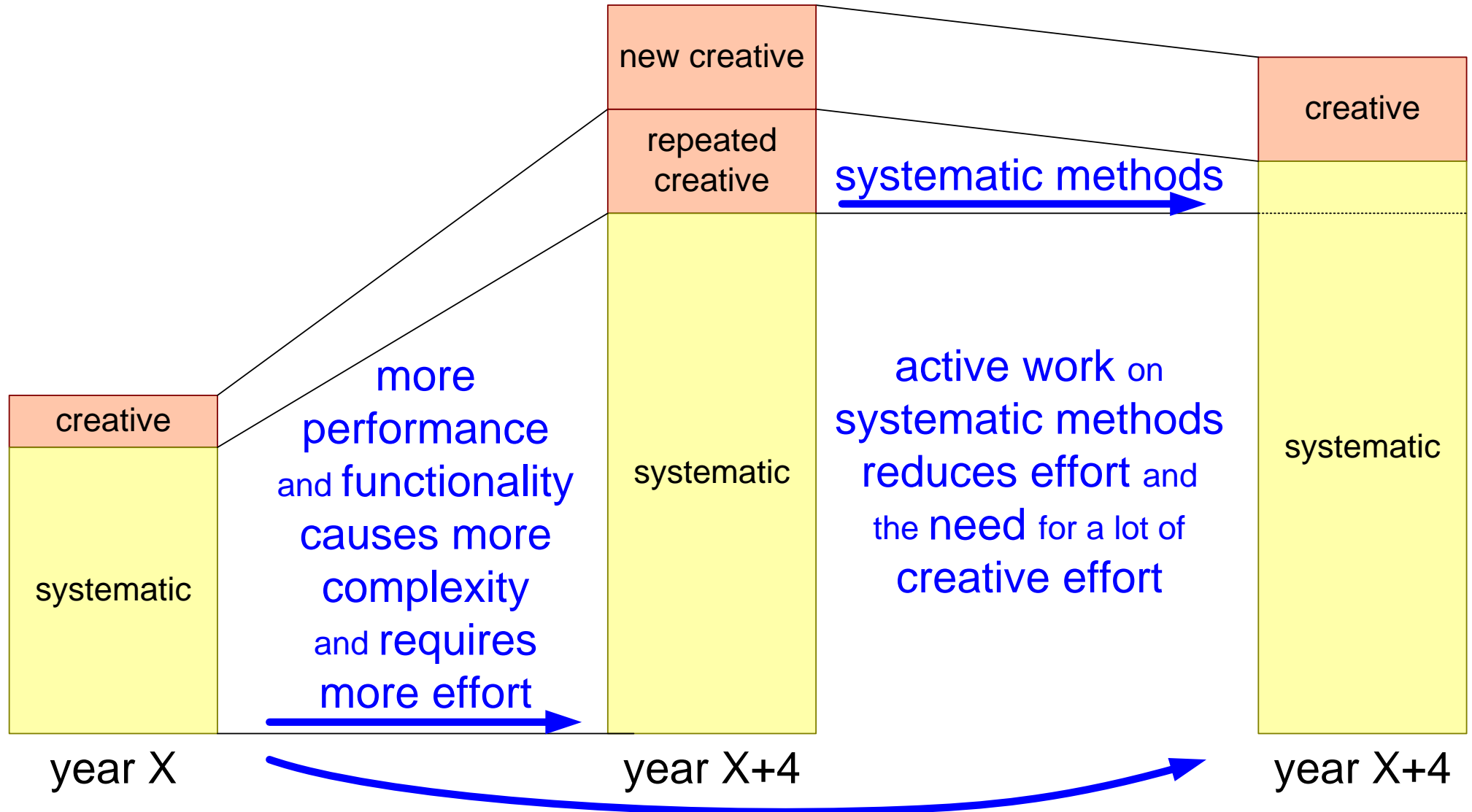
# Spectrum of sciences

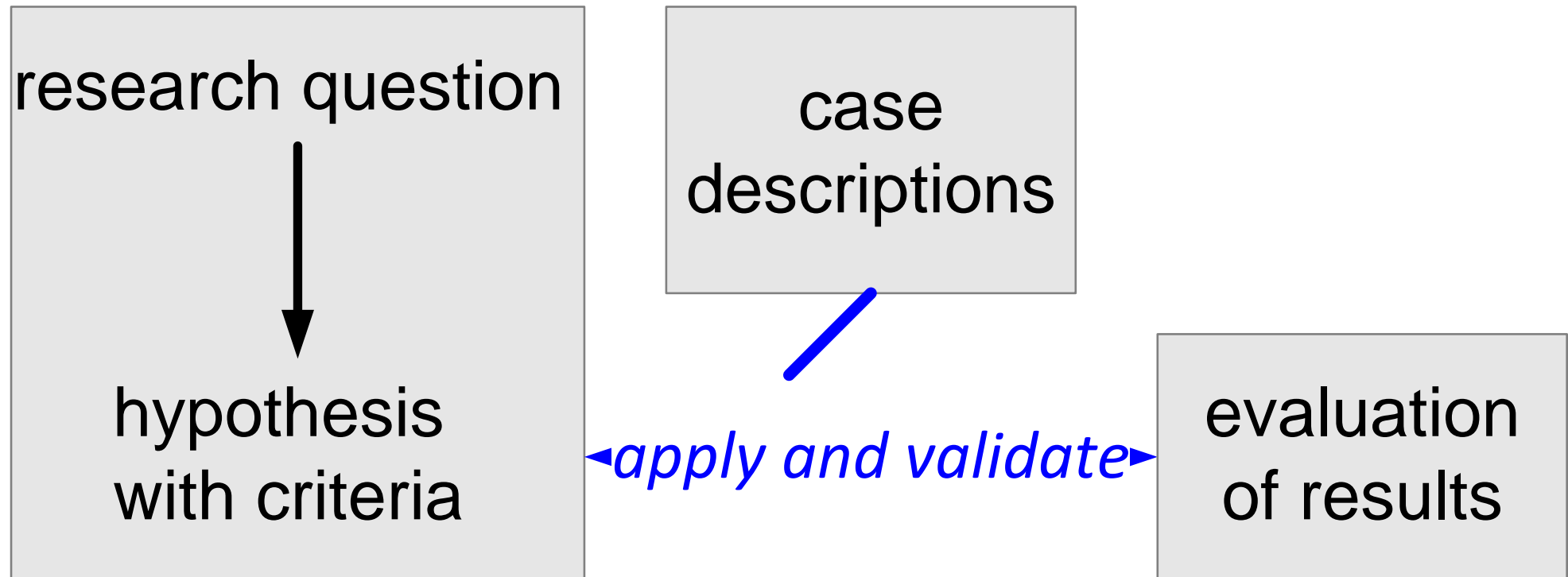


## *soft is not in conflict with scientific attitude*



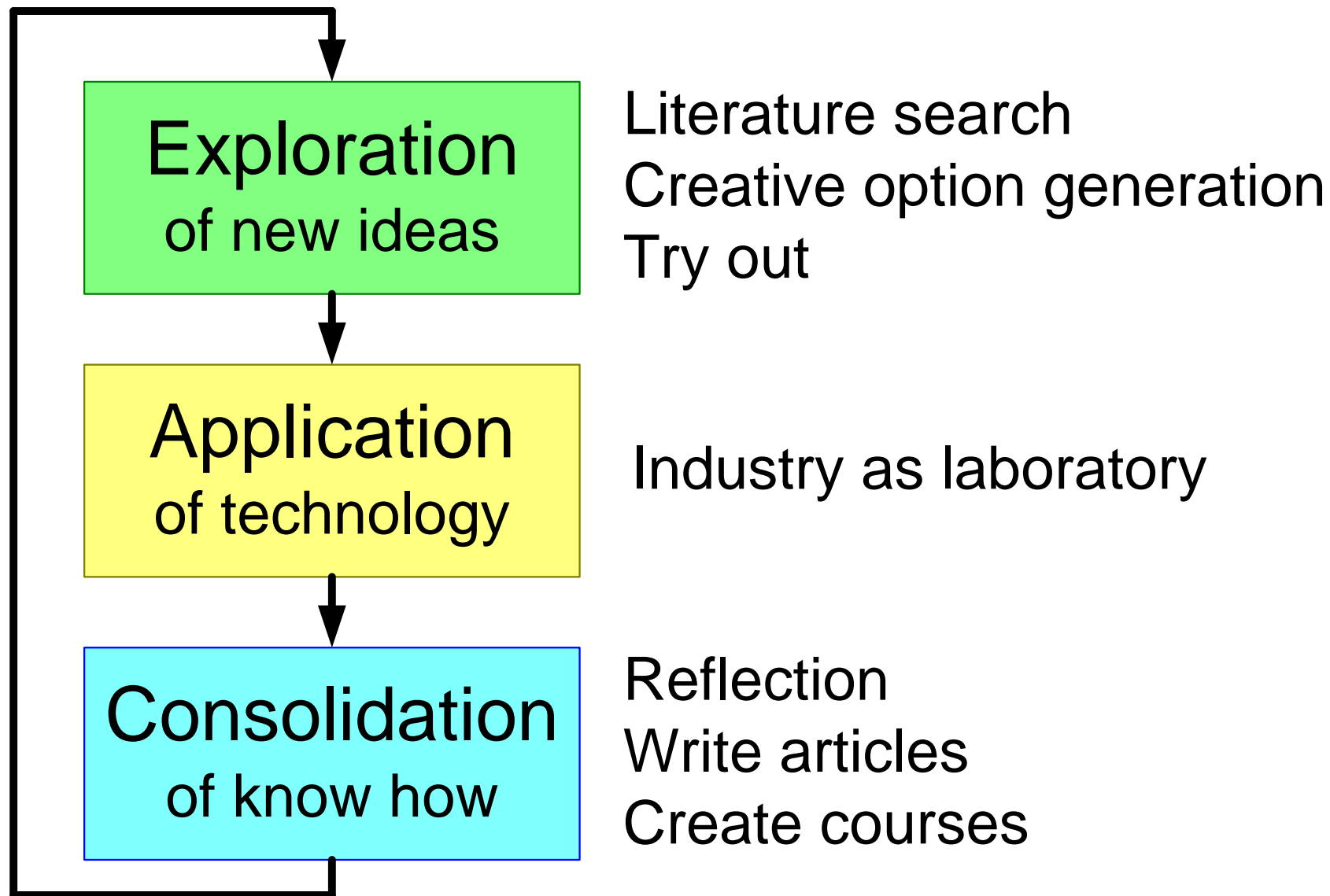
# Systematic Know-how to cope with Growing Complexity



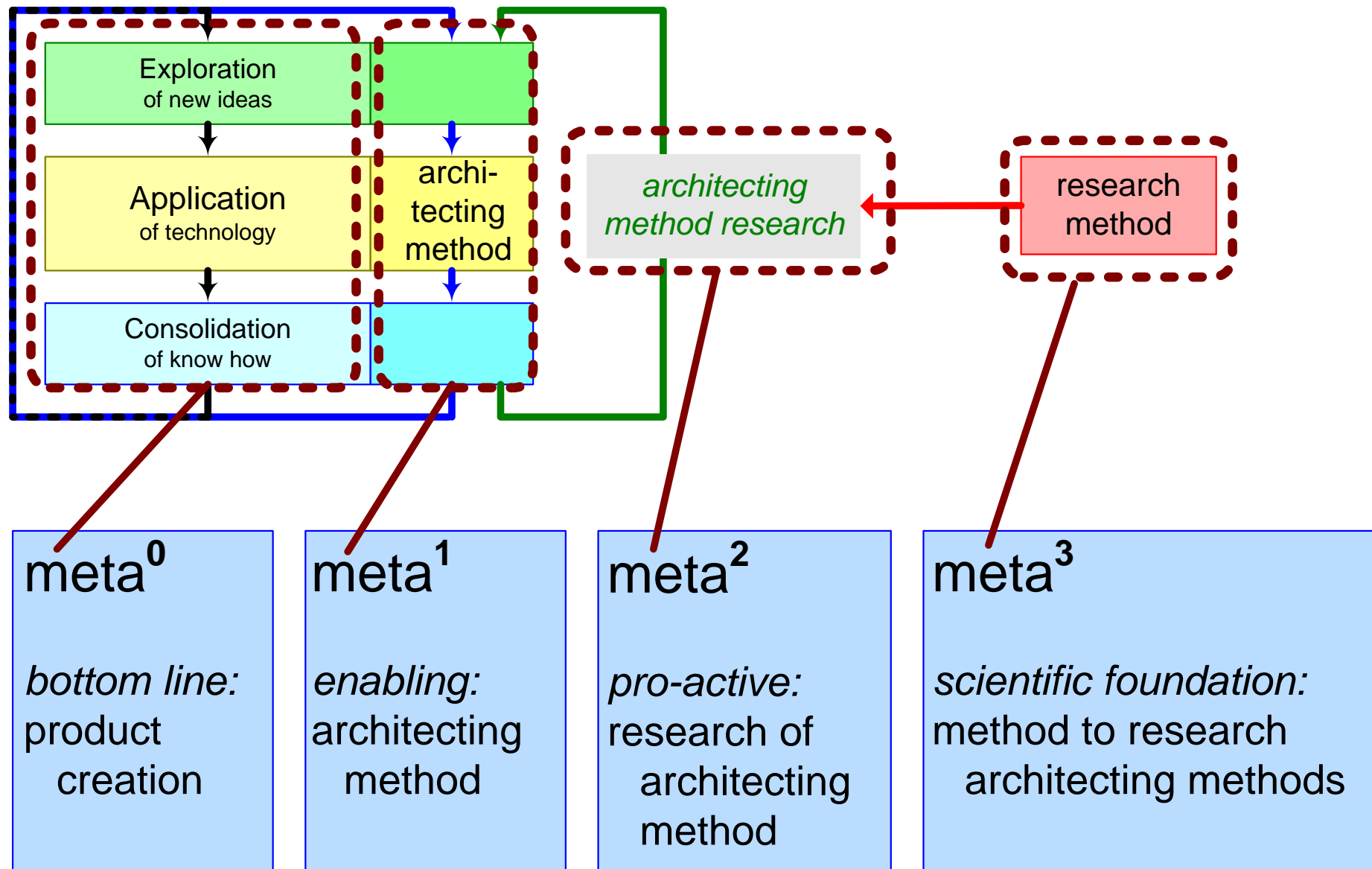


# Technology Management Cycle

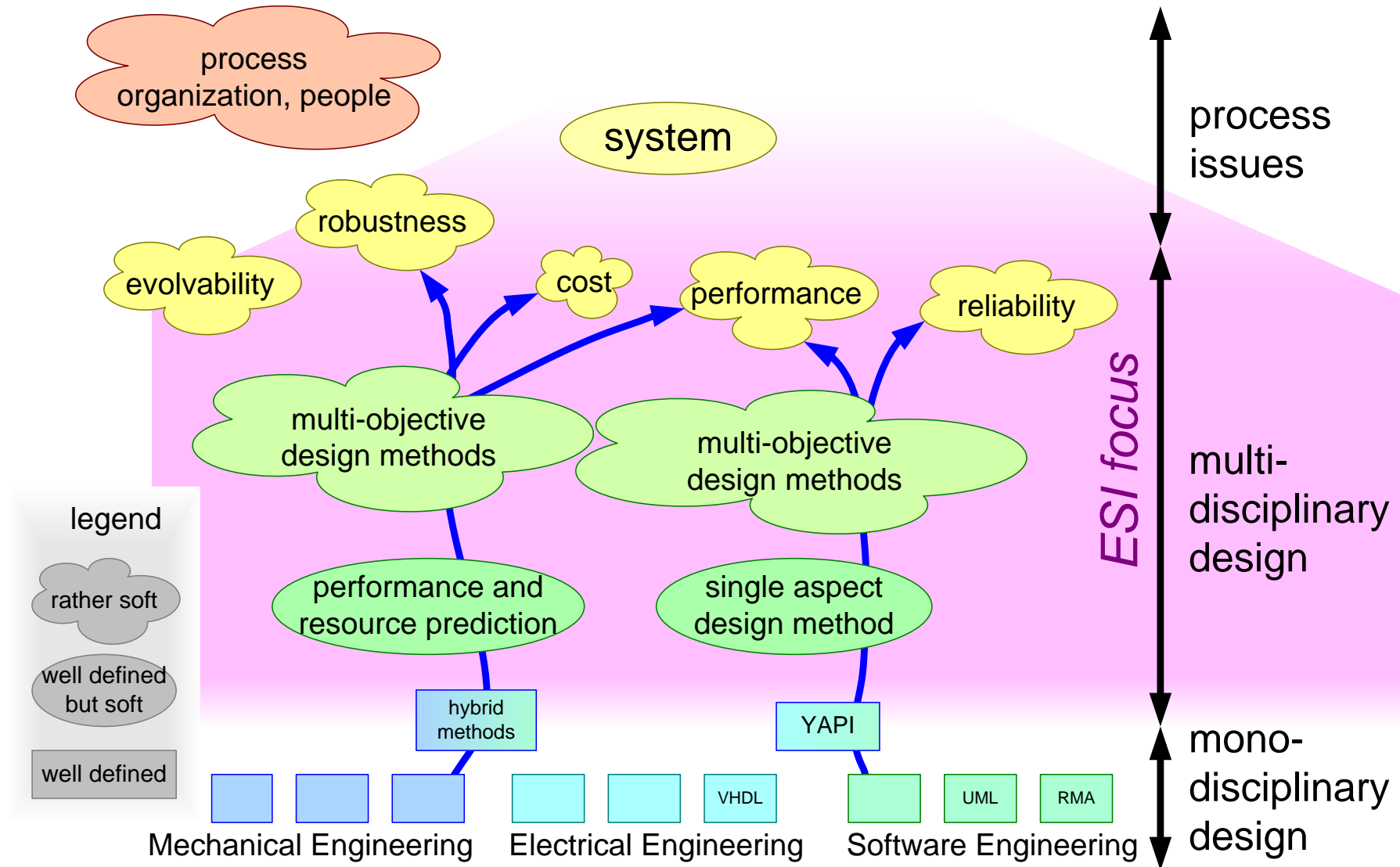
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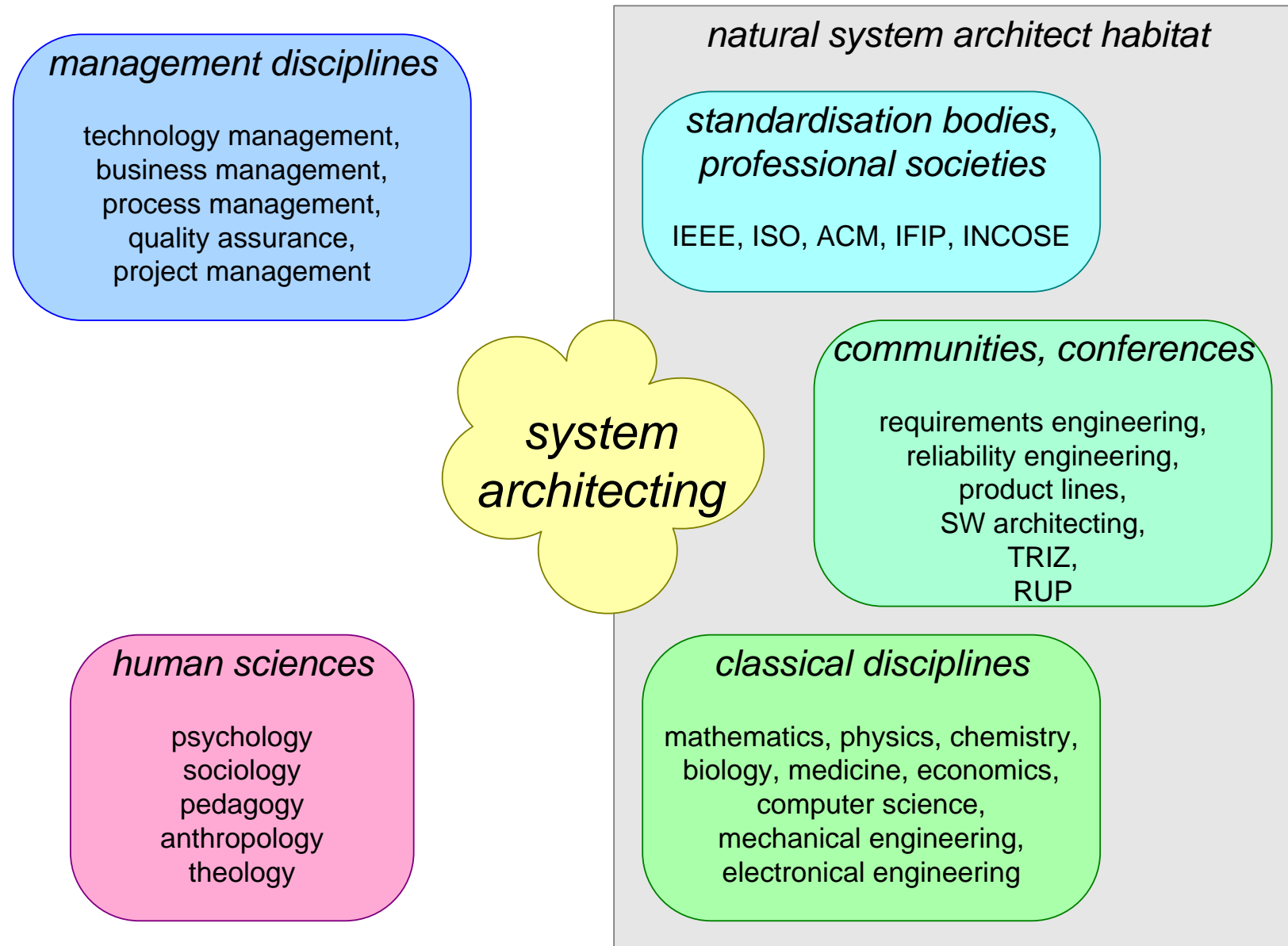
# Moving in the *meta* direction



# System ?= Multi-disciplinary

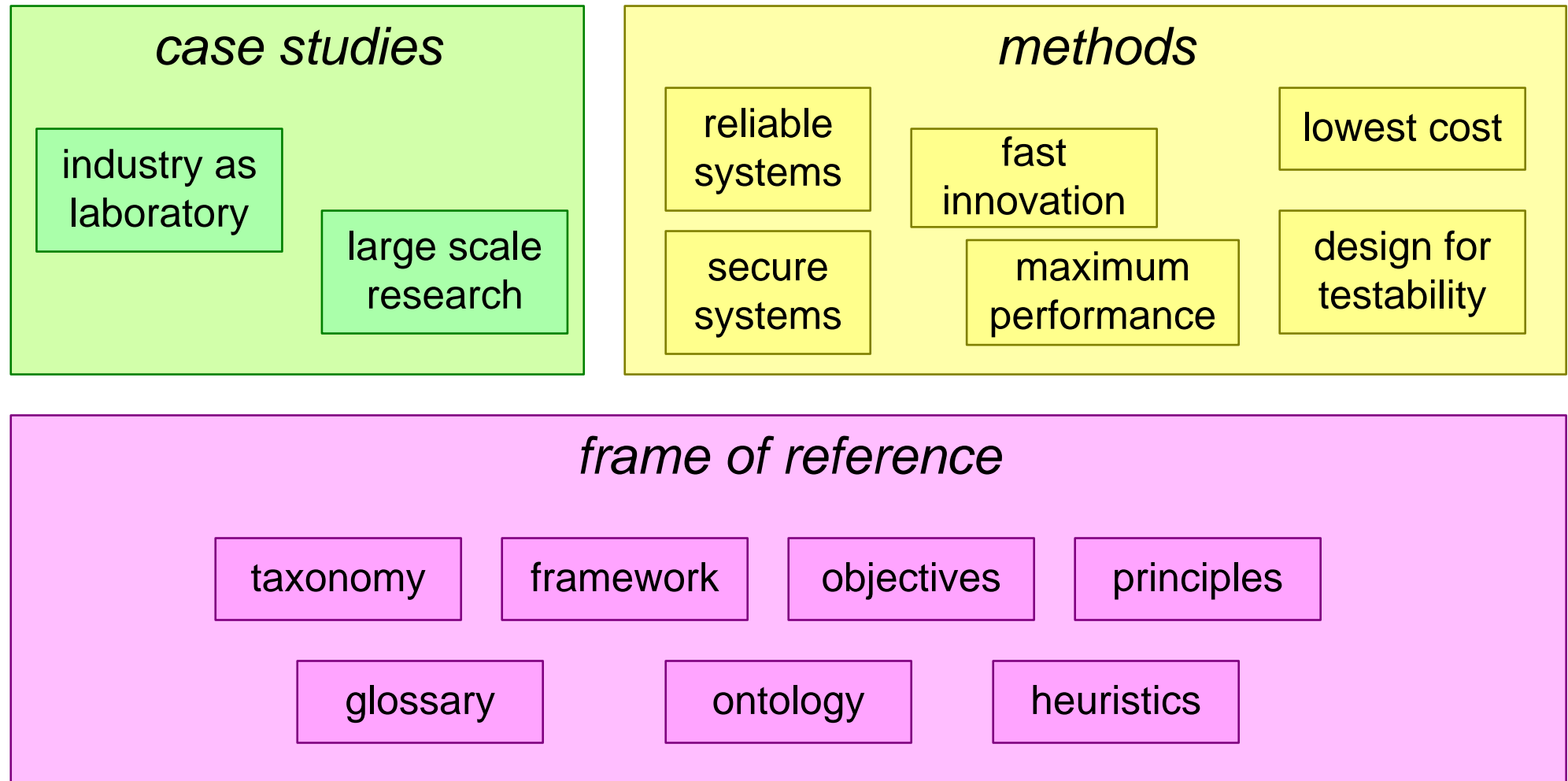


# The context of architecting

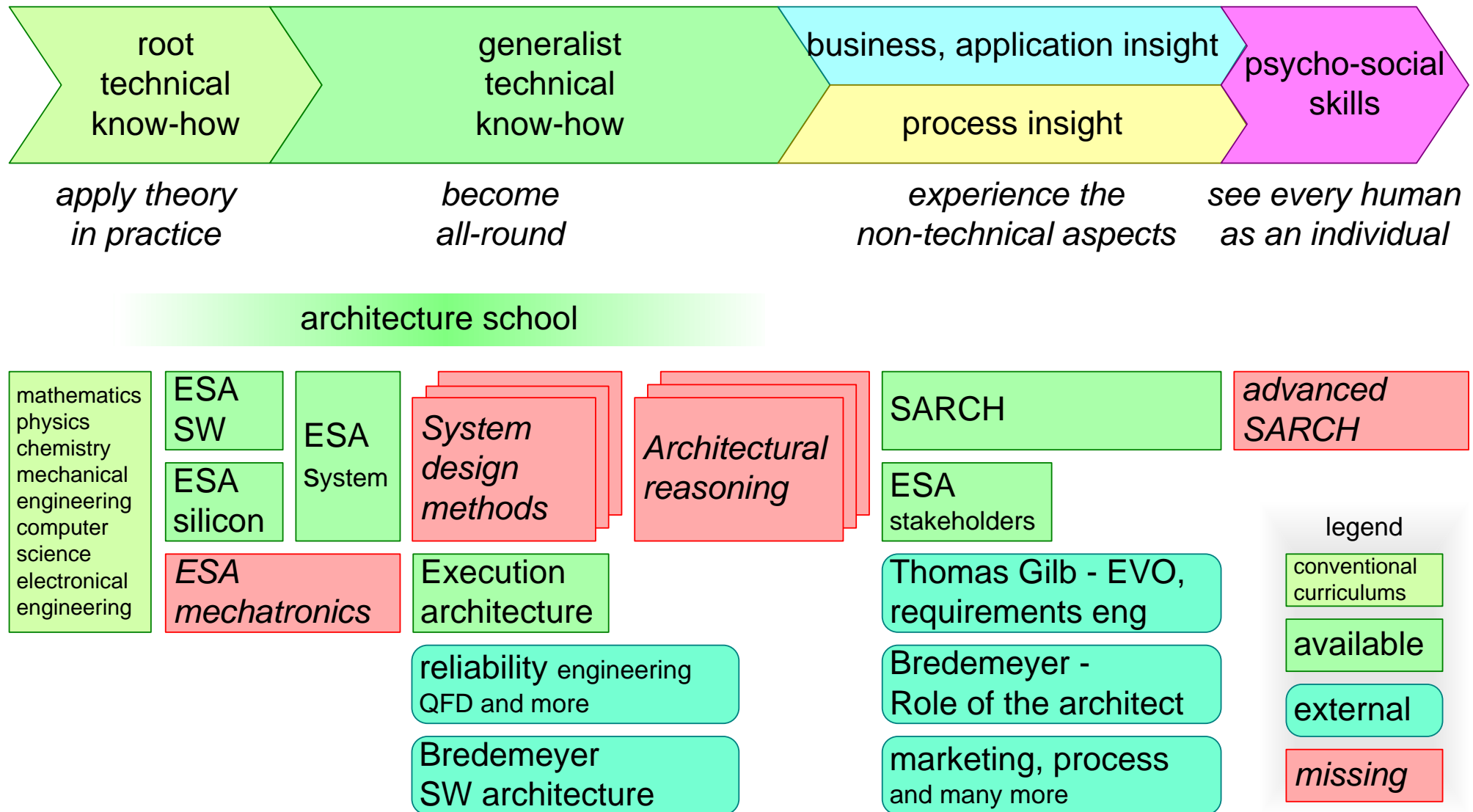




# System architecting research: to do



# Curriculum system architecting



# Courses based on Gaudí Material

Course	Abbreviation	Duration (in days)	Participants per course	Target audience
System Architecture	SARCH	5	16	architects stakeholders of architects
Management SARCH	MSARCH	2	16	management teams
Embedded Systems Architecting; Stakeholders	ESA	3	16	potential architects
Requirements Engineering as part of OOTI curriculum	OOTI	5	12-18	post-doctoral students
Embedded Systems context	EScontext	4	30	masters students
Execution Architecture (with Ton Kosteljik)	EXARCH ASP	4..5	16	SW designers architects
Multi-Objective System Architecting and Design	MOSAD	3..5	16	designers architects
System Modeling and Analysis	MA611	3..5	16	designers architects

# Status of Courses

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Course	Abbreviation	number of courses upto March 2008	appr. total participants
System Architecture	SARCH	44	660
Management SARCH	MSARCH	7	72
Embedded Systems Architecting; Stakeholders	ESA	20	300
Requirements Engineering as part of OOTI curriculum	OOTI	7	125
Embedded Systems context	EScontext	3	90
Execution Architecture (with Ton Kostelijk)	EXARCH ASP	11	160
Multi-Objective System Architecting and Design	MOSAD	3	36
System Modeling and Analysis	MA611	2	16

`http://www.gaudisite.nl/index.html`