From Legacy to State-of-the-art; Architectural Refactoring

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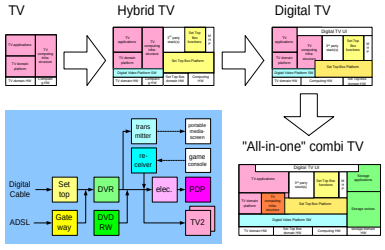
Abstract

The market of electronic appliances shows a fast increasing diversity. Manufacturers must be able to combine existing functions and new applications in a short time frame. A large amount of accumulated SW code (legacy) has to be reused in new ways.
The architecture(s) must be adapted to these new ways of working. Revolutionary adaptations have proven to be extremely risky. Opportunistic extension and integration decrease the quality of the code base, making it increasingly more difficult to continue. Architectural refactoring is a feedback based method to evolve an architecture.



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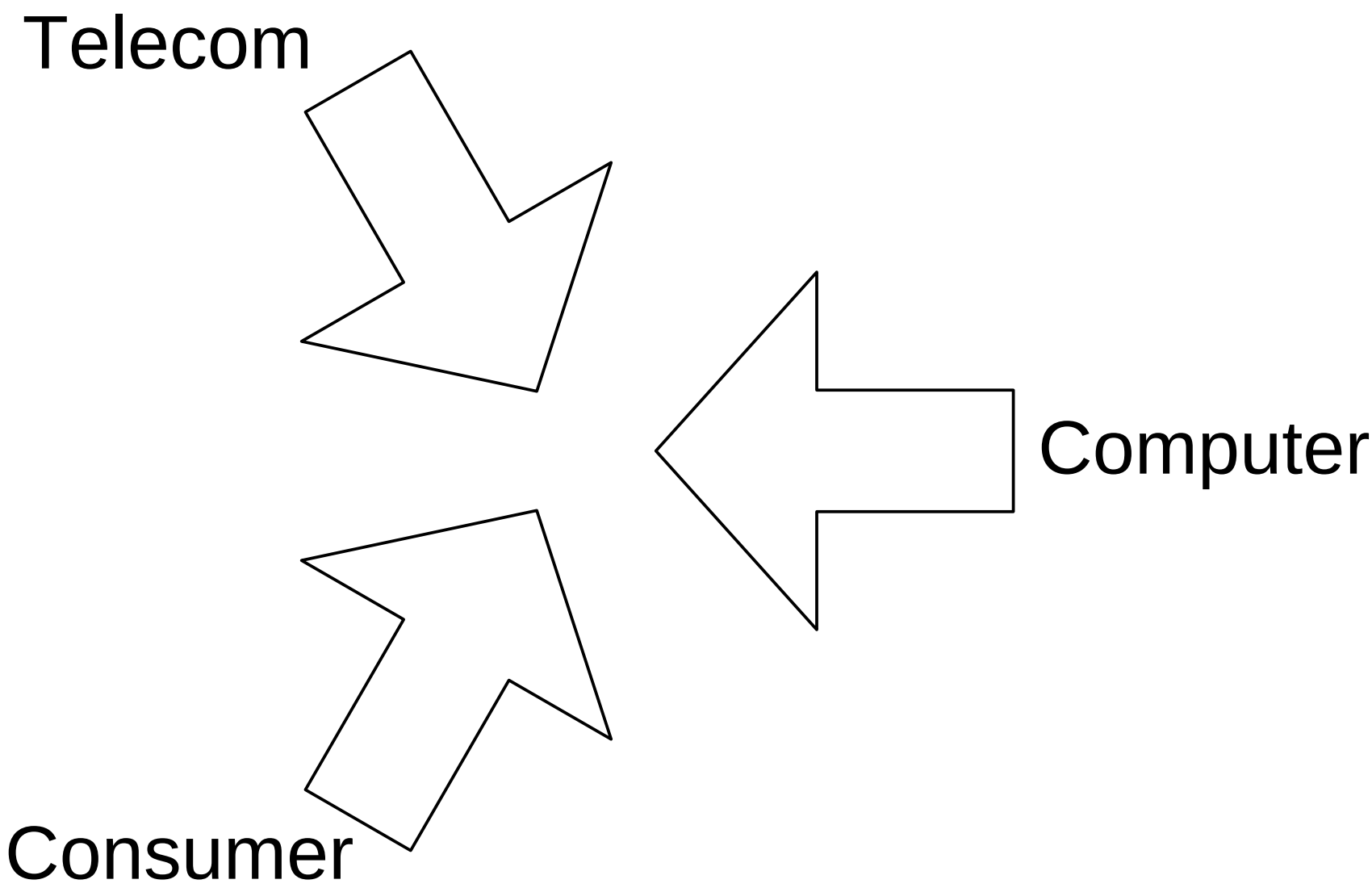
Today's Audio Video Consumer Products

From: COPA tutorial, Rob van Ommering

Trend: Convergence of separate worlds



Integration and Diversity


GSM phone


firewall


dvd


audio microset


pda


watch


sailboat


surveillance camera


cable modem


set top box


headphone


pen


garment


car


camera


speech


mp3

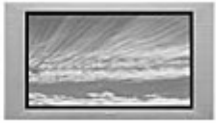

television


Ambient Intelligence living room

car navigation

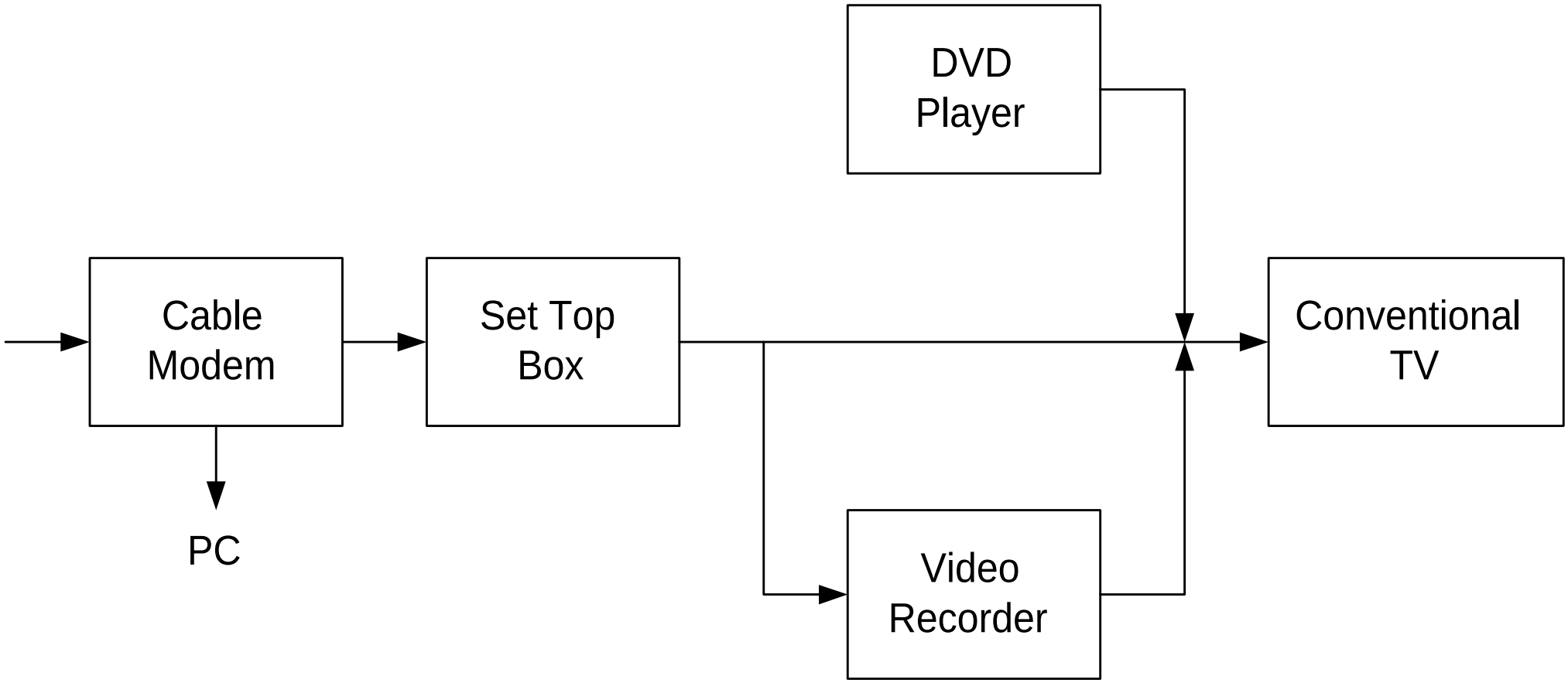

computer


games

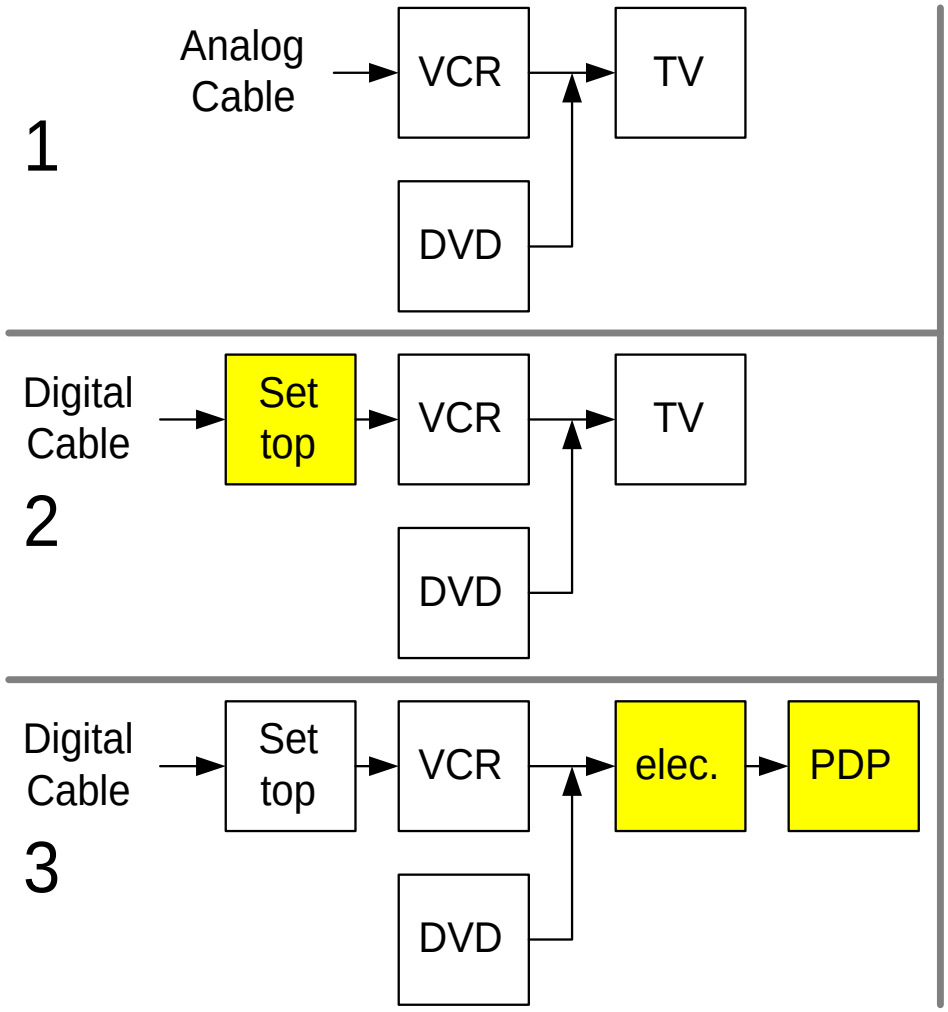

flat display

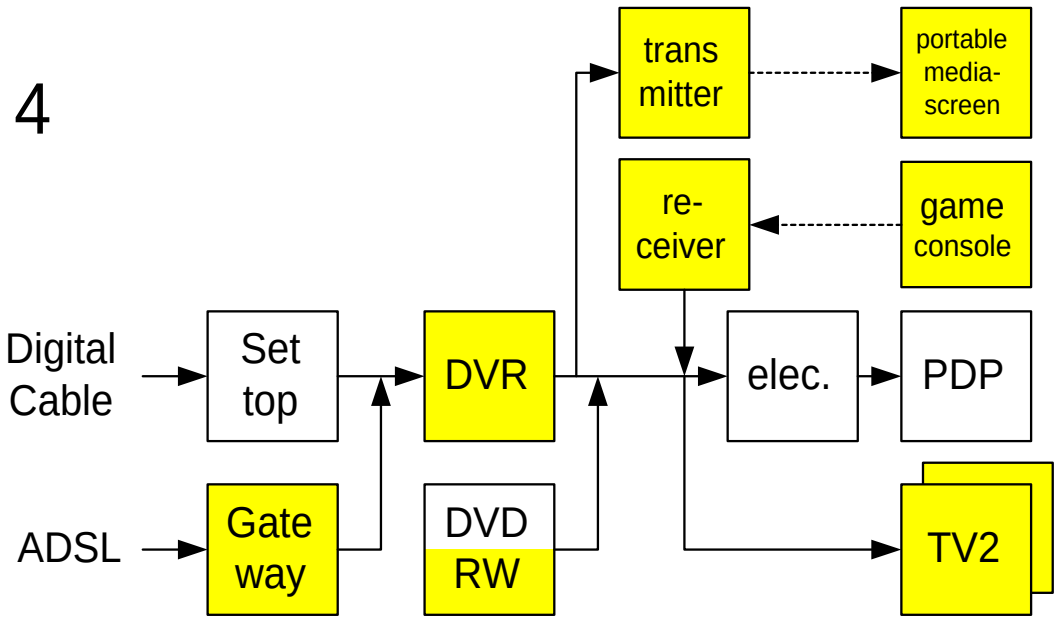

Communicator

Today's Video Products



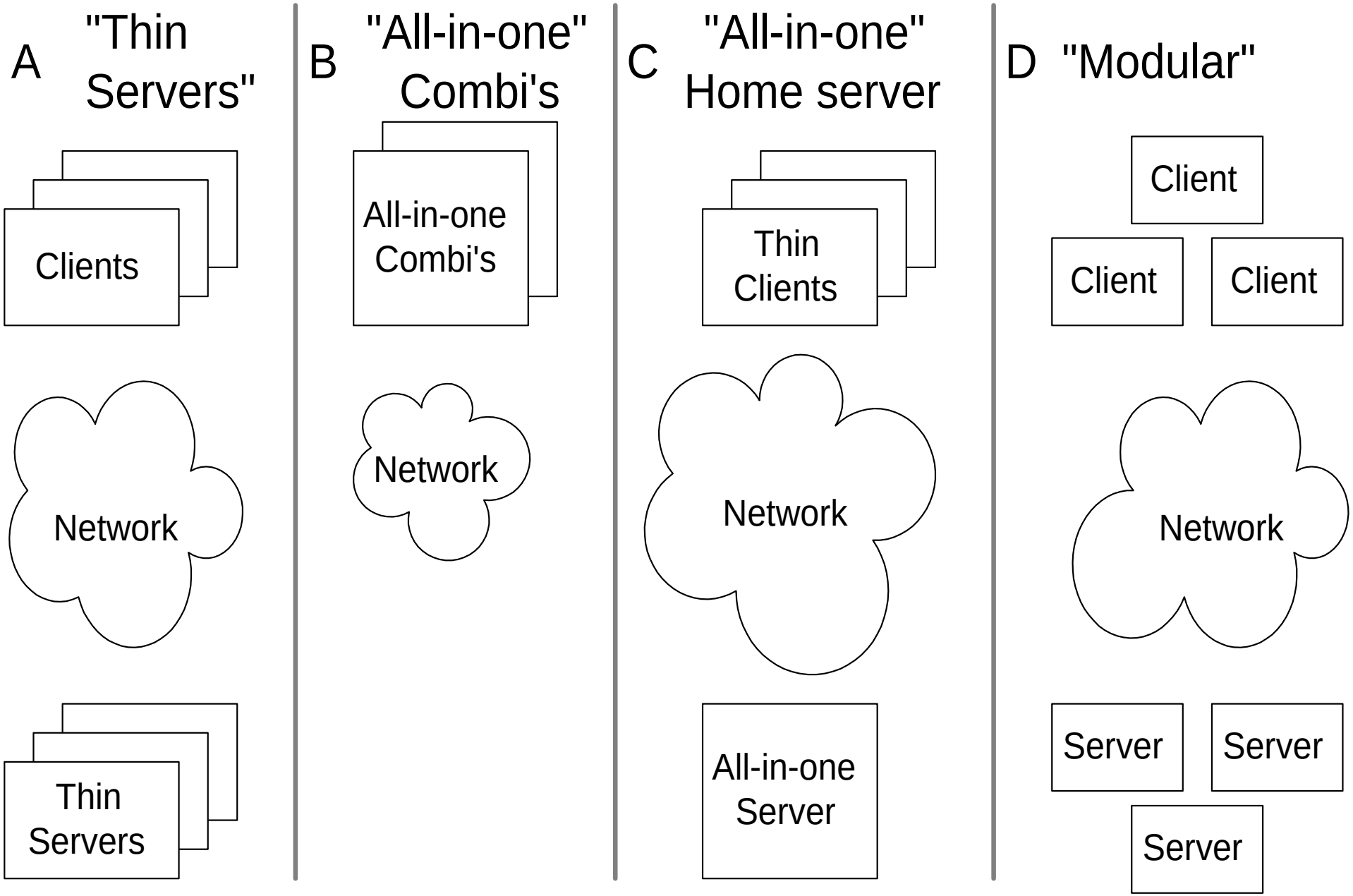
Evolution of Video Products



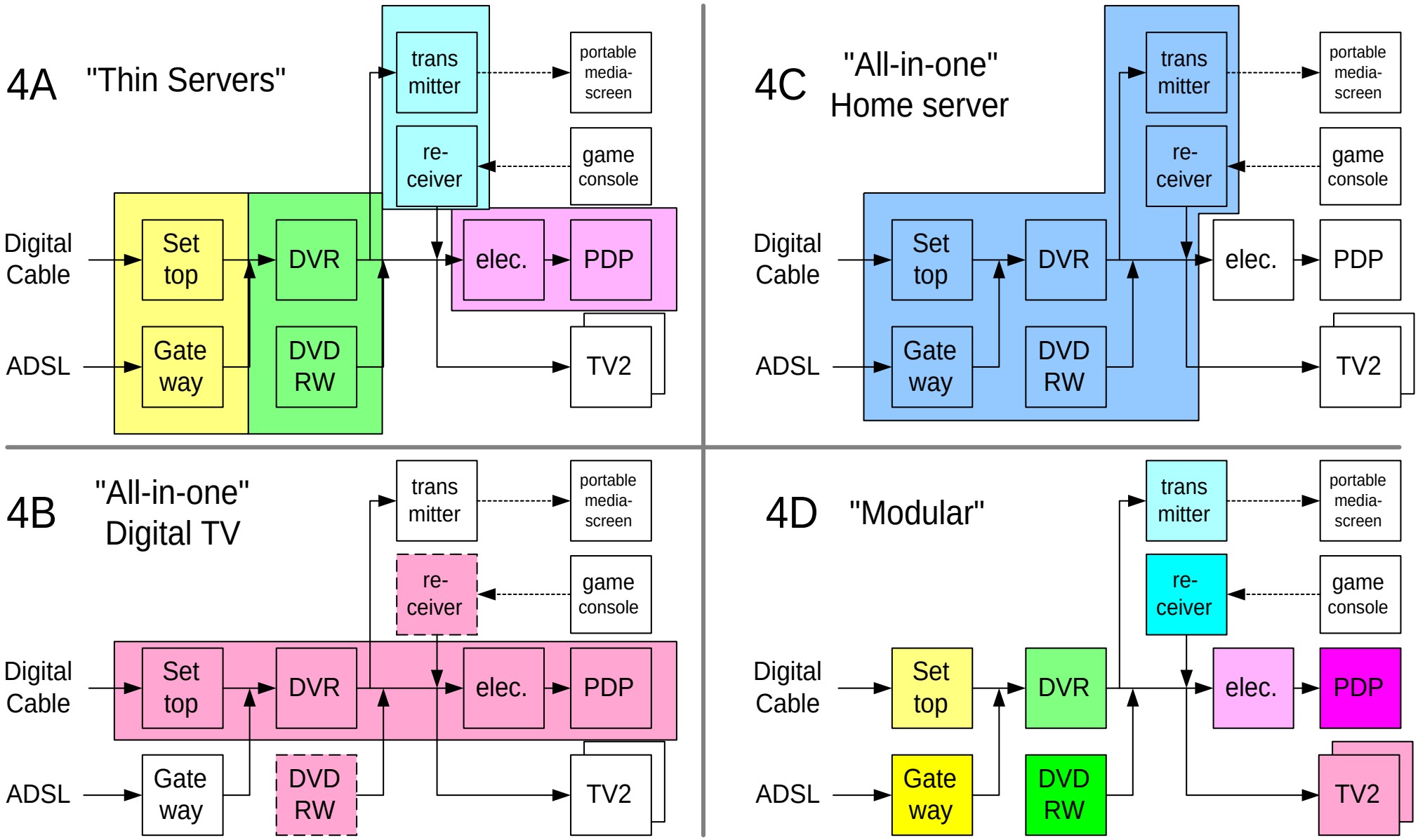


Multiple inputs
Multiple stores
Multiple displays
Multiple applications
Multiple formfactors

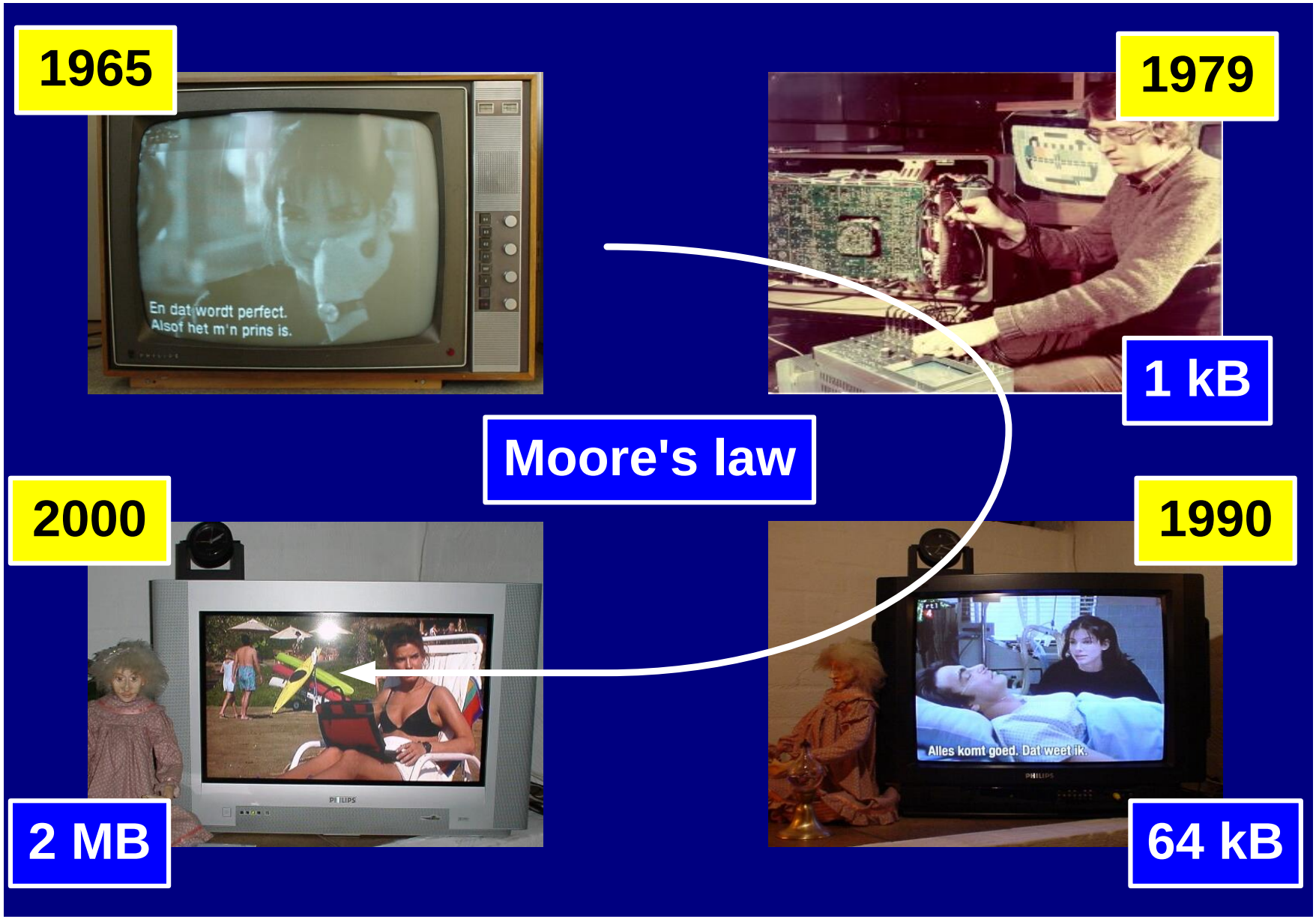
Distribution Scenario's



Product Packaging Options



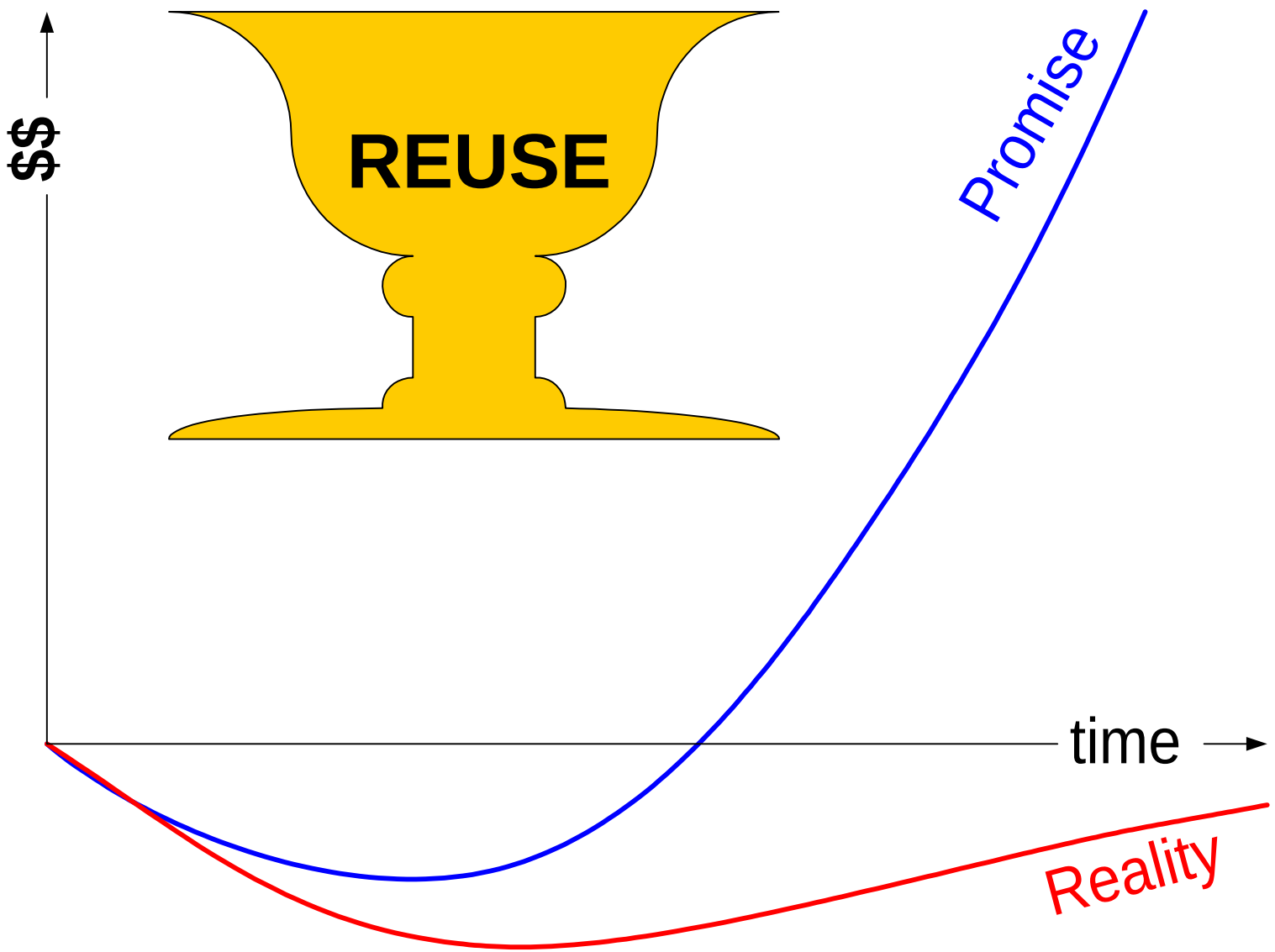
Moore’s law



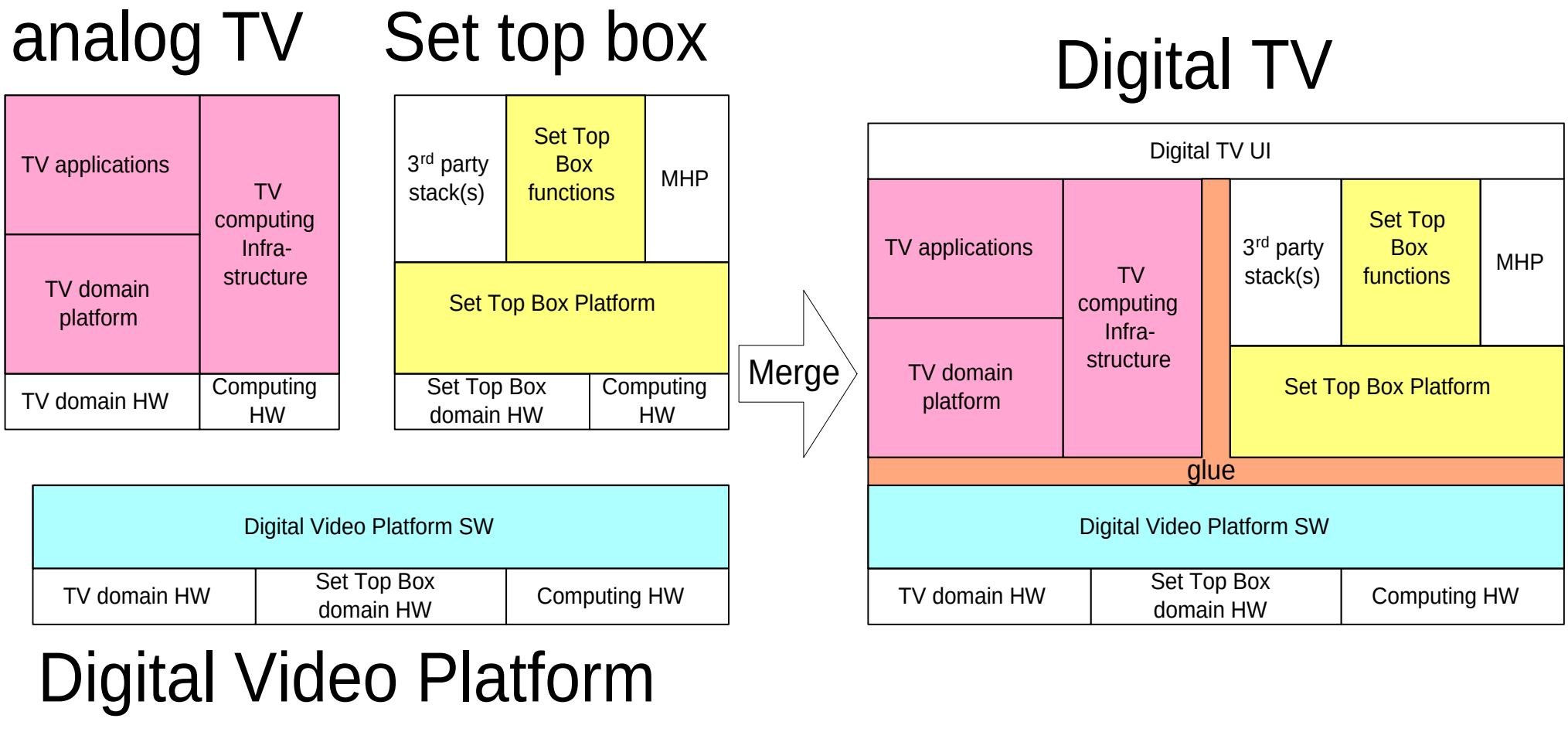
From: COPA tutorial, Rob van Ommering

Problem: increasing SW size, decreasing reliability?

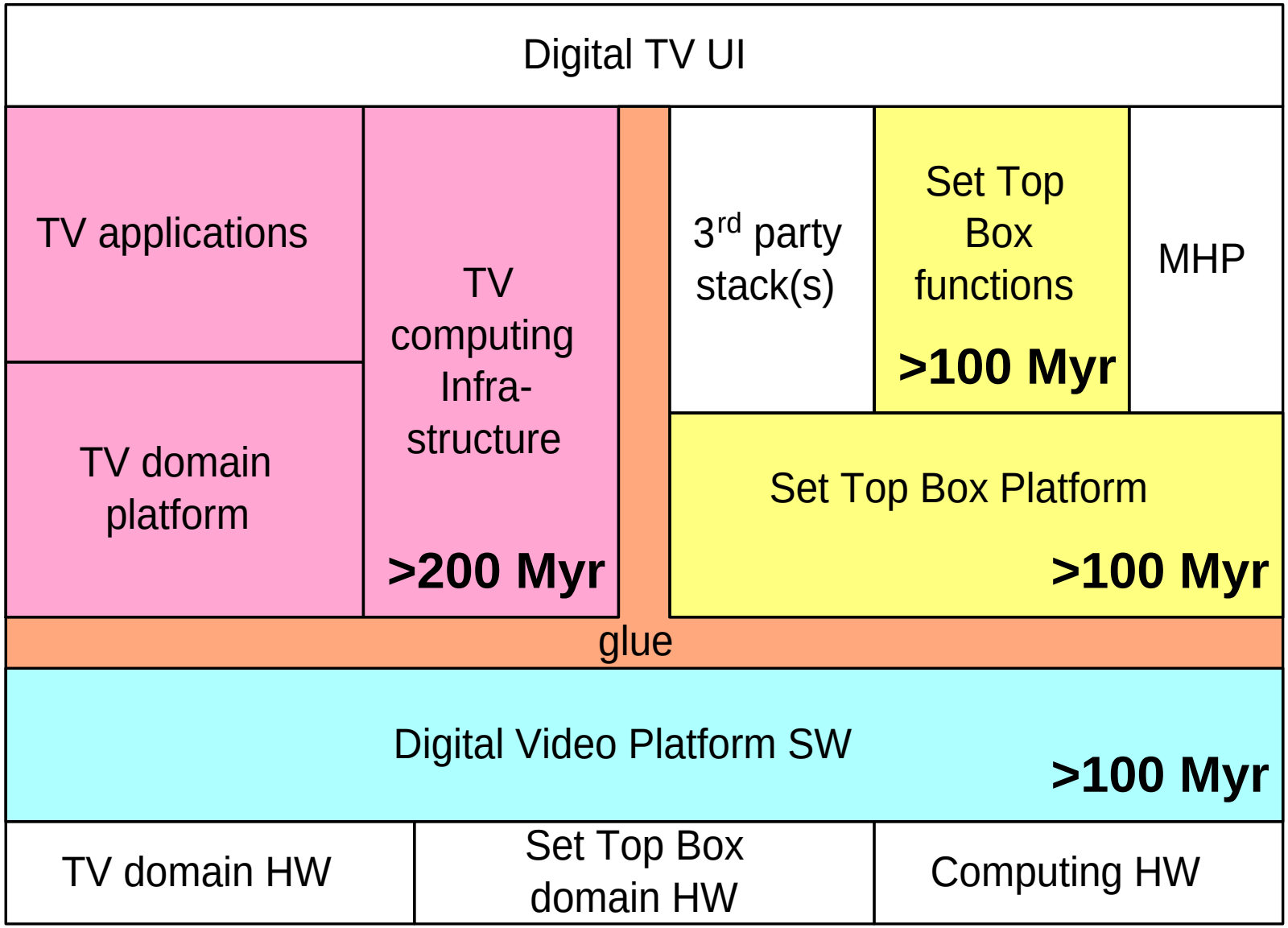
The Holy Grail: Reuse



Simplistic Architecting: Digital TV

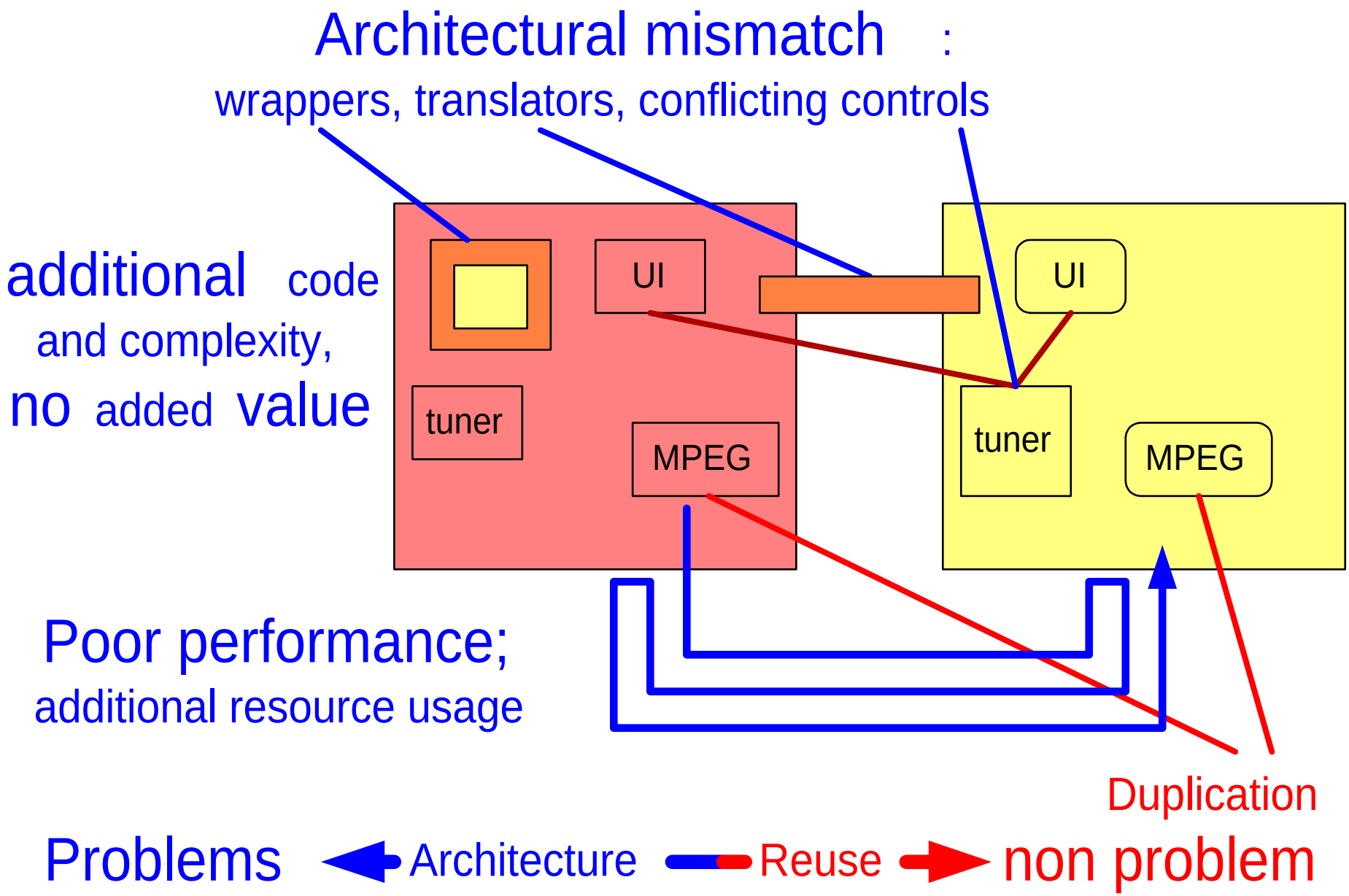


Available Code Assets

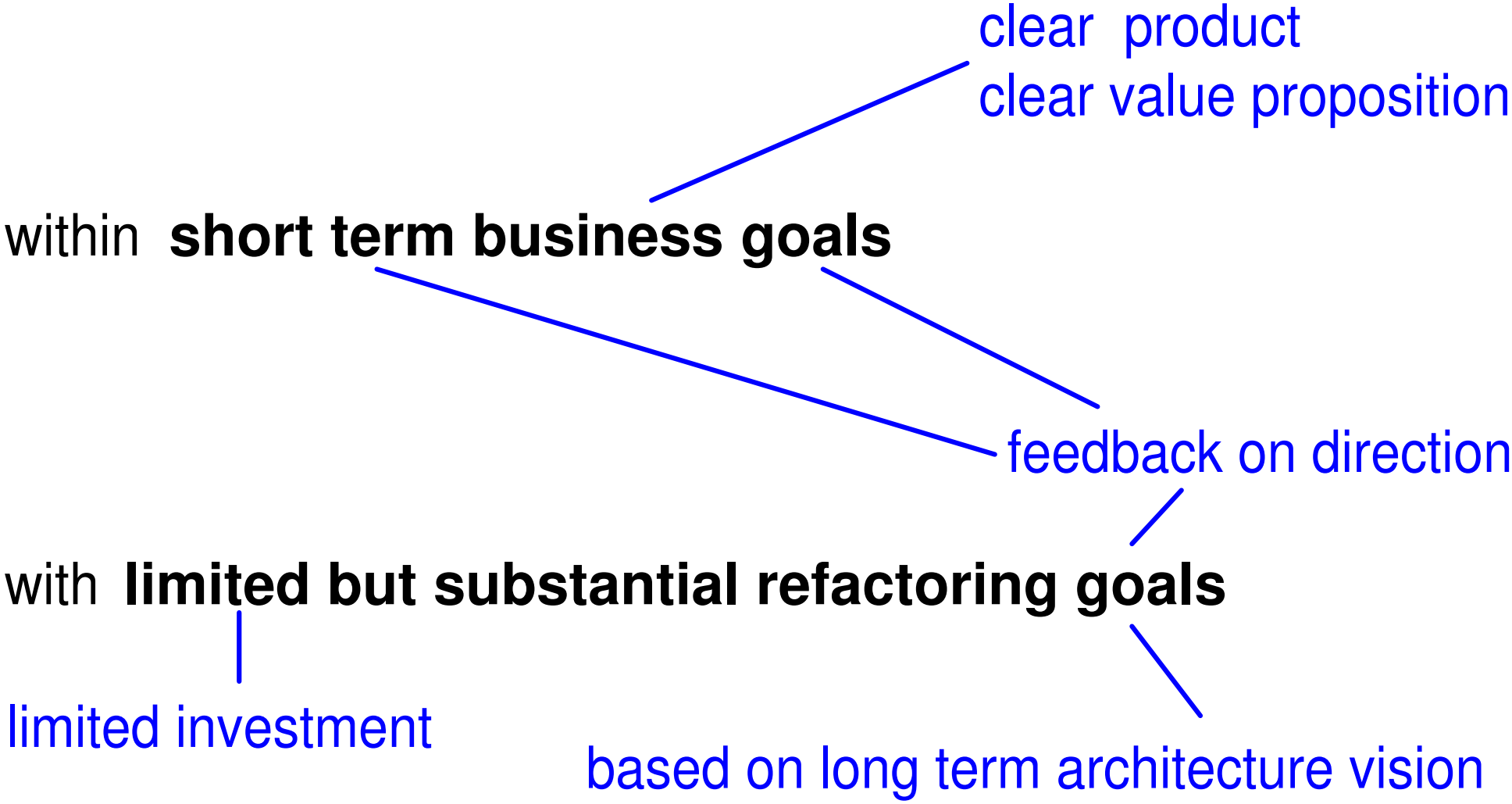


"Legacy" code > 500 Myr

Merge problems



Refactoring

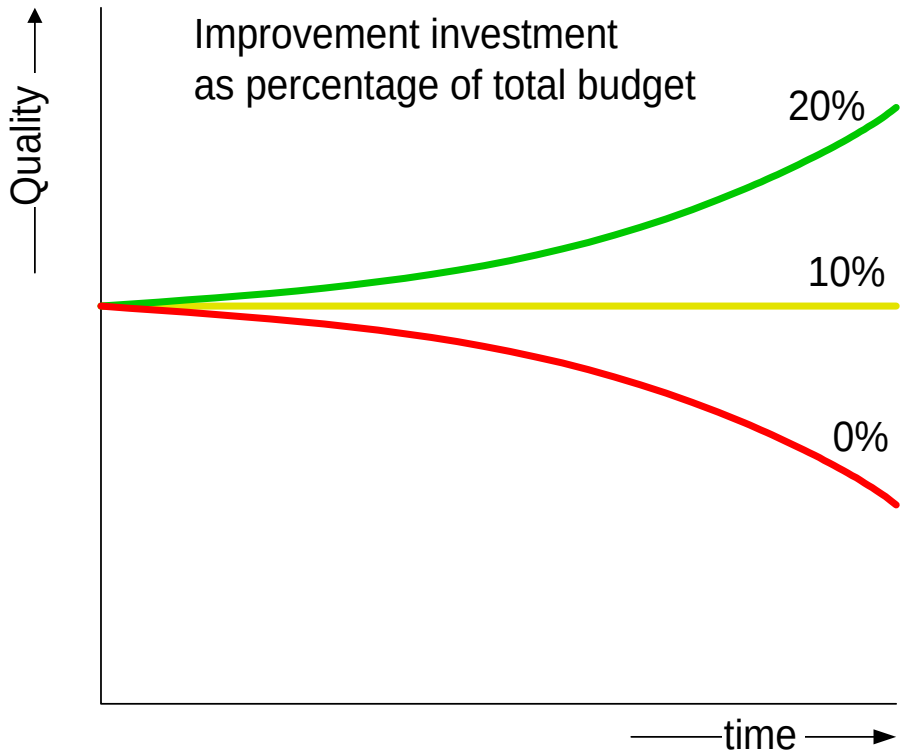


Example of Refactoring Goals

+ Decrease Code Size

+ Decrease Resource Usage
  * power
  * memory
  * silicon area

+ Increase Performance
  * response time
  * throughput

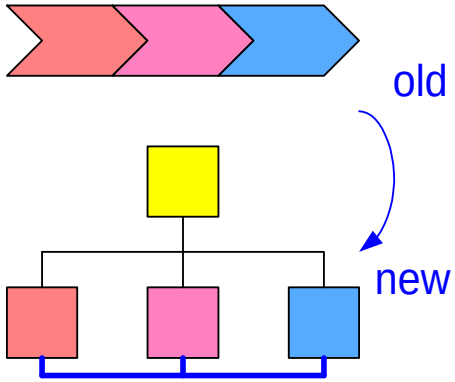


+ Increase quality
  * decrease fault density

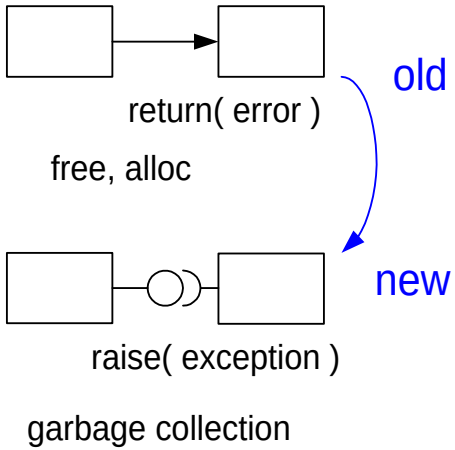
Architectural vs Code refactoring

Architectural Refactoring

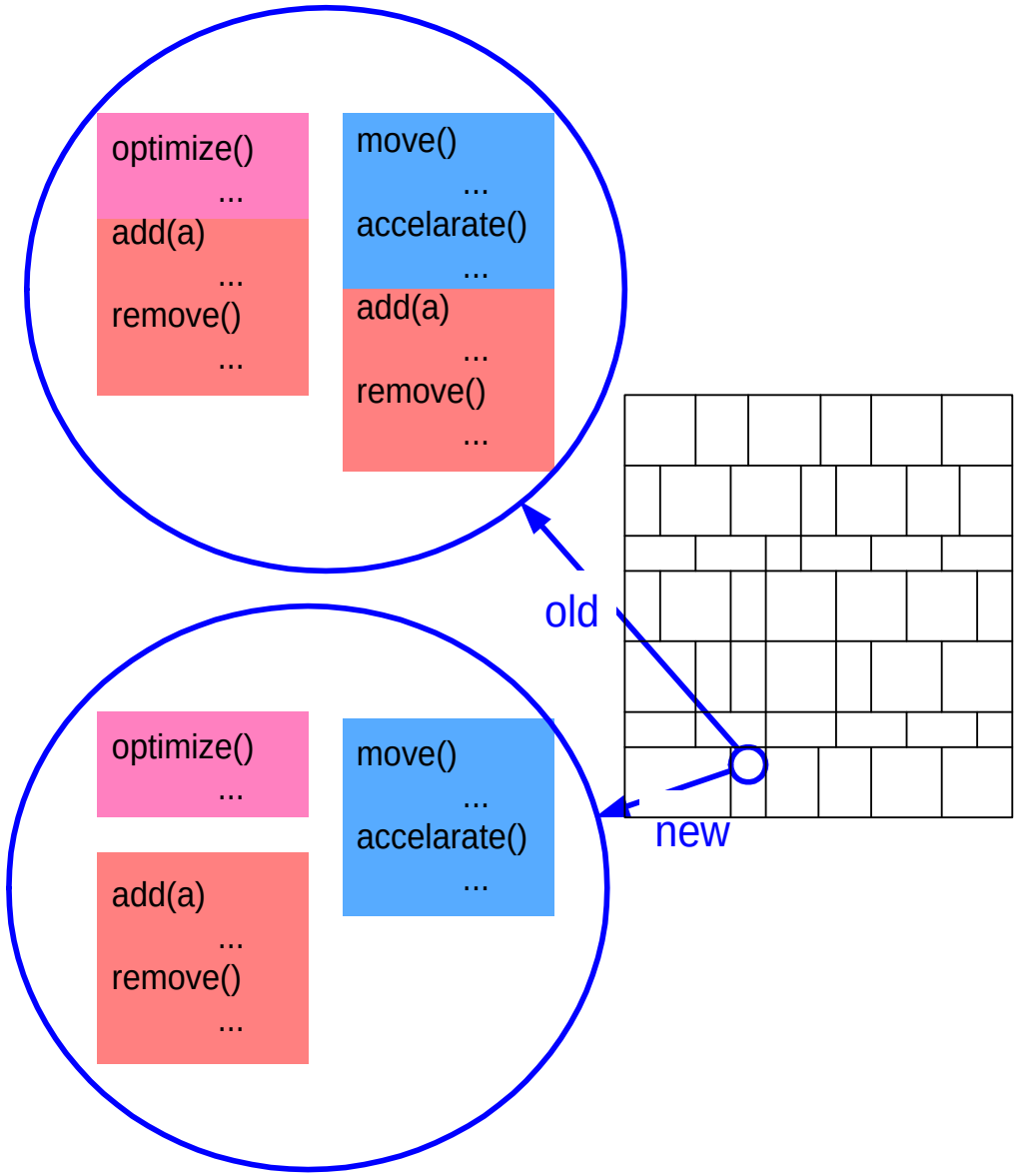
Function, Structure, Rationale



Mechanisms, Technologies



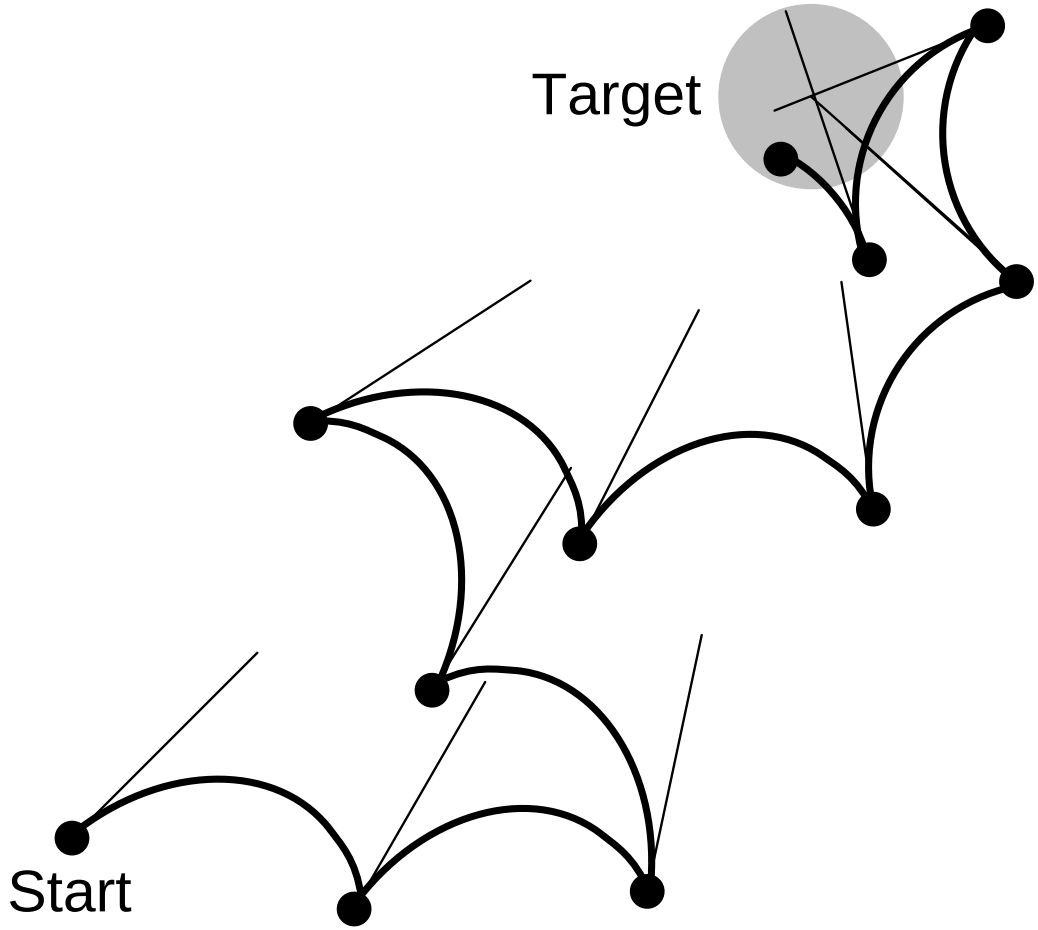
Code Refactoring



Frequent feedback

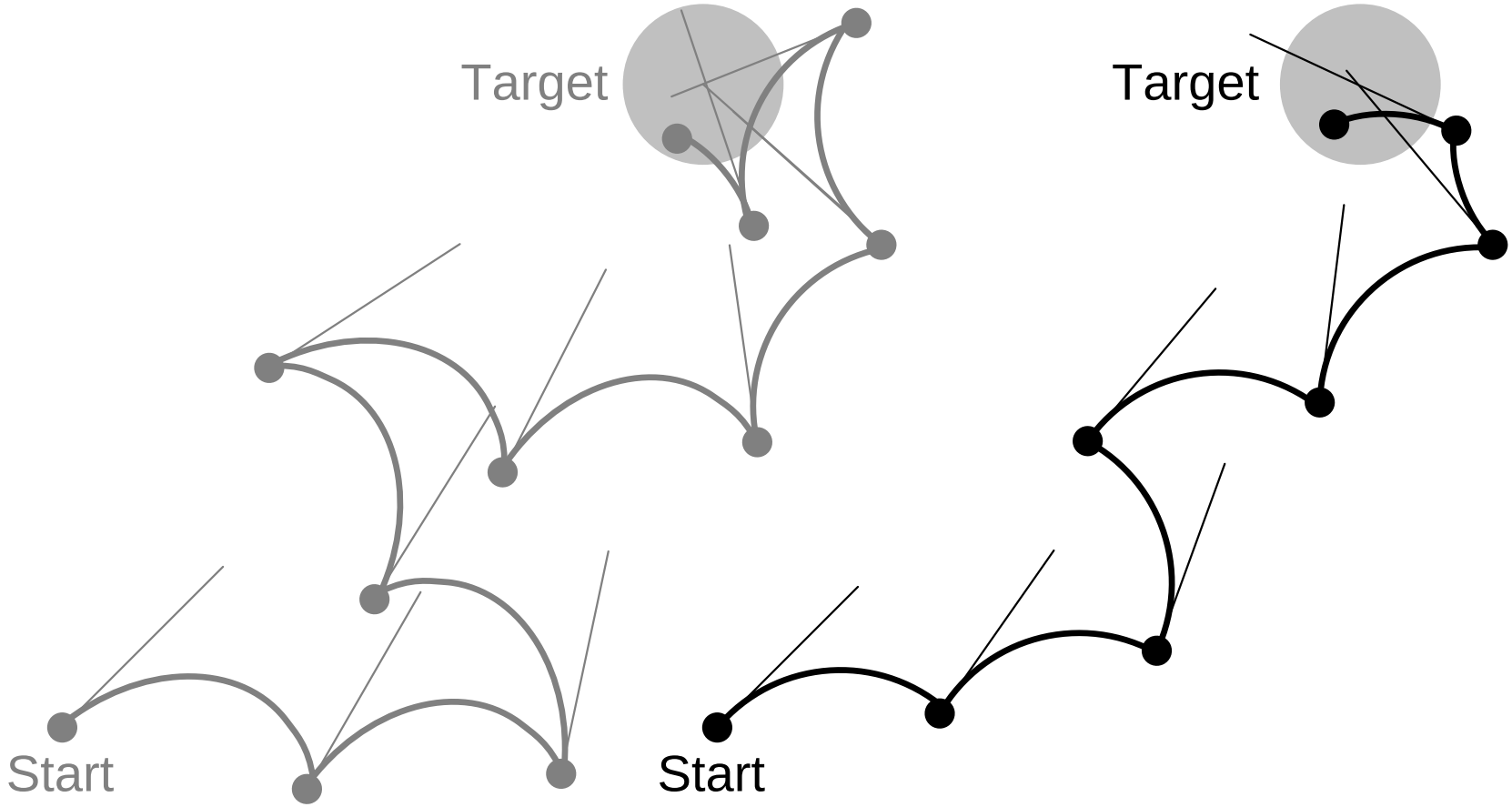
Feedback

stepsize: 3 months
elapsed time: 25 months

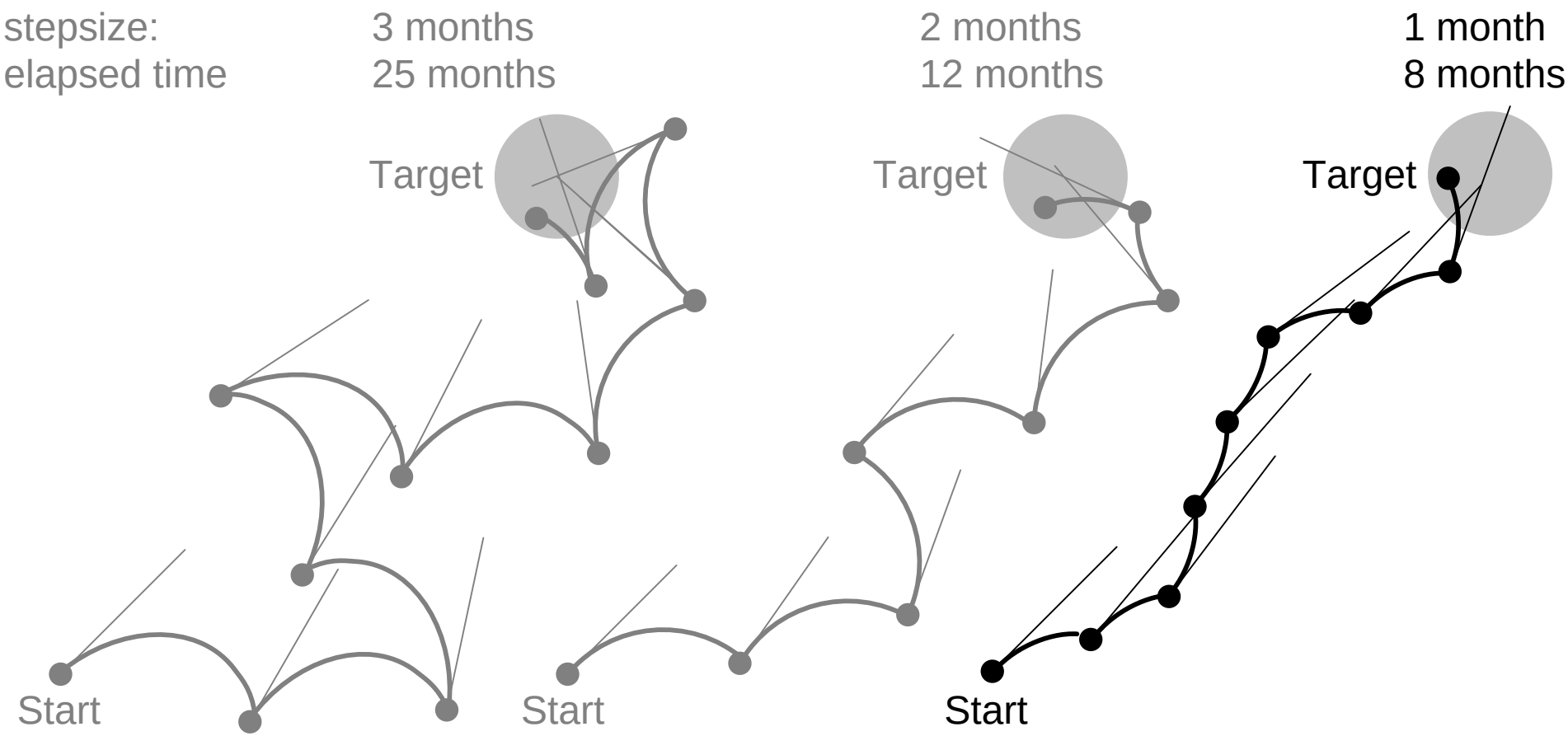


Feedback (2)

stepsize: 3 months 2 months
elapsed time 25 months 12 months



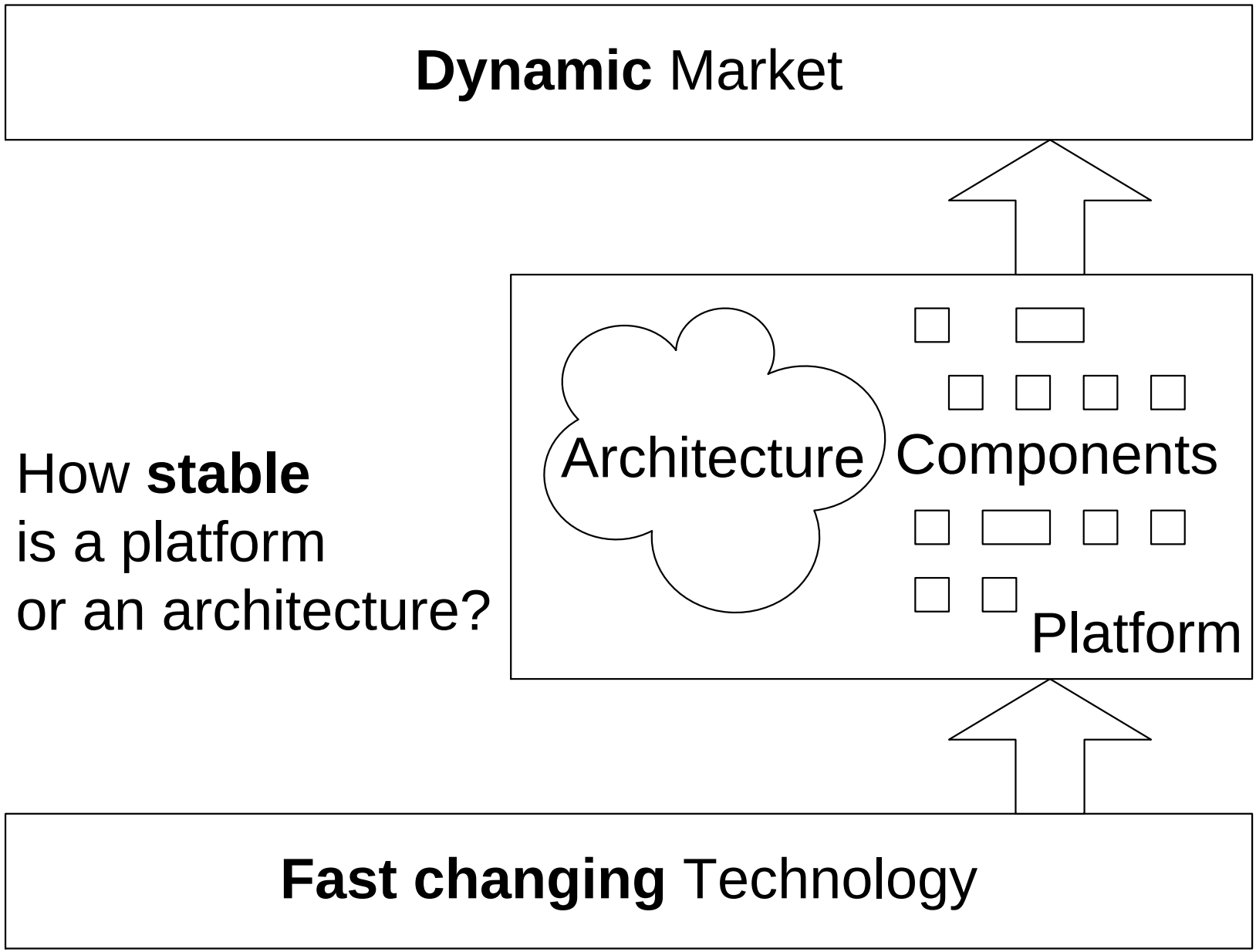
Feedback (3)



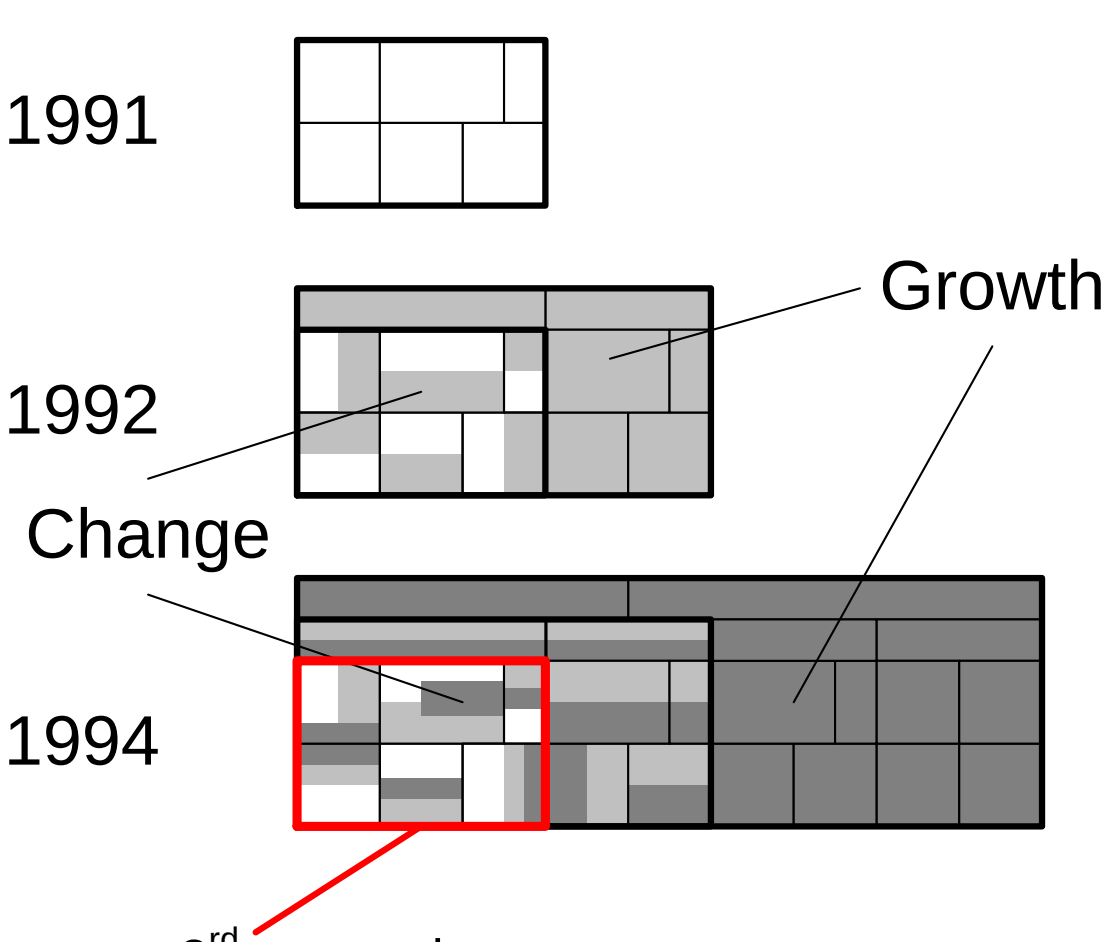
Small feedback cycles result in Faster Time to Market

Awareness of dynamics

Myth: Platforms are Stable



Platform Evolution (Easyvision 1991-1996)



Last changed in:

1991

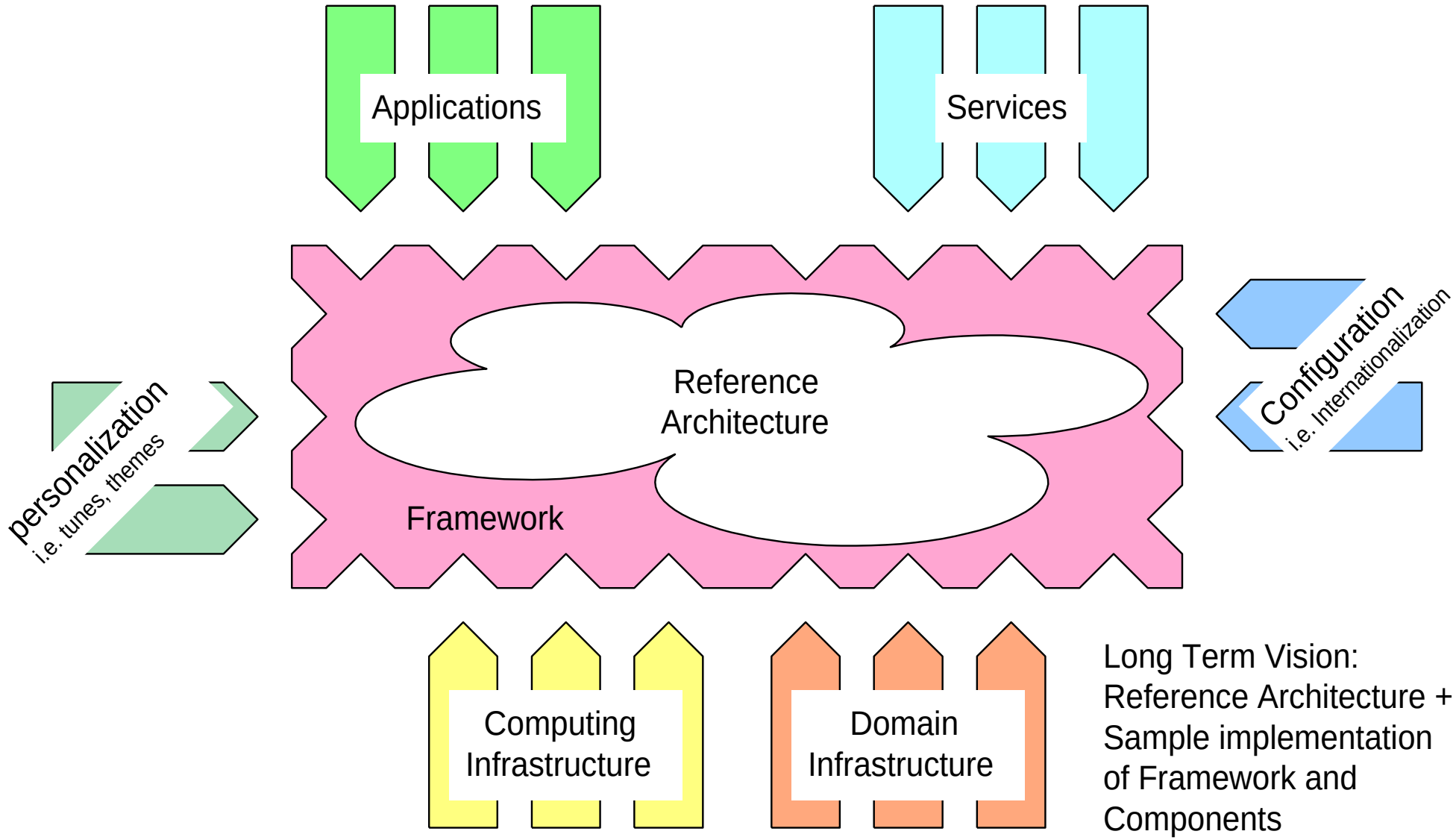
1992

1994

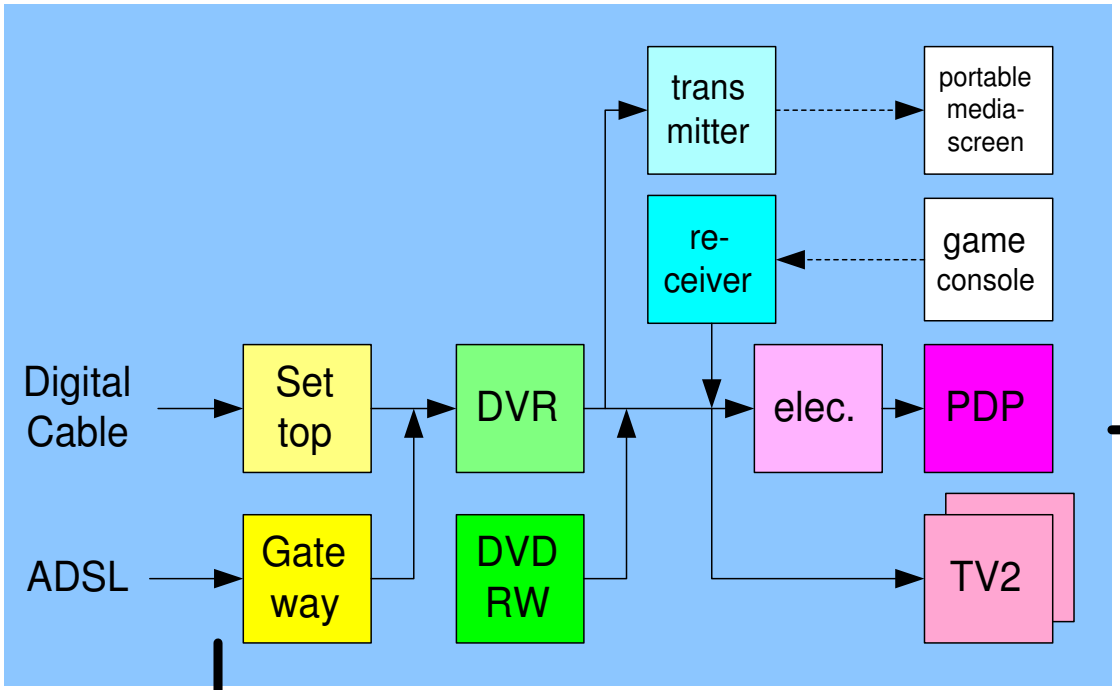
3rd generation components are mature, active maintenance needed.
Growth and change continues, some "old" components become obsolete

Long Term Vision

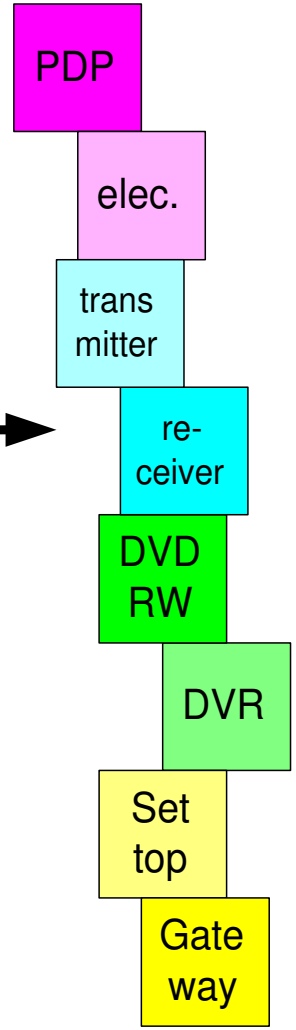
Example Long Term Vision



Don’t do

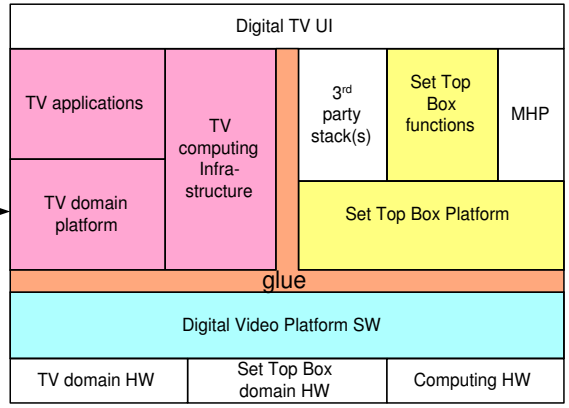


Opportunistic Legacy Integration



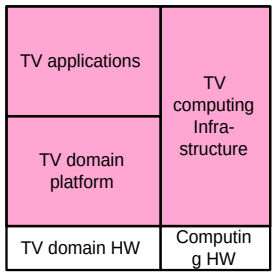
Proclaimed reuse

Digital TV

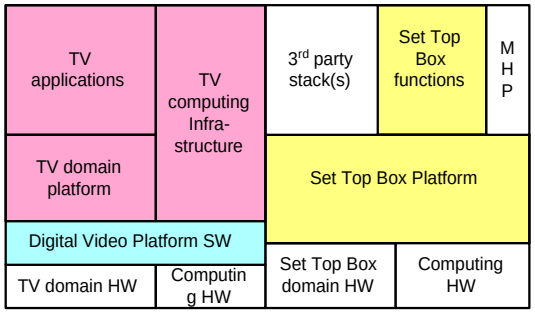


Conclusion: Refactoring the Architecture is a must

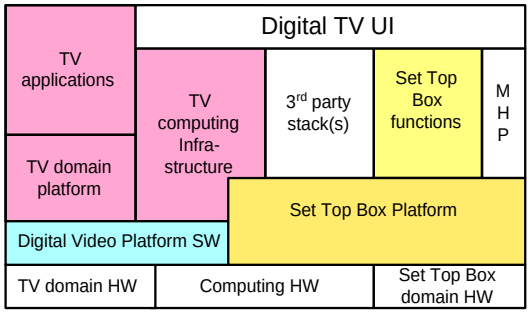
TV

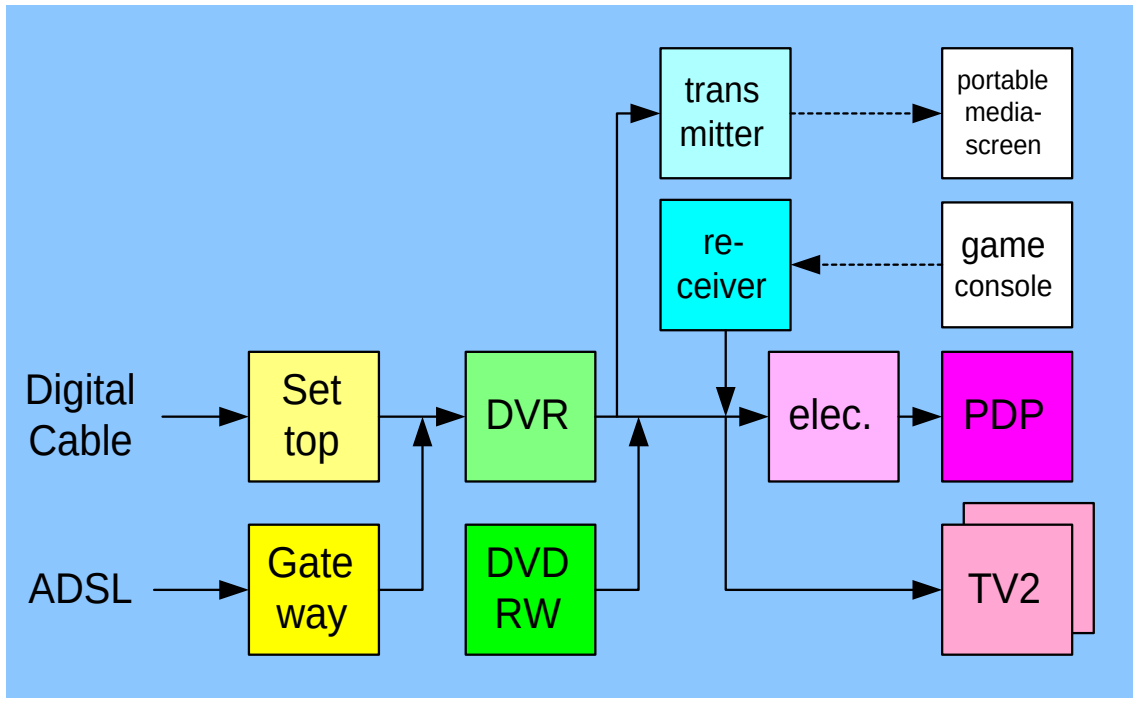


Hybrid TV



Digital TV





"All-in-one" combi TV