Agenda

10.9. Introduction
17.9. Innovation process (Dogson chapters 3-4)
24.9. R&D management (Dogson 6)
1.10. Telecom R&D in Finland
8.10. Standardization (Varian 8-9)
15.10. Productization (Dogson 7)
29.10. Patenting
5.11. Technology marketing (Varian 2-7, Dogson 9)
12.11. Case: Mobile network evolution
19.11. Case: Product management
26.11. Case: Mobile cloud computing
3.12. Summary

16.12. Exam

Technology management

- Technology is an ensemble of theoretical and practical knowledge, knowhow, skills and artifacts that are used by the firm to develop, produce and deliver its products and services
- Technology is a **resource** that is as pervasively important in the organization as are financial and human resources
- The deployment of technology in the firm´s product-market strategy strategy to position itself in terms of differentiation and cost, and gain **technology-based competitive advantage**
- The firm´s resource commitment to various areas of technology
- The firm´s use of organization design and management techniques to manage the technology function

Characteristics of innovation

- New or improved product, service or process from market point of view, which contains new technological solutions and has been commercially successfully introduced to the market

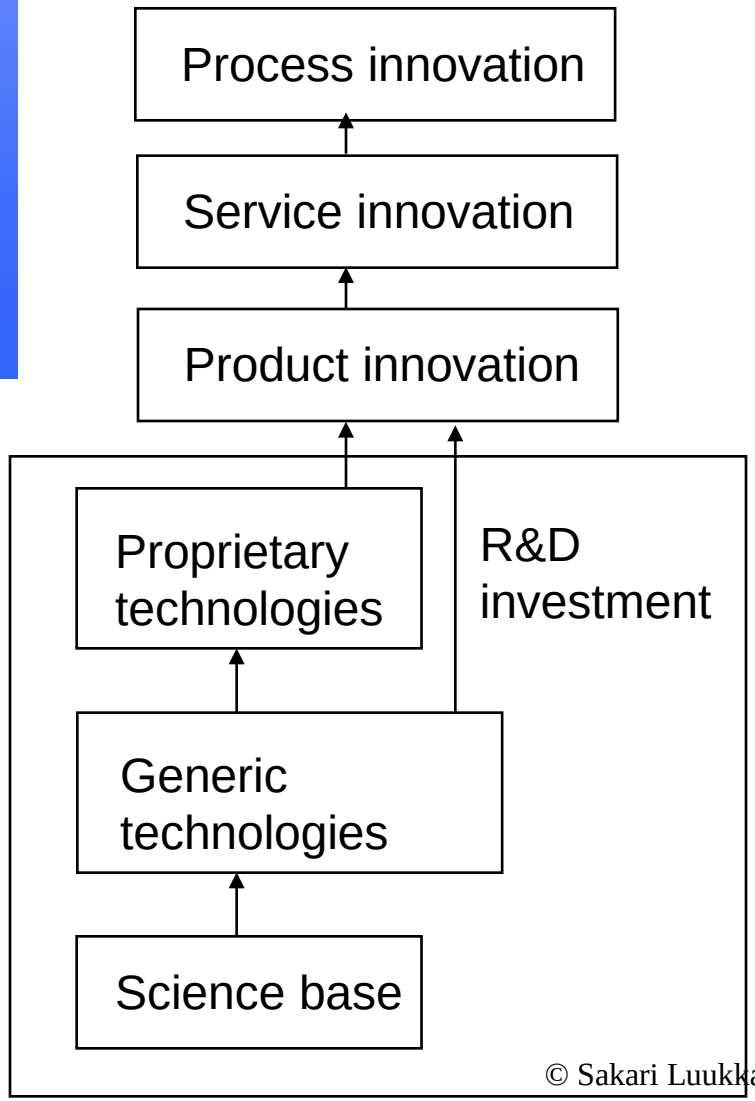
- Innovation management has both relative (competitive position) and absolute (technology-market coincide) dimension

- Radical, discontinuous, disruptive, sustained, incremental, architectural, service and process innovations

- Innovator gets competitive advantage through timing advance and IPR protection by patents – short monopoly

- Monopoly will loosen through trade of patents and licenses or knowledge spillovers when competitors copy the technology and proprietary technology gets common to all industry players

Innovation in telecommunications



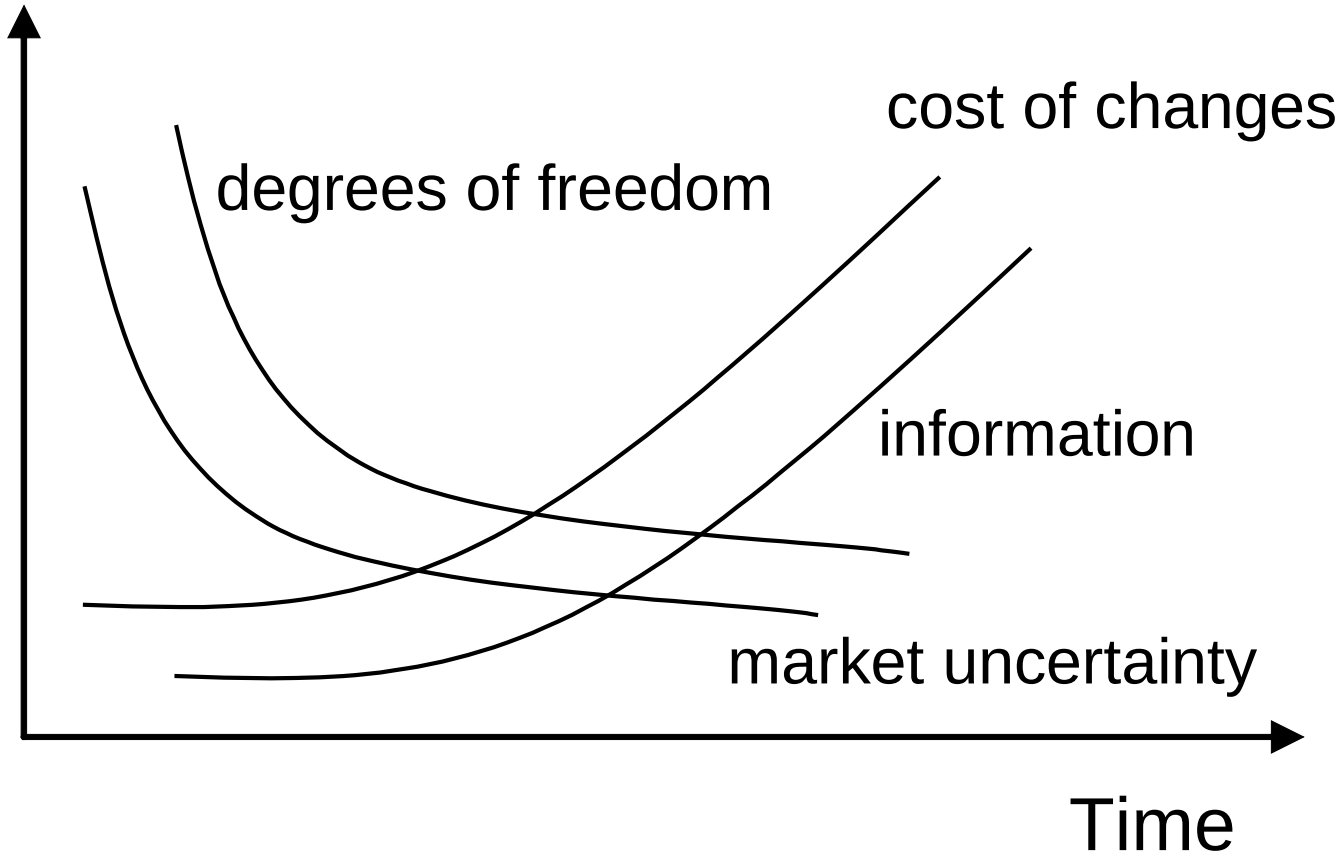
Market appeal

GSM, ADSL, DOCSIS

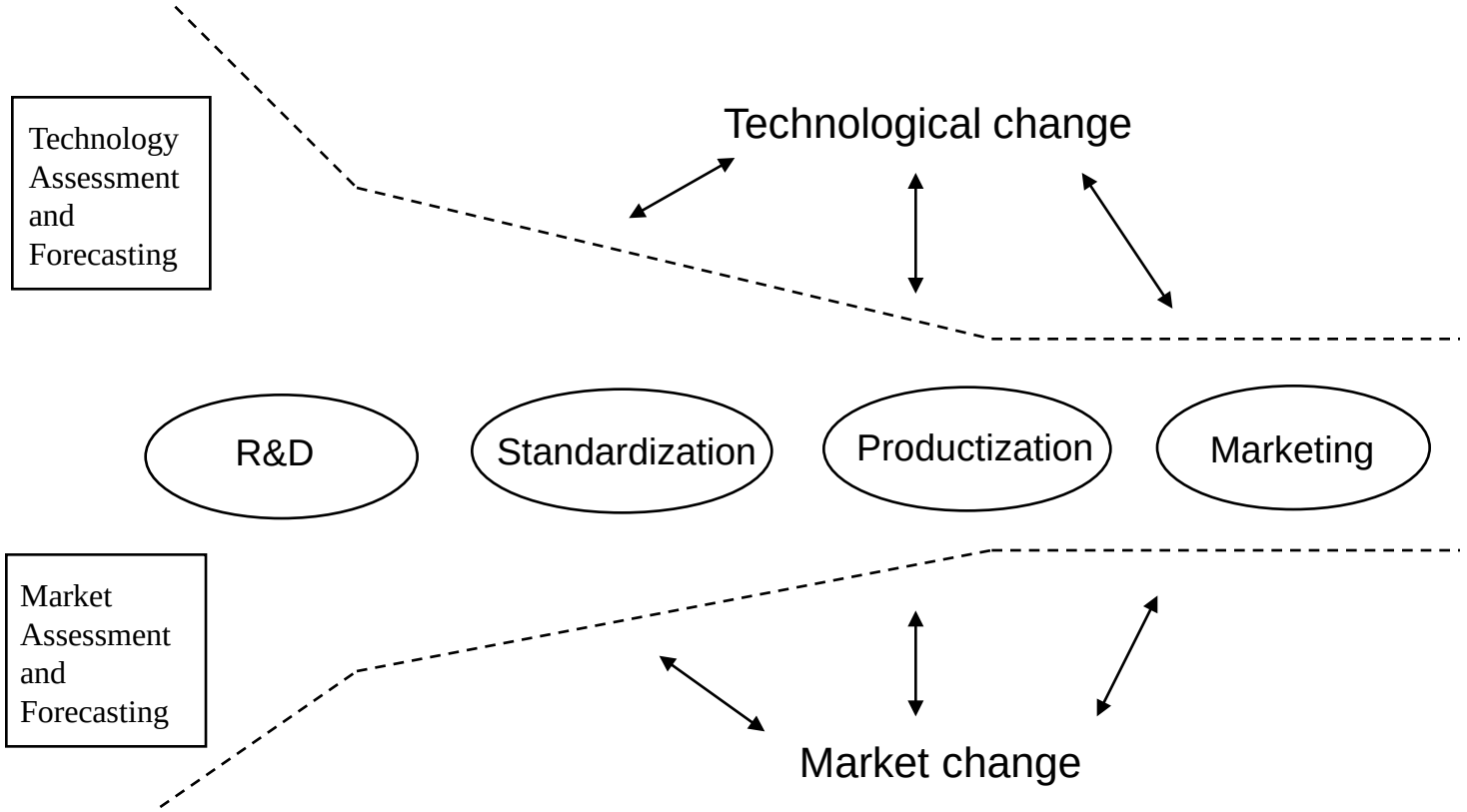
ISDN, ERMES, UMTS, LTE?

Technology push

Innovation process over time

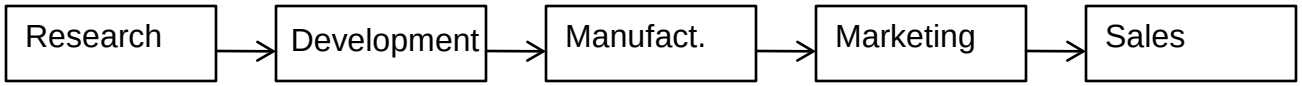


Innovation process

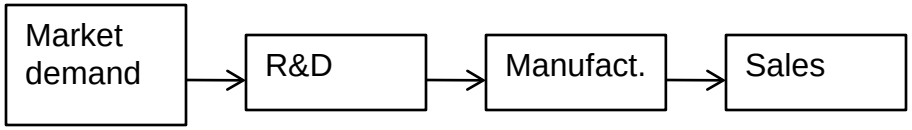


Innovation process evolution

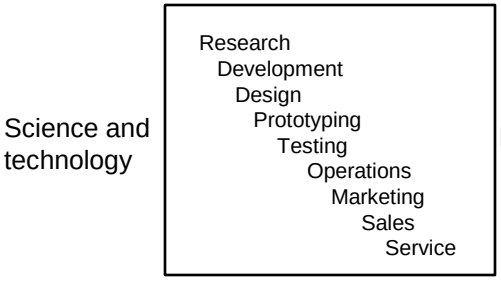
First-generation innovation process
(Research push)



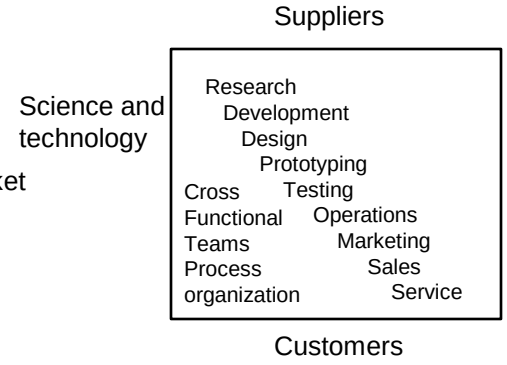
Second-generation innovation process (Demand pull)



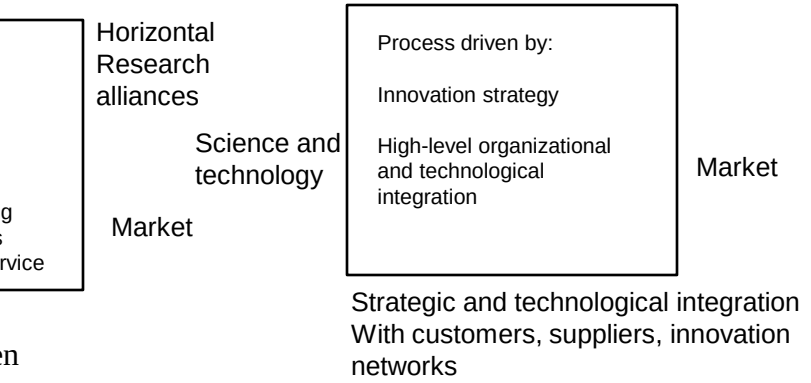
Third-generation innovation process (Coupling)



Fourth-gen. innovation process (Collaborative)



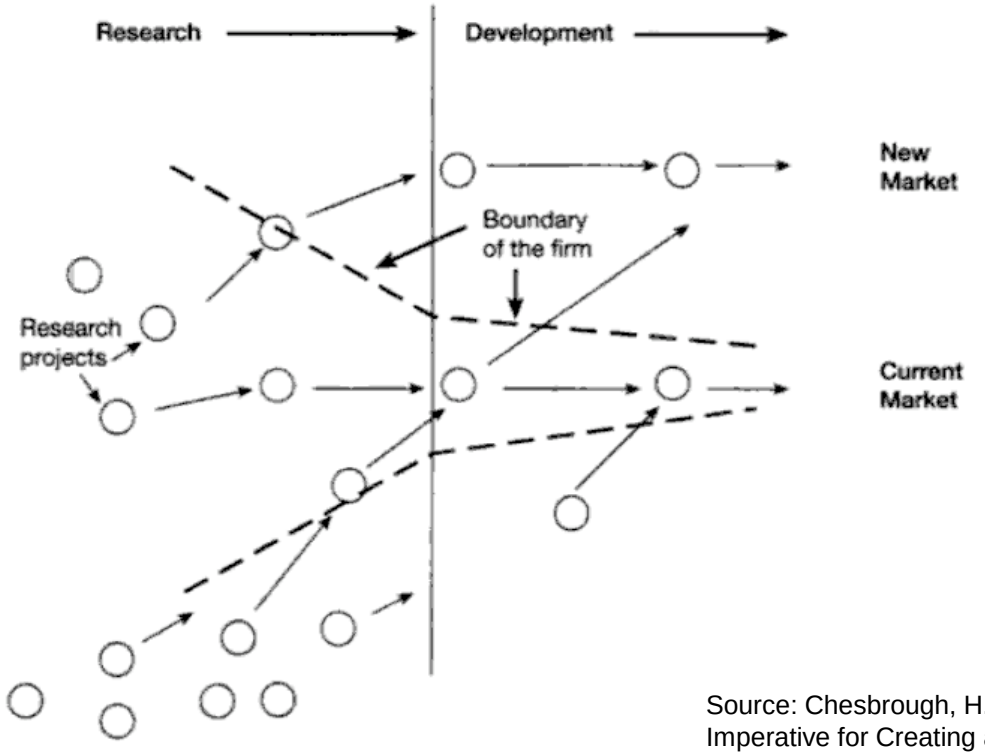
Fifth-generation innovation process (Strategic and integrated)



Open Innovation

FIGURE I-4

The Open Innovation Paradigm for Managing Industrial R&D



Source: Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology

Open Innovation

TABLE I-1

Contrasting Principles of Closed and Open Innovation

Closed Innovation Principles	Open Innovation Principles
The smart people in our field work for us.	Not all the smart people work for us. We need to work with smart people inside *and* outside our company.
To profit from R&D, we must discover it, develop it, and ship it ourselves.	External R&D can create significant value; internal R&D is needed to claim some portion of that value.
If we discover it ourselves, we will get it to market first.	We don't have to originate the research to profit from it.
The company that gets an innovation to market first will win.	Building a better business model is better than getting to market first.
If we create the most and the best ideas in the industry, we will win.	If we make the best use of internal and external ideas, we will win.
We should control our IP, so that our competitors don't profit from our ideas.	We should profit from others' use of our IP, and we should buy others' IP whenever it advances our own business model.

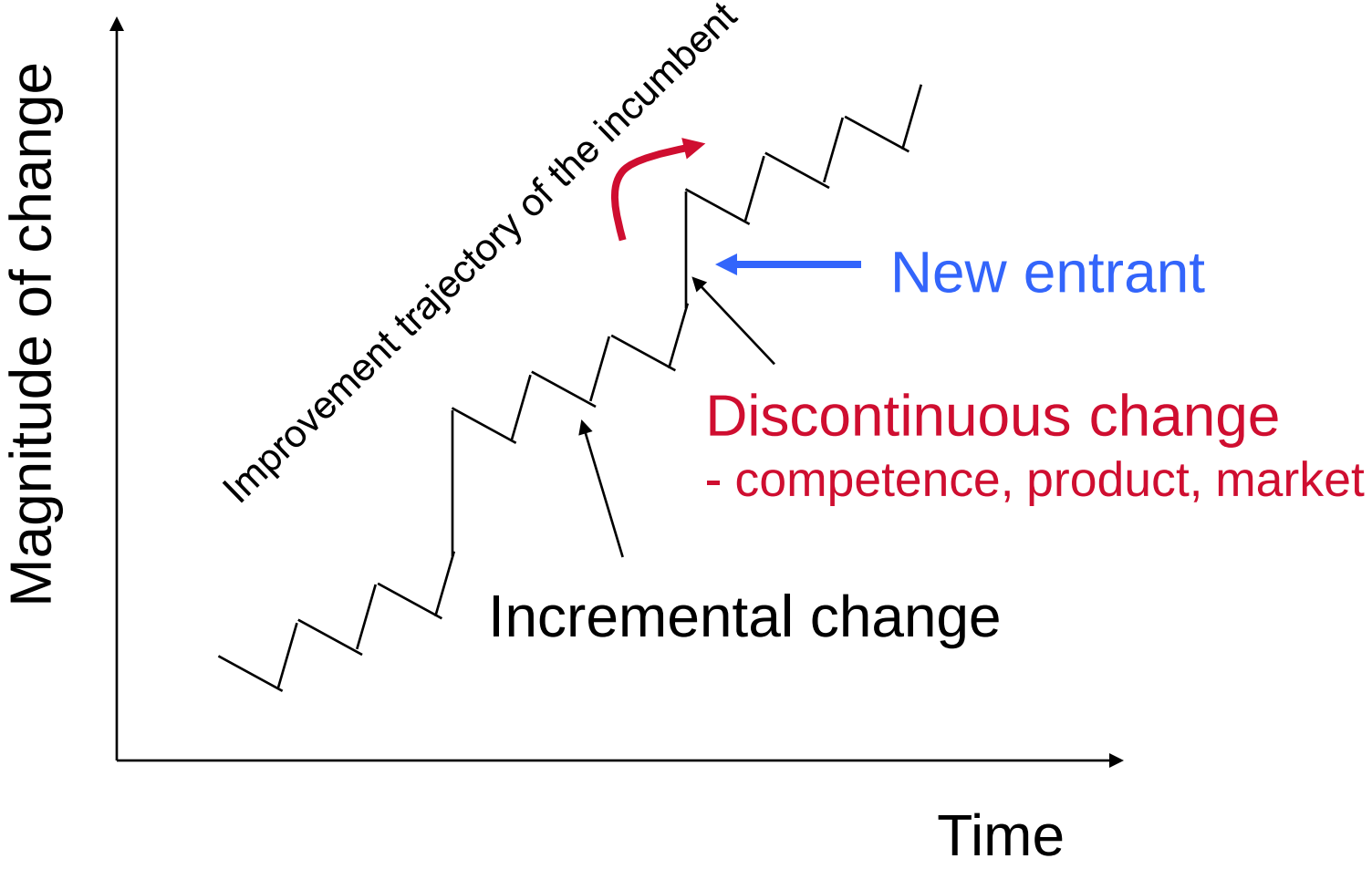
Source: Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology

”Possibilities for new ways of competing usually grow out of some **discontinuity or change** in industry structure often created by new technologies or by new demands that bring existing technologies to market in new combinations and forms.

Often innovators are outsiders to the existing industry. A firms ability to sustain its success is most likely a result of constant innovations to adapt to **changing** circumstances.”

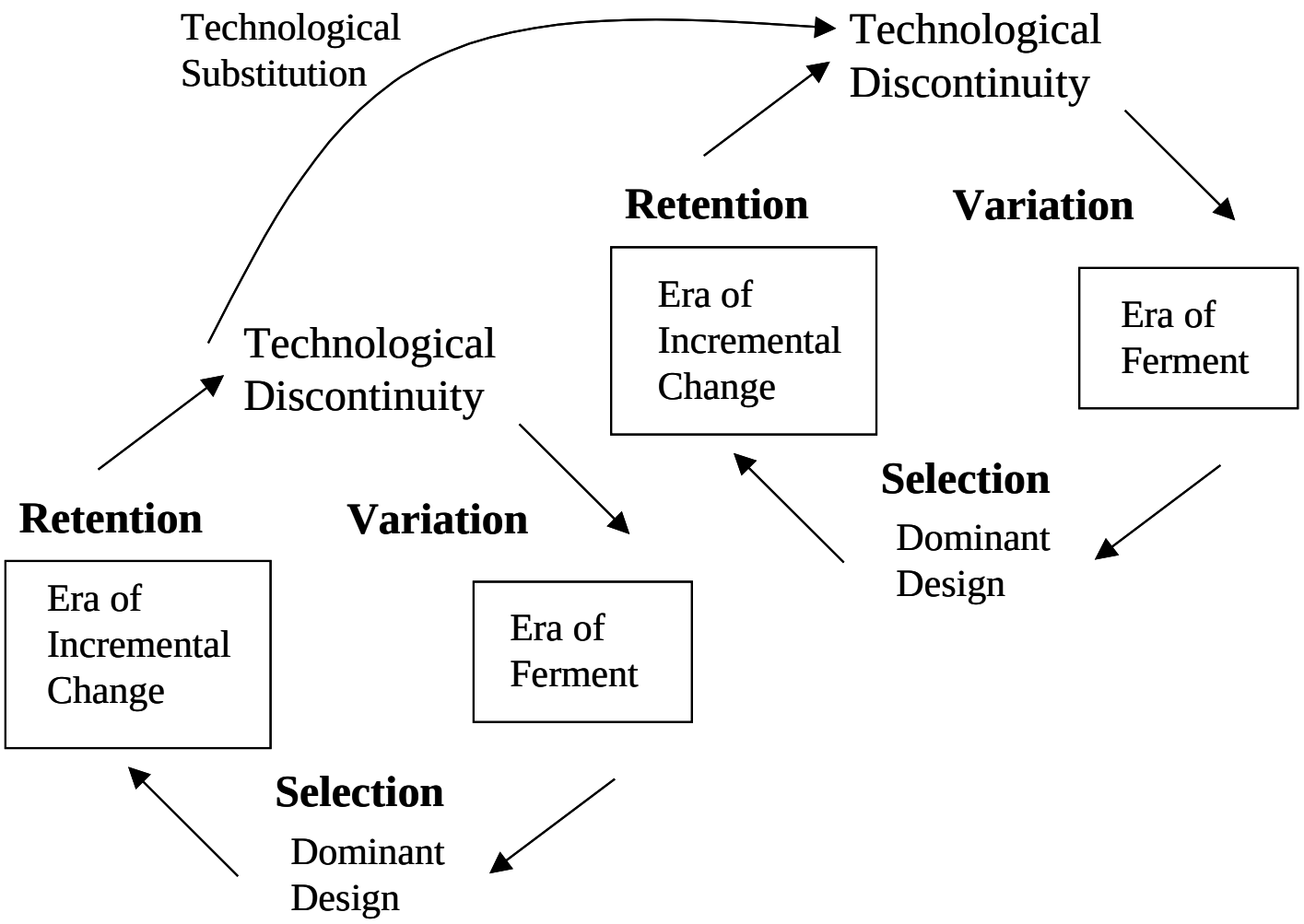
Porter, 1990

Technological change



Source Tushman, 1997

Technology cycle



Source Tushman, 1997

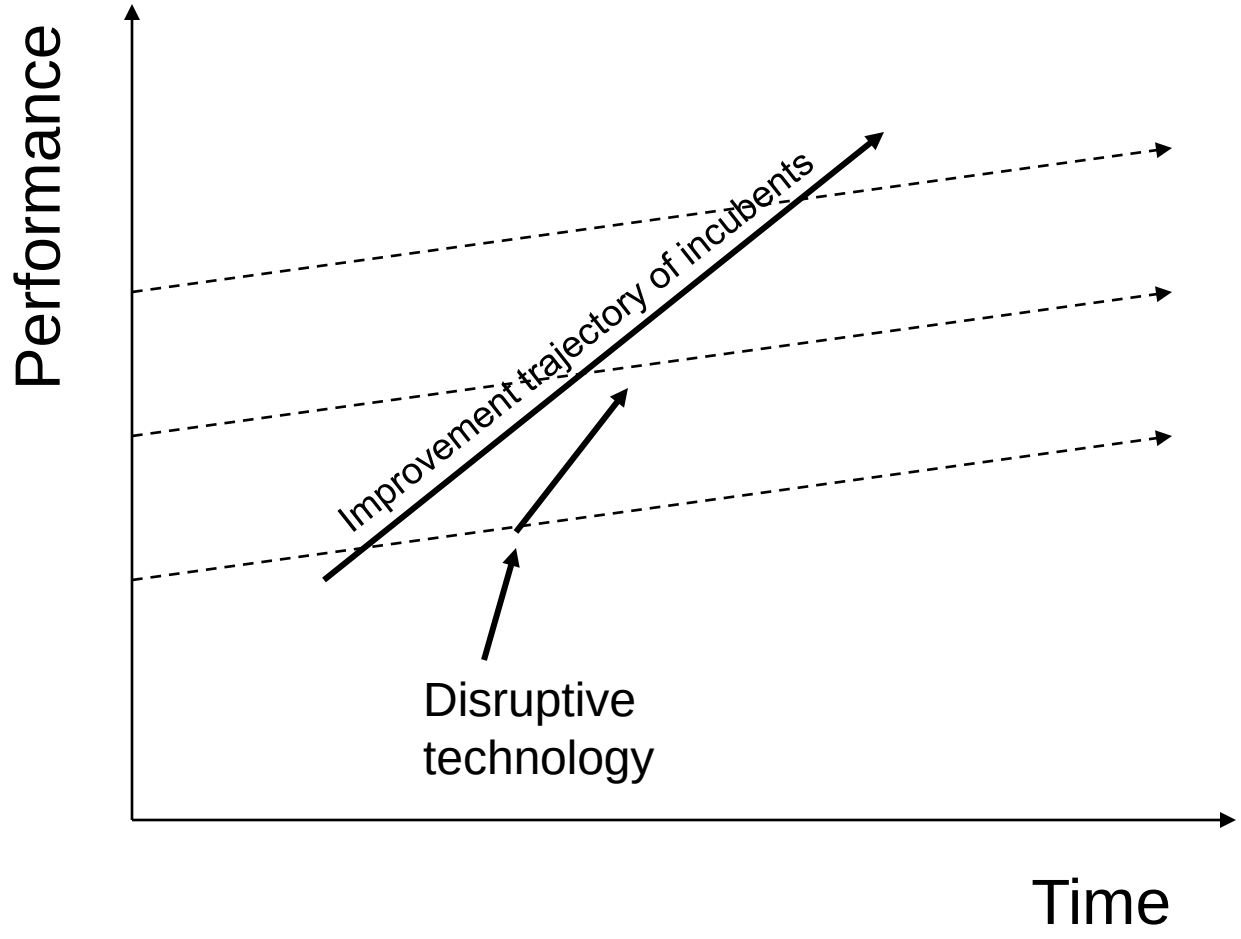
Managing incremental innovation

- Cost advantage
- Minor design modifications
- Process efficiency development
- New features to existing products
- Re-innovating
- Branding
- Reputation of quality
- Learning from users and customers

Managing radical innovation

- Openness to new ideas outside the firm and sector
- Continuous searching and scanning of new technologies and markets
- Options by invensting in portfolio of technologies
- Links and relationships within innovation system
- Reshaping organizational structures
- Acquisitions and hiring
- Investment in distant technologies
- Networks and alliances outside base industry
- Awareness of new patterns of customer behaviour
- Abandon old habits when required

Disruptive technology



Source Christensen, 1997

Innovative capabilities development

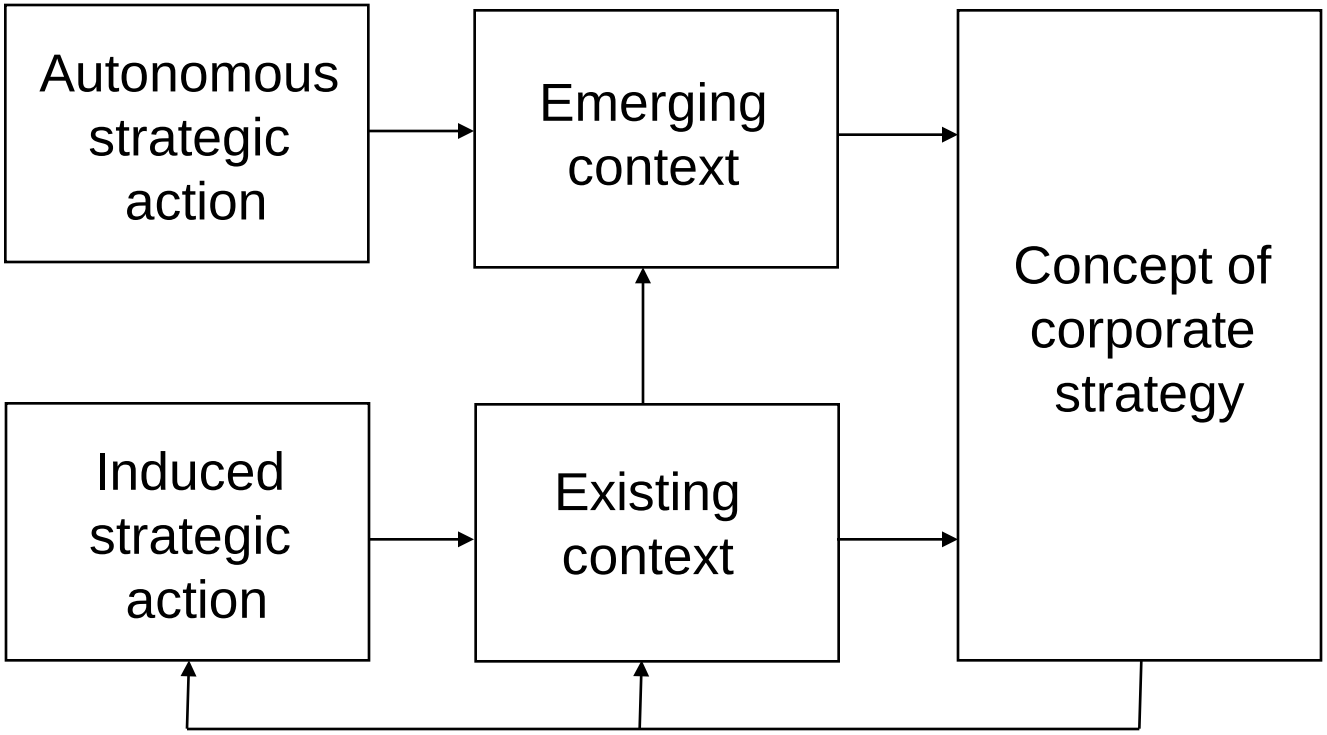
	Objective	Frameworks	Tools
Searhing	Seeking and assessing market opportunities and threats	Technological trajectories, innovation types, lead customers	Forecasting, Delphi, bibliometrics, technlogy road maps
Selecting	Choosing amongst options	Lifecycle, core competence, timing	Portfolio analysis, audits
Configuring	Coordination and integration	Lean thinking, agile methods	R&D alignment tools, QFD
Deploying	Protecting and delivering	Complementary assets, productization dominant design	IPR management, standards setting, real options
Learning	Improving the performance	Learning curve	Post-project evaluations Balanced Scorecard

Innovation strategy

Interrelated decisions related to

- Technology choice
- Technology sourcing
- Level of technology competence
- Level of funding for R&D
- Organization for R&D
- Timing
- Technology introduction in new products/services
- Marketing of products/services

Innovation strategy implementation



Source Burgelman, 2001

Innovation strategy implementation

Induced

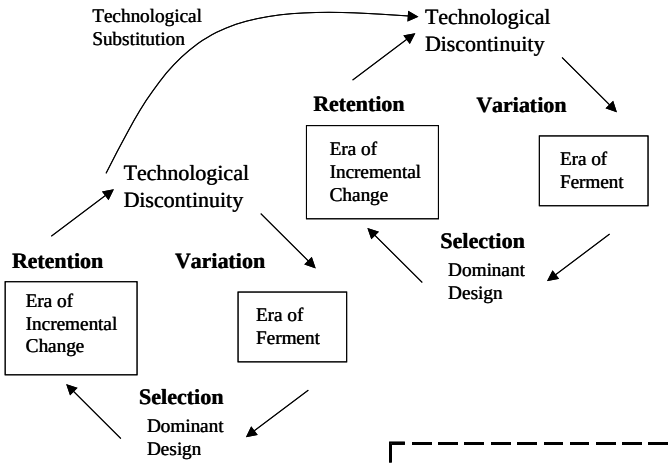
- applied research on new technologies opportunities and threats to support existing businesses
- standardization, alliances
- product development
- joint ventures
- acquisitions

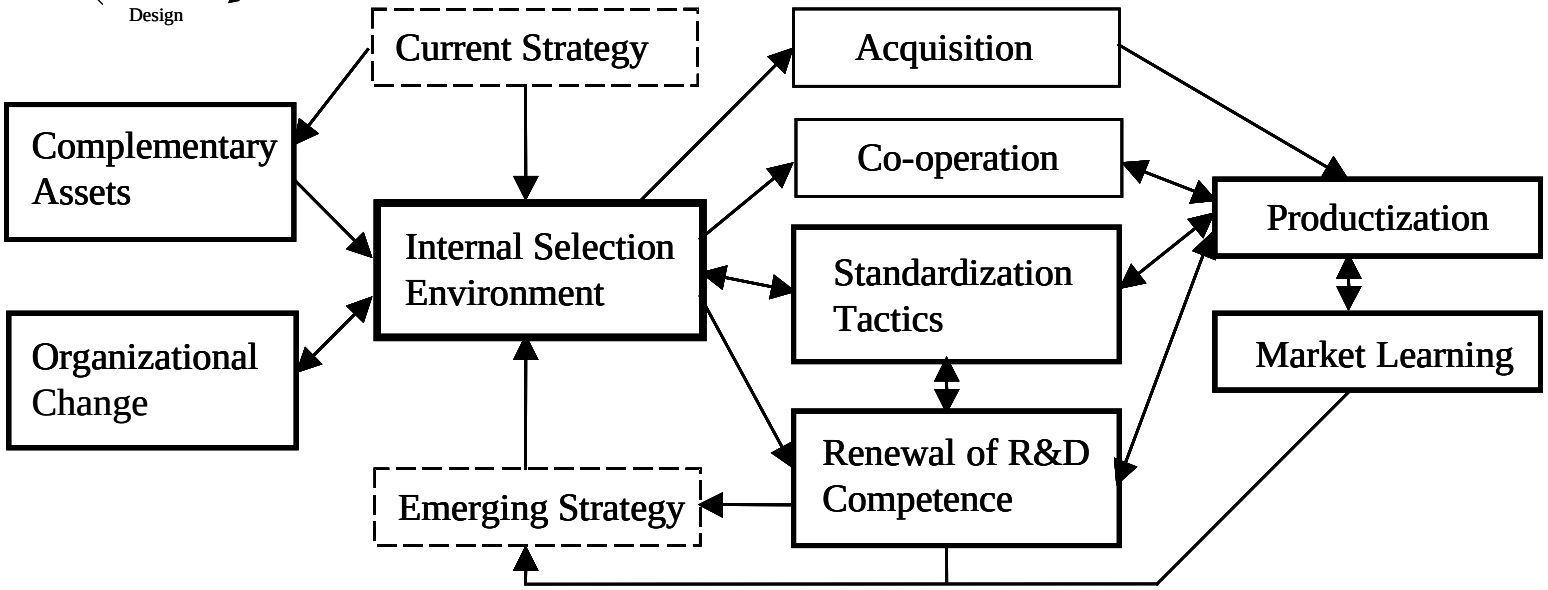
Autonomous

- science-based research
- internal corporate venturing
- external corporate venturing: VC, venturing alliances

and if they fail the last change is followership by copying / contracting / licensing without timing and cost advantage

Managing technological change





Ambidextrous Organization

Alignment of:	Exploitative Business	Exploratory Business
Strategic intent	cost, profit	innovation, growth
Critical tasks	operations, efficiency, incremental innovation	adaptability, new products, breakthrough innovation
Competencies	operational	entrepreneurial
Structure	formal, mechanistic	adaptive, loose
Controls, rewards	margins, productivity	milestones, growth
Culture	efficiency, low risk, quality, customers	risk taking, speed, flexibility experimentation
Leadership role	authoritative, top down	visionary, involved

Ambidextrous Leadership

Different alignments held together through senior-team integration, common vision and values, and common senior-team rewards

Source O´Reilly and Tushman, 2004

Different innovation strategies

	Proactive	**Active**	**Reactive**	**Passive**
Objective	Be first	Follow quickly	Follow slowly	Do what is compulsory
Type	Radical and incr.	Mainly incremental	Incremental	Occasionally incremental
Knowledge	R&D, collab., lead customers	R&D, collab.	Competitors, cust., licenses	Customers
Inn. expenditure	Basic and applied R&D	Applied R&D	Focus on operations	No formal activities
Risk acceptance	High risks in portfolio	Medium risk	Low risk	No risk
Appropriability	IPRs, secrecy	Complementary assets, speed	None	None
Case companies	**Amazon**, Apple	Microsoft	Ryanair	Subcontractors

Case Amazon renewal

• in 1997, Amazon sold books and CDs to consumers, in 2009 Amazon earns similar amount of revenue from services as it does from selling directly consumer products

• main decision was to open its platform to third-party merchants which were competitors, however customers wanted to buy from all sellers through Amazon

• the new service innovations were:
- Associate Model, which drives buyers on other Websites to Amazon's site
-Web Store Platform, which enables sellers to create their own site but use Amazon for fulfillment
- Enterprise Platform, which is used by major Websites such as Marks & Spencer
- Infrastructure Platform, which provides virtualized cloud-based computing, messaging and storage services to enterprises

- after renewal Amazon continues as dominant player in e-commerce by very rapid growth and good profitability

Source: Graham Finnie, 2009

Amazon's lessons for operators

• Do telecom operators have anything to sell to third parties, apart from pure bandwidth following the way Apple is leading by App Store?

• Do they have a platform that is as valuable as the platform that Amazon offers to its customers and and half-million-strong developer community?

• How and why they should open their platforms to third parties?

• The assets that operators could open and provide are billing system with micro-payments, data of customers and their behavior, messaging, information on devices in use, customer locations, and the ability to securely authenticate and authorize users

Source: Graham Finnie, 2009