

# Towards Uberization... introducing disruption

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## *Chapter 10*

The economics of innovation in the bio-medical industry - MGT 403  
Spring 2019



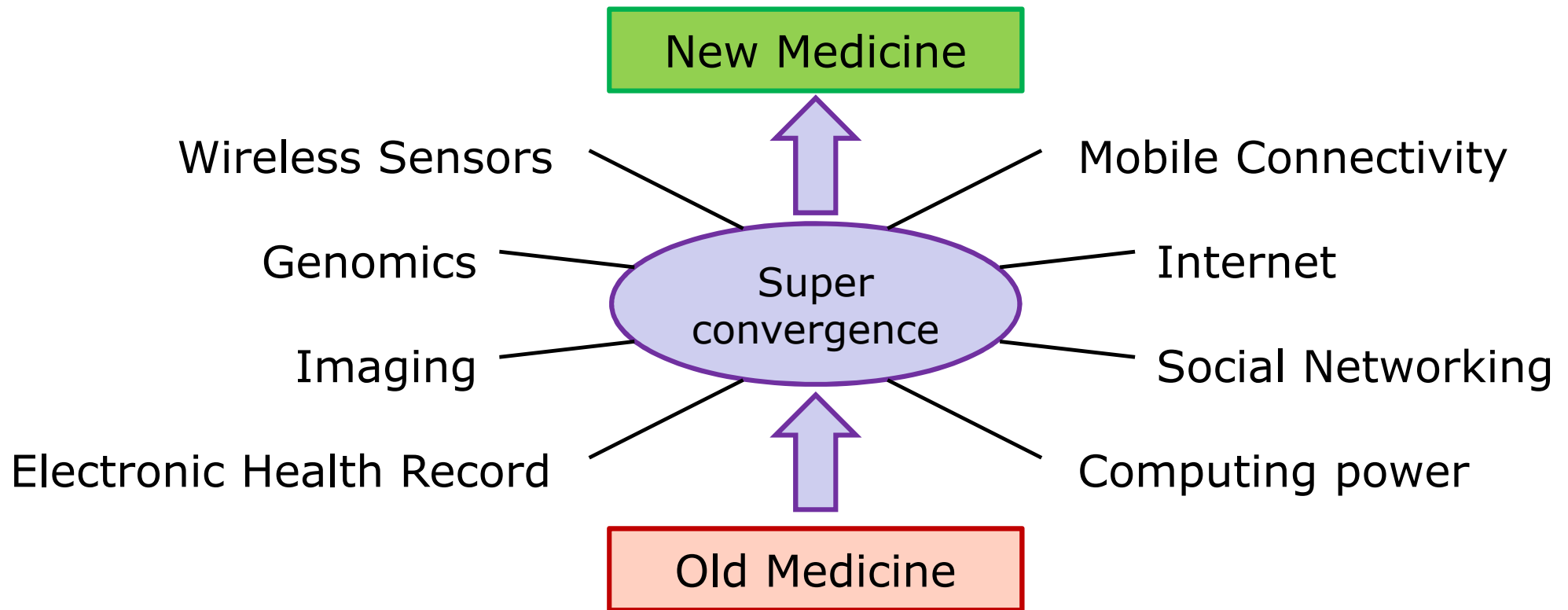
# Old medicine

- Few indicators
  - Fever
  - Blood pressure
  - Cardiac rhythm
  - Pain
  - ...

} Multiple diseases  
sharing the same  
symptoms

- Treatment efficient at XX%
  - Treatment of the wrong disease
  - Different (and unknown) response to a treatment

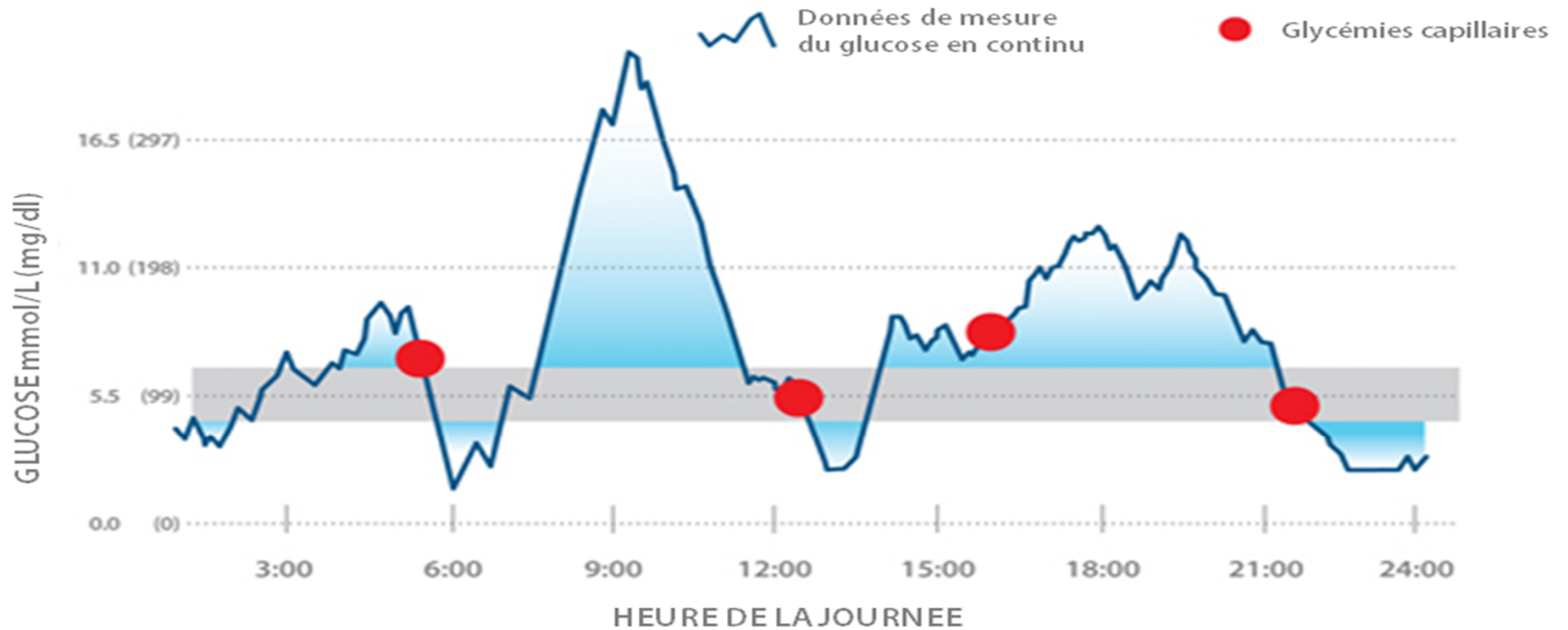
# Towards new medicine



# New Medicine

- Sensors
  - Analyze each and every individual
    - Higher granularity and time follow-up
    - Increase number of parameters

# Sensors



# New Medicine

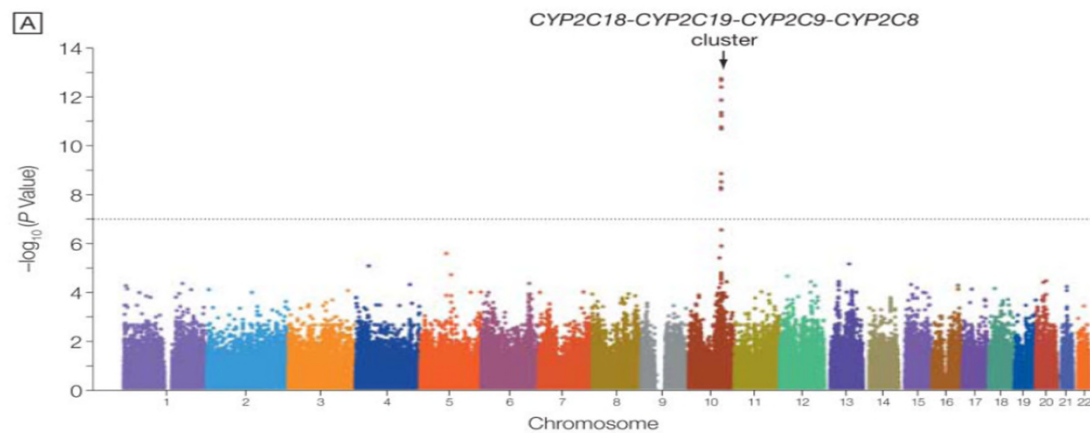
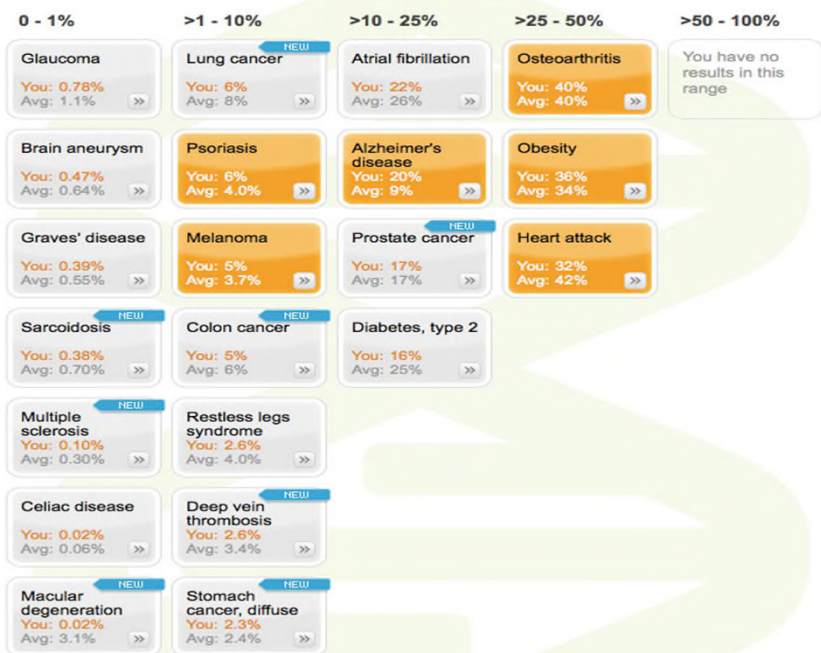
- Sensors
  - Analyze each and every individual
    - Higher granularity and time follow-up
    - Increase number of parameters
- Genomics
  - Personalize each and every individual
    - Anticipate potential issues (prevention)
    - Better selection of treatment

# Genomics

## Your estimated lifetime risk



Click anywhere on the colored boxes below to access in-depth information about each health condition, your genetic predispositions, what you can do, your specific genetic markers, and much more.

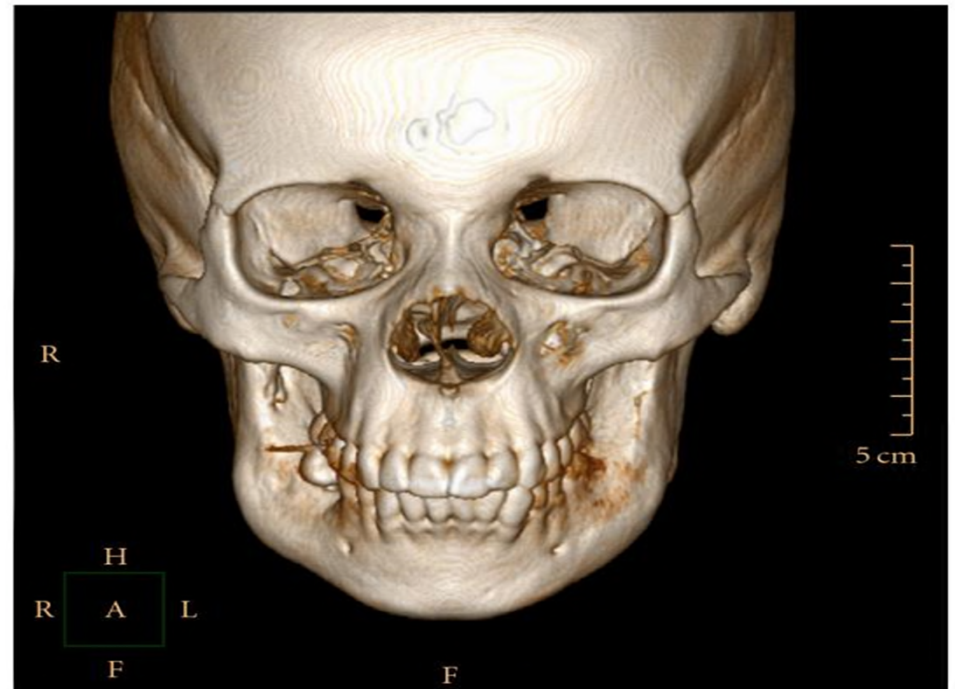




# New Medicine

- Imaging
  - Digitalize each and every individual
    - Create a proper and precise image
    - Reproduce organs and patients in silico

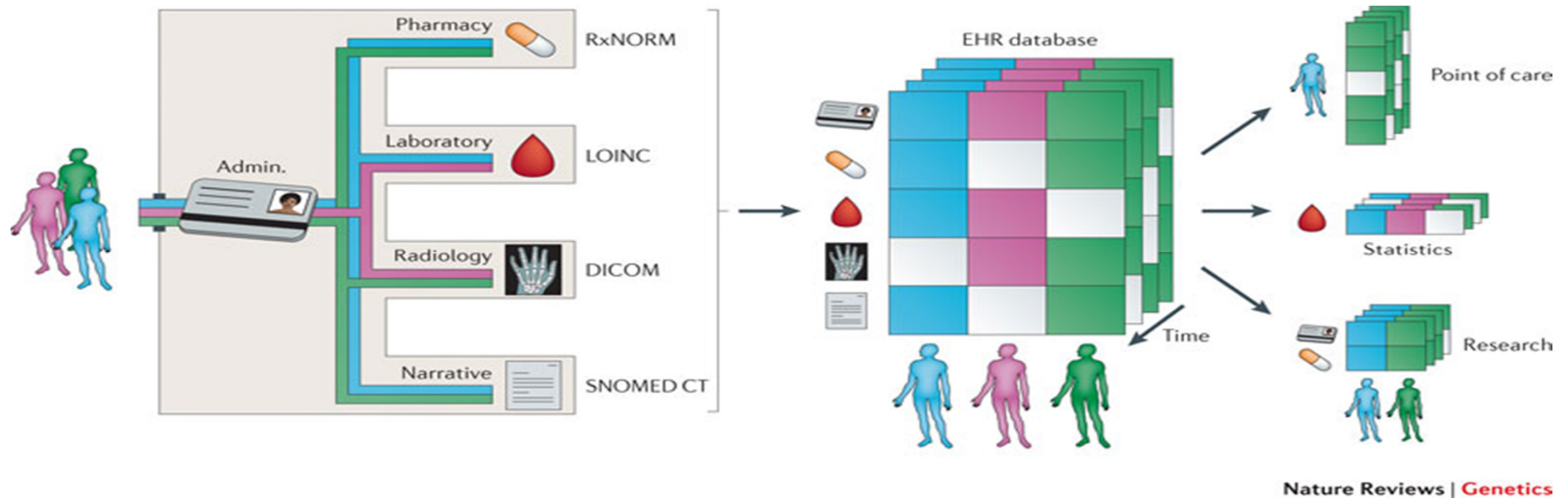
# Imaging



# New Medicine

- Imaging
  - Digitalize each and every individual
    - Create a proper and precise image
    - Reproduce organs and patients in silico
- Electronic Health Records
  - Memorize each and every individual
    - Keep track of all accumulated data
    - Analyze and compare it to models

# Electronic Health Record



# New medicine

- Data from:
  - Sensors
  - Genomics
  - Imaging
  - Electronic Health Records
- Progresses in:
  - Mobile connectivity
  - Internet
  - Social Networking
  - Computing power

Precise understanding of the disease  
Towards personal medicine

# 1<sup>st</sup> level of change

- Increased knowledge on diseases and patients allow:
  - Intuition replaced by evidence
  - Trial and errors replaced a process based approach
  - Personalization of treatment
- From Intuitive to Empirical to Precision Medicine

# Intuitive medicine

- Based on symptoms / different diseases share the same symptoms
- Treatment based on deep knowledge / experience / intuition
- Trial & error approach
- Success depends on skills and judgement of highly trained people

# Empirical Medicine

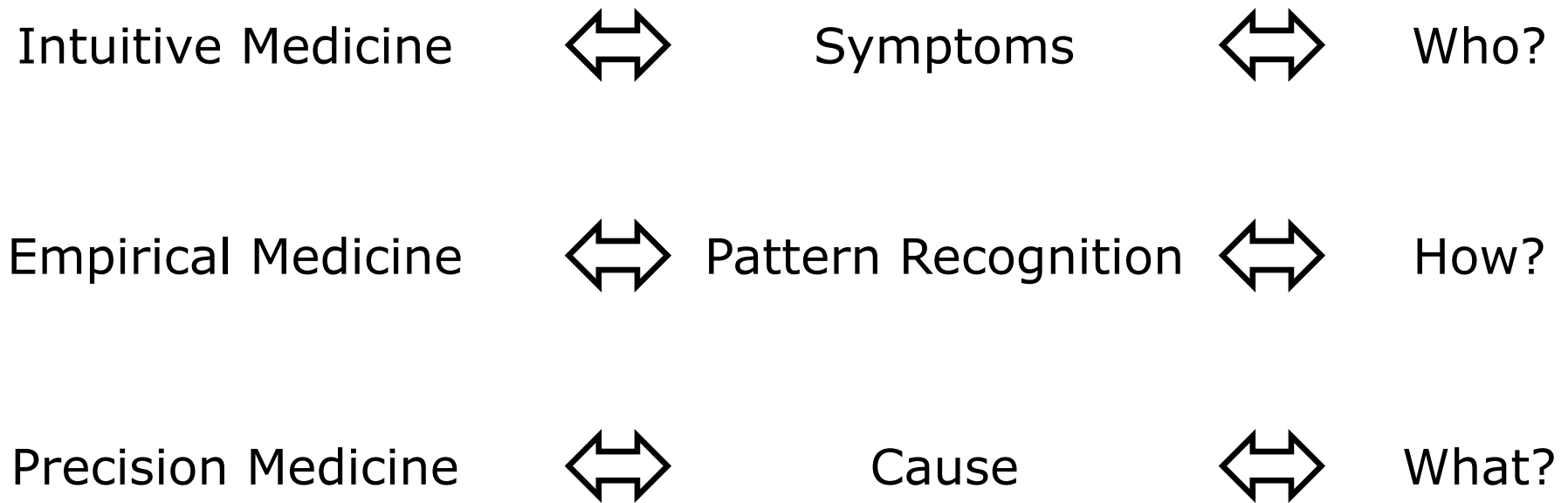
- Based on pattern recognition
- There is sufficient correlation between action and outcome so it can be described with probabilities



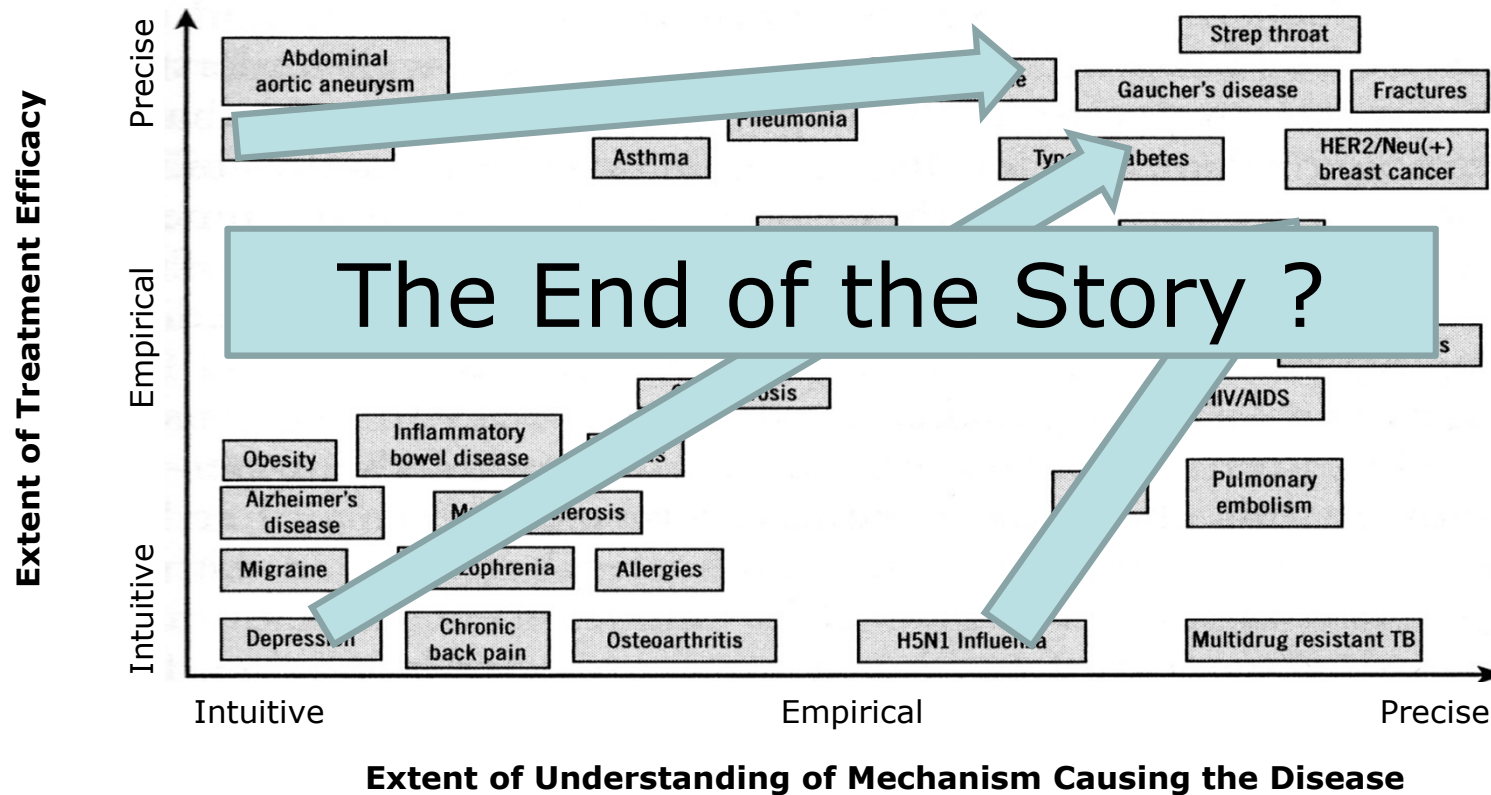
# Precision Medicine

- The disease can be precisely diagnosed
- Its root cause is well identified and understood
- It can be treated following (established, agreed and proven) rules
- It can be tailored to each patient according to her own data

# Classification



# Medical conditions classification

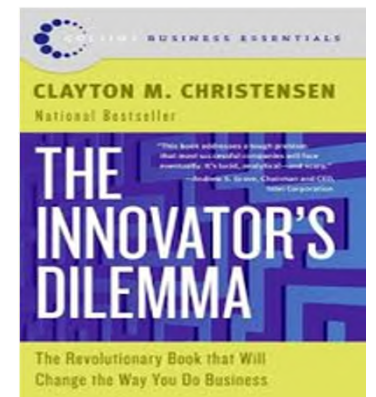


## 2<sup>nd</sup> level of change

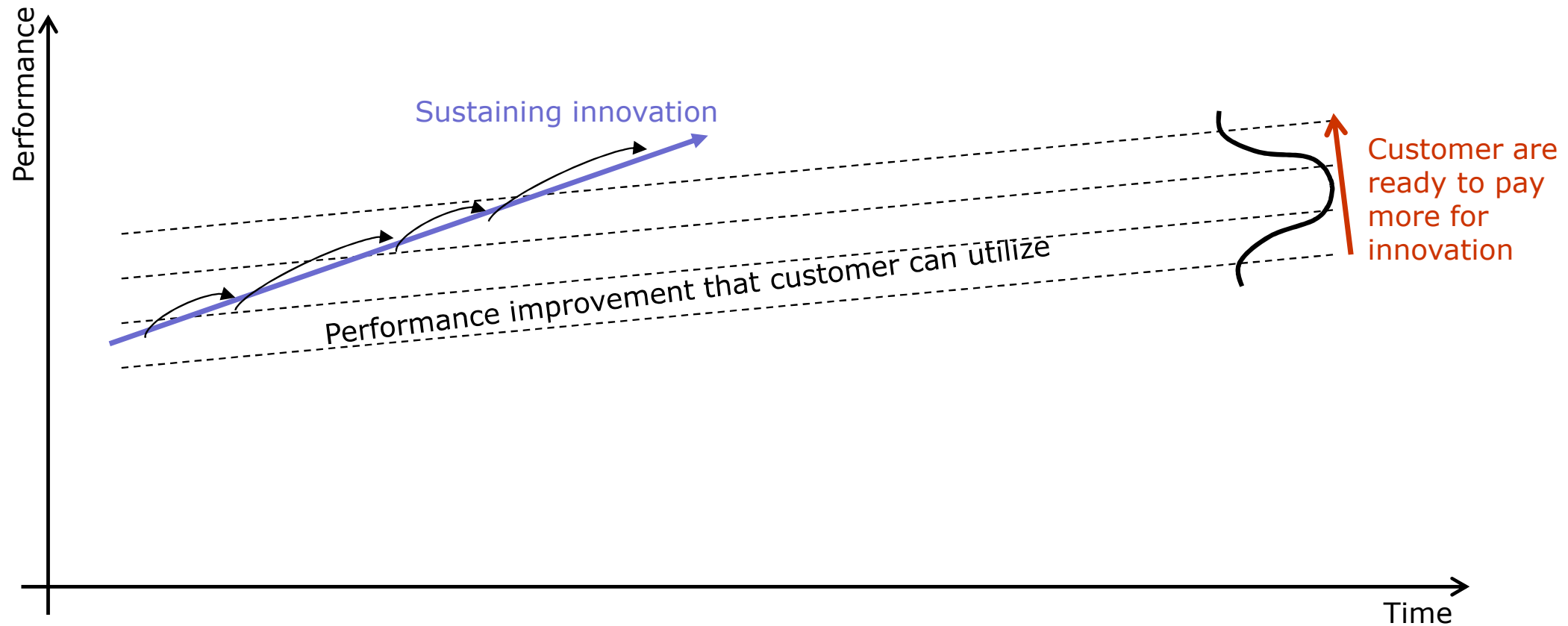
- Are these technological innovations
  - Only changing the understanding of diseases and their treatment?
  - Or also impacting the way we are treated, the relationship patient – healthcare giver?
- How and why will this happen?

# Concept of disruptive innovation

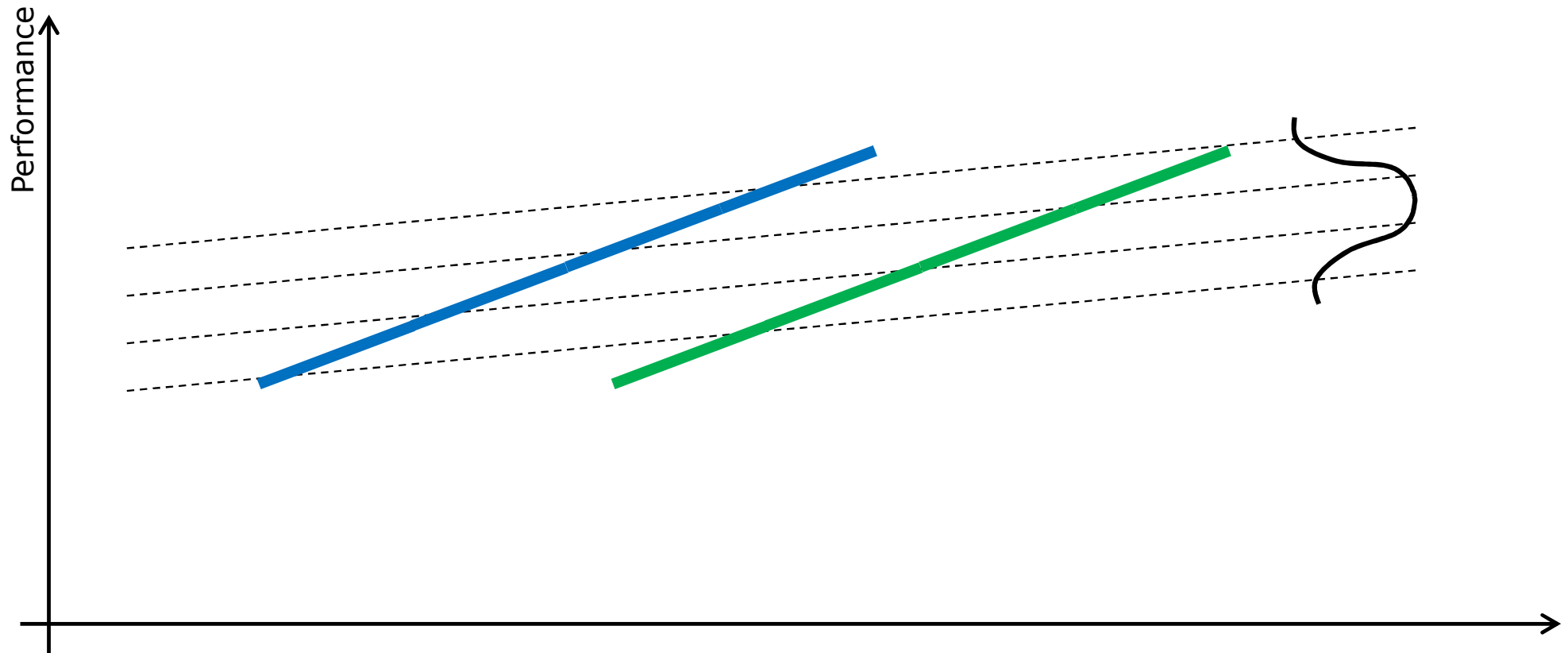
- Concept introduced by Clayton Christensen from The Harvard business school
- Approach to describe why and how major players of an industry may be replaced (disrupted) by new entrants proposing a less complex, less performant technologies



# Model of disruptive innovation



# Model of disruptive innovation



# An example outside of healthcare

**DELL**

**ASUS**<sup>®</sup>

Simple circuit boards

Motherboards

Assemble the components

Manage supply chain

Design of components

- Reduce cost & headcounts (engineers and designers). Brand is the key asset.
- As price is maintained
- **Increase margin**

Go directly to resellers

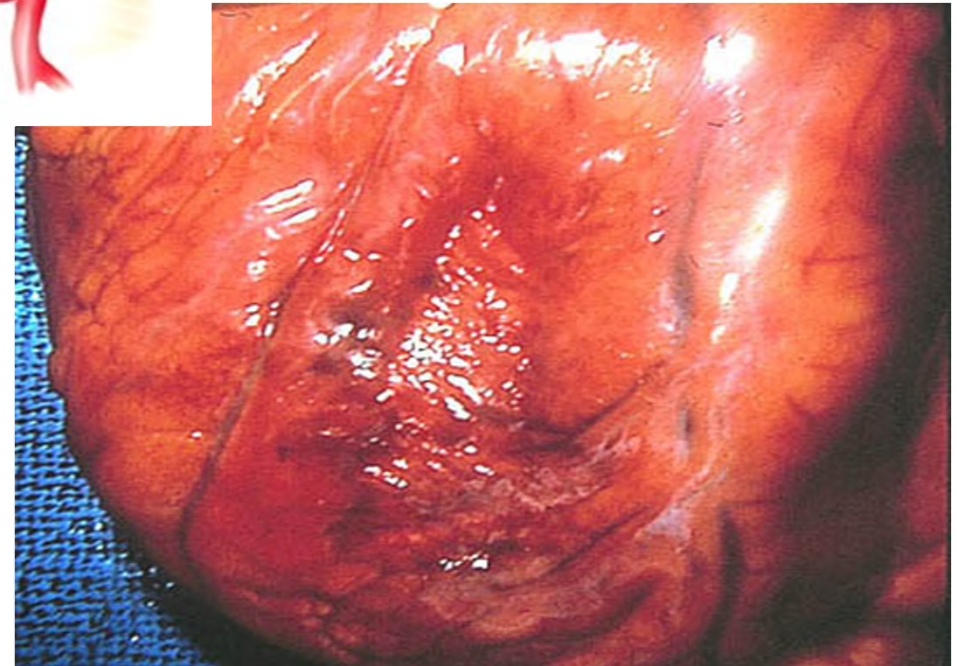
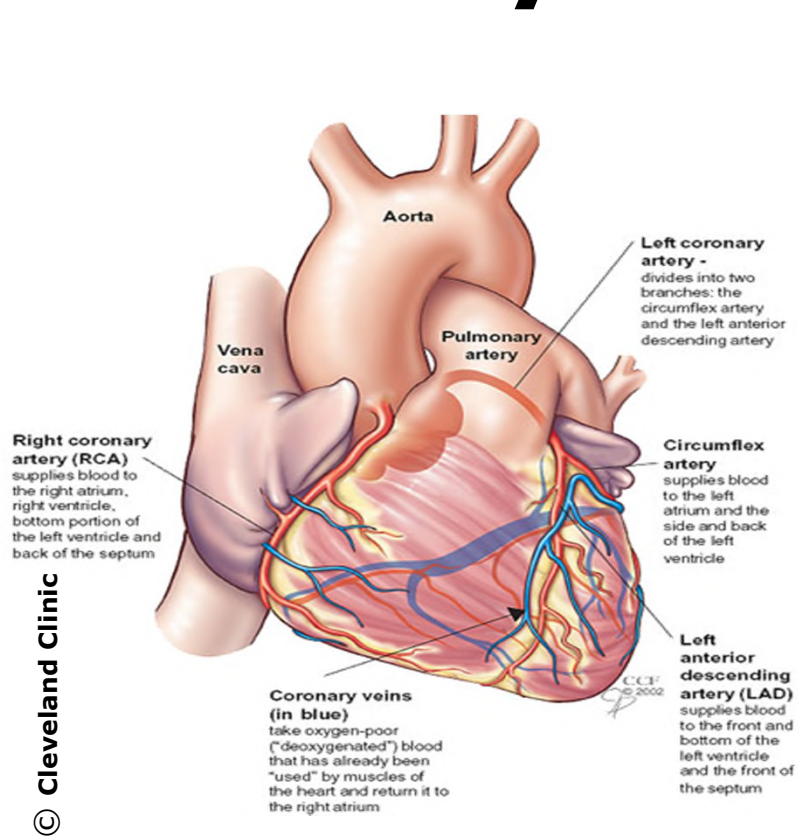




# **An example of disruptive innovation**

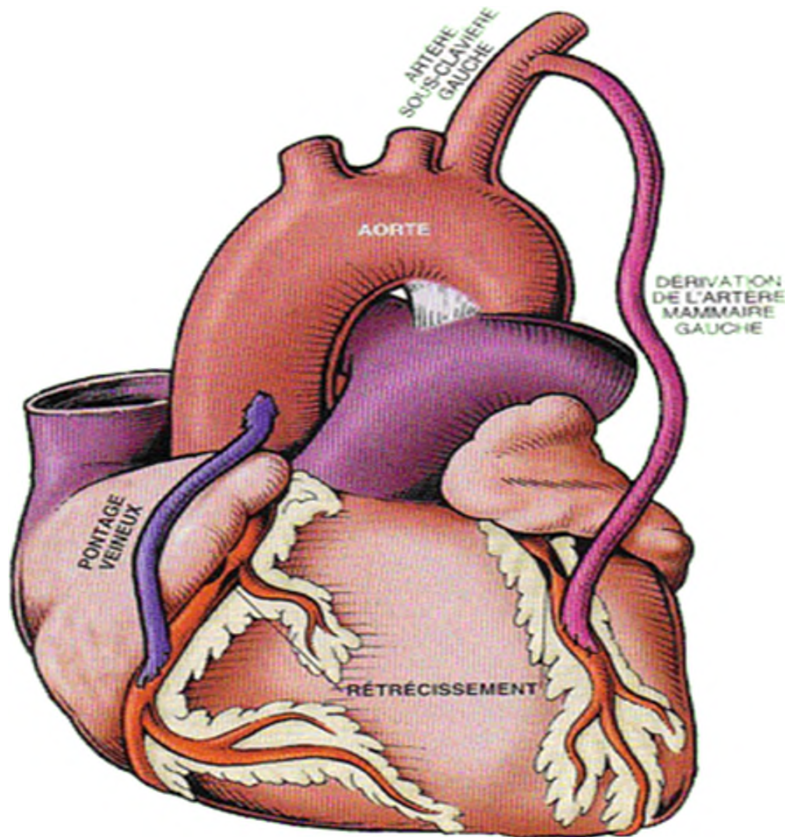
## The treatment of Myocardial Infarction

# Myocardial Infarction



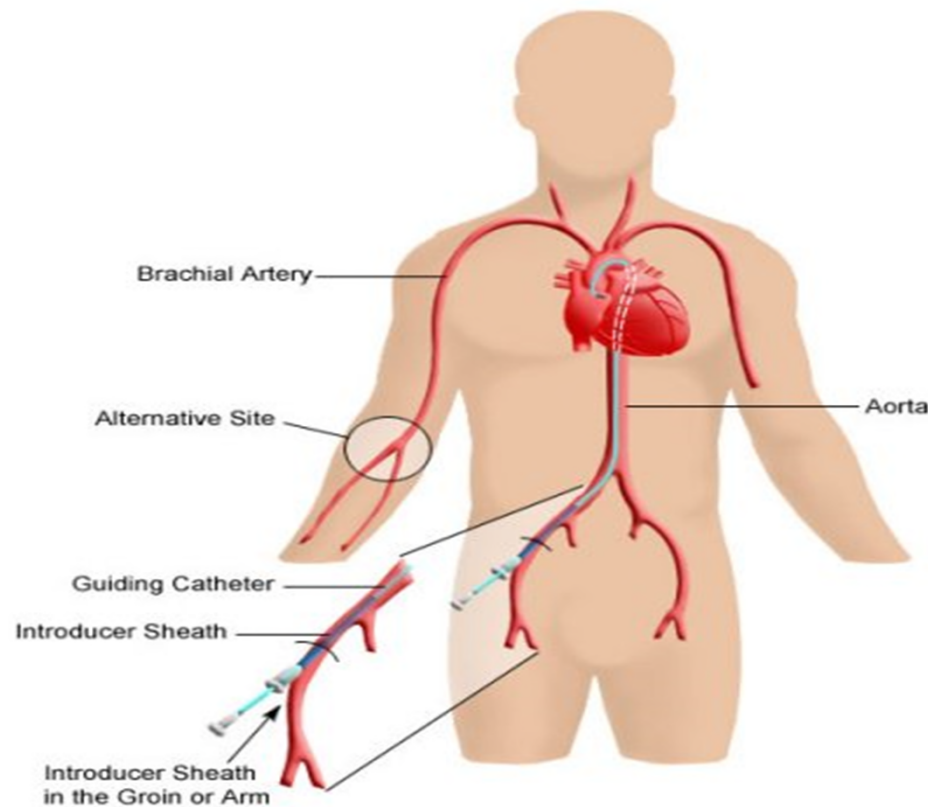
© Cleveland Clinic

# Bypass surgery



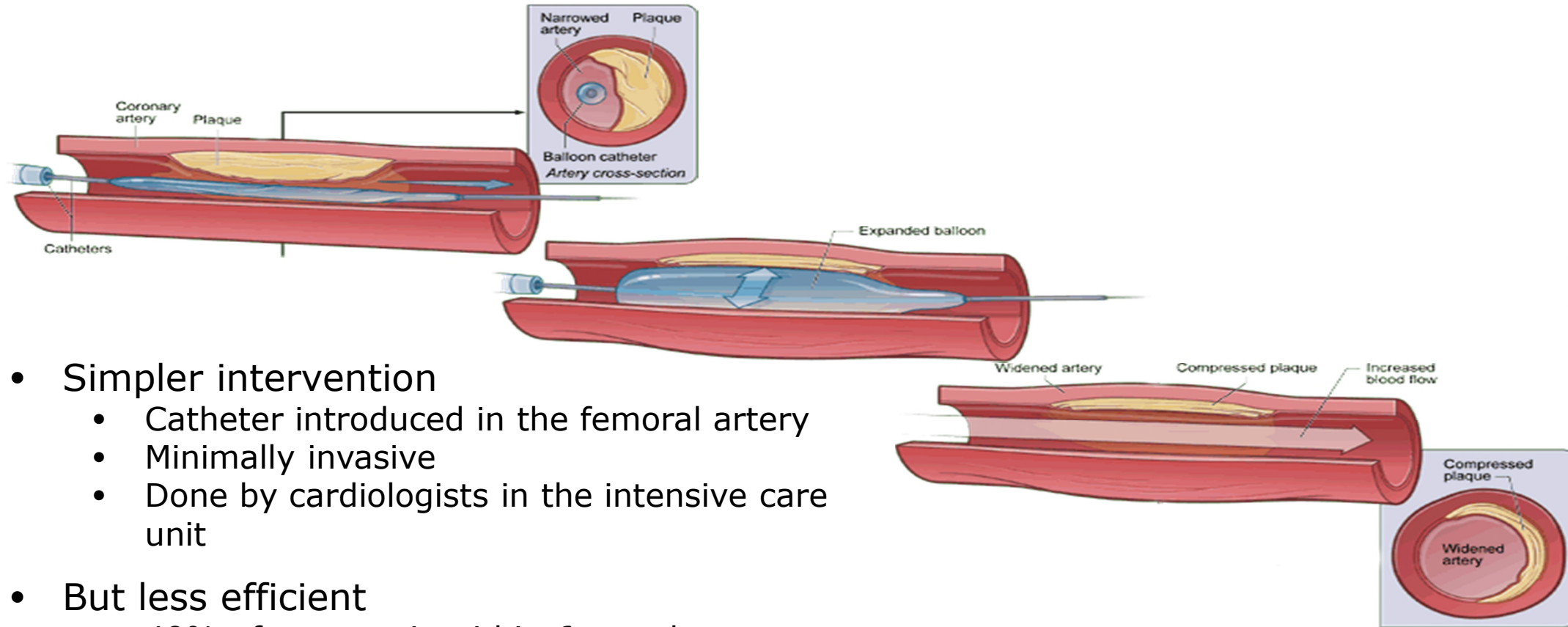
- Coronary Artery Bypass Grafting (CABG)
- Necessitate complex surgery (sampling and grafting of the vein)
- Done by highly experienced cardiac surgeons

# Stenting: a disruptive approach



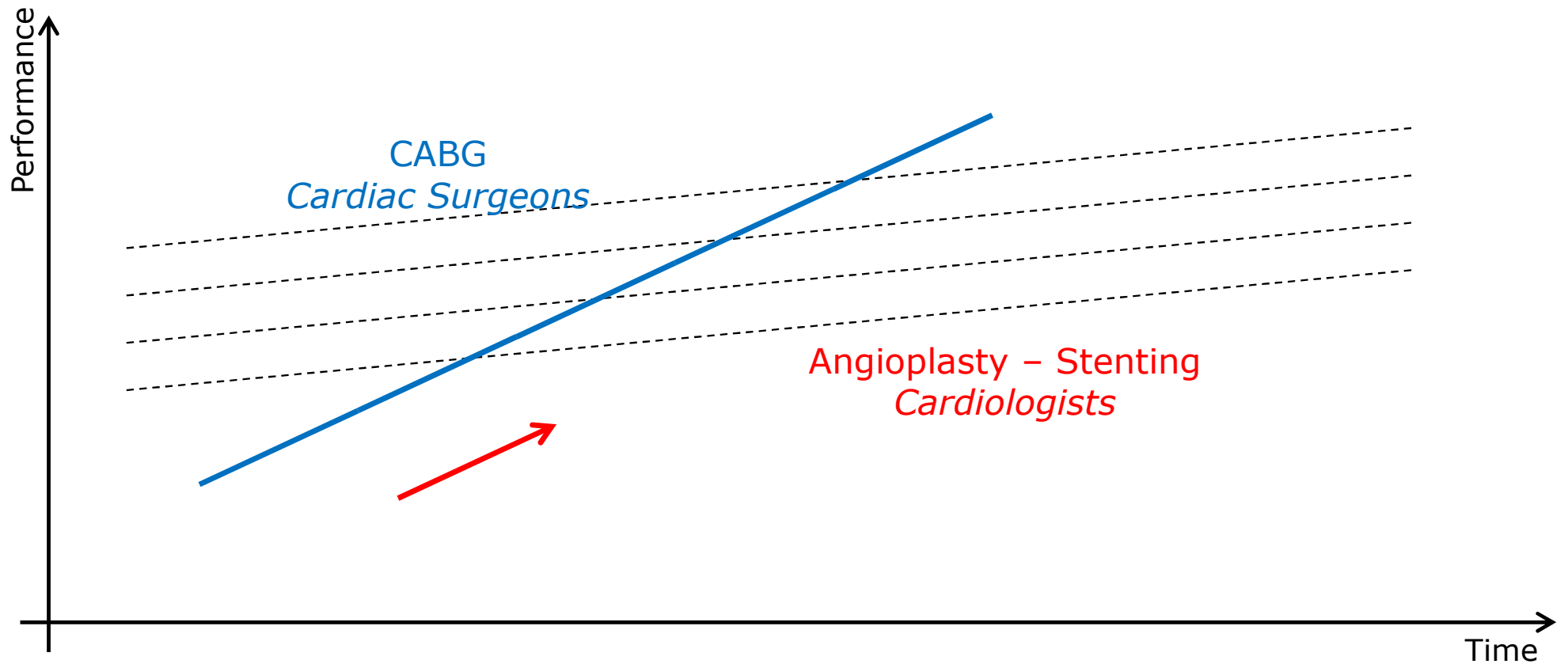
- Angioplasty (1977) completed by stenting (1984)
- Necessitate minimally invasive procedure (catheter introduced in the femoral artery)
- Done by cardiologists

# Step 1: Angioplasty

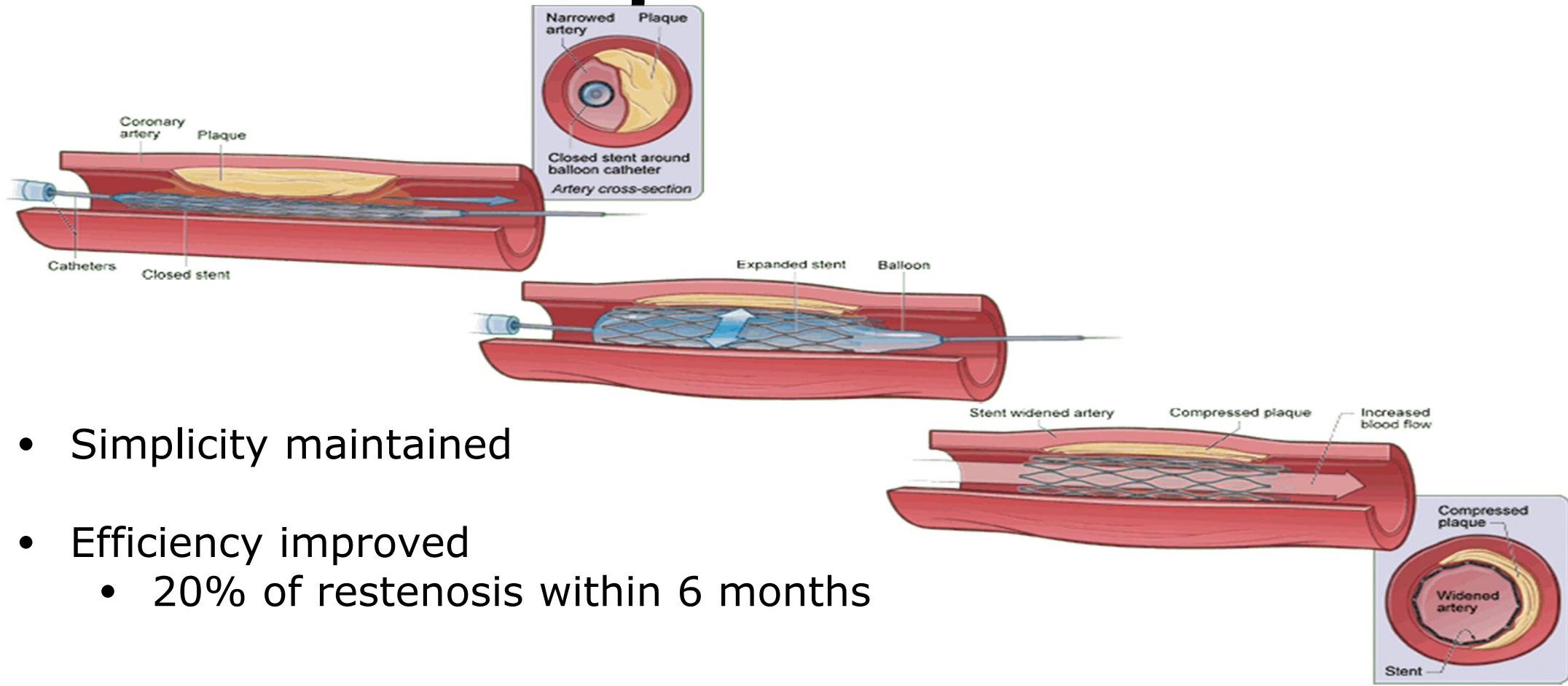


- Simpler intervention
  - Catheter introduced in the femoral artery
  - Minimally invasive
  - Done by cardiologists in the intensive care unit
- But less efficient
  - 40% of restenosis within 6 months

# Step 1: Angioplasty

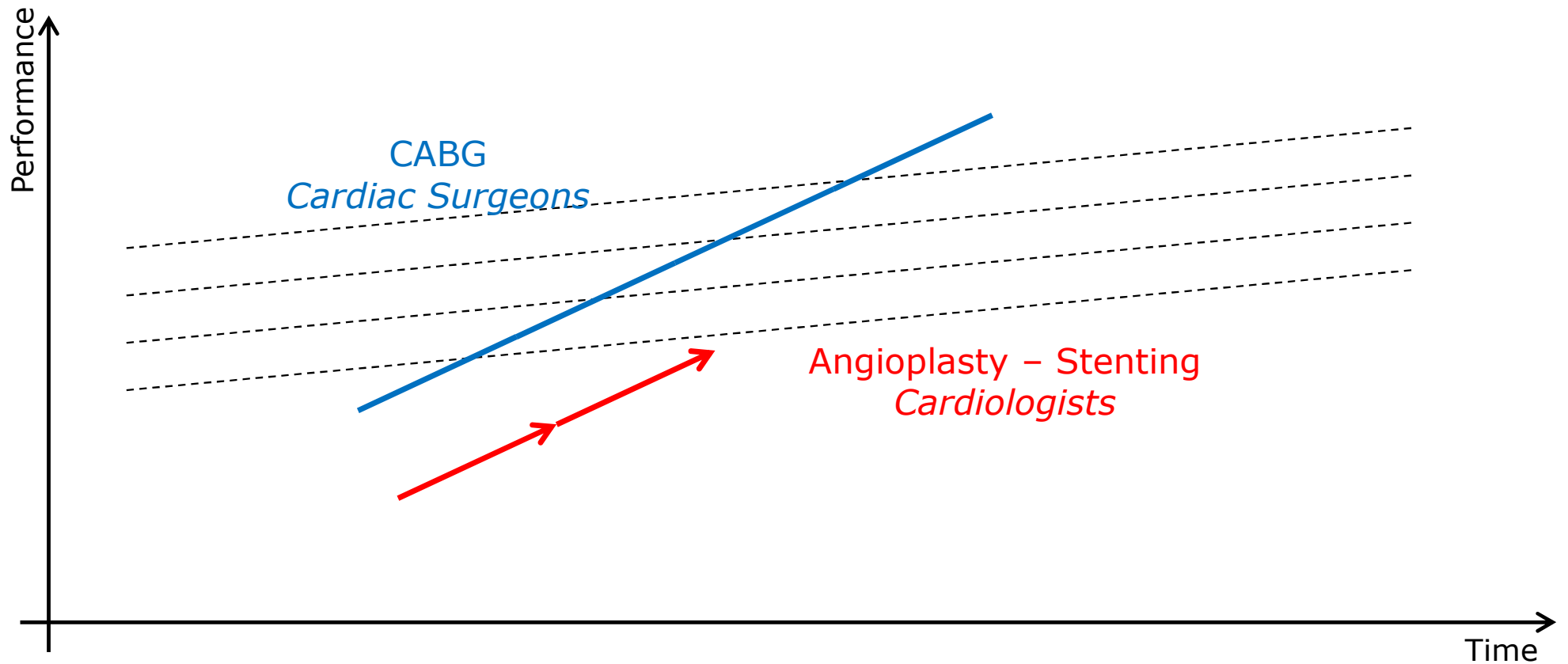


# Step 2: Stents



- Simplicity maintained
- Efficiency improved
  - 20% of restenosis within 6 months

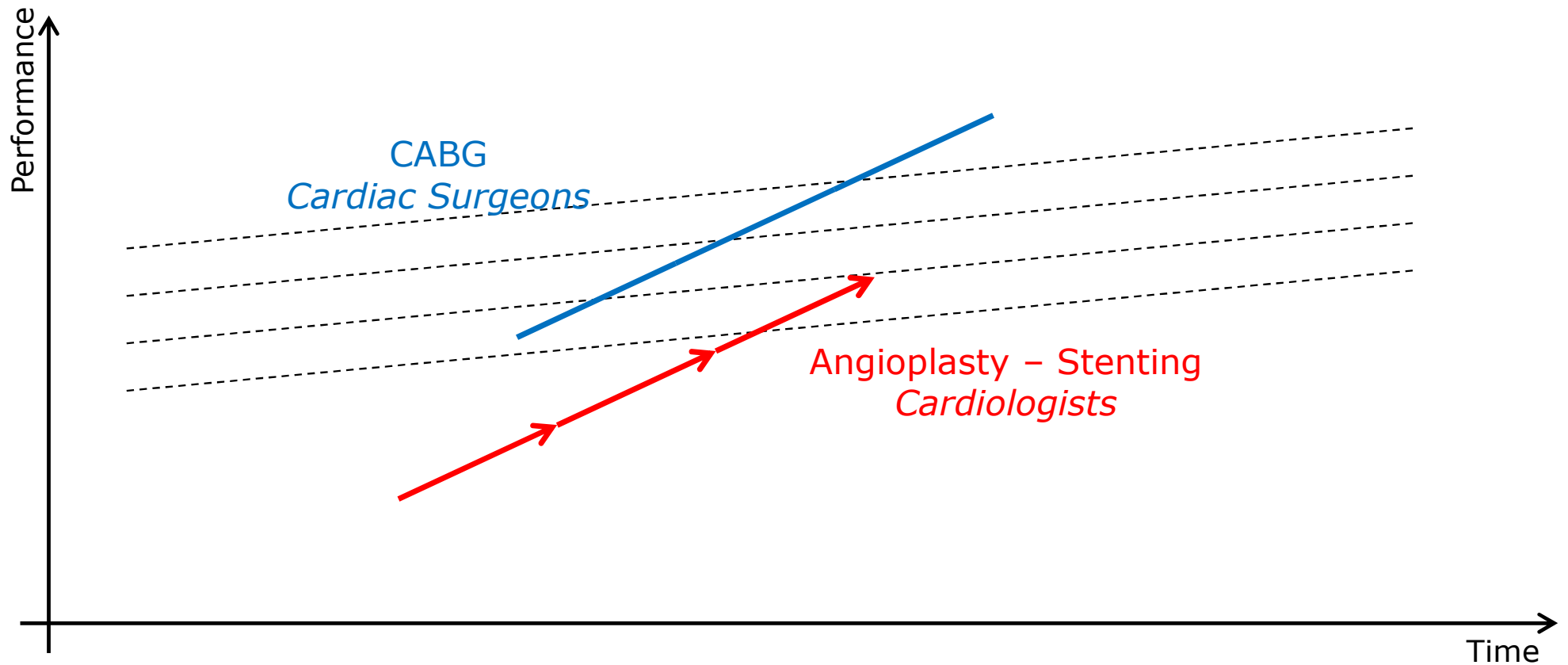
# Step 2: Stents



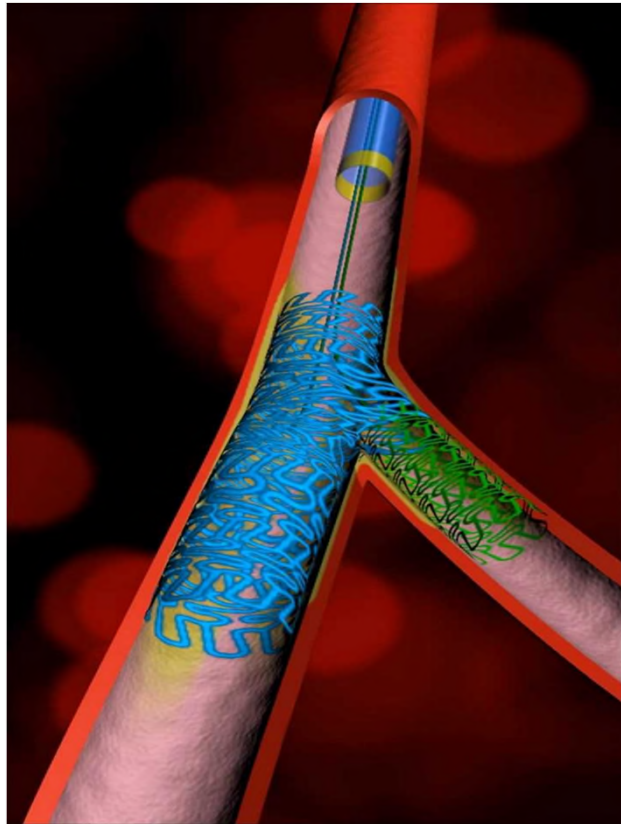




# Step 3: Drug Eluting Stents

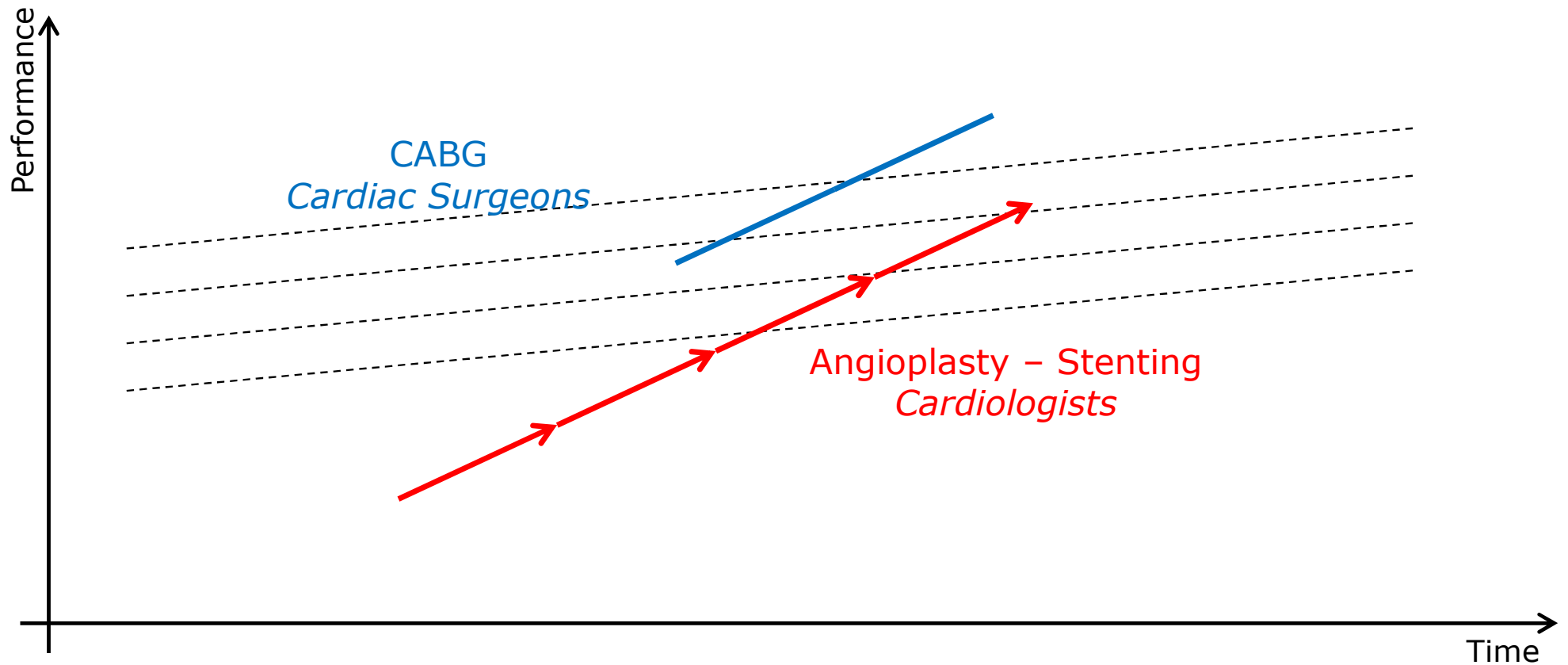


# Step 4: Bifurcation Stents

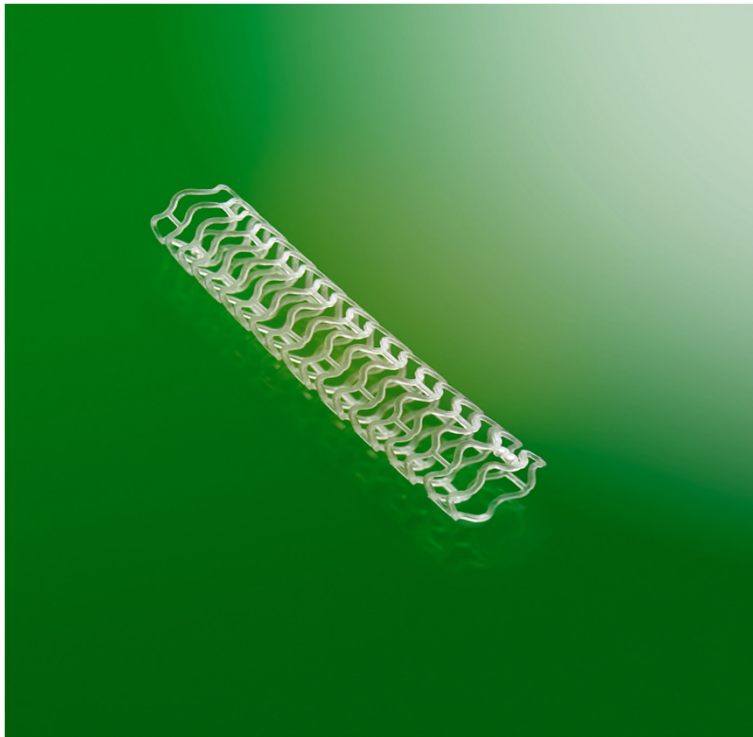


- Treatment of more complex conditions
  - Artery blockage at or near a bifurcation
  - Combination of two stents placed after each other

# Step 4: Bifurcation Stents



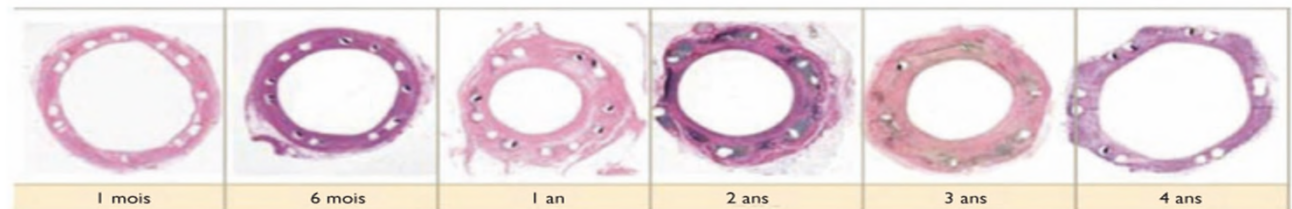
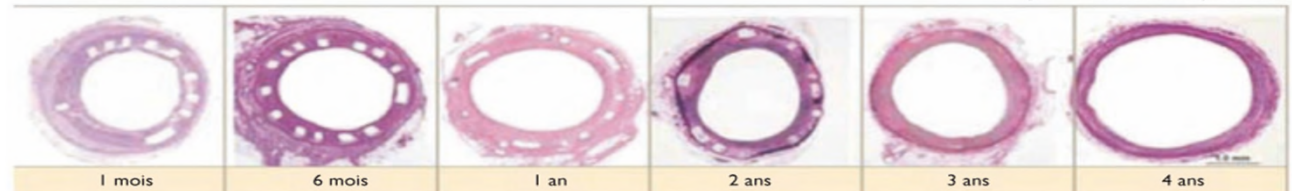
# Step 5: Soluble stents



- Metallic mesh replaced by a degradable polymeric structure
- A few years after treatment, vessel in its «original» state

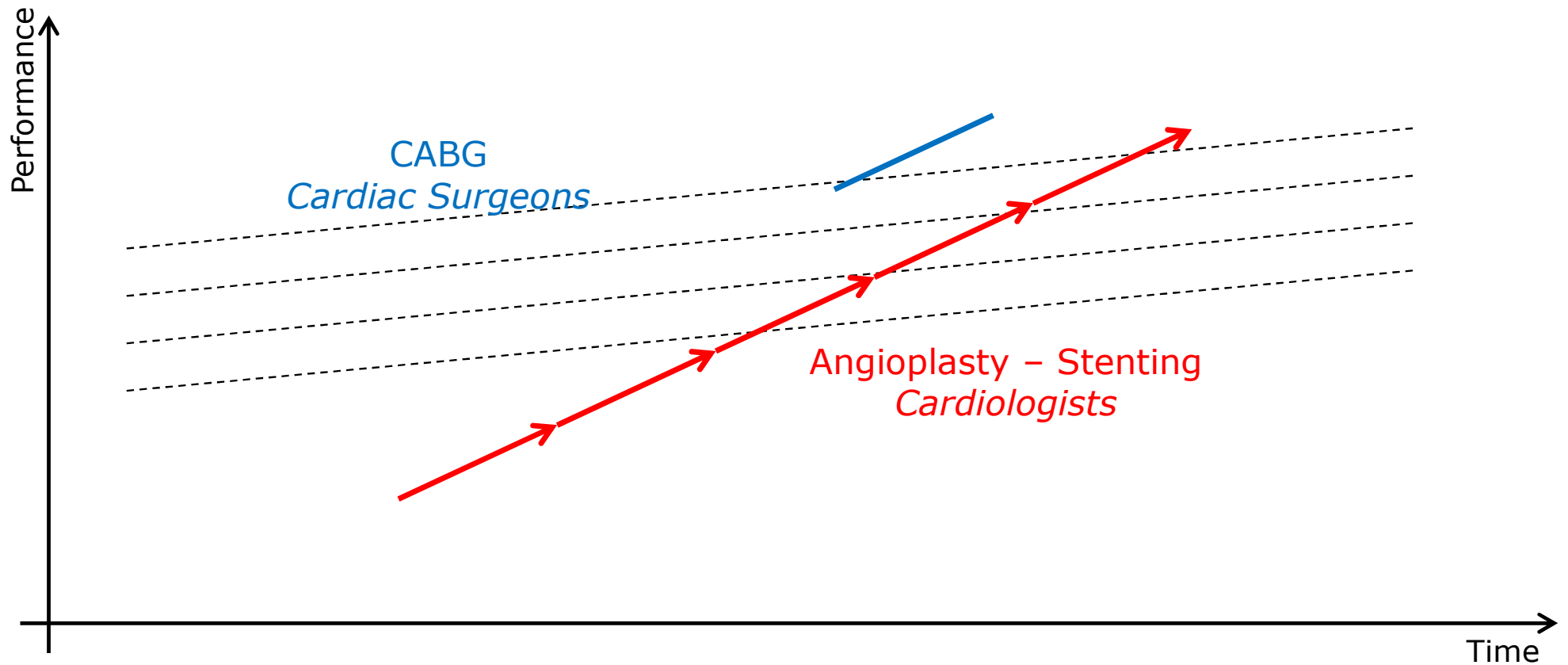
Stent biorésorbable (BVS)

*Disparition de l'endoprothèse*



Stent actif (DES)

# Step 5: Soluble stents



# Lessons from disruption

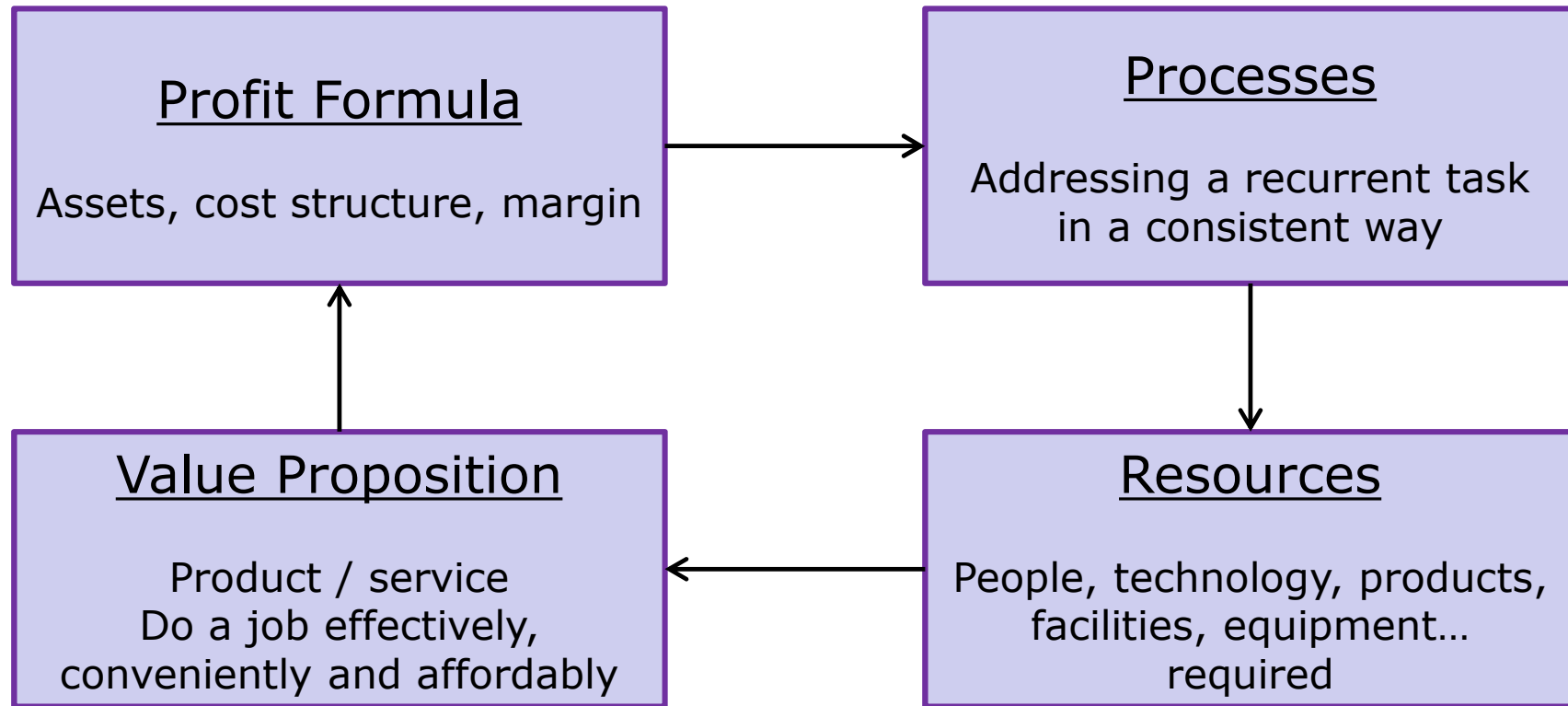
- A new technology is introduced
  - Less effective at the beginning
  - Used in fewer simpler cases
  - Used by less trained physicians
  - That improves over time
  - And replaces gradually the incumbent method
- Angioplasty and stenting have disrupted CABG
- Cardiologists have disrupted heart surgeons

# Disruption

- Disruption necessitates:
  - A new technology
  - A new development / manufacturing process
- But it will most of the time induce:
  - A change in business model
  - A market evolution



# What is a business model?



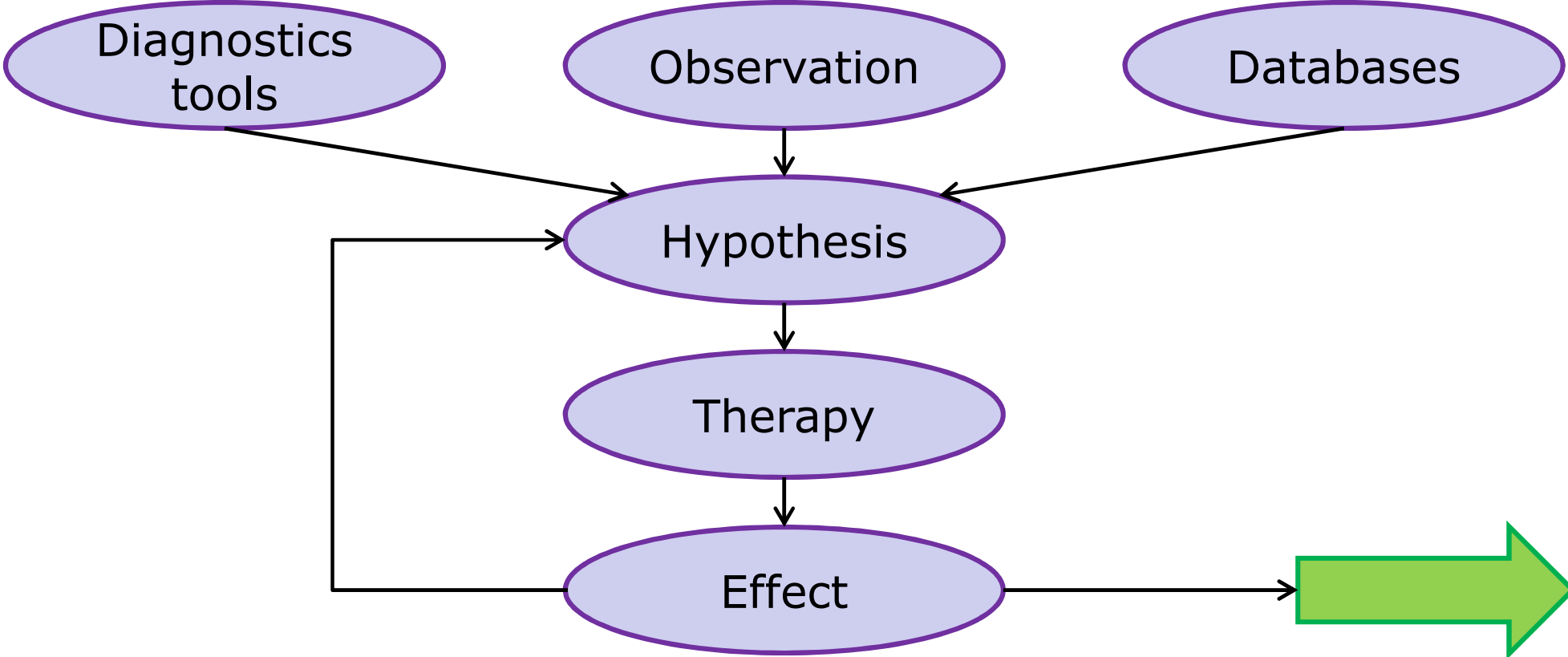
# Business models in healthcare

- The Healthcare market is organized around three major business models
  - Solution shop
  - Value-adding Process
  - Facilitated Networks (more recently)
- Some may be followed in the same environment by the same persons

# Solution Shop

- Diagnose and solve unstructured problems
  - Value delivered through employed people
    - Experts using their intuition, problem solving skills to diagnose the cause of complicated problems
  - After diagnosis, solutions are recommended
  - Customers are willing to pay high price for the services. No guarantee about total cost or ultimate outcome
    - *Fee for service*

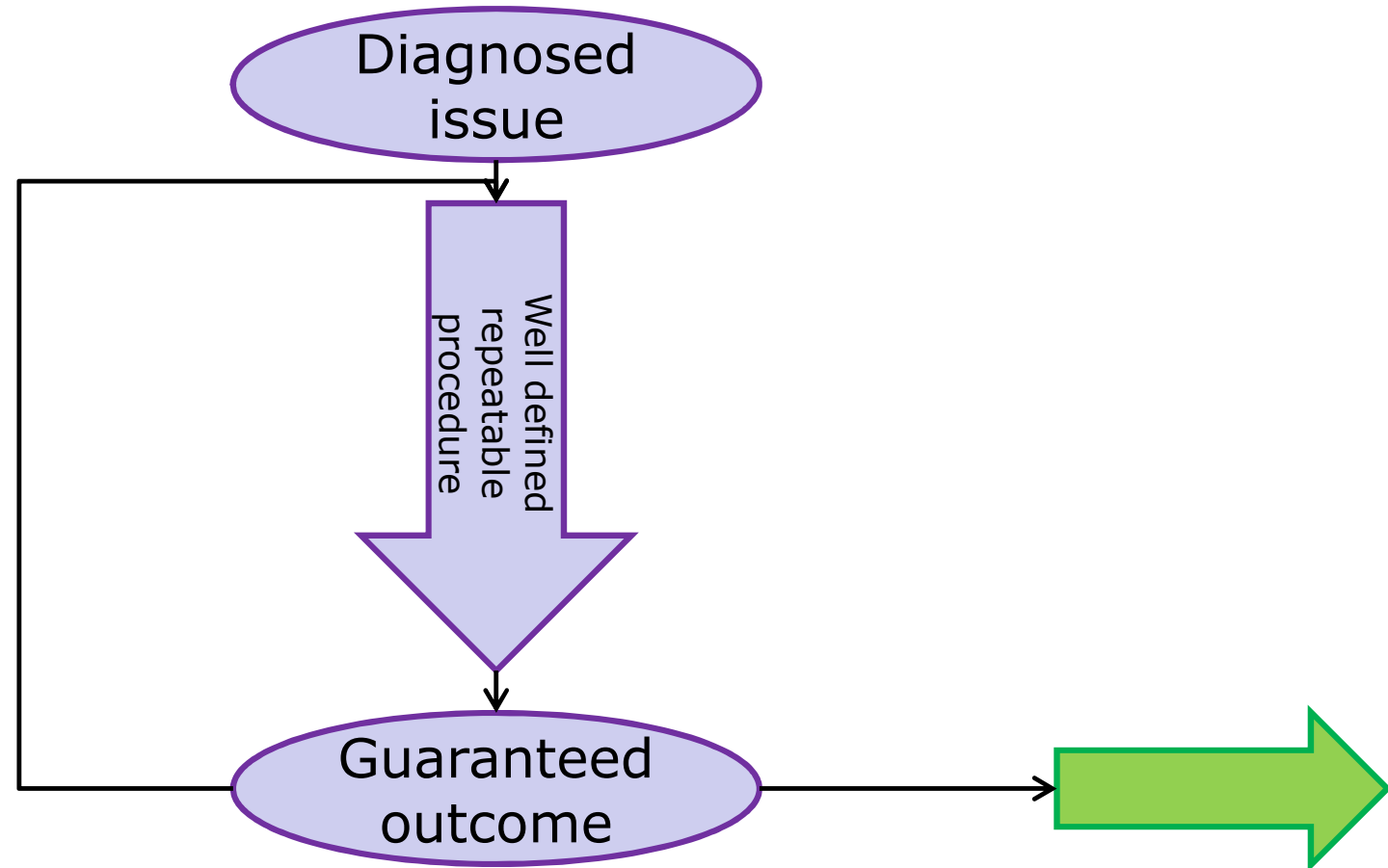
# Solution Shop



# Value-adding Process

- Incomplete inputs are transformed into more complete outputs of higher value
  - Medical procedure done after definitive diagnosis (hernia repair, bone repair, angioplasty)
  - Transformation can be organized, optimized (overhead cost drop)
  - Customer are charged for the output of the process (and often result is guaranteed).
    - *Fee for outcome*

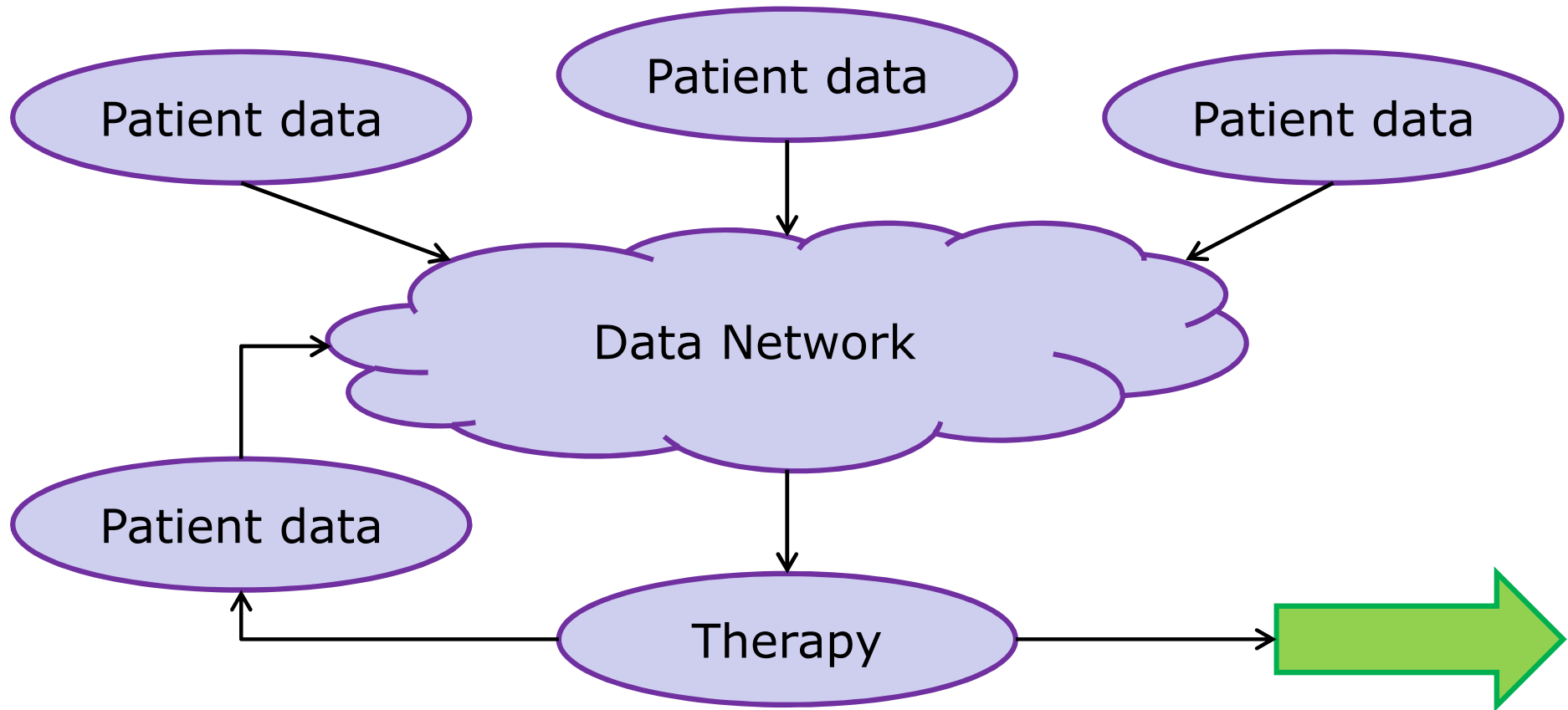
# Value-adding Process



# Facilitated networks

- People exchange thing with another
  - Pooling of resources by participants who will use part of it, according to their need
    - Need to harvest large amount of «data»
    - Organize its (re)distribution among participants
  - Customer pays through the resources it brings to the network.
    - *Fee for membership*

# Facilitated Network





# A first level of disruption

- A VAP business model replacing a solution shop:
  - Simple rule-based precision medicine cases
  - Primary care physician practices are disrupted by a clinic of nurse practitioners
  - Fee for outcome replaces fee for service.

# Example

- For simple diseases representing a large number of visits (common illness, vaccinations,...):

*From:*

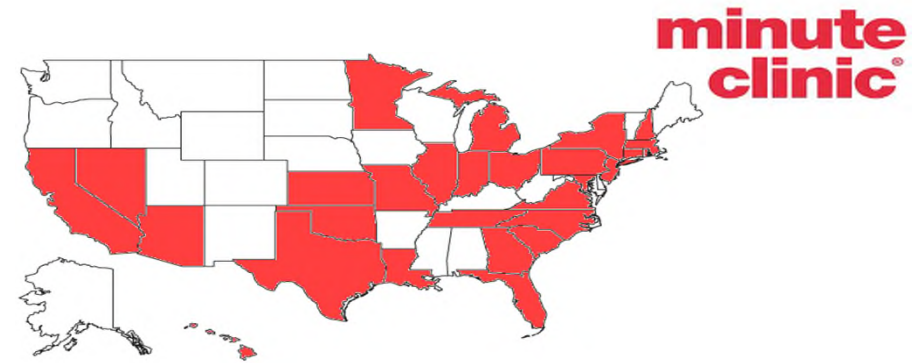
- I need to know what the problem is, what is causing it, and what I can do to correct it

*To:*

- I know what needs to be done to fix my problem, I need to do it effectively, affordably, and conveniently

# Example

- Founded in 2000
- More than 800 clinics in the US today
- Cover a limited number of disease
- Representing nearly 20% of doctors visits
- No appointments, no physician, treated in less than 15 minutes
- Fee for service
- 30%-50% cheaper



Common Illnesses	Skin Conditions	Vaccines
Allergies	Athlete's foot	DTP
Bladder infections (females)	Cold sores	Flu
Bronchitis	Deer tick bites	Hepatitis A (adults)
Ear infections	Impetigo	Hepatitis A (child)
Pink eye and styes	Minor burns	Hepatitis B (adult)
Sinus infections	Minor skin infection	Hepatitis B (child)
Strep throat	and rashes	Meningitis
Swimmer's ear	Minor sunburn	MMR
Flu diagnosis	Poison ivy	Pneumonia
Mononucleosis	Ringworm	Polio
Pregnancy testing	Wart removal	TD

# And after?

University of Georgia School of Law

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From the SelectedWorks of Fazal Khan

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March 5, 2015

The "Uberization" of Healthcare: The  
Forthcoming Legal Storm Over Mobile Health  
Technology's Impact on the Medical Profession

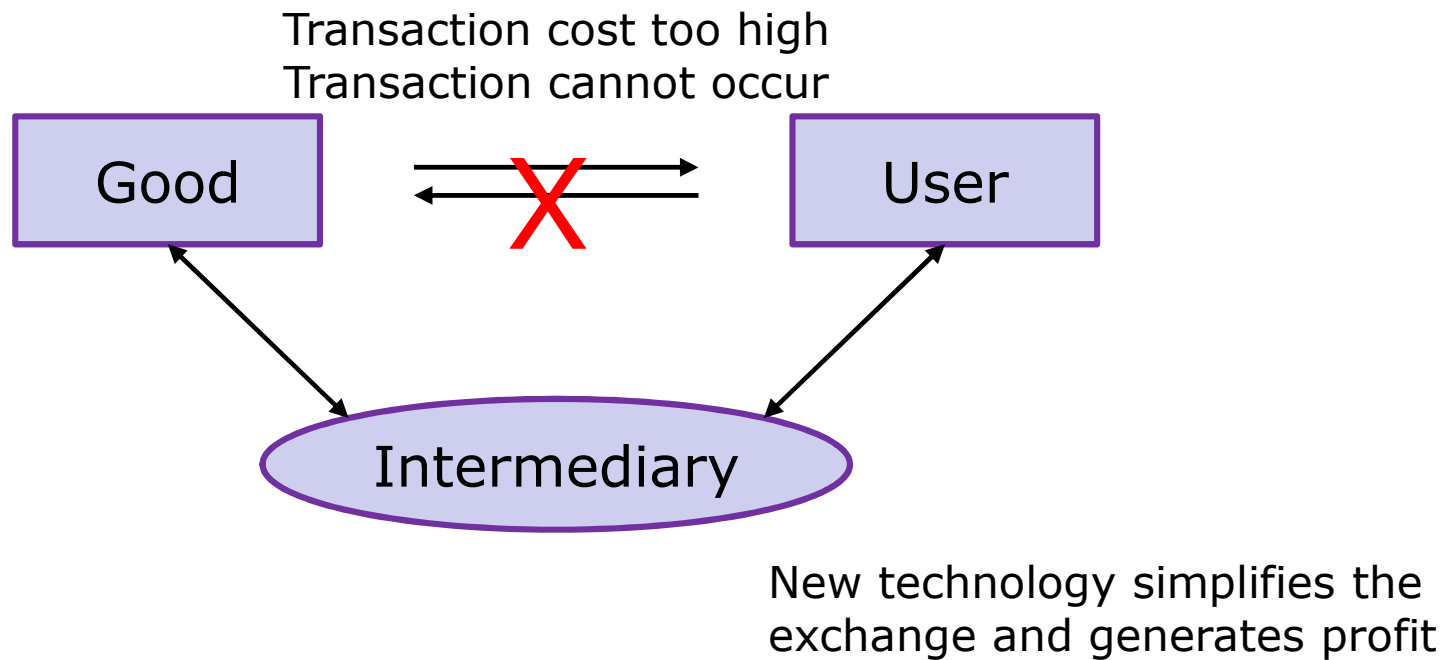
Fazal Khan, *University of Georgia School of Law*



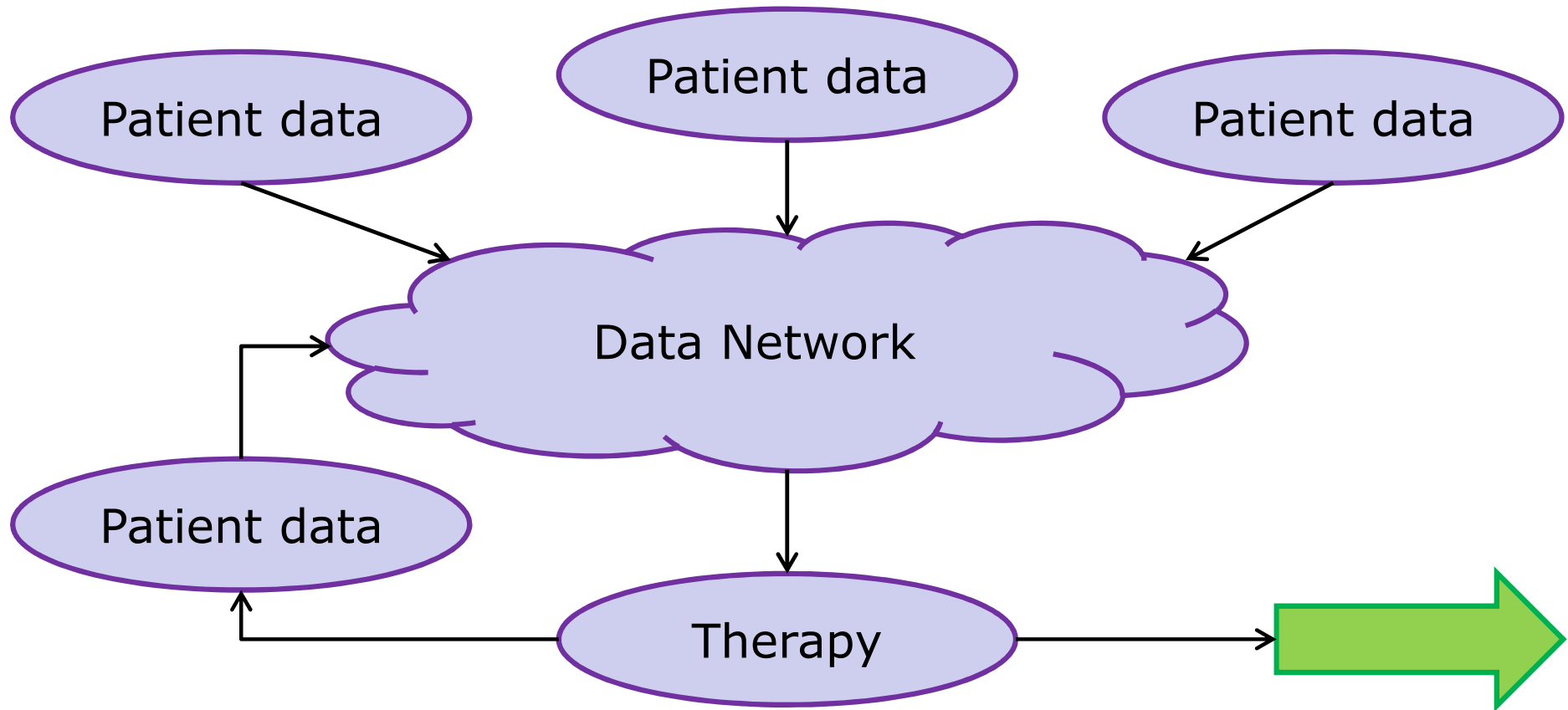
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# Uber principle

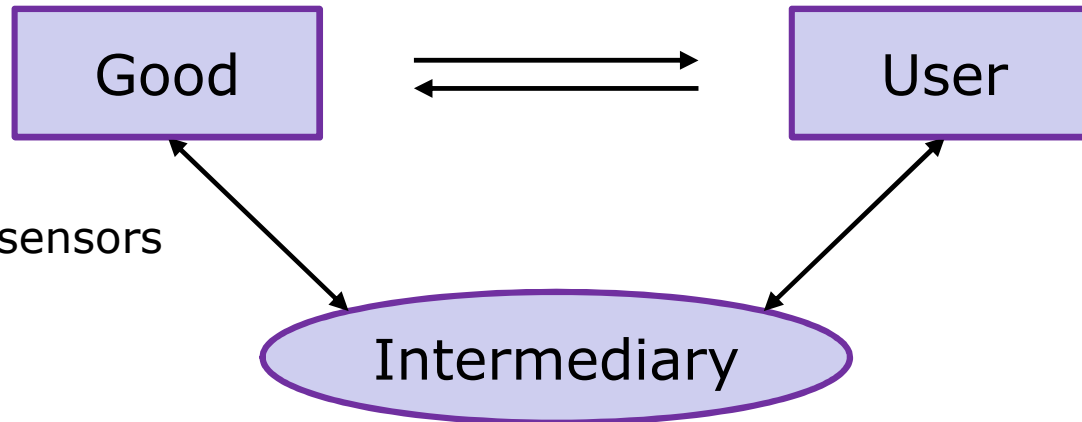


# Facilitated Network



# Uber principle in healthcare

Transaction cost too high  
Transaction cannot occur



Wireless sensors  
Genomics  
Imaging  
EHR  
Mobile connectivity  
Internet  
Computing power  
Social Networks

New technology simplifies the exchange and generates profit

**Your Wearables/Apps**



**Your IoT Devices**



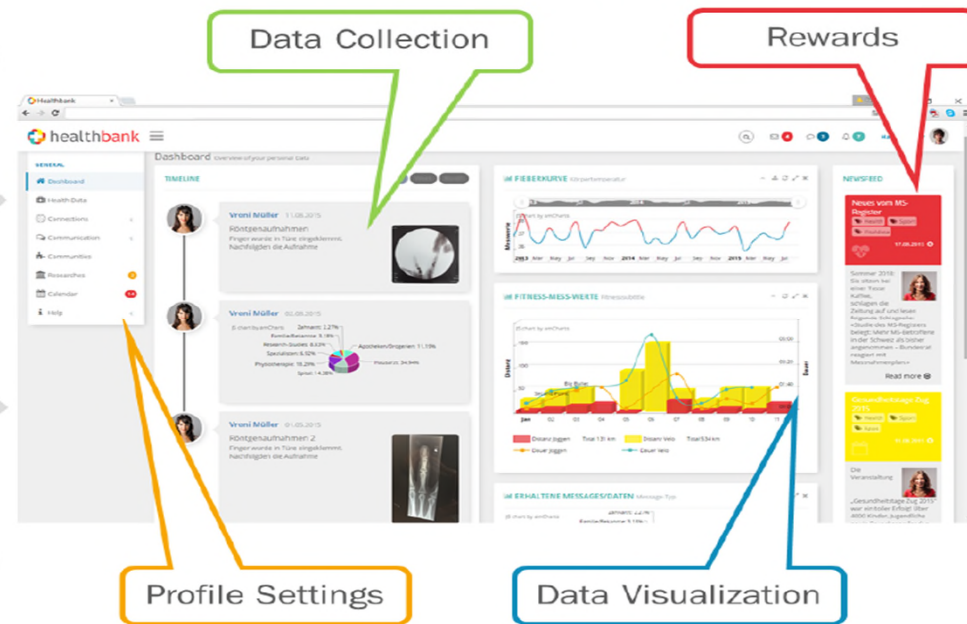
**Your Care Providers**



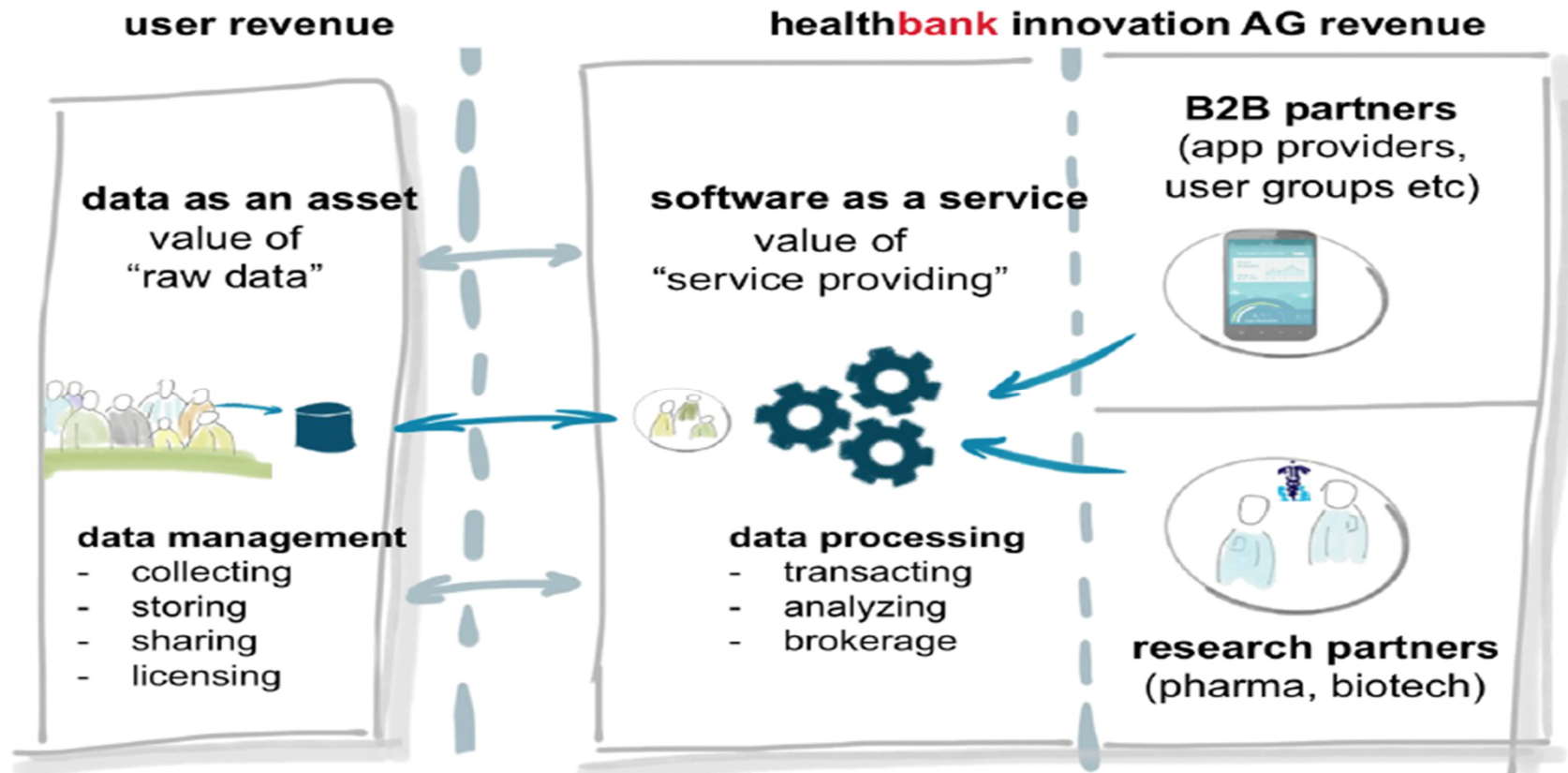
**Your Prescriptions**



**Your healthbank**







# Another level of disruption

- A facilitated network replaces a solution shop or a VAP
  - Patients provide their data to the network
  - Patients are rewarded (paid) for their data
  - Third parties use analytical tools to provide in a useful way (reduce transaction cost) the data to other patients

# Disruption of healthcare professions

