

# The Art Of Innovation; How to bypass countless hurdles?

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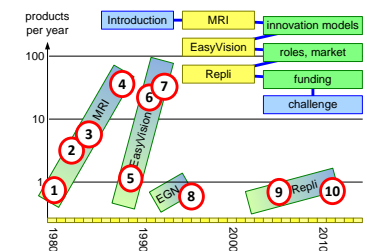
## Abstract

Mature companies grow often via consolidation and incremental innovation. They have so much focus on their running business that there is little room for significant innovations. However, for long-term business, companies need solutions beyond the ordinary. In this presentation we look at practical hurdles of significant innovations in several case studies. We analyze some aspects further, e.g. innovation models, roles in innovation, the market, and funding.

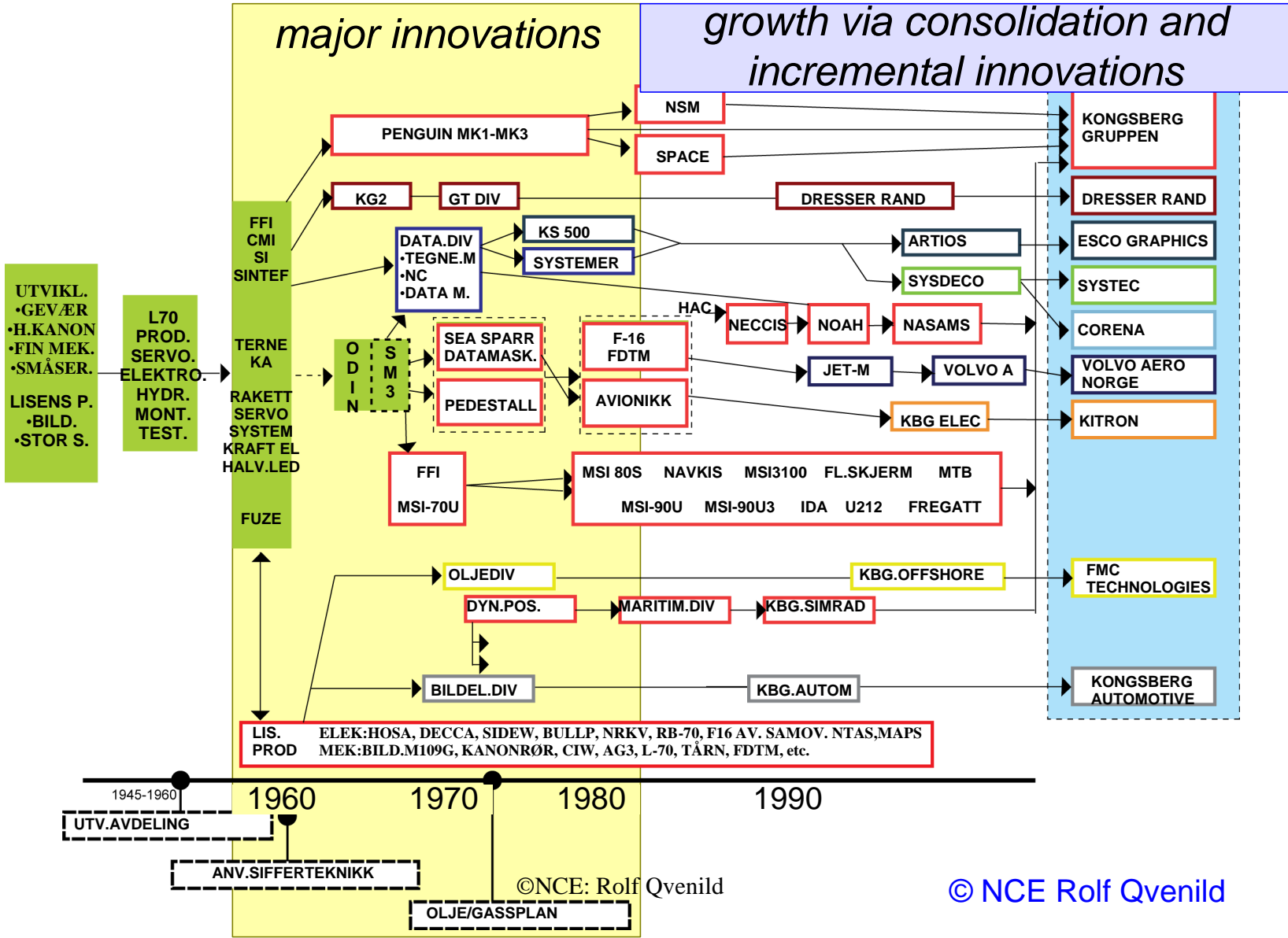
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# Genealogy of Kongsberg Industry



# Why Innovation and Solutions beyond the Ordinary?

Why is **Innovation** such popular **buzzword**?

Sales **price erosion** -> **low margin**

**Innovation maintains** sales **price** and **margin**

Why “**Solutions beyond the Ordinary**”?

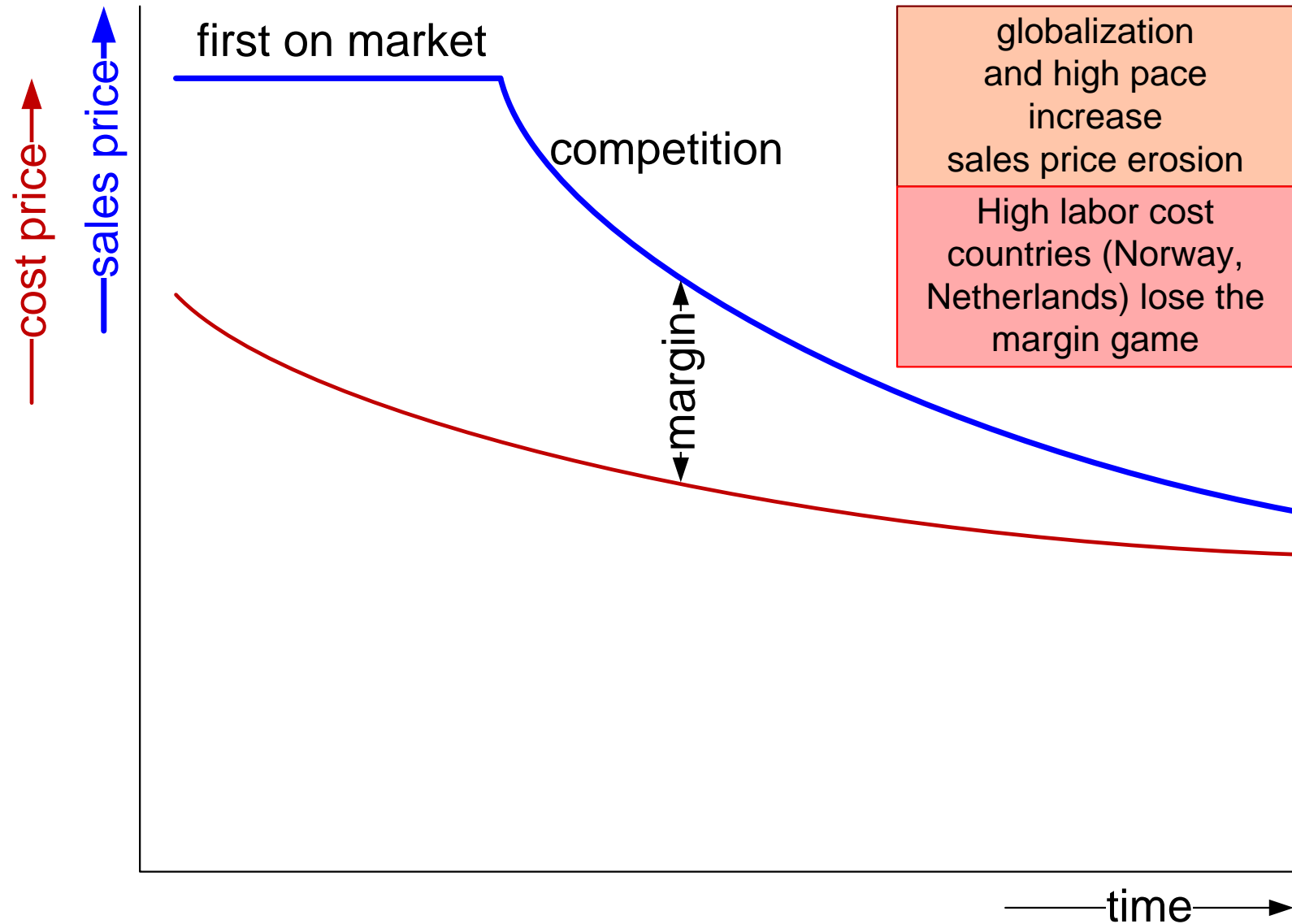
**Mature companies** grow via consolidation and **incremental innovation**

**Mature companies** struggle to **innovate significantly**; creating **Solutions beyond the Ordinary** is rather difficult for them

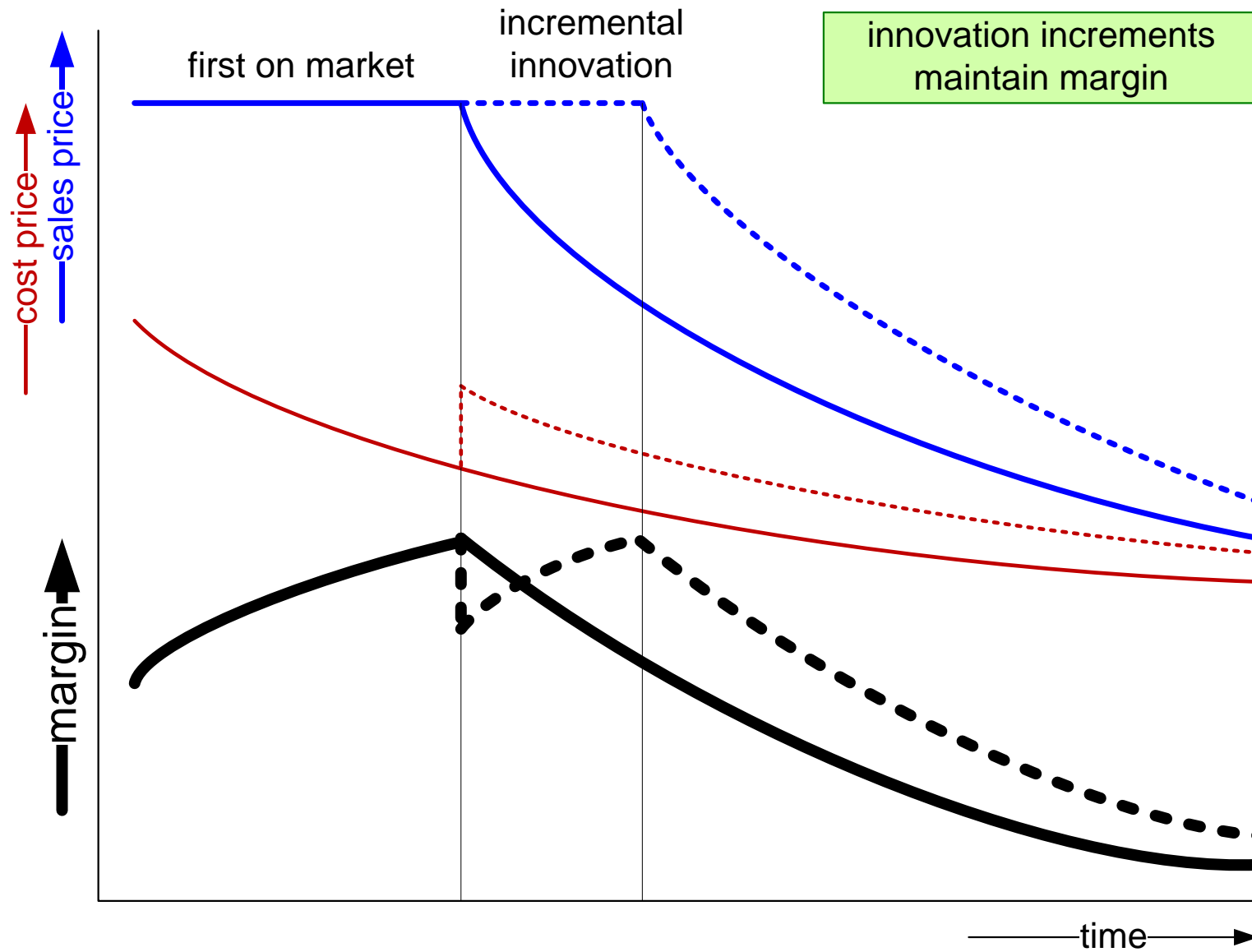
What happens when current markets get saturated and **current solutions** get **obsolete**?

How can we fill the **market-product-technology pipeline** for the **next 30 years**?

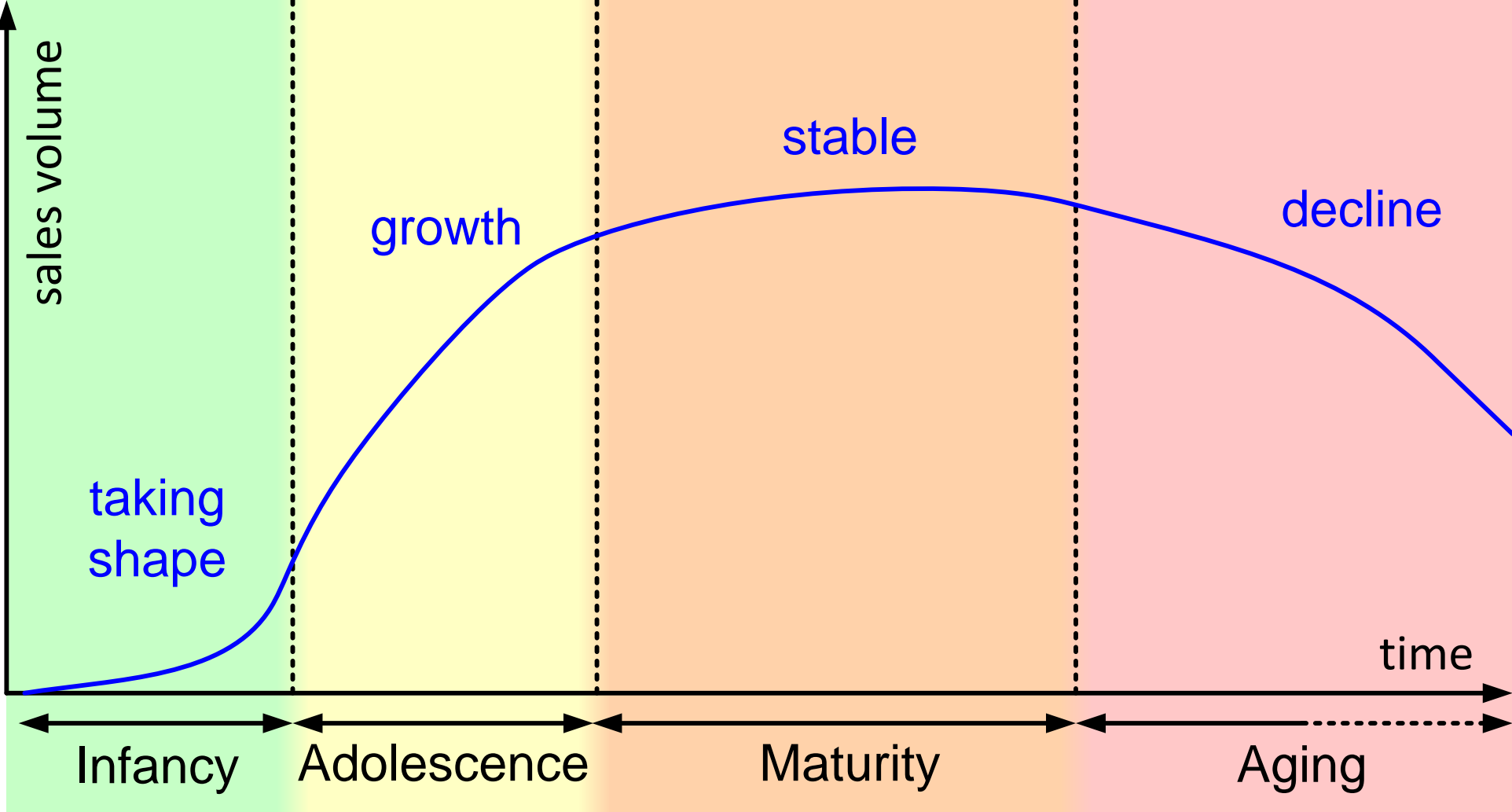
# Margin Problem Due to Price Erosion



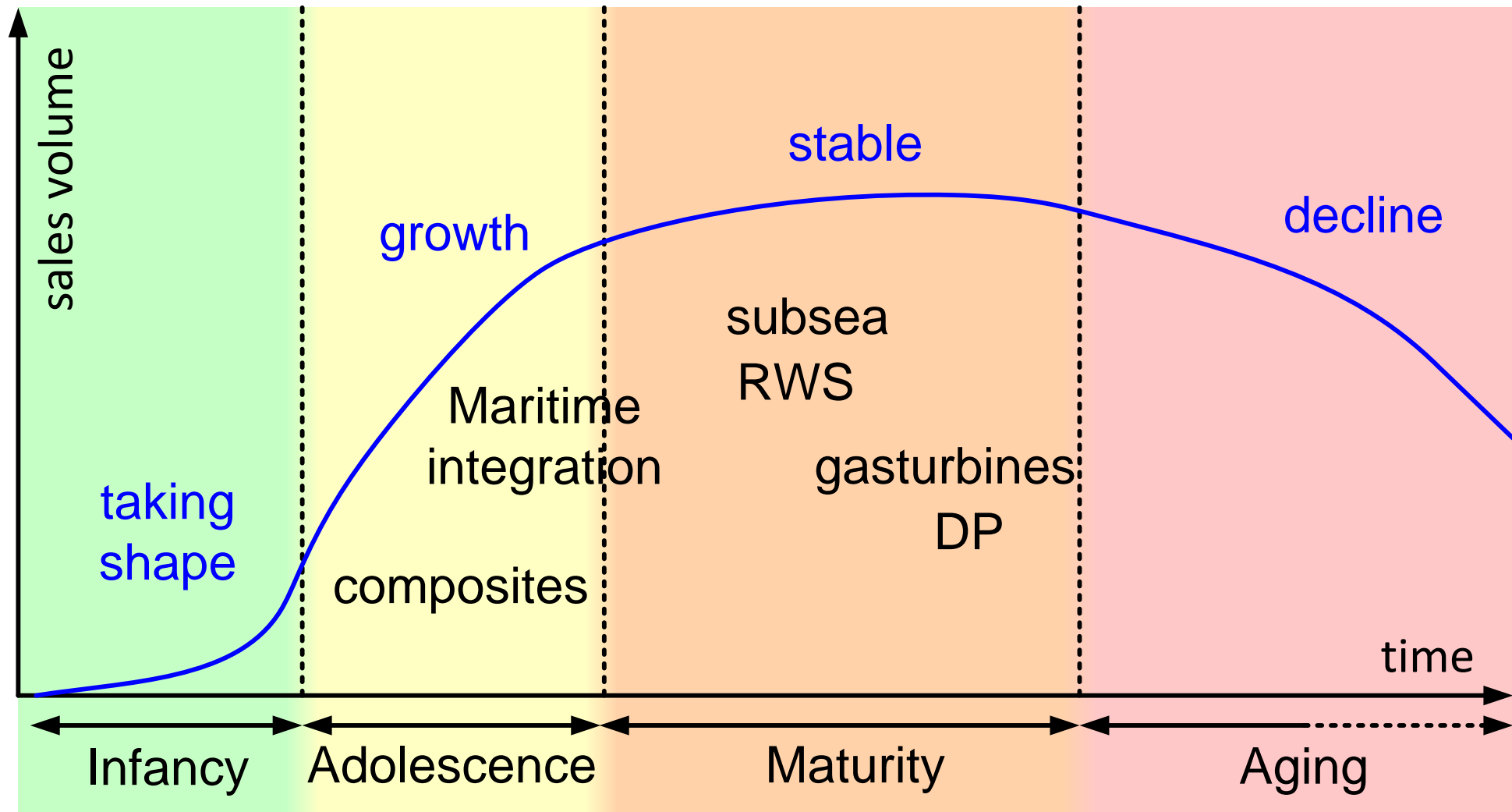
# Innovation is the Escape



# Market Product Life Cycle

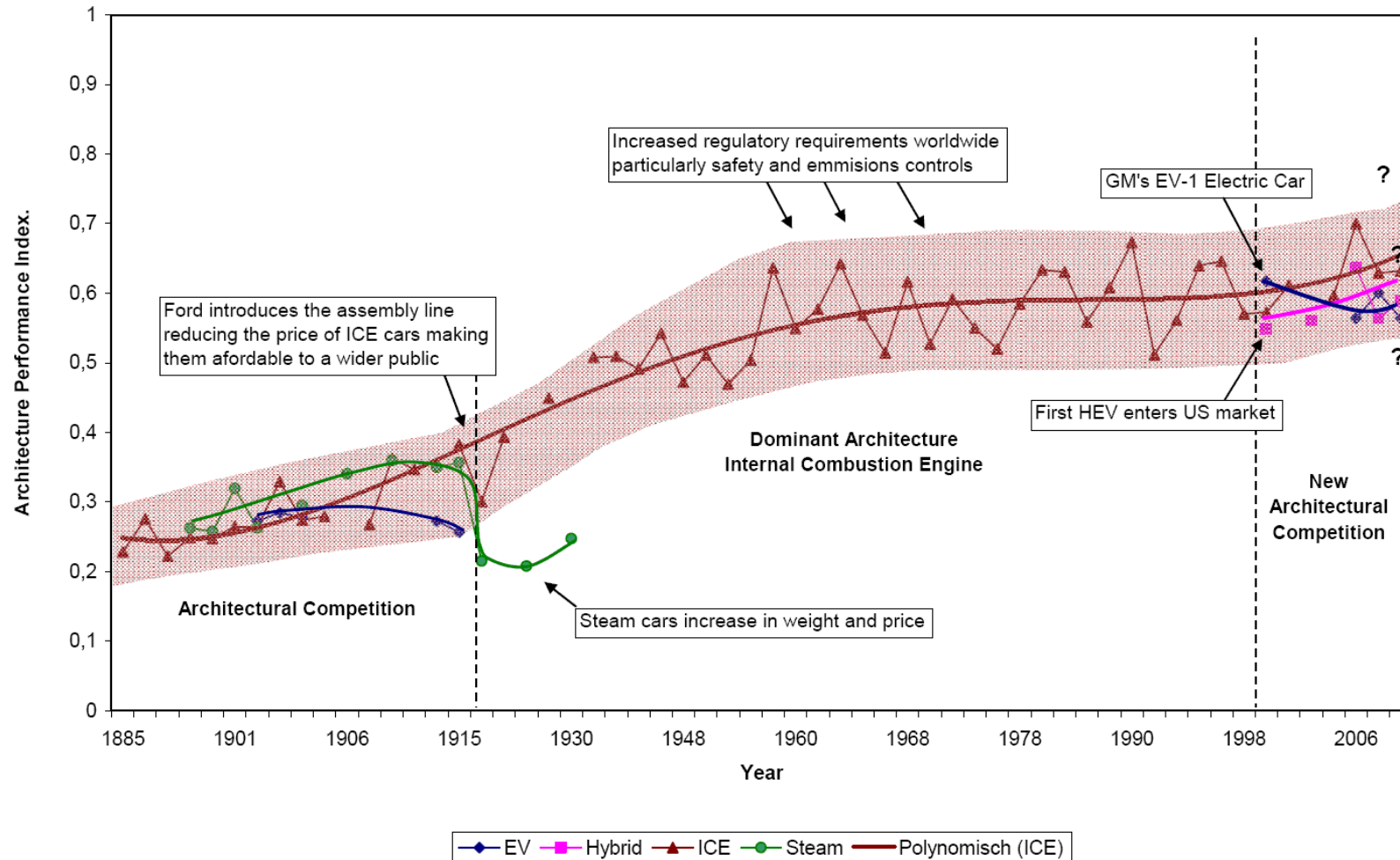


# Where is Kongsberg Industry?



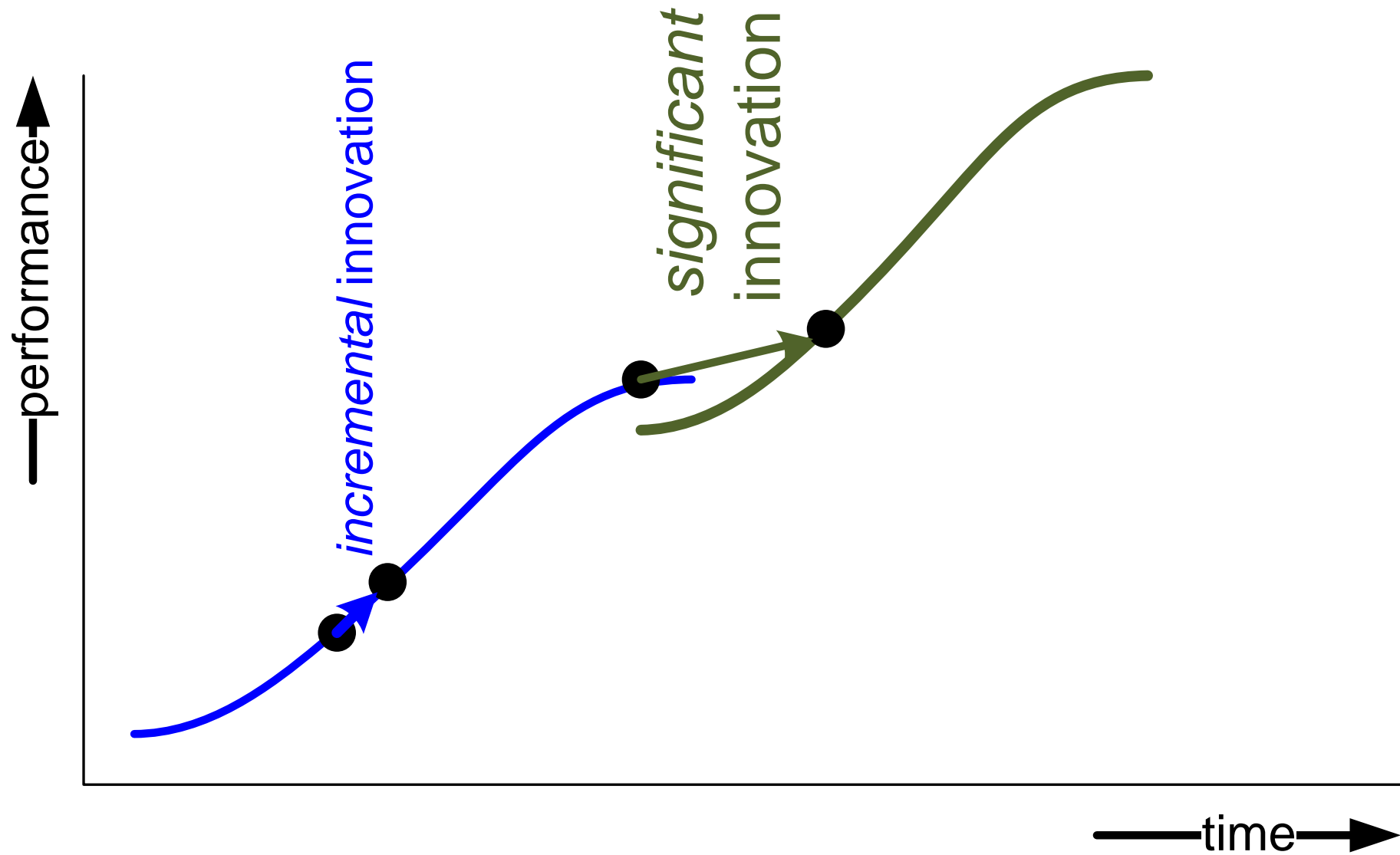
# S-curve, Automotive Example

$$\text{Performance} = f(\text{power, weight, } v_{\text{max}}, \text{ fuel consumption, price})$$

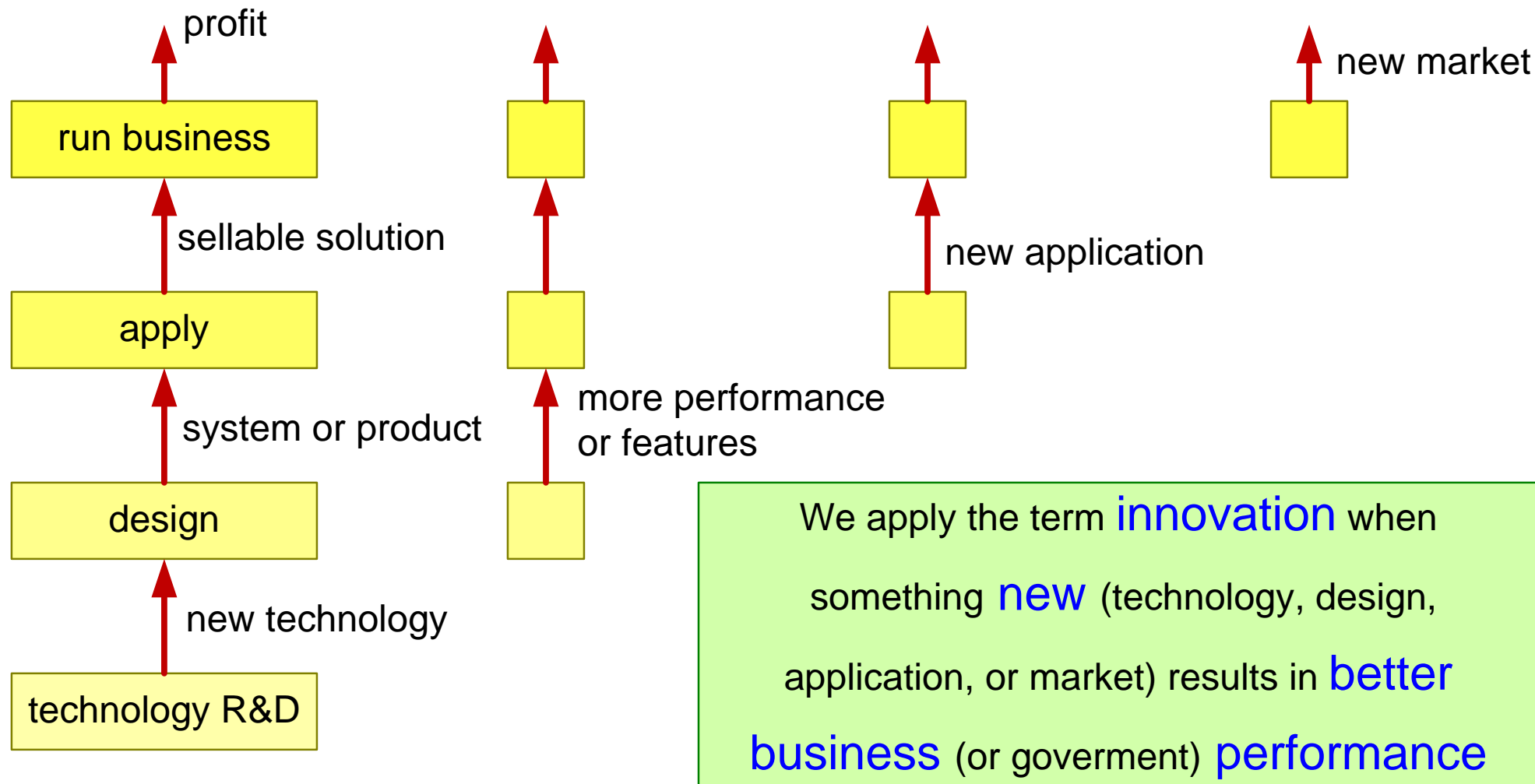


[Gorbea 2008] Carlos Gorbea, Ernst Fricke, and Udo Lindemann,  
*The Design of Future Cars in a New Age of Architectural Competition,*

# Significant Innovation

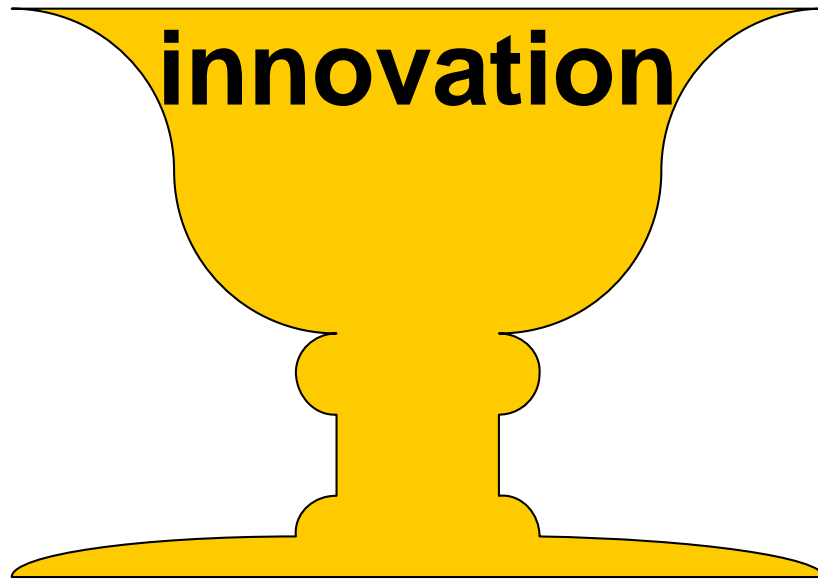


# What is Innovation?

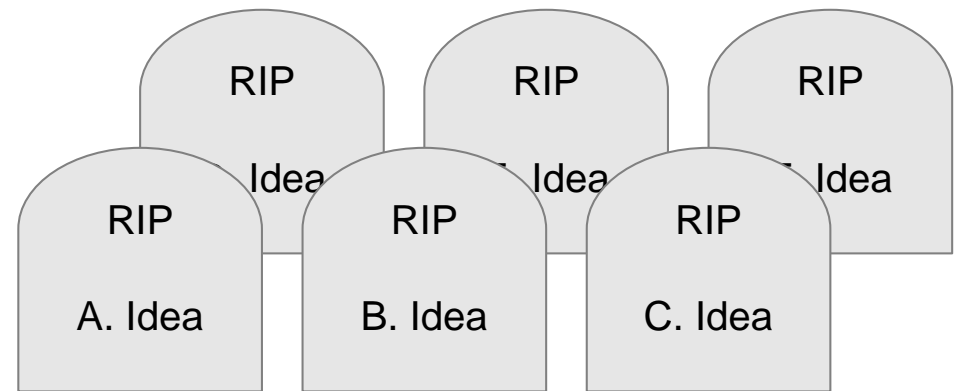


# How, that is the Question

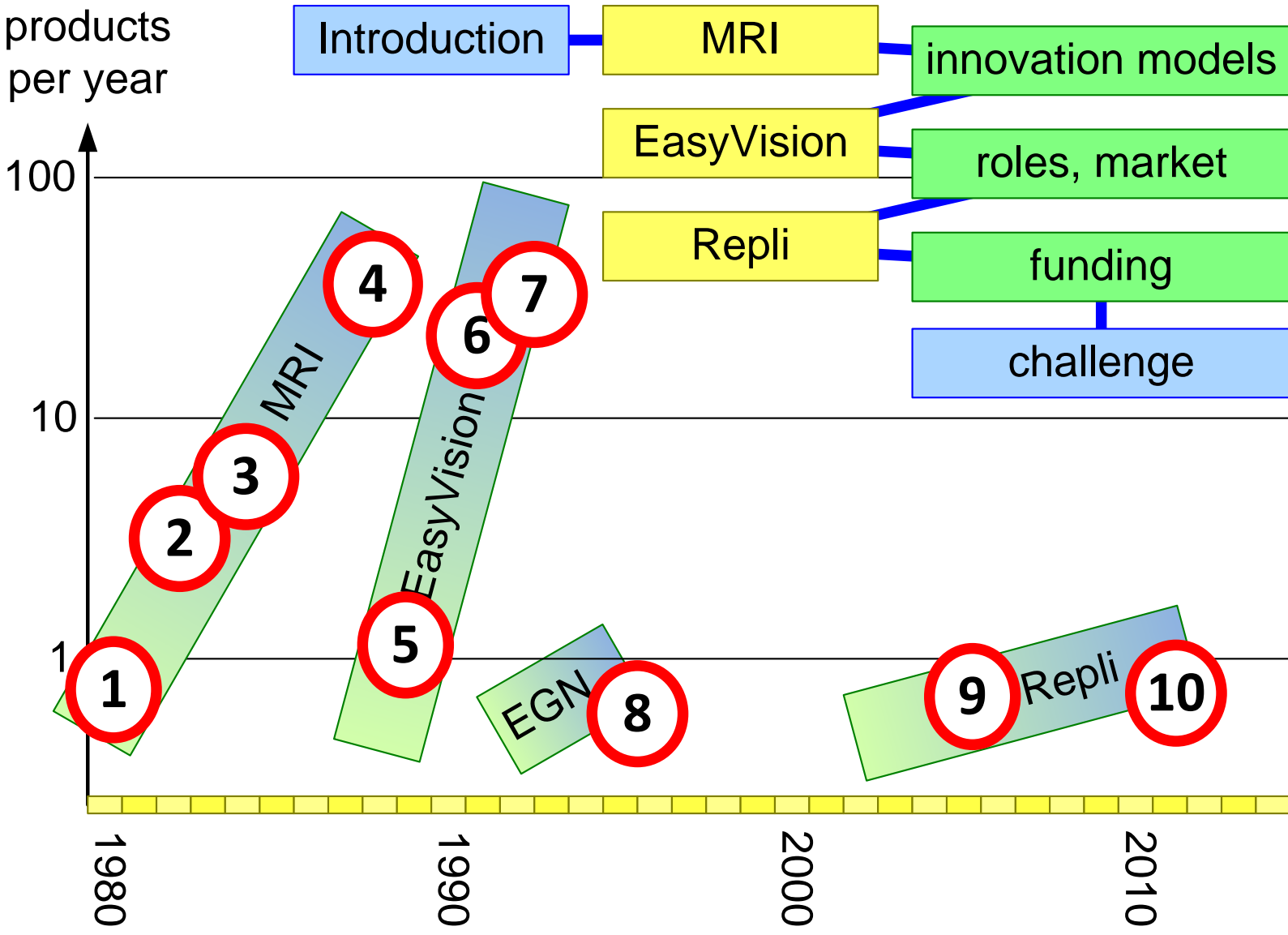
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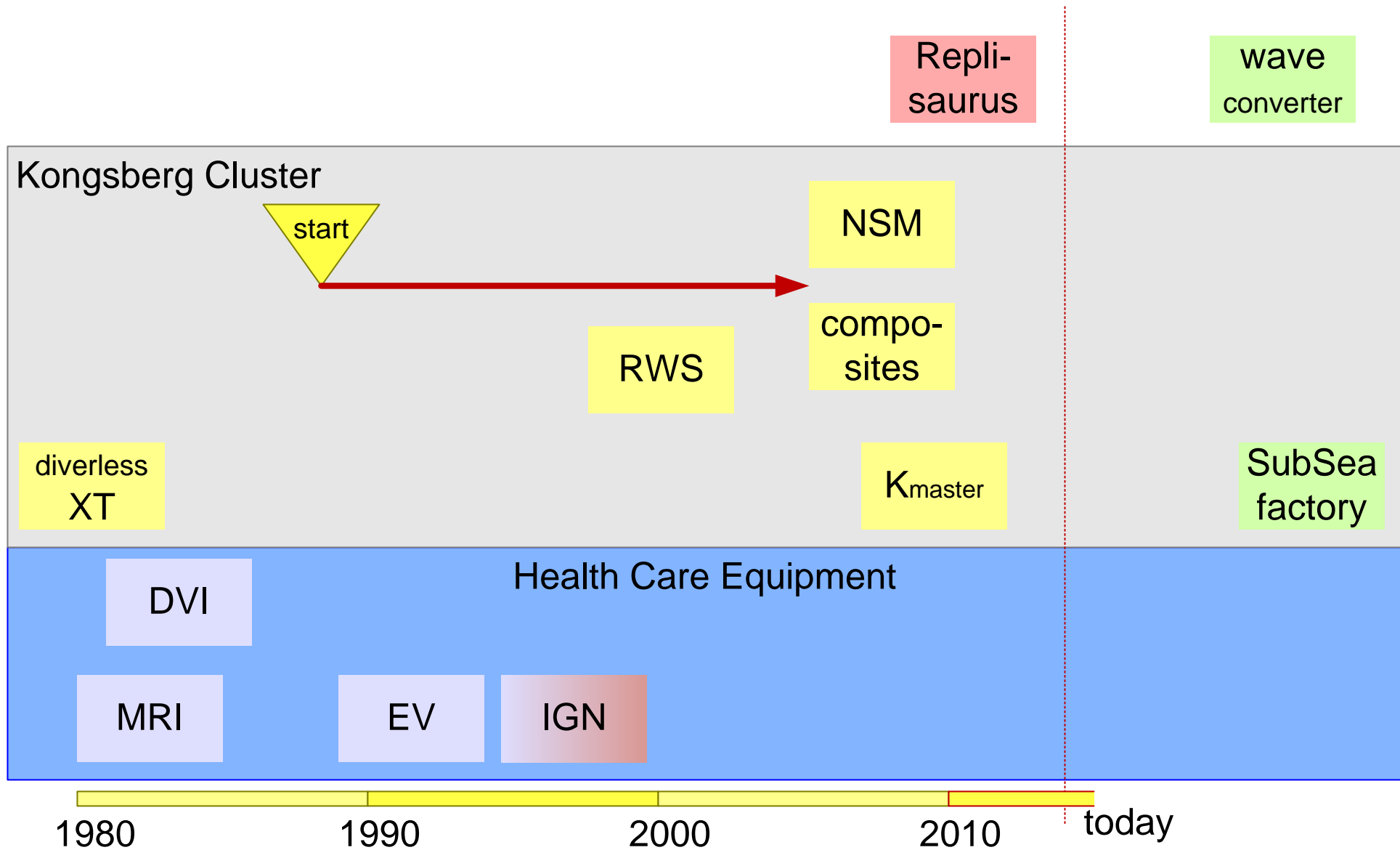
The vision and harsh reality



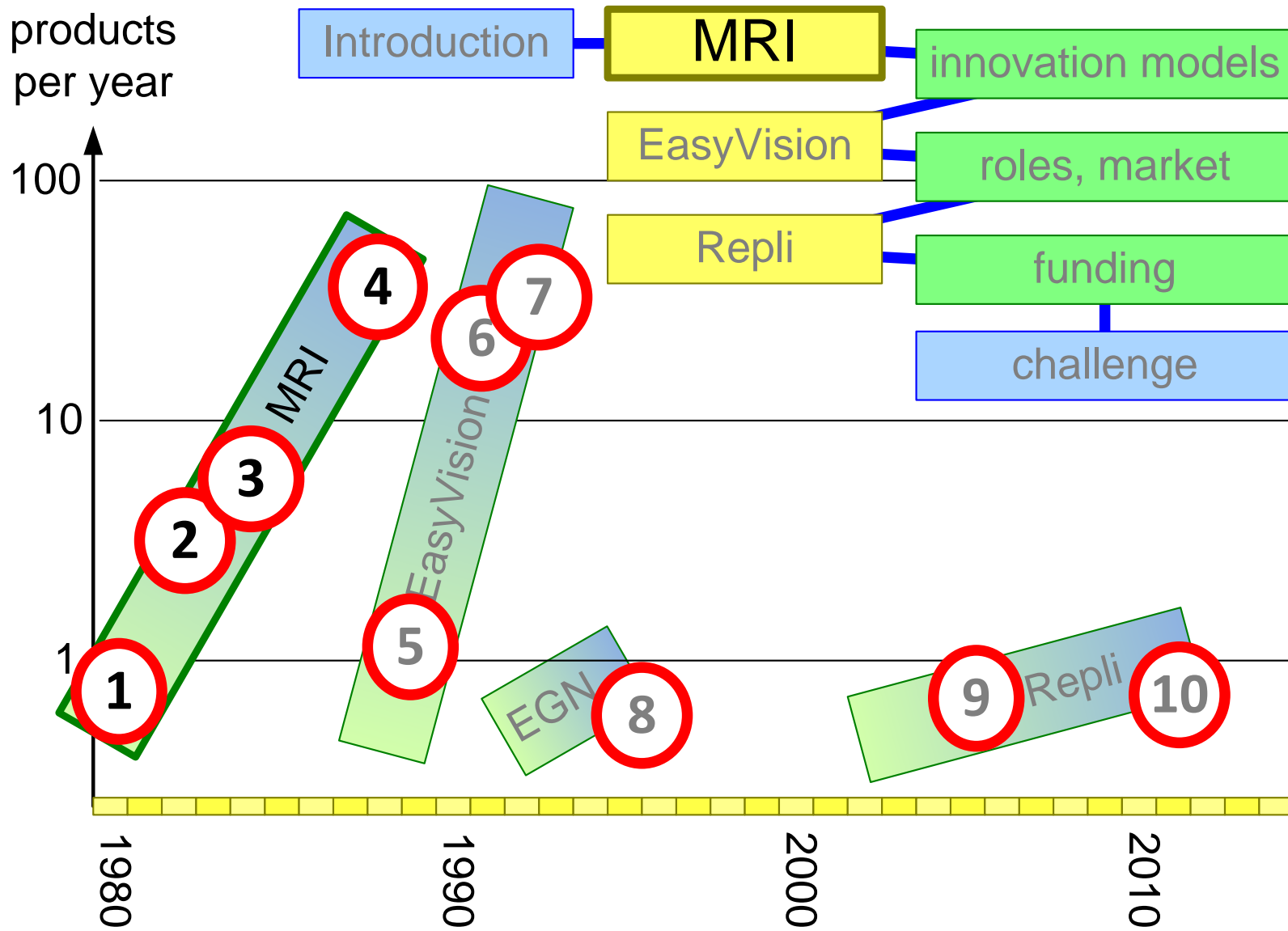
# Figure of Contents™; 10 Hurdles



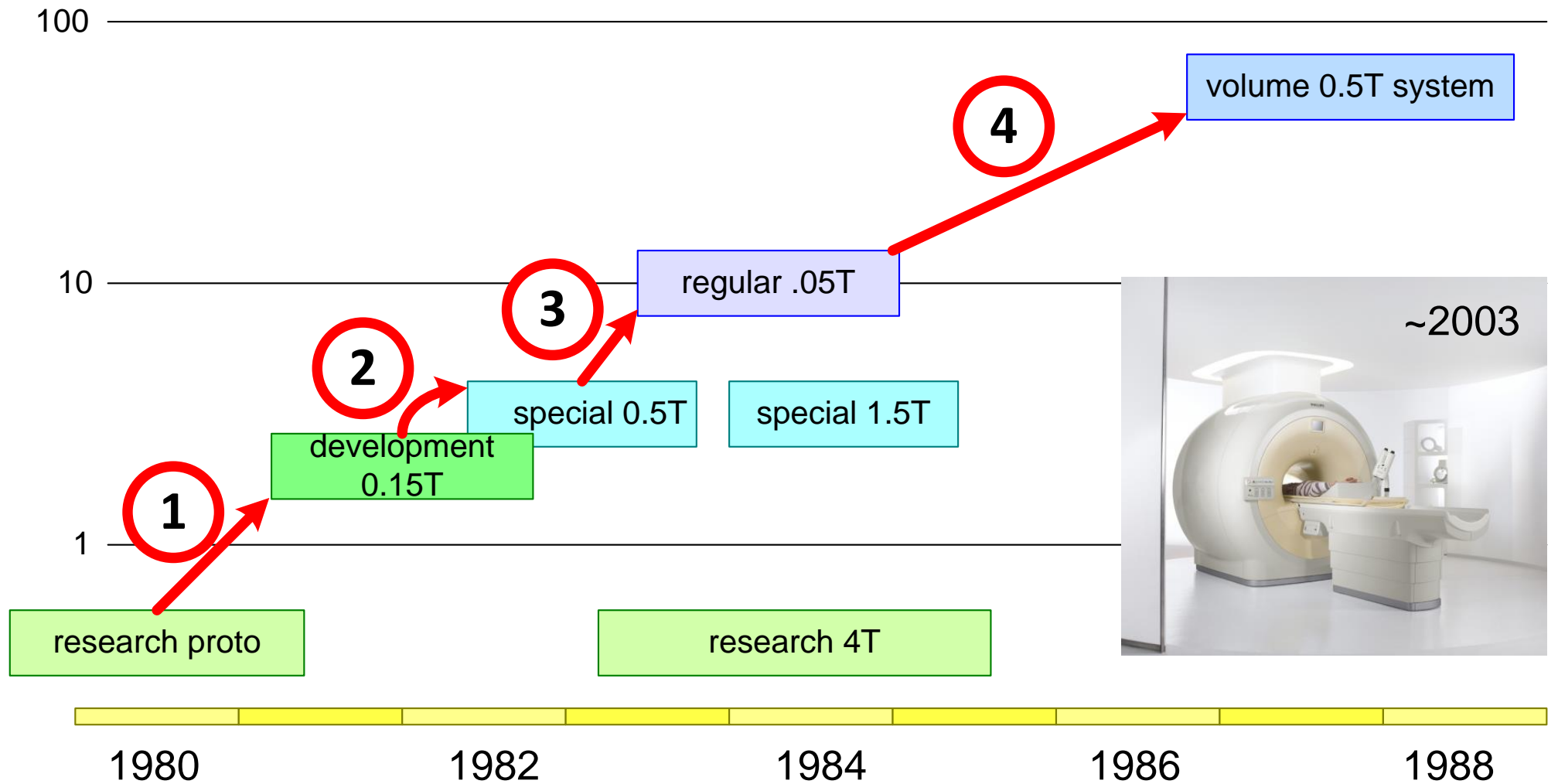
# Examples of Significant Innovations



# 1980: MRI scanners

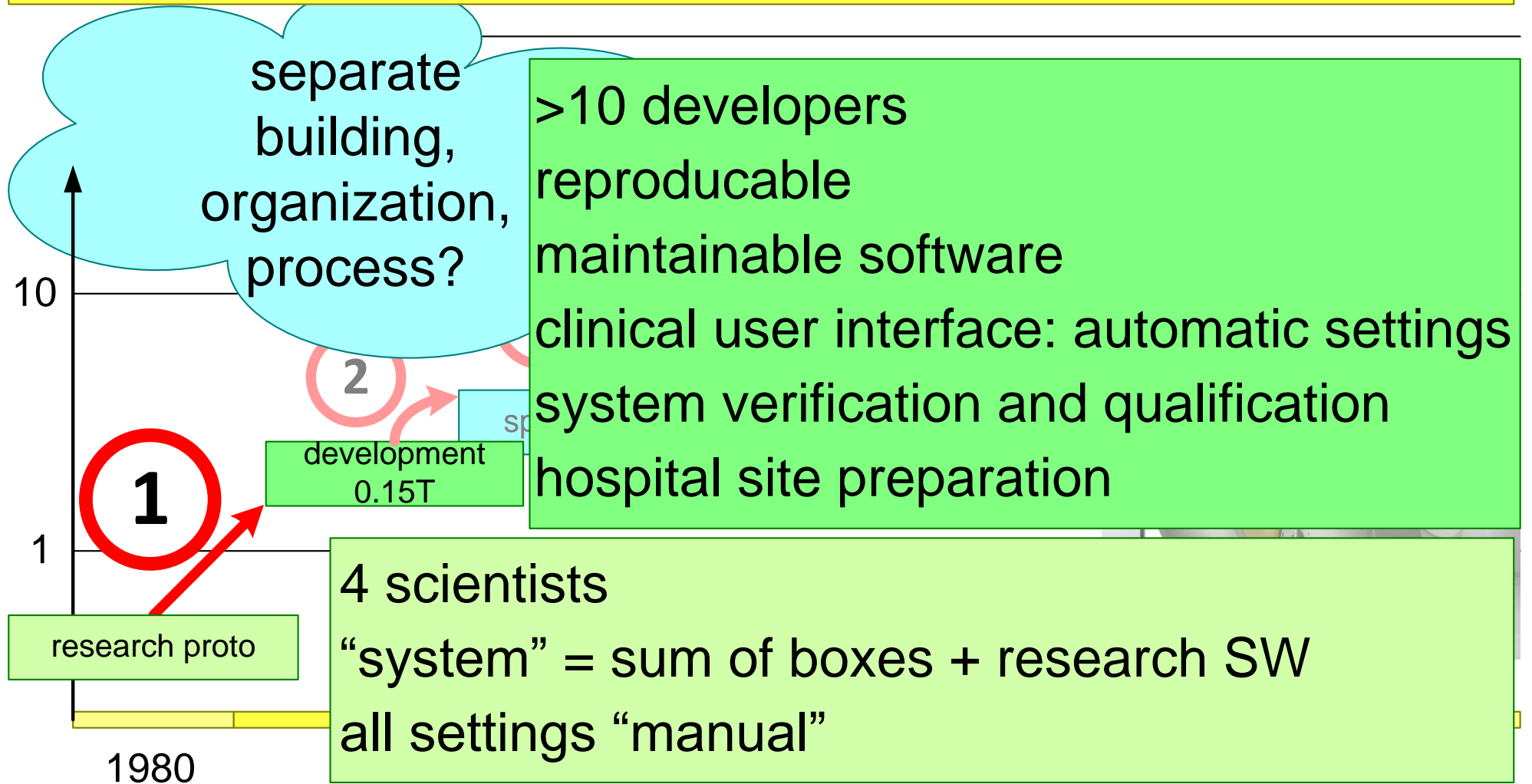


# The Beginning of MRI scanners

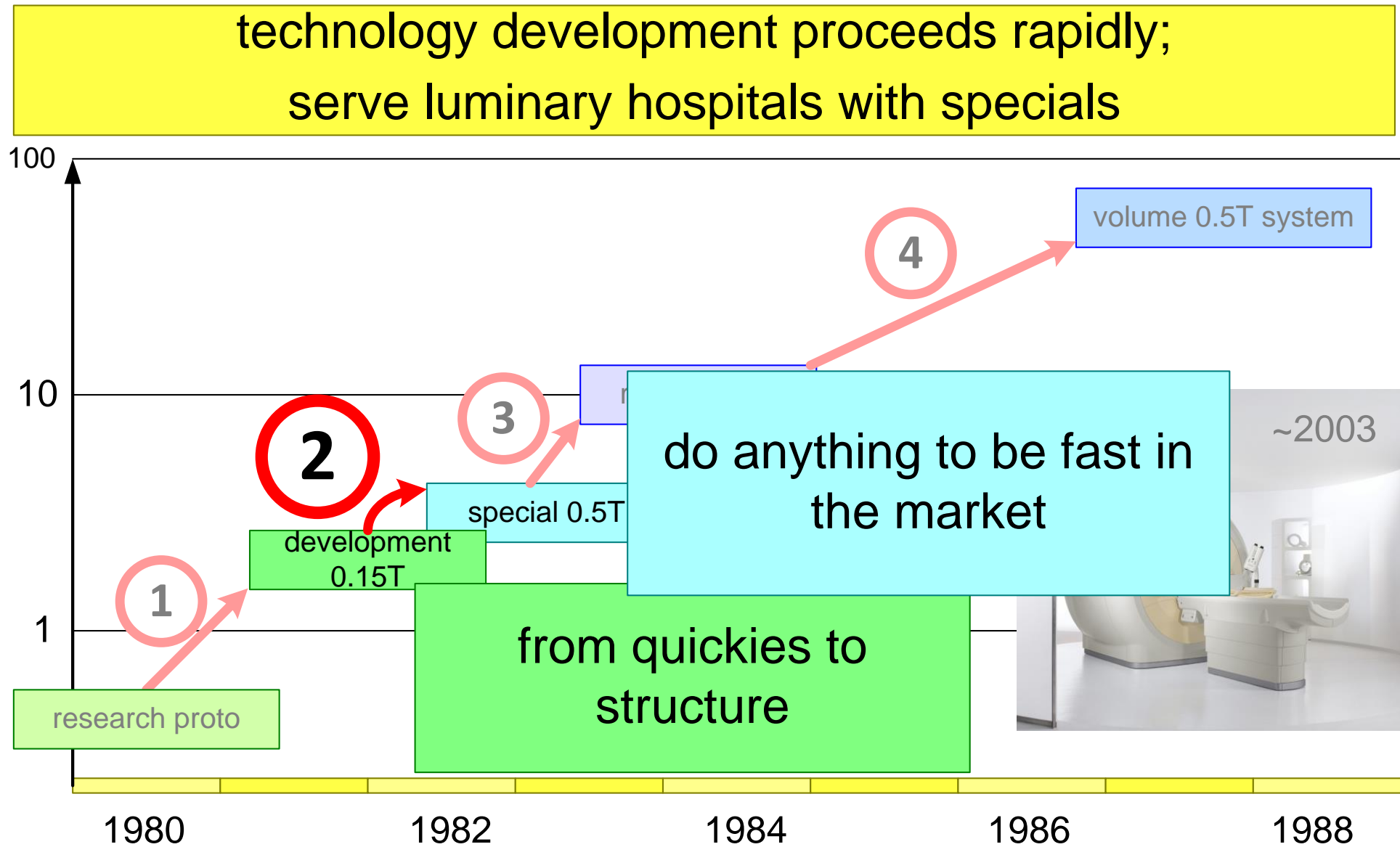


# From Research to Development

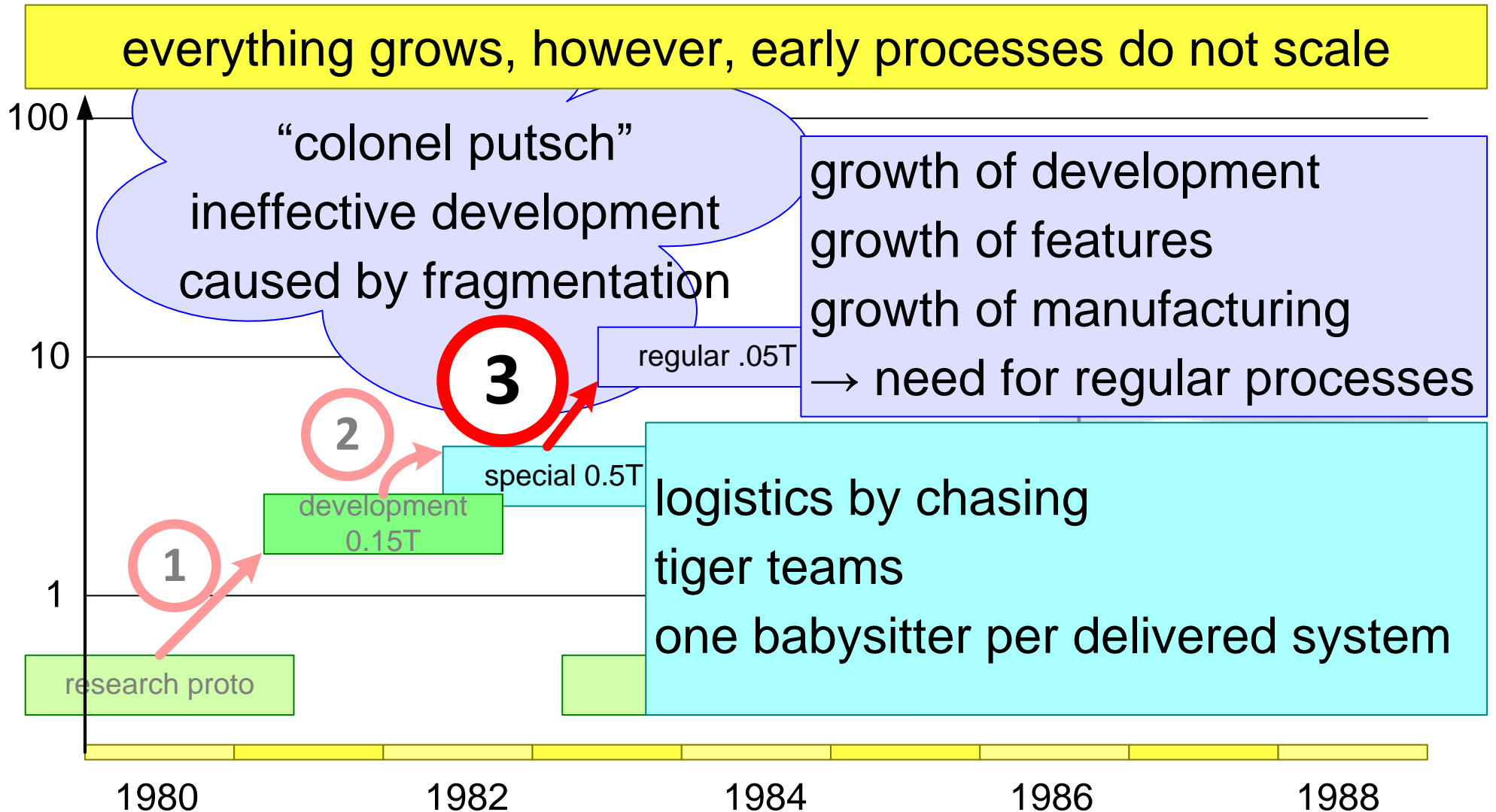
from one physics laboratory to multiple clinical hospitals



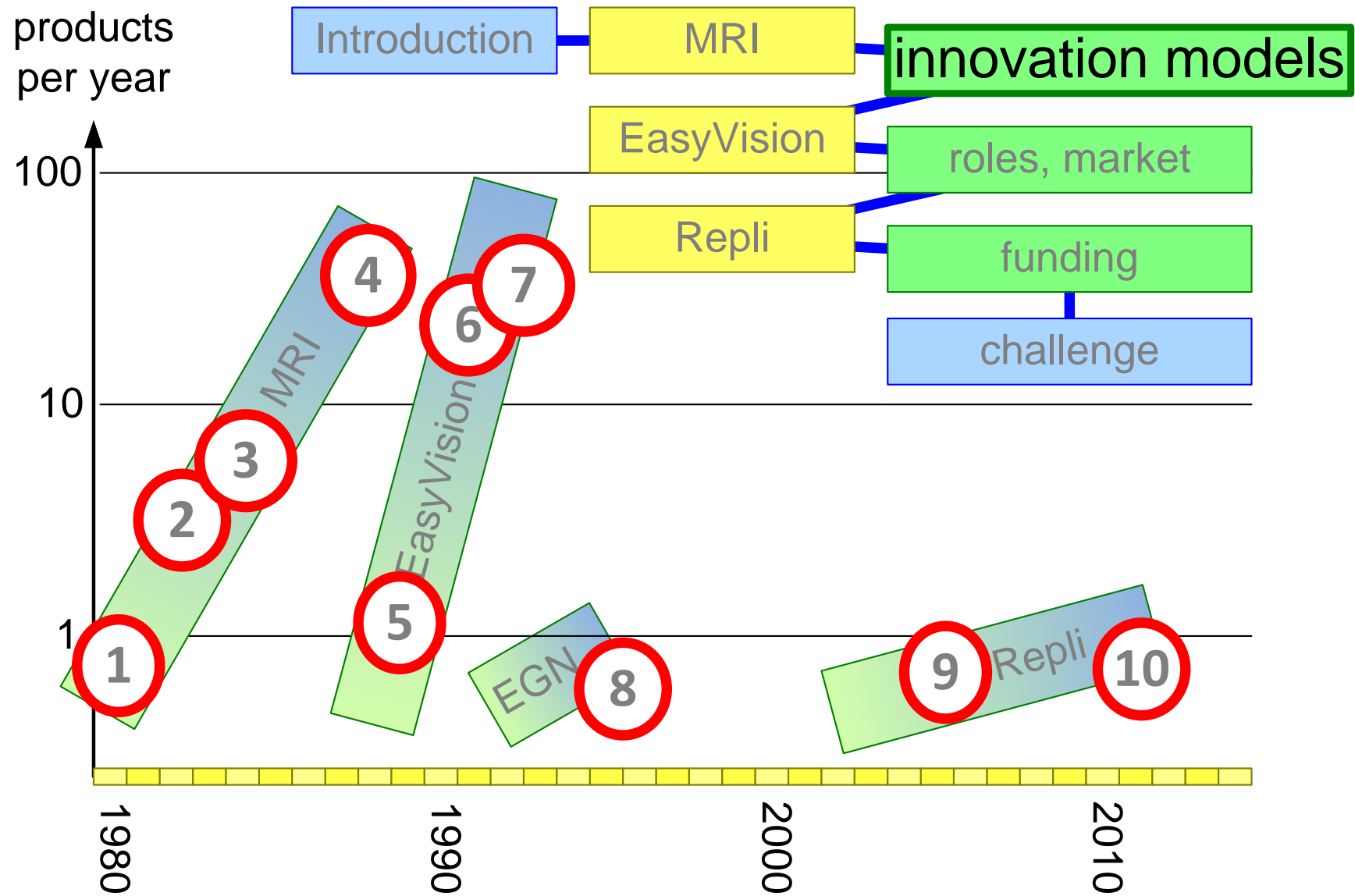
# From Development to Specials



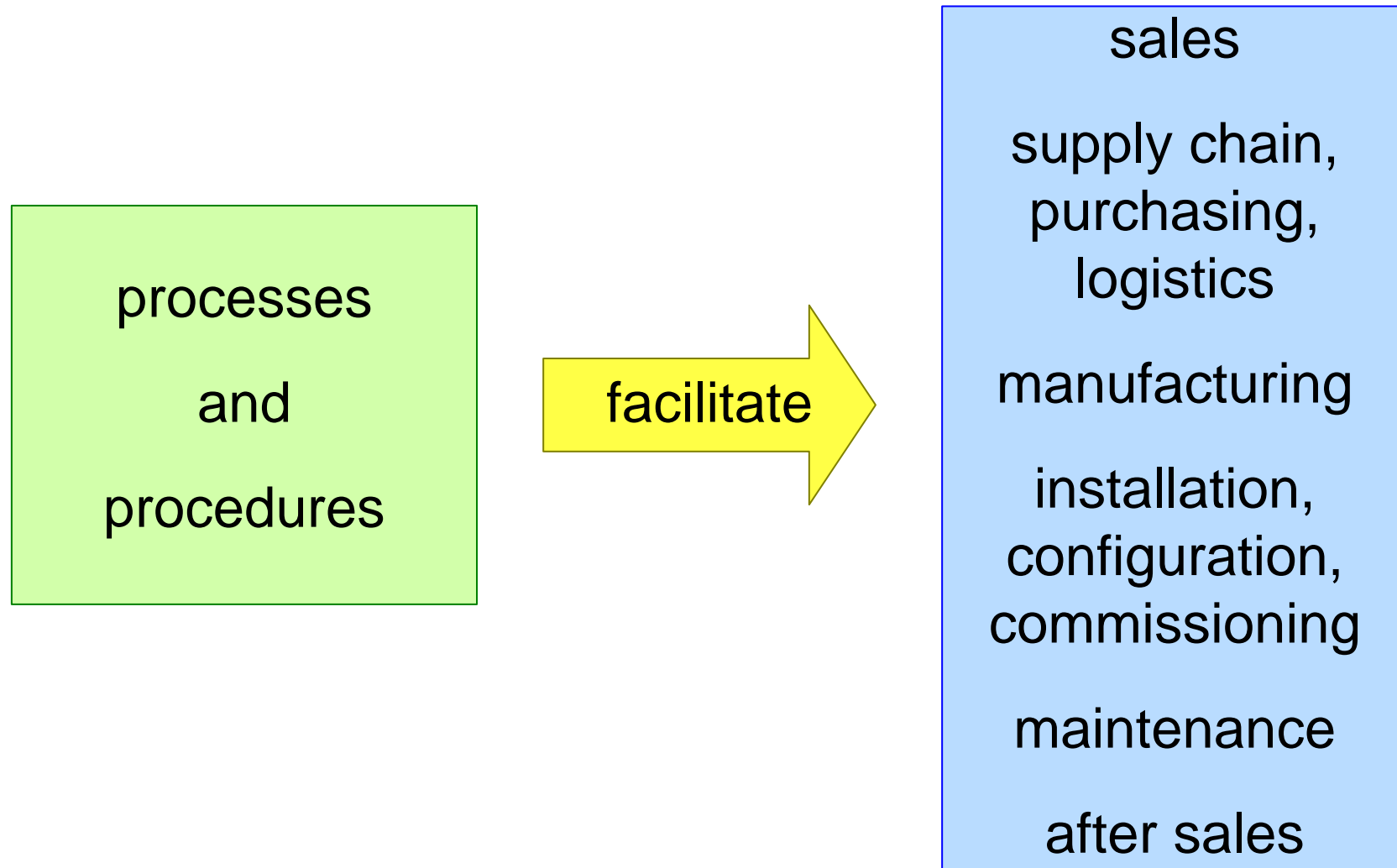
# From Specials to Regular



# Approaches to Innovation



# Existing Process Framework May not Fit



however, may constrain need and solution exploration

# Various Innovation Approaches

DARPA, grand challenge

SFI, EU funding (precompetitive)

Skunkworks      Lockheed Martin -> KM

start-up

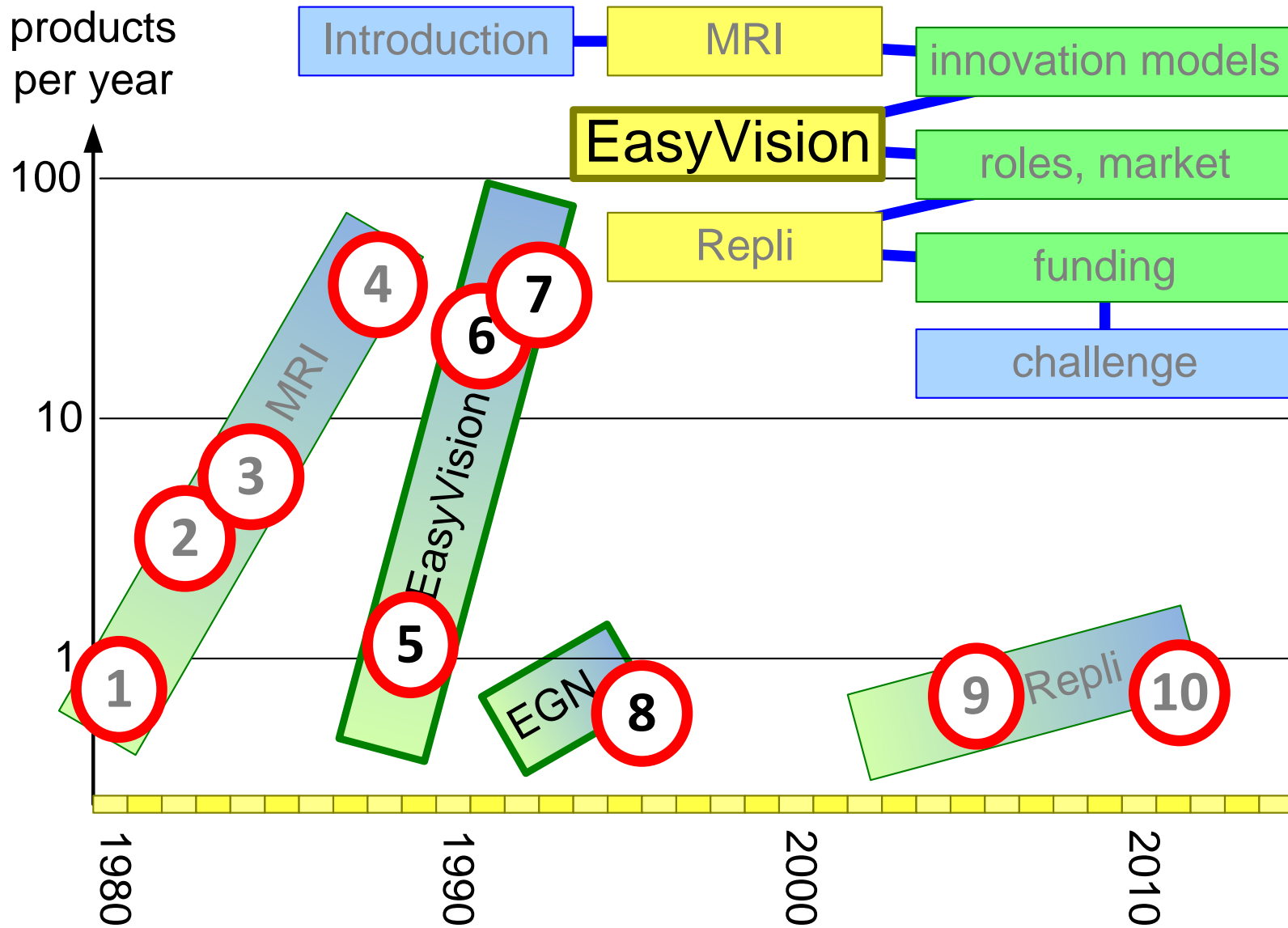
campus (parken)      Teknologiparken Kongberg  
Oslo Cancer Cluster  
High Tech Campus Eindhoven

incubators      KTH Stockholm  
Philips personal health

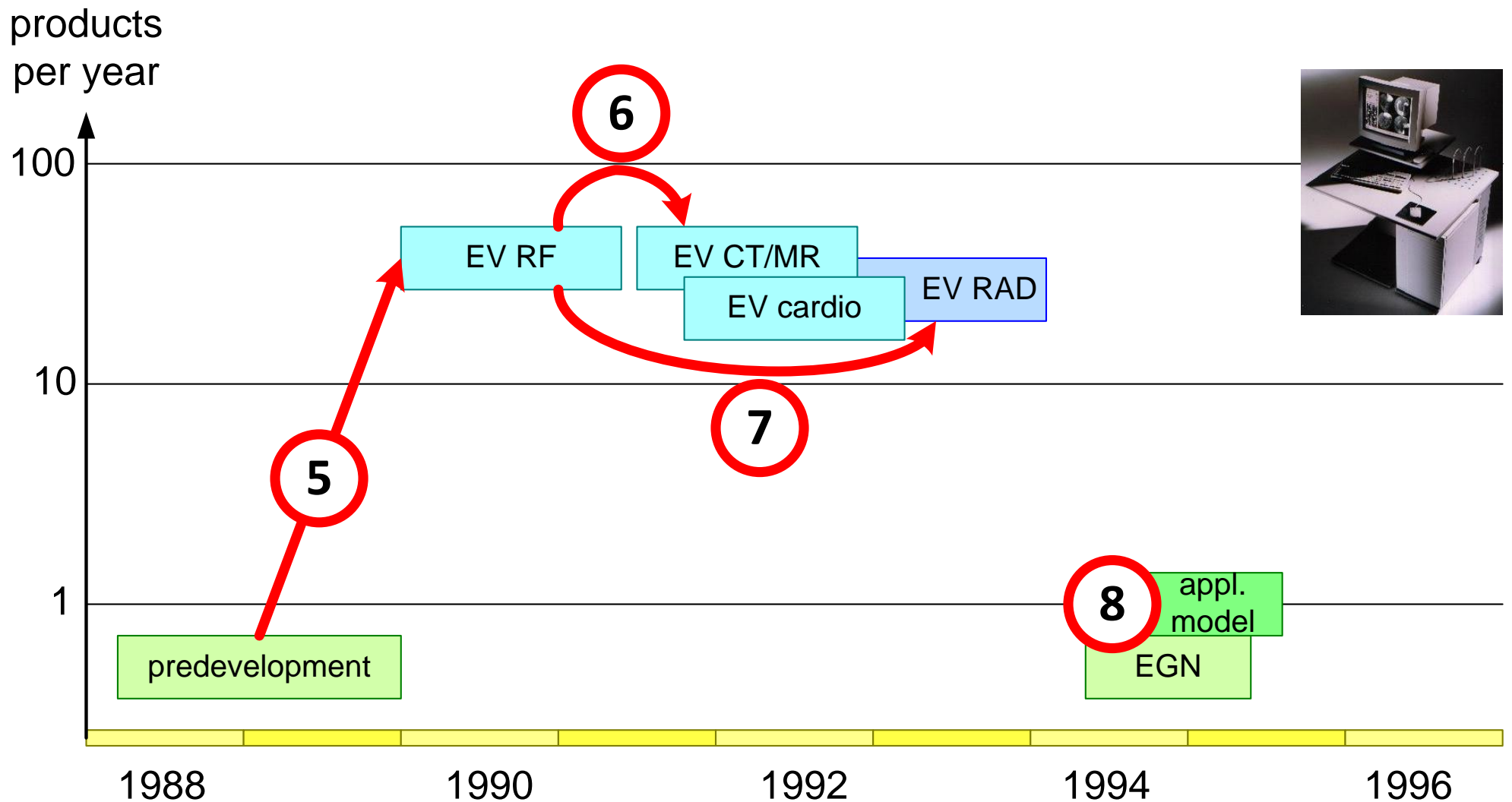
venture capitalists

open innovation

# 1990: Medical Workstation EasyVision

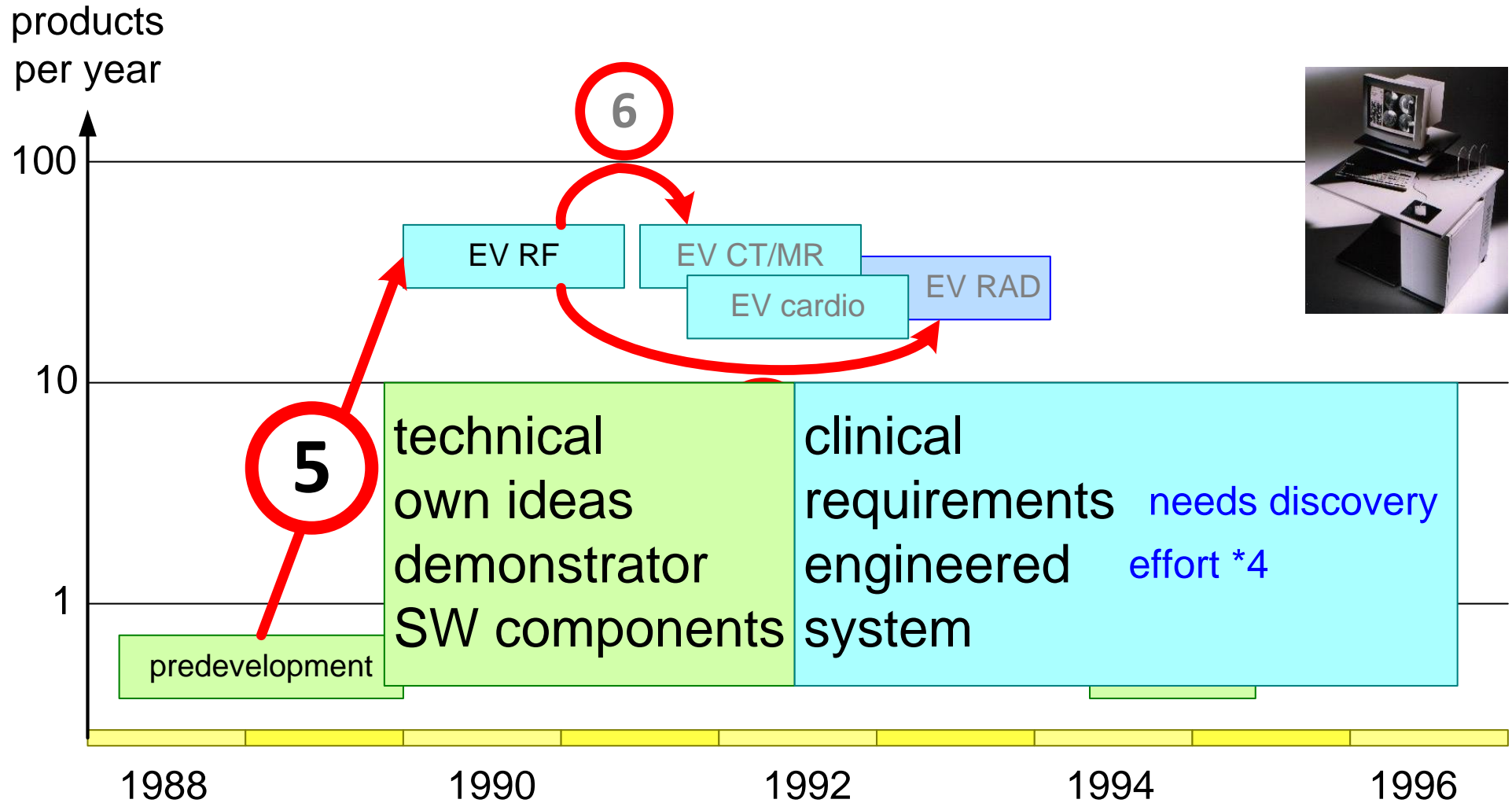


# The beginning of EasyVision



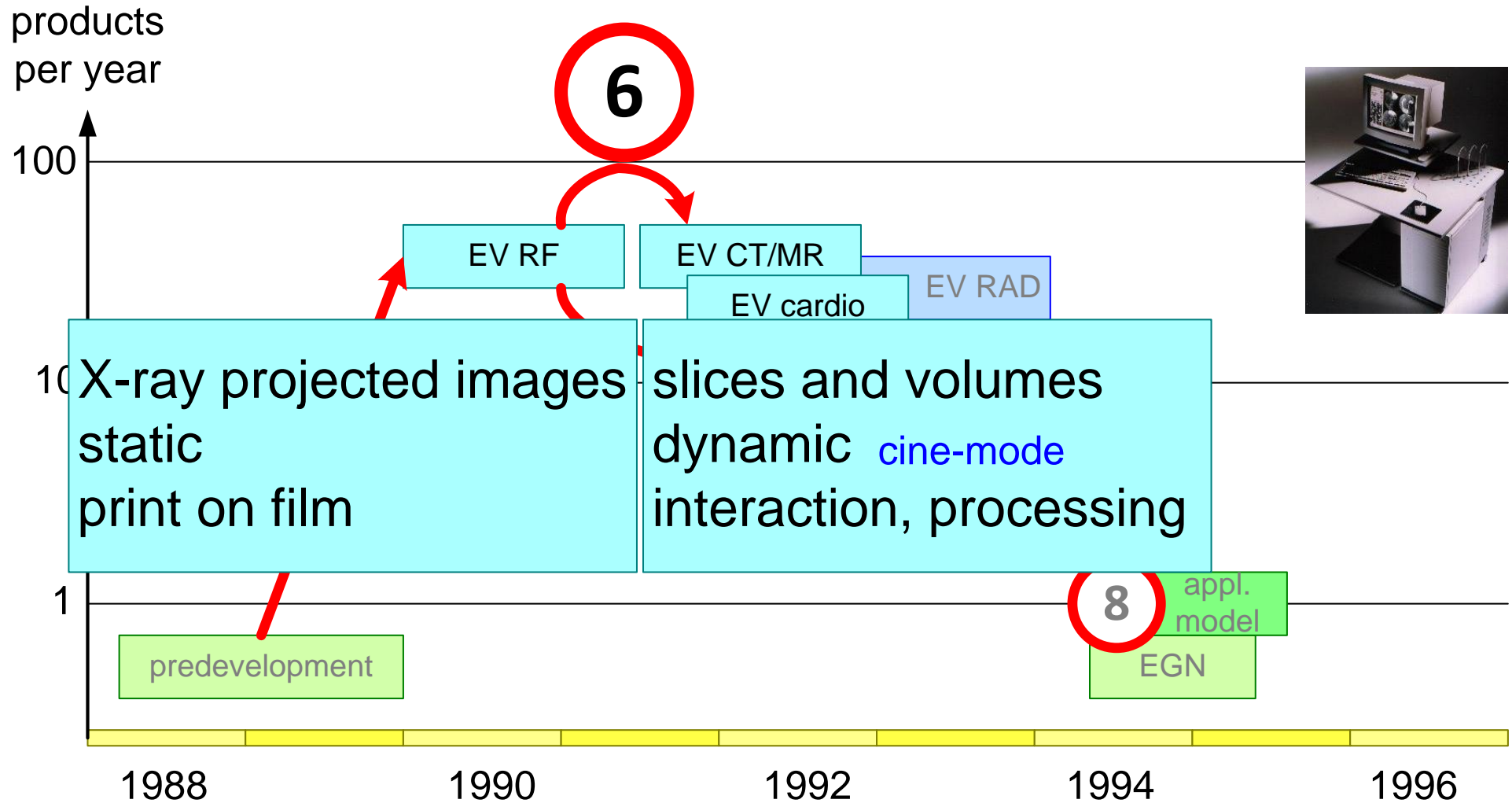
# From Demonstrator to Product

from unconstrained coding to systems engineering



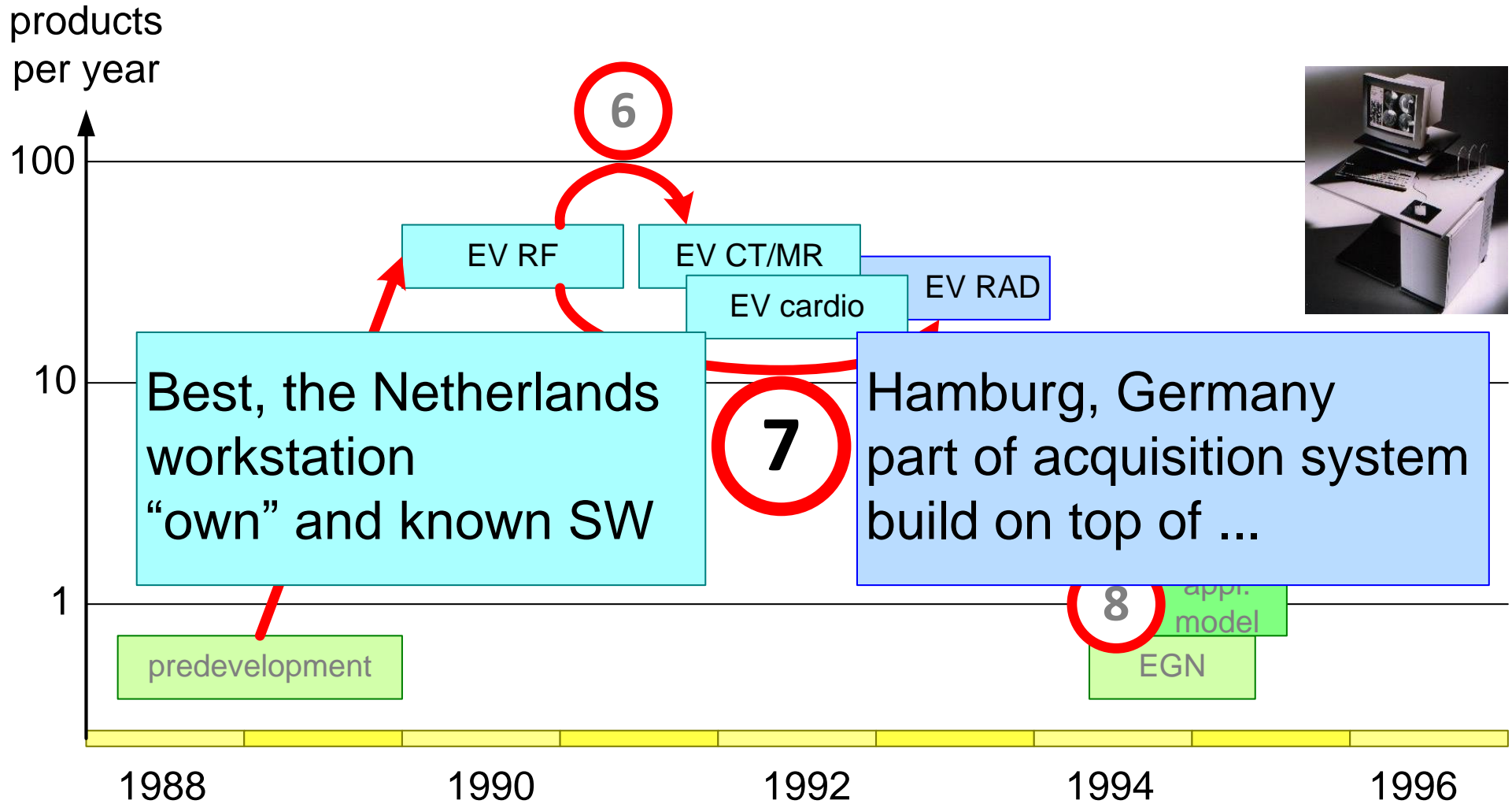
# Adding other Applications

other clinical users, other images, new applications



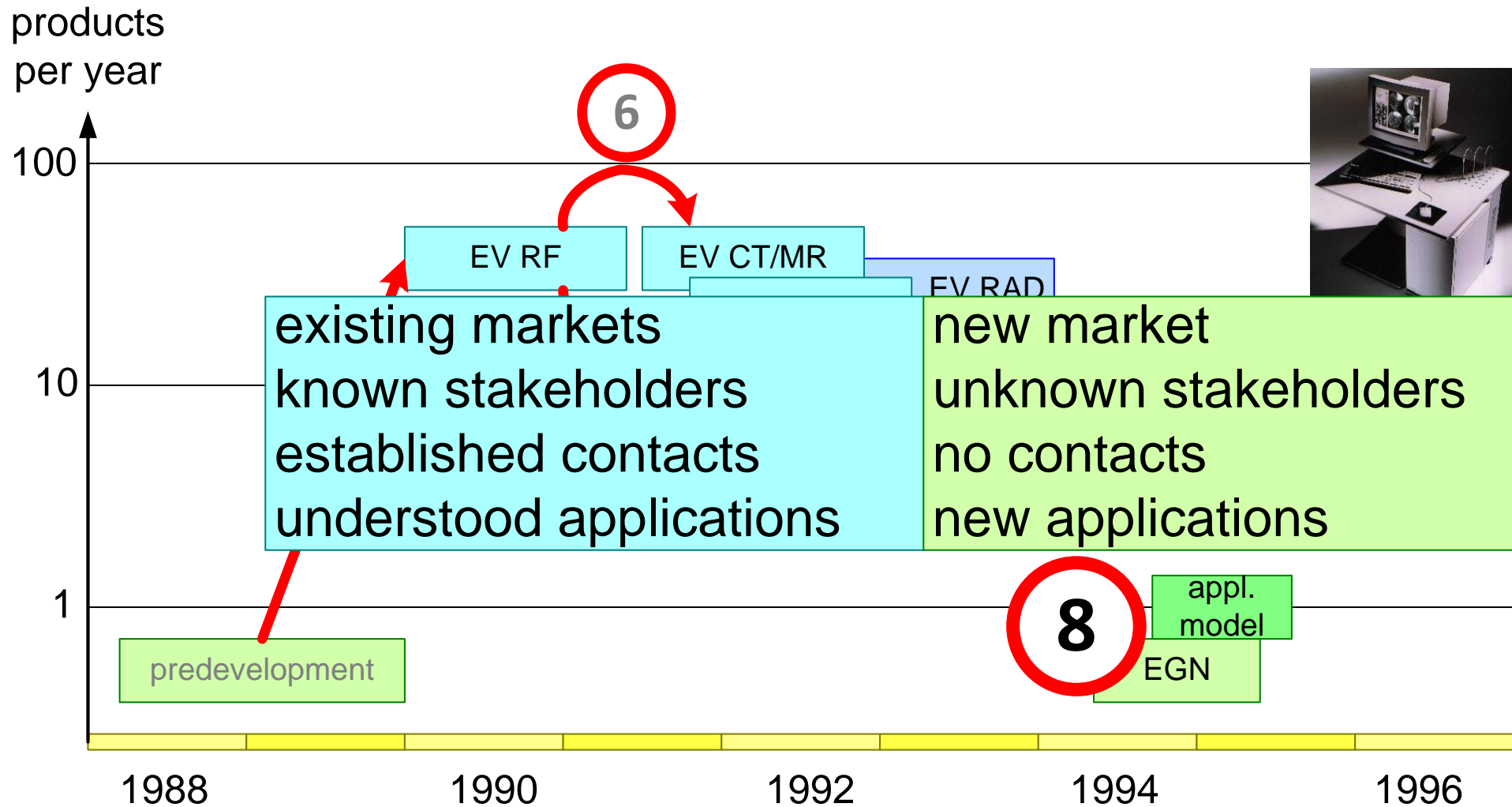
# Re-use by Others

software re-used by other department in other location

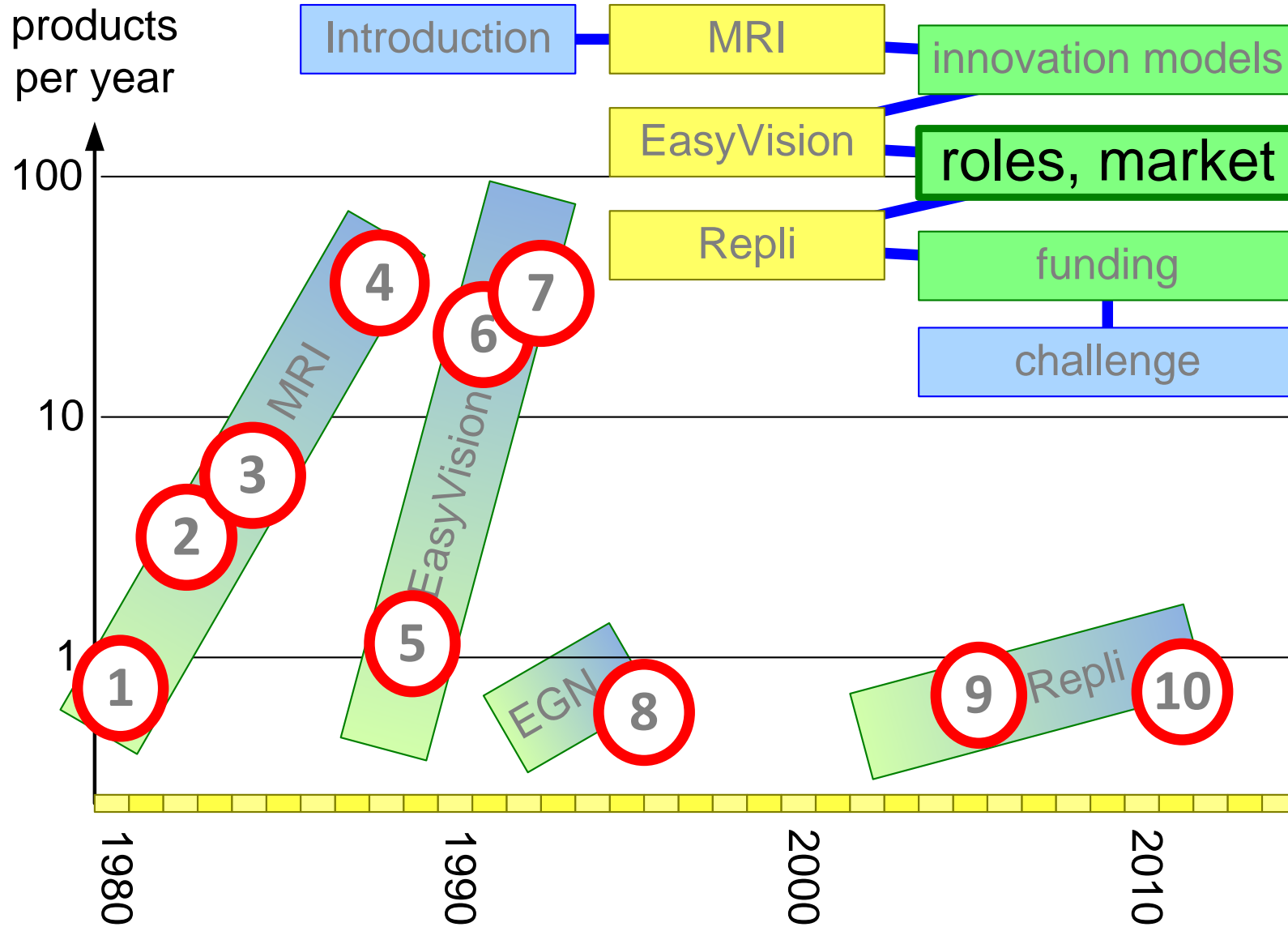


# Re-use in New Unknown Market

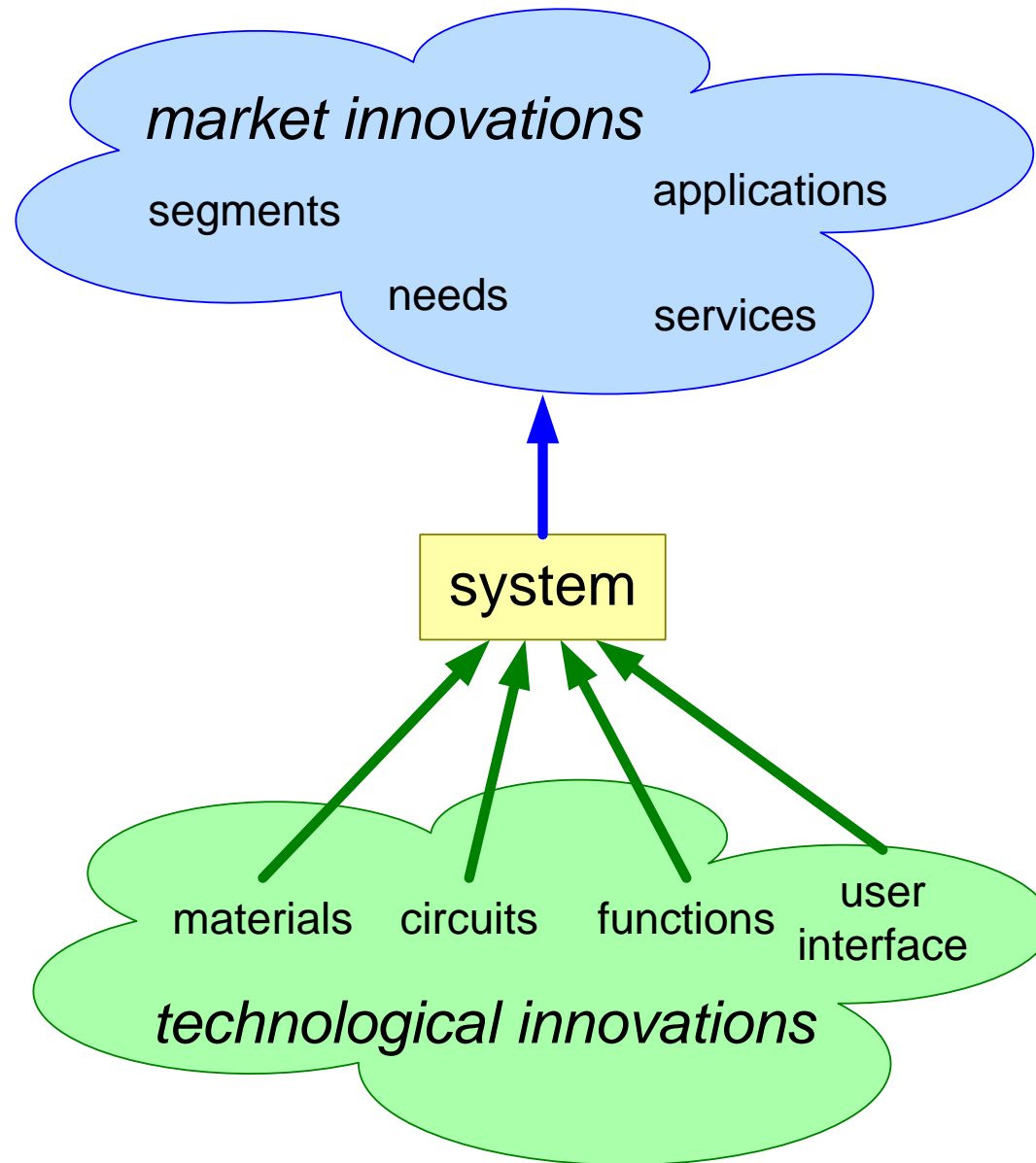
creating new business in new market



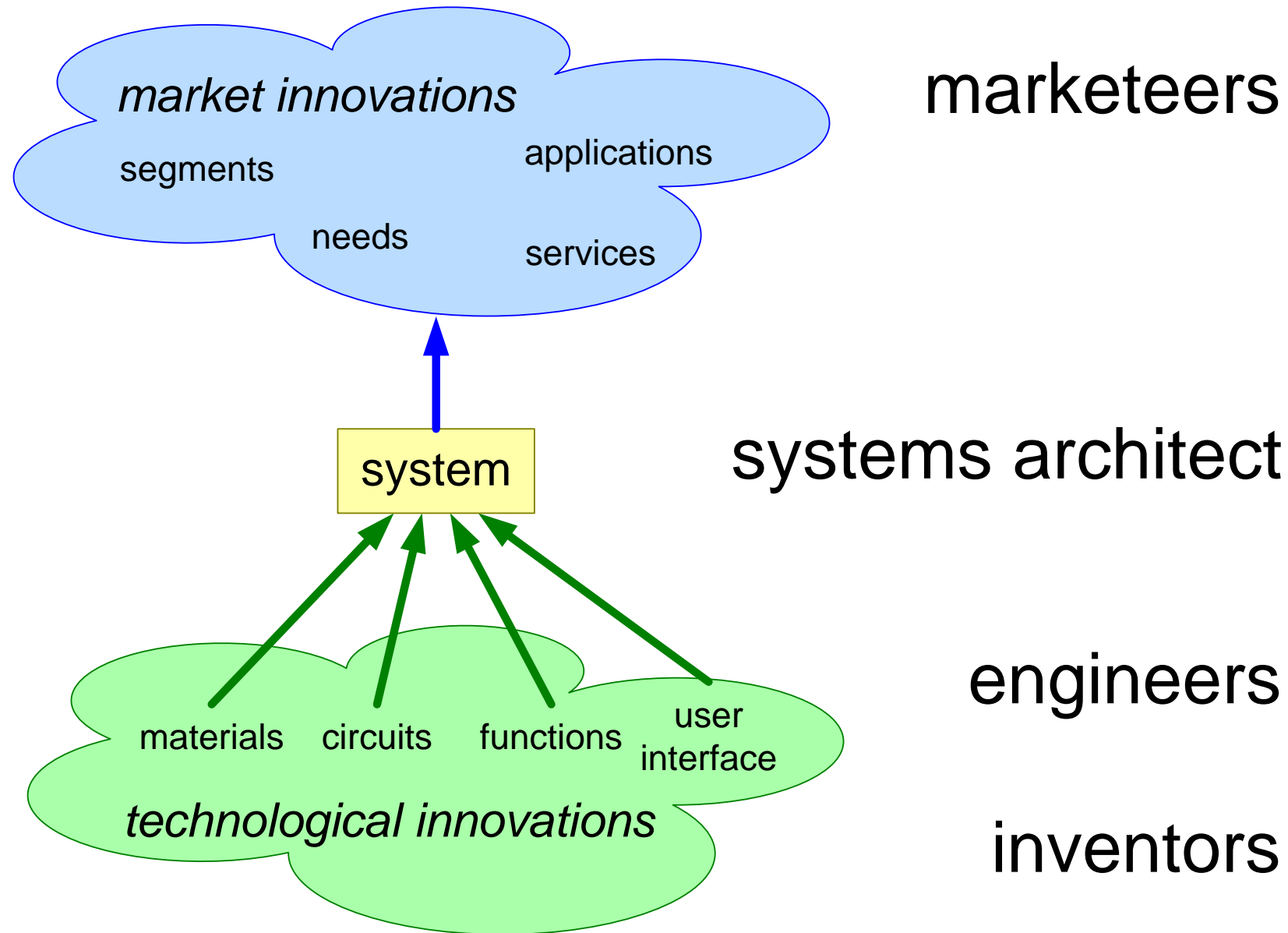
# Various Roles in Innovation



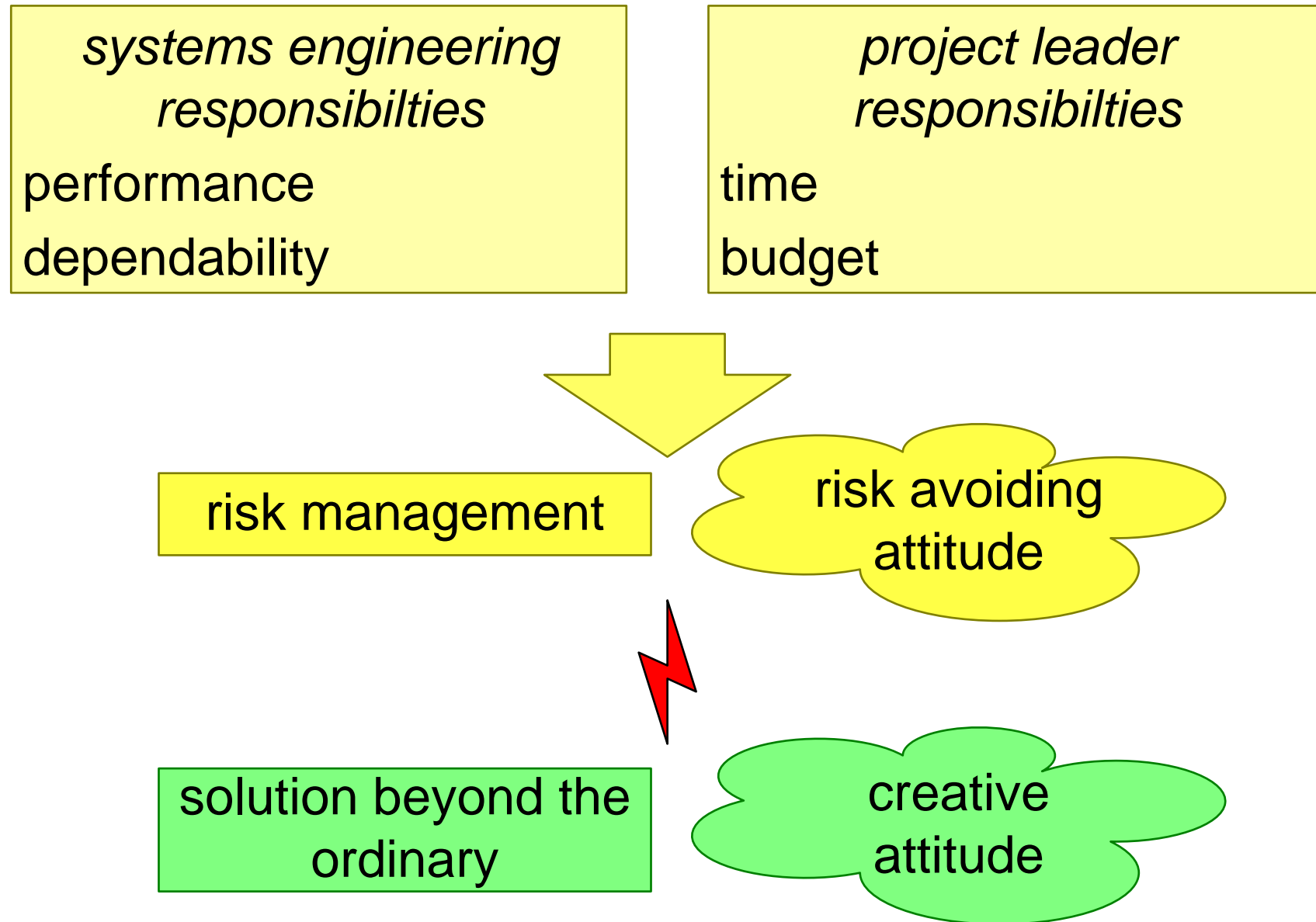
# Successful Innovation = Technological + Market



# System Architect links technology and market



# Conservative SEs and PLs



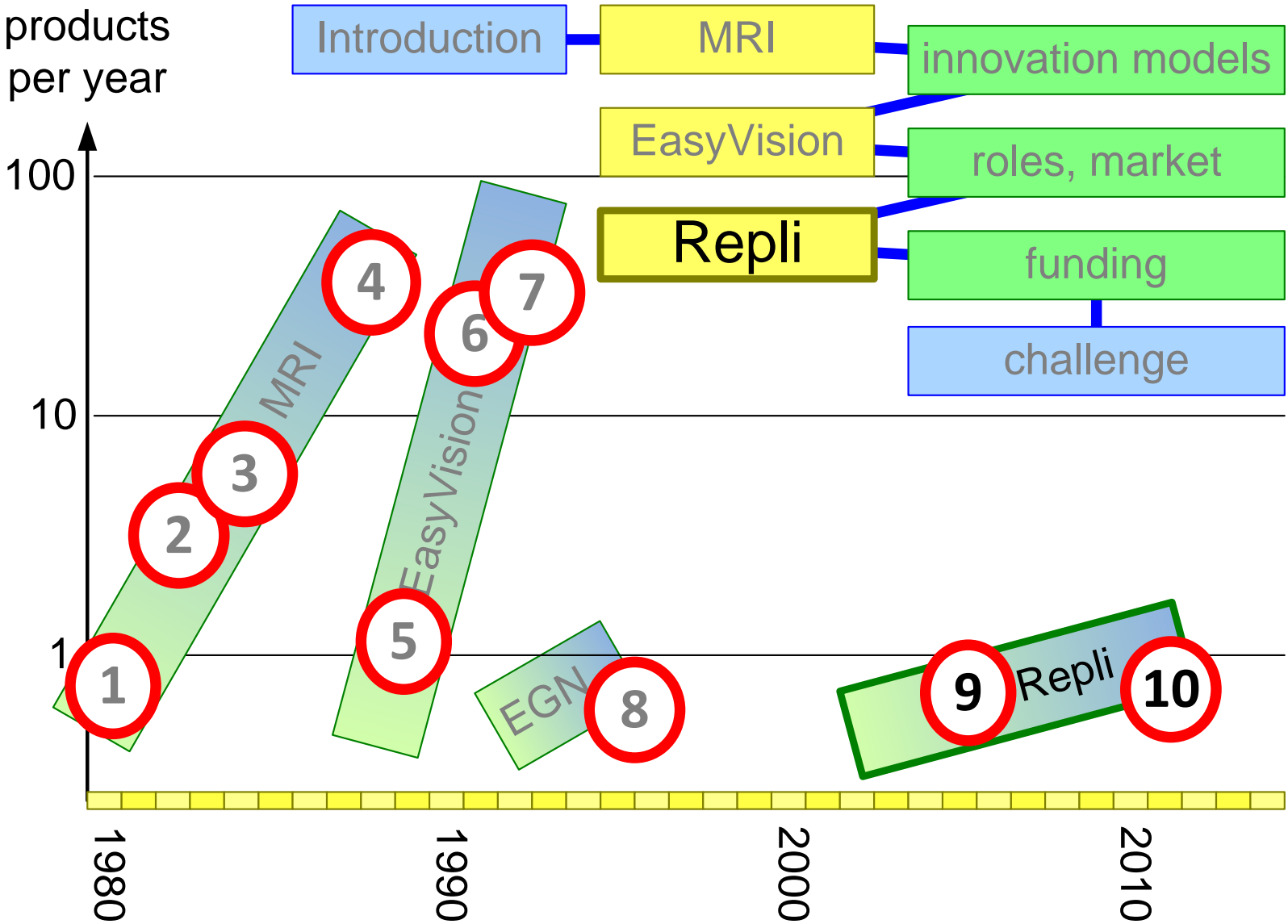
# Marketing <> Sales!

marketing	sales
understands and sees many (potential) customers smells (latent) needs transforms them in business creates the future	sells what is available convinces customers poor sales people only demand more from D&E determines today's business

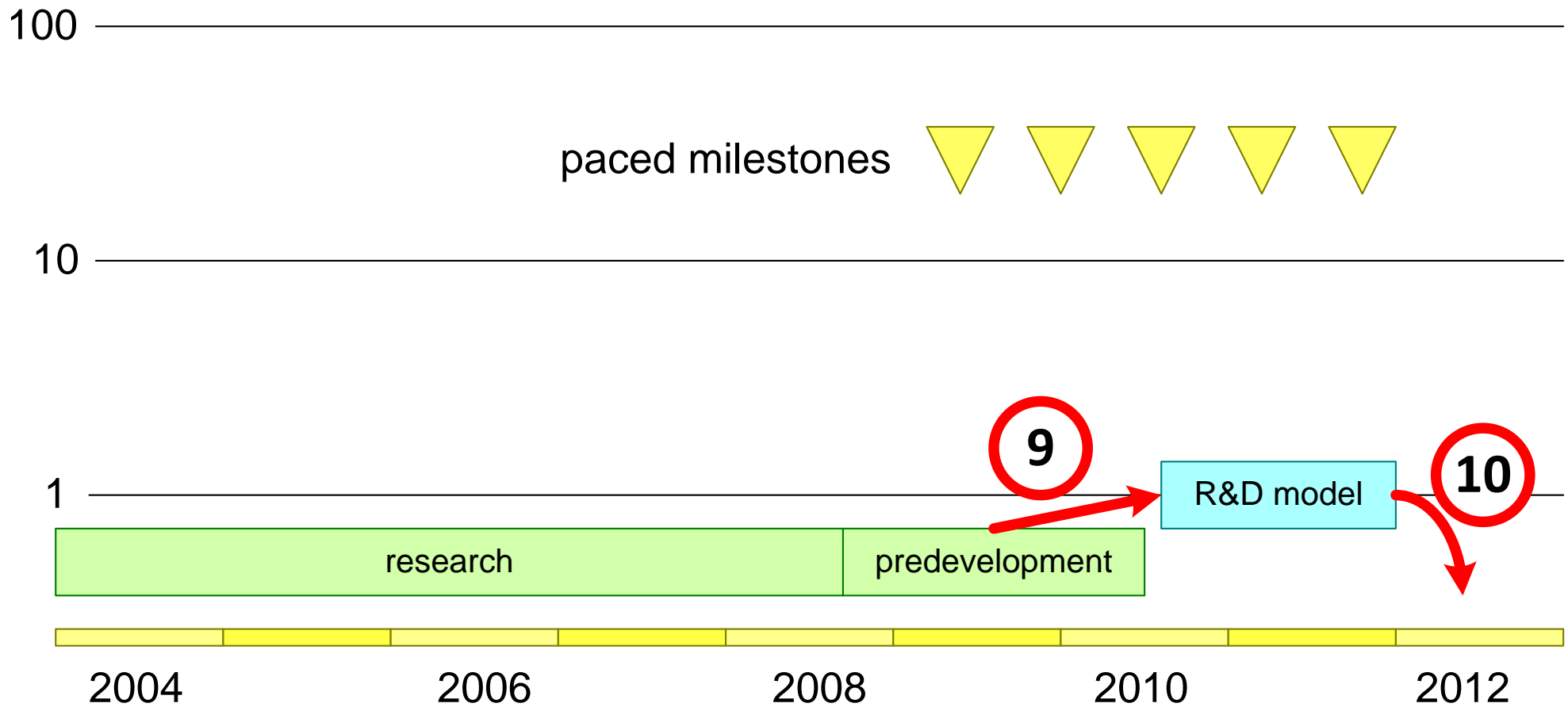
Requirements discovery: Market-as-Laboratory

extreme: test Internet responses

# Semiconductor Equipment Start-up

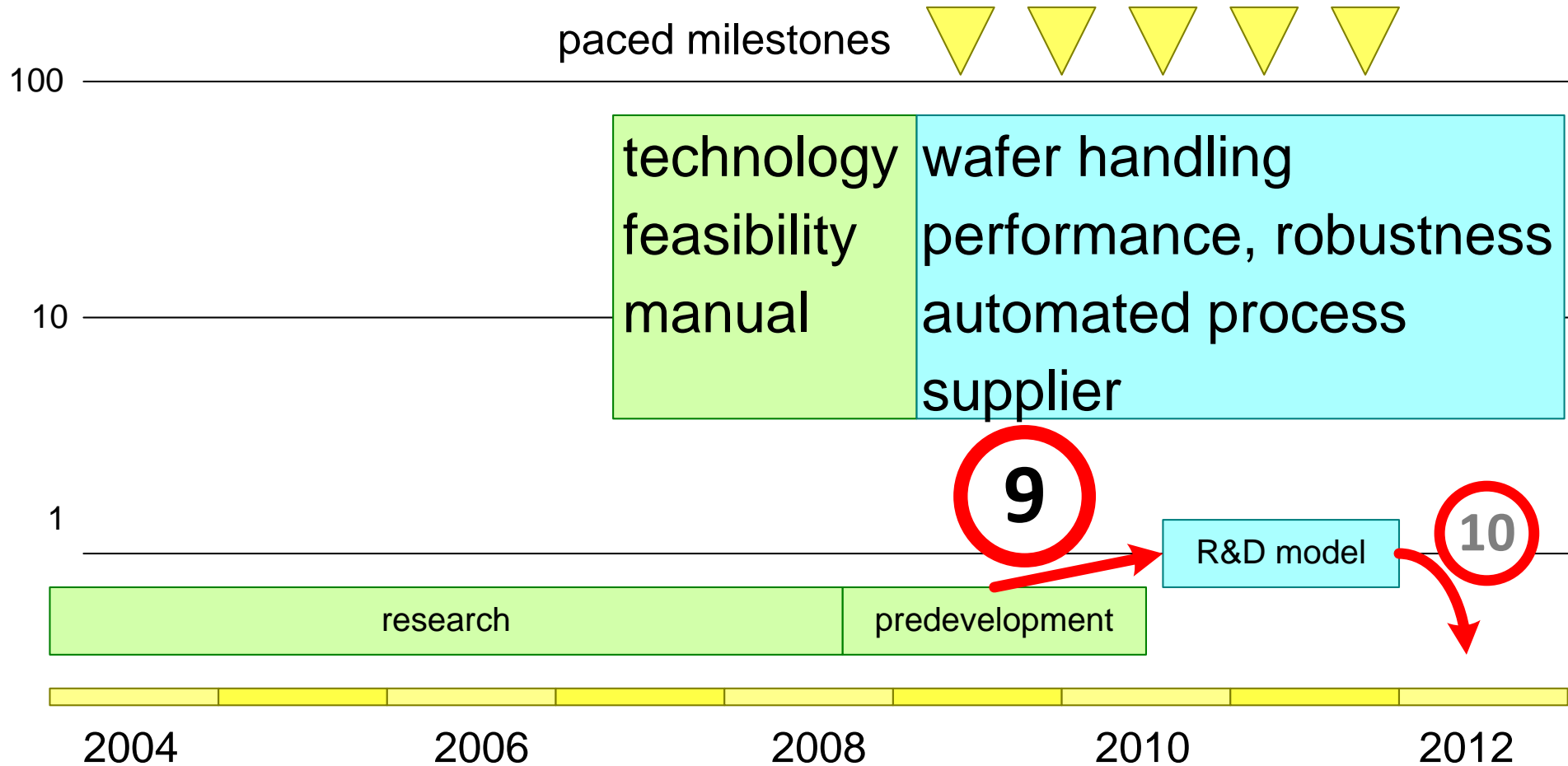


# The Tragedy of a Technology Start-up

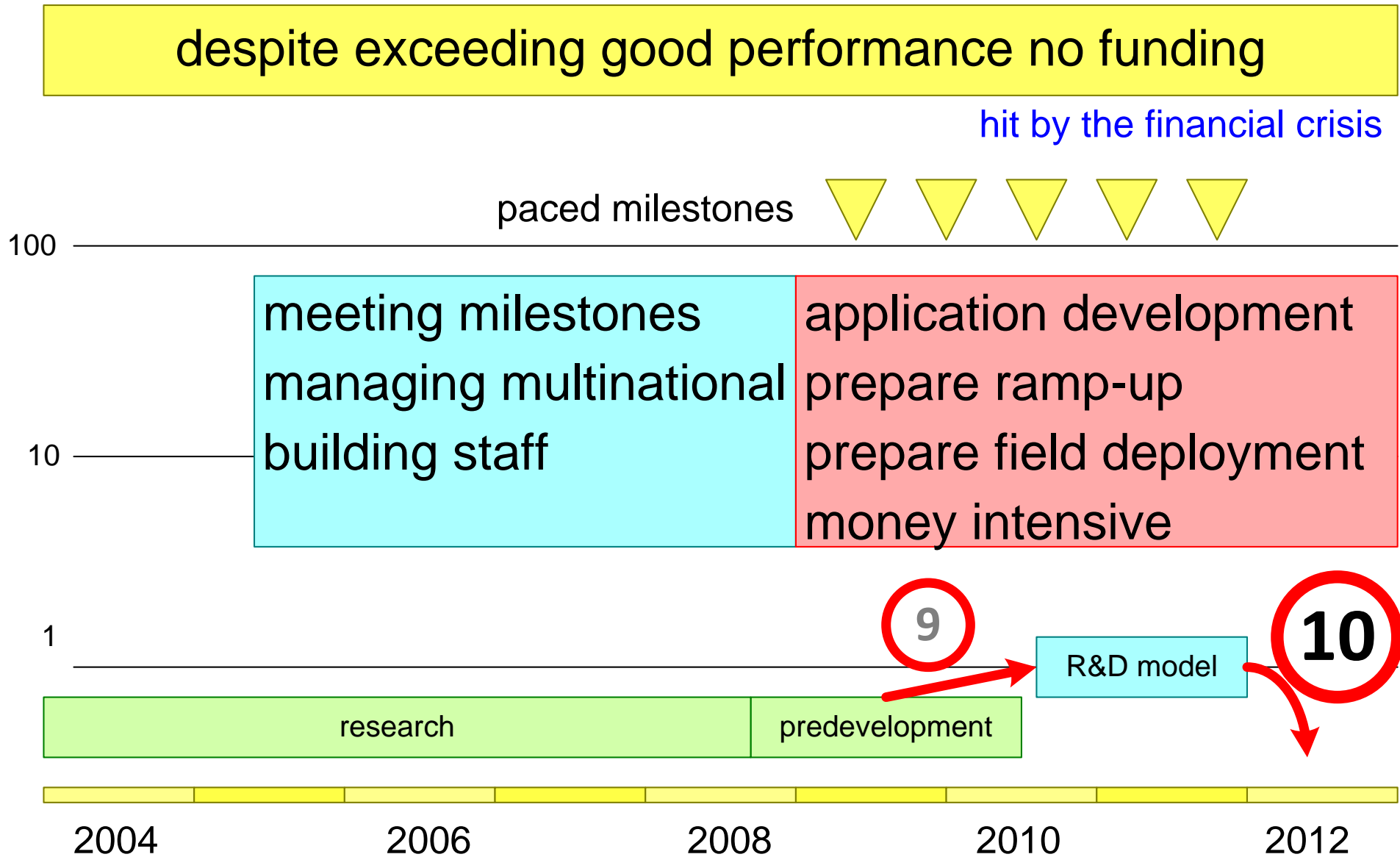


# From research to RD model

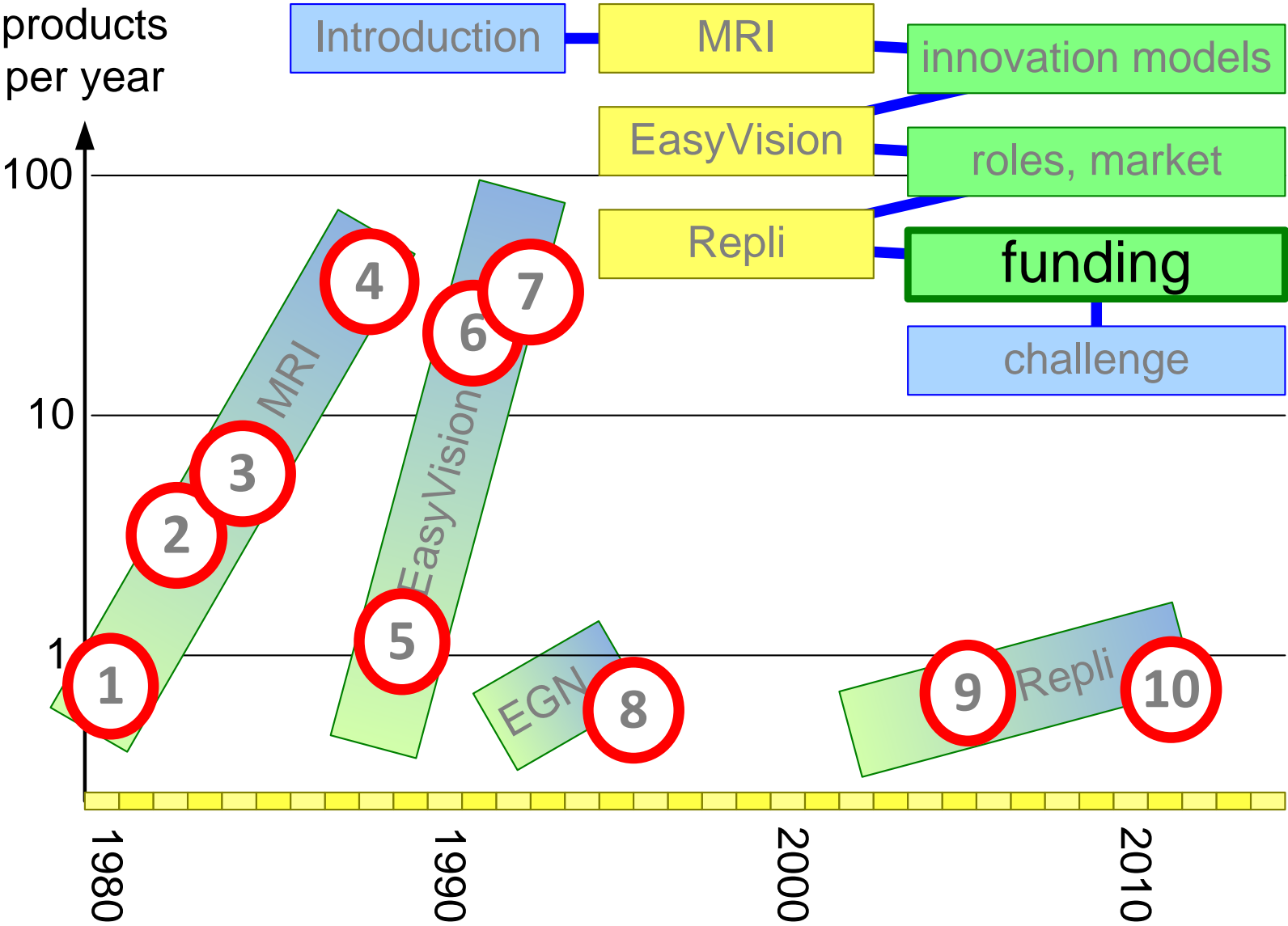
from flexibility for experts to production workhorse



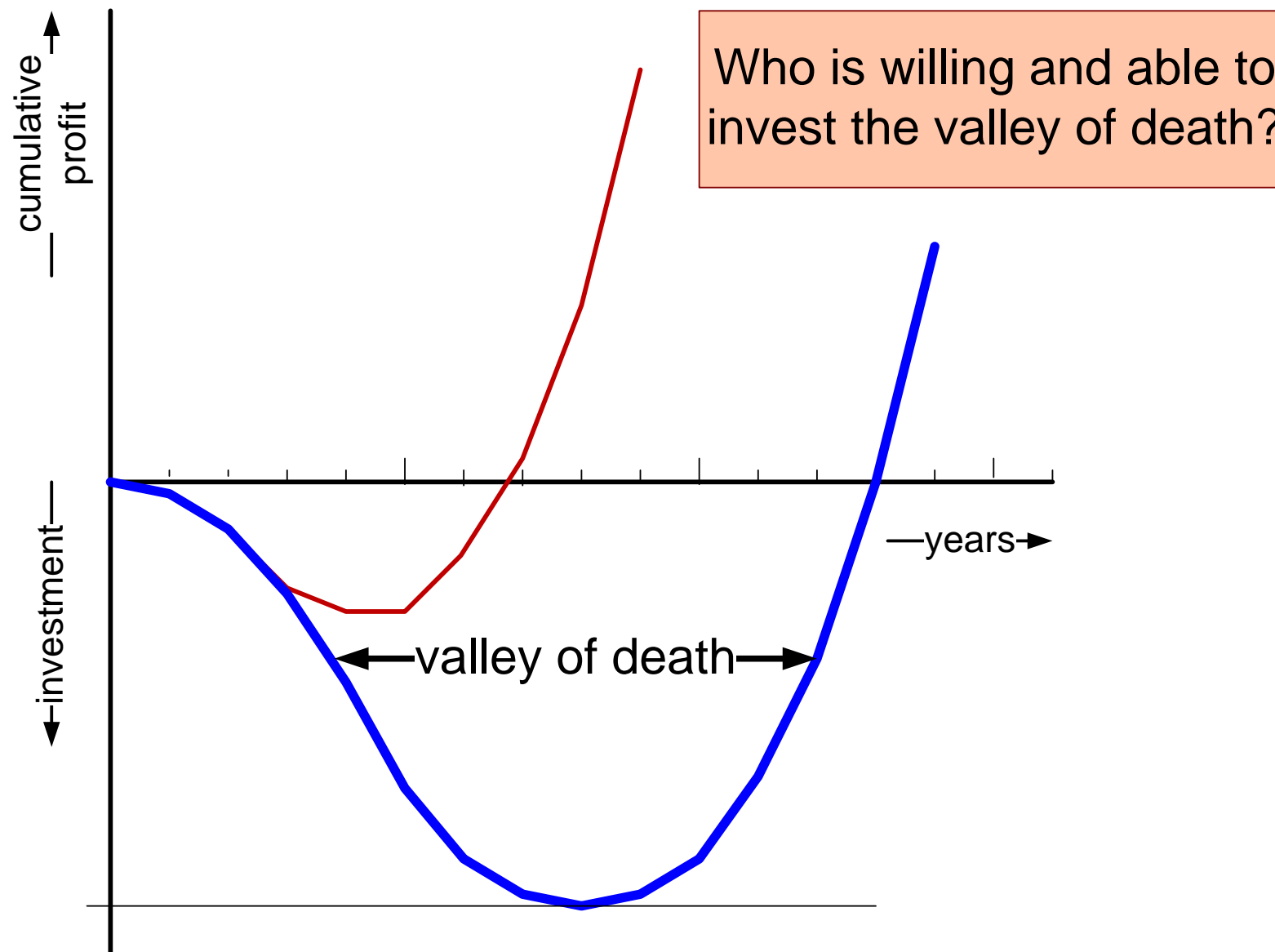
# From RD model (not) to Market Intro



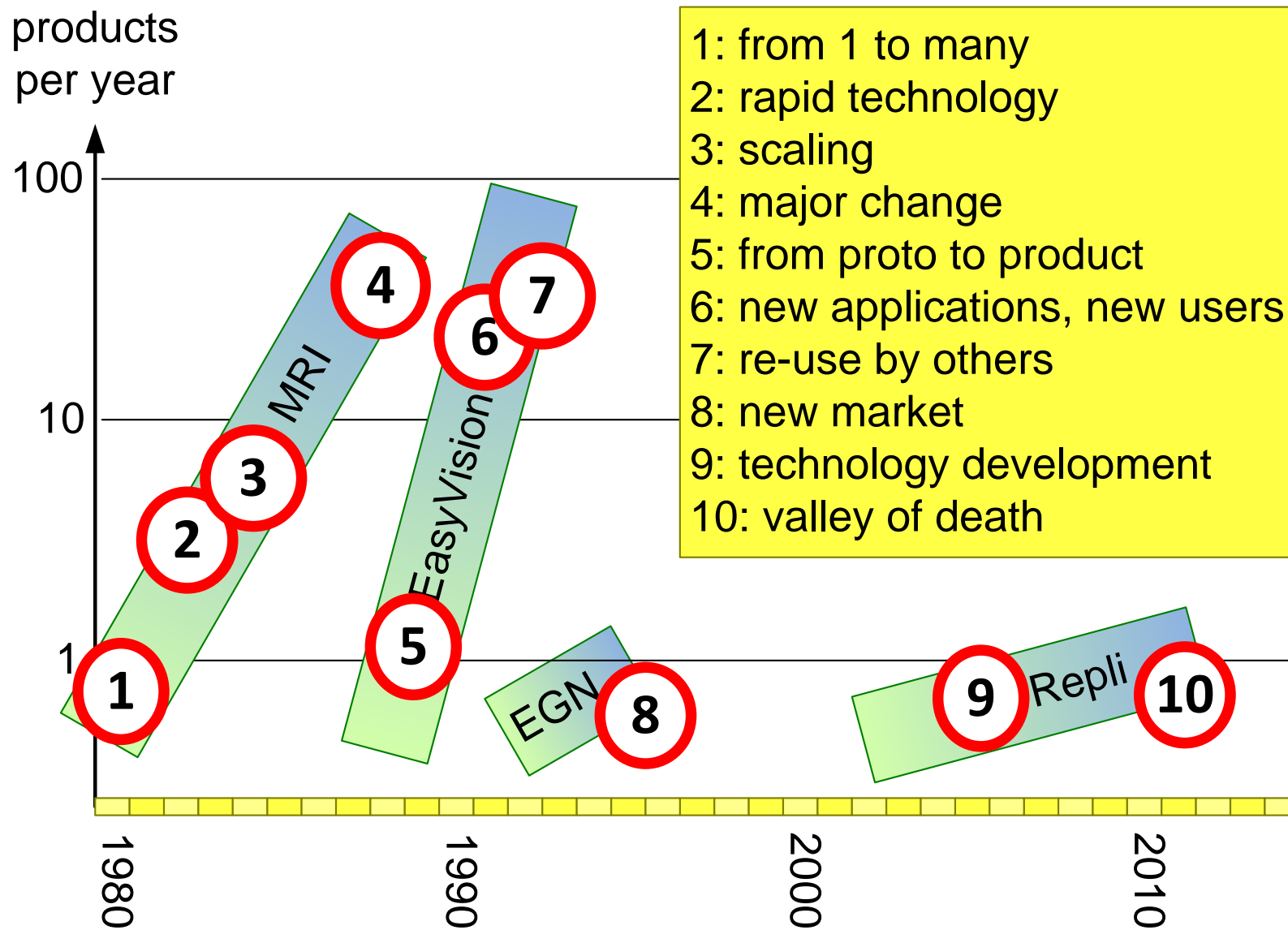
# How to get the Money?



# Valley of Death



# Summary of Experiences



# Lessons Learned

## R&D

Research: *inspire* rather than *constrain*

Predevelopment: *when* start *including* process *constraints*?

Early development and deployment: *requirement discovery* (market-as-laboratory)

Development and engineering: how to *scale* in all directions?

## management

How to *foster long term* under short term pressure

How to survive the *valley of death*?

*Pacing* as early phase progress method

## *Challenge*

How do we prepare Kongsberg/Norway successes for the next 30 years?

Who will take all hurdles and create tomorrow's solutions beyond the ordinary?