Guidelines for Visualization

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Abstract

his document gives a number of concrete guidelines for visualizations, such as block diagrams, flow diagrams, graphs, decompositions, et cetera.
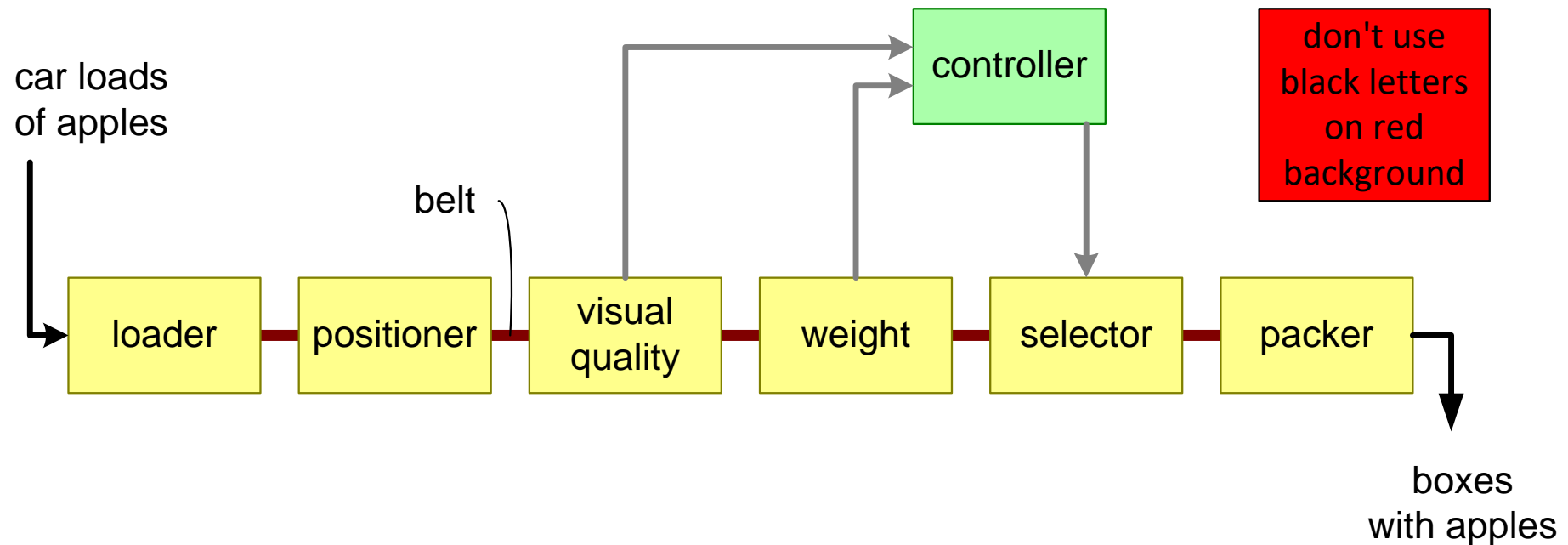
logo
TBD

September 1, 2020
status: planned
version: 0.1

Readability

car loads
of apples

belt

```
controller
```

don't use
black letters
on red
background

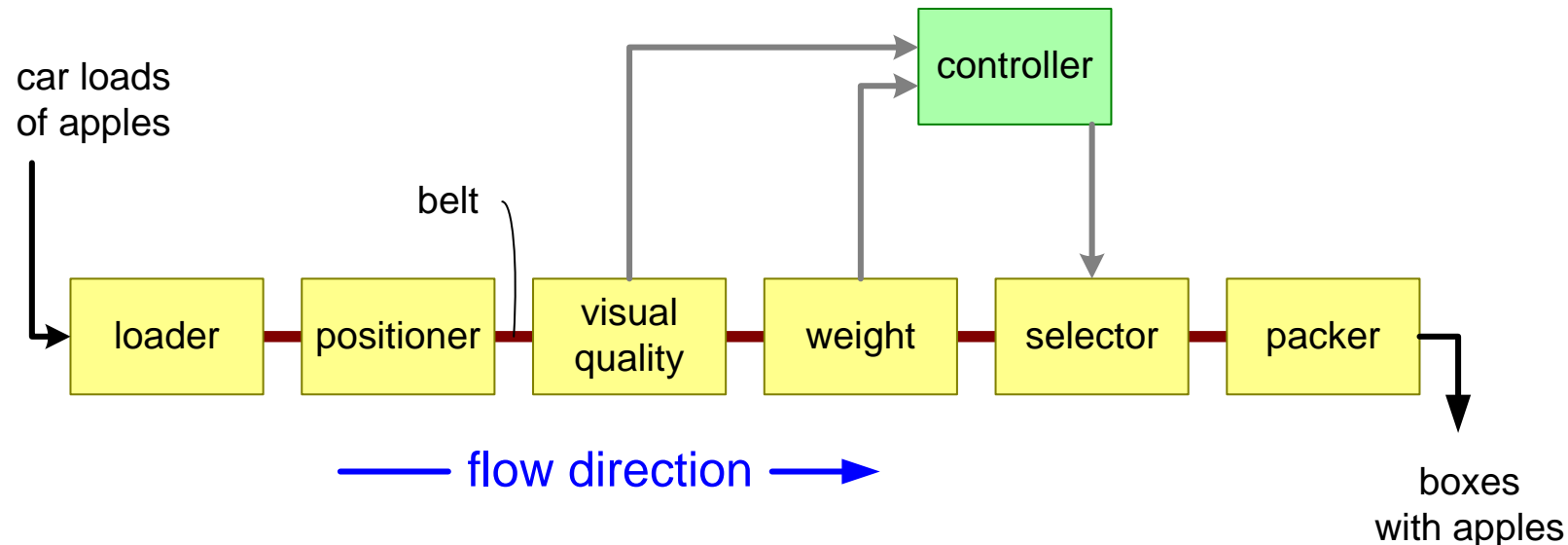loader — positioner — visual quality — weight — selector — packer

boxes
with apples

Texts should be readable, in PowerPoint minimum font size 14 pt

(or if you print a slide on A4, put the paper on the floor,

then you should be able to read the text)

Text and background should have sufficient contrast

(black letters on red background tend to be unreadable)

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Layout

controller

car loads
of apples

belt

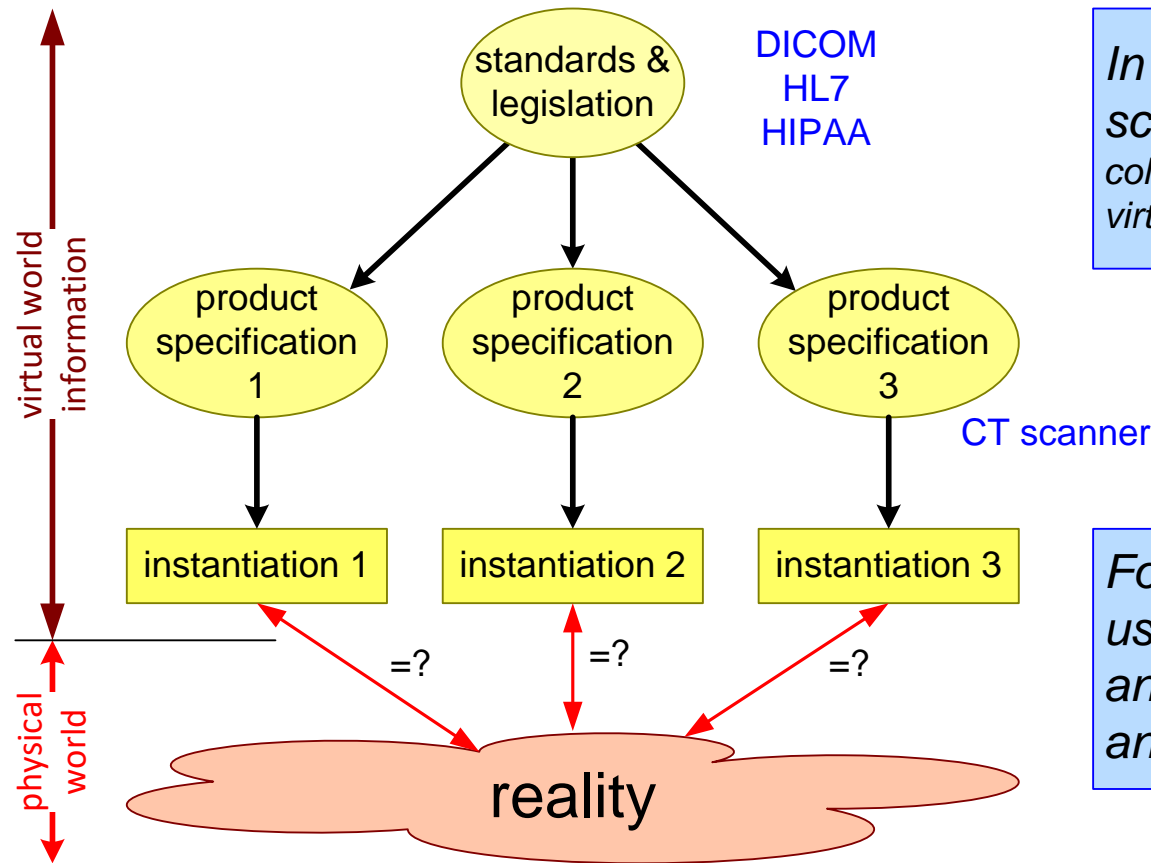| loader | positioner | visual quality | weight | selector | packer |

flow direction

boxes
with apples

Boxes (ellipses, rectangles, triangles, et cetera) should have the same size, unless the size has a clear meaning;

don't size the box to the text, since readers might interpret size in a way that you did not intend.

use the layout (left-right, up-down, close-remote) to support the message of the diagram; e.g. flow from left to right or from top to bottom.

design the layout such that there are few crossing lines;

this is often kind of puzzle.

Color

standards & legislation

DICOM
HL7
HIPAA

product specification 1

product specification 2

product specification 3

CT scanner

instantiation 1

instantiation 2

instantiation 3

=?   =?   =?

reality

virtual world information

physical world

In this example the color scale is used functionally; the color indicates the "degree of virtuality"

For readability the Gaudi site uses light background colors and darker colors for text and lines

Use colors, but limited.

Try to use additional visual support to keep the diagram usable when printed black and white or for color-blind people. Alternate means to add meaning are shape (e.g. rectangles with rounded corners), line thickness, dotted lines, alternate end points or connectors.
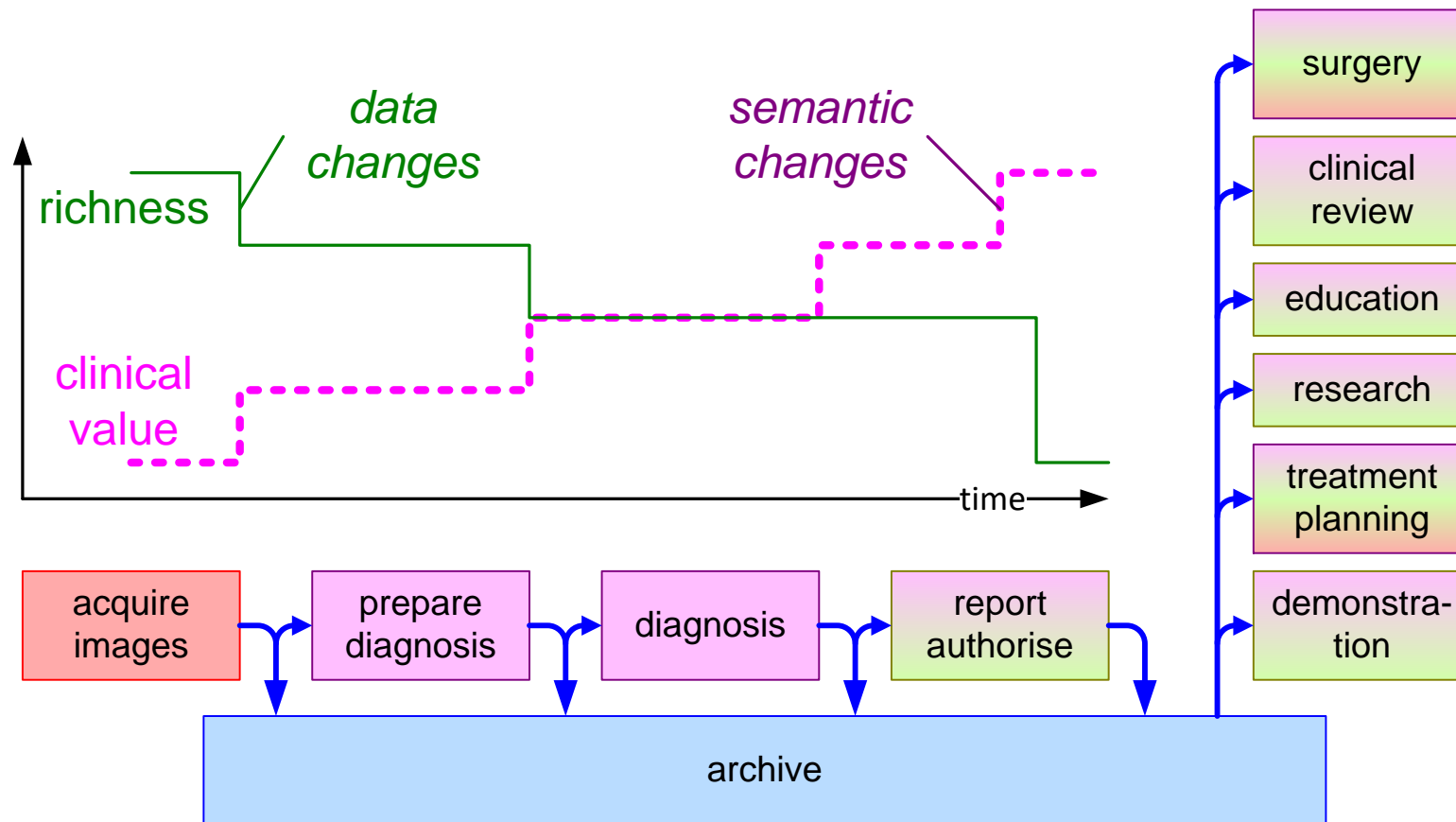
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Information

Limit the amount of information in one diagram.

Two or three types of information can be combined in one diagram. For example a block diagram that also shows effort, risk or complexity as size of the boxes. Or a flow diagram with annotations where the functions are allocated.

Generic and Specific

integrating **multiple**

applications

cilinical analysis
clinical support
administrative
financial
workflow

in **multiple**

languages
cultures

USA, UK,
China, India,
Japan, Korea
France, Germany
Italy, Mexico

delivered by **multiple**

vendors

Philips
GE
Siemens

based on **multiple**

media, networks

DVD+RW
memory stick
memory cards
bluetooth
11a/b/g
UTMS

and **multiple**

standards

Dicom
HL7
XML

and **multiple**

releases

R5
R6.2
R7.1

Annotate generic diagrams with specific examples; A generic diagram often captures some valuable insight, however, the examples help readers in understanding the diagram.

Use font size and type to visually differentiate main generic message and supportive specific examples

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Attractiveness

..~1985
autonomous subsystems:
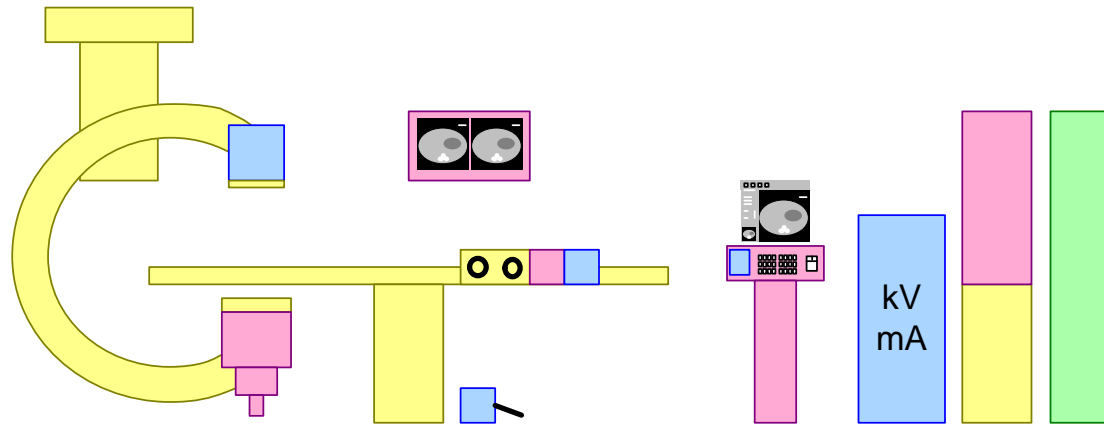
| Geo | Acquisition | Imaging | X-ray generation |

sales: preferred configurations; arbitary configurations are more expensive
system integration (SI) in R&D
    SW in all subsystems
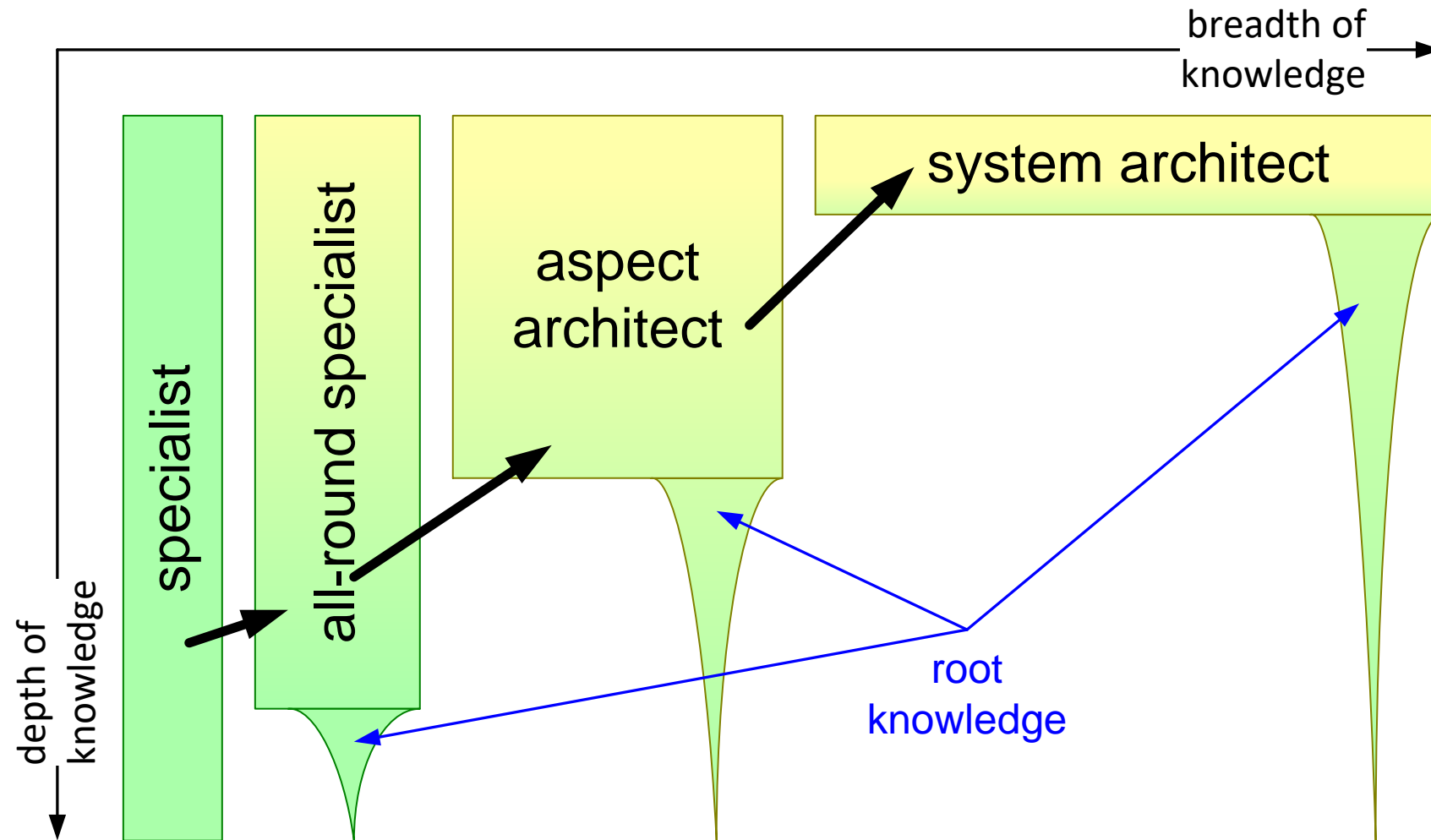   SI is is electro mechanical *and configuration parameters*
innovation elapsed time several years (f.i.,2 years for digital imaging chain)

kV
mA

in some cases 2D/3D drawings or photos help to make a diagram more accessible (less abstract). However, it also "clutters" the diagram. So use these "real" objects sparsely

Use animations sparsely. Animations can be very powerful to visualize processes or flows. However, animations cannot be printed. Avoid animations that only make the presentation more sexy.

Message

breadth of knowledge →

depth of knowledge

specialist

all-round specialist

aspect architect

system architect

root knowledge

Good visualization bring and clarify a message. What is the take away of this visualization for your audience?

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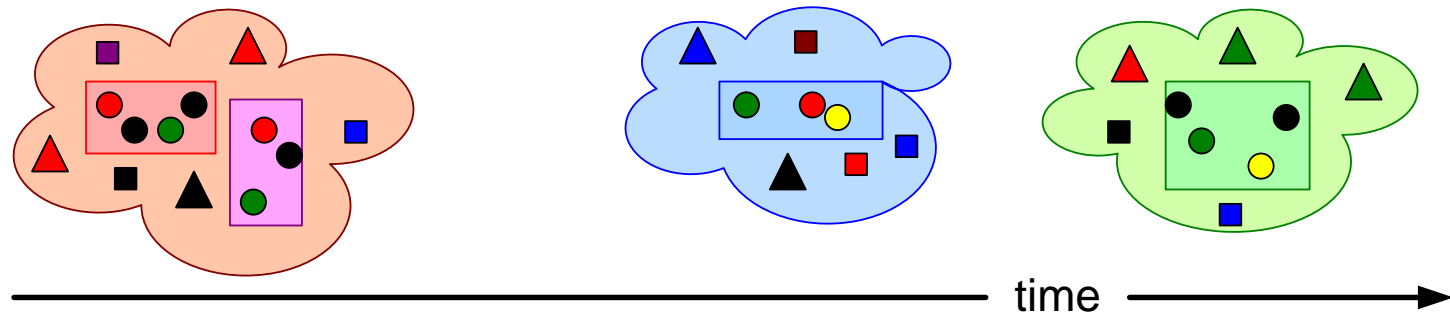
Legend

architects move from:
 product to product
 environment to environment

architects experience:
 thousands of patterns
 design patterns in systems
 process patterns in environments
 human patterns in environments

time

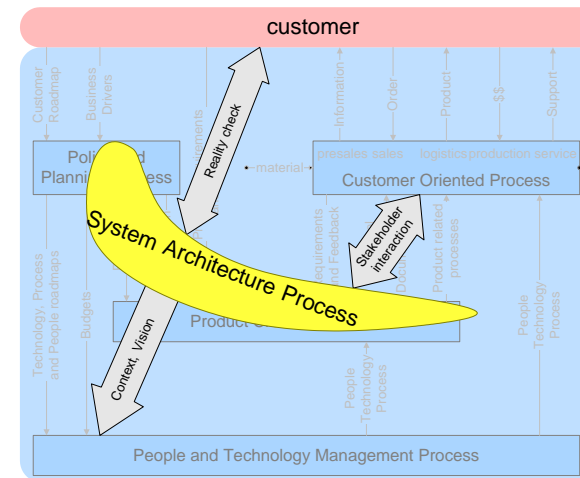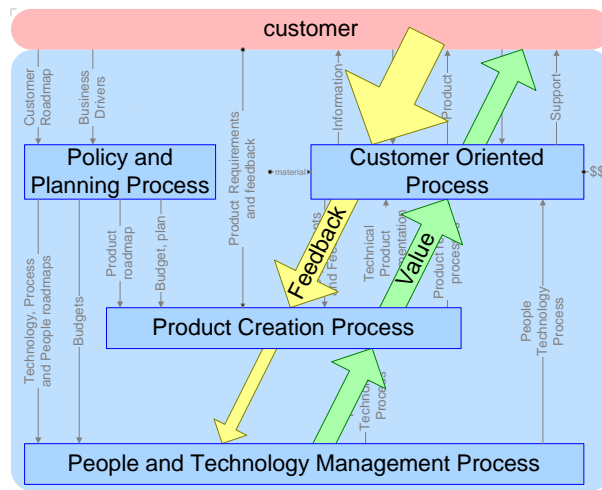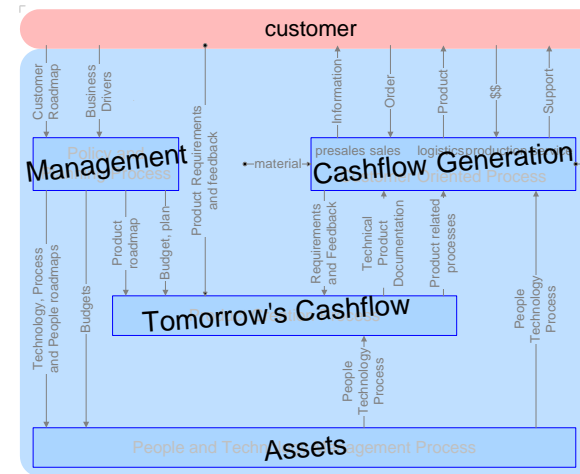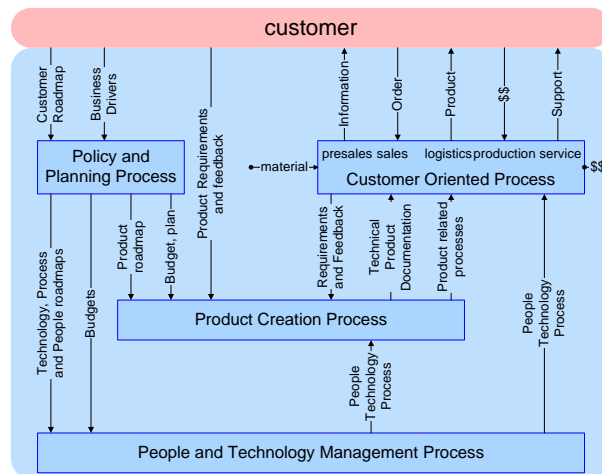legend

environment

system

● design pattern

▲ process pattern

■ human pattern

Add a legend for shapes, lines, or colors when the meaning is essential for the figure.

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Separate information, prevent overload

Don't overload diagrams; if you have tens of boxes then consider simplification or divide in multiple slides plus one overview slide.

Consider to add one overview slide when dividing over multiple slides

Summary

Texts should be readable: use sufficient font size.

Text and background should have sufficient contrast.

Shapes, such as boxes, should have the same size.

Use the layout (left-right, up-down, close-remote) to support the message of the diagram.

Design the layout such that there are few crossing lines.

Use colors, but limited.

Design the diagram such that it still works when printed in black and white.

Limit the amount of information in one diagram.

Two or three types of information can be combined in one diagram.

Annotate generic diagrams with specific examples; use font size and type to visually differentiate generic from specific.

Use 2D/3D drawings or photos limited.

Ensure that the message of the visualization is clear.

Add legend to explain shapes, colors, line types, axes, etc.