



Management of Technological Innovation

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INNOVETY
unleash your innovation



Outline



- Innovation levers (What is Innovation?)
- Types & Sources of Innovation
 - Collaboration
 - Licensing
- Technology cycles
 - Dominant Designs
 - Timing of entry
- Product Design and Innovation
 - Product Design Principles
 - Product and Service Design Activities

What is Innovation?



Technology Innovation

Product and Services

Process Technologies

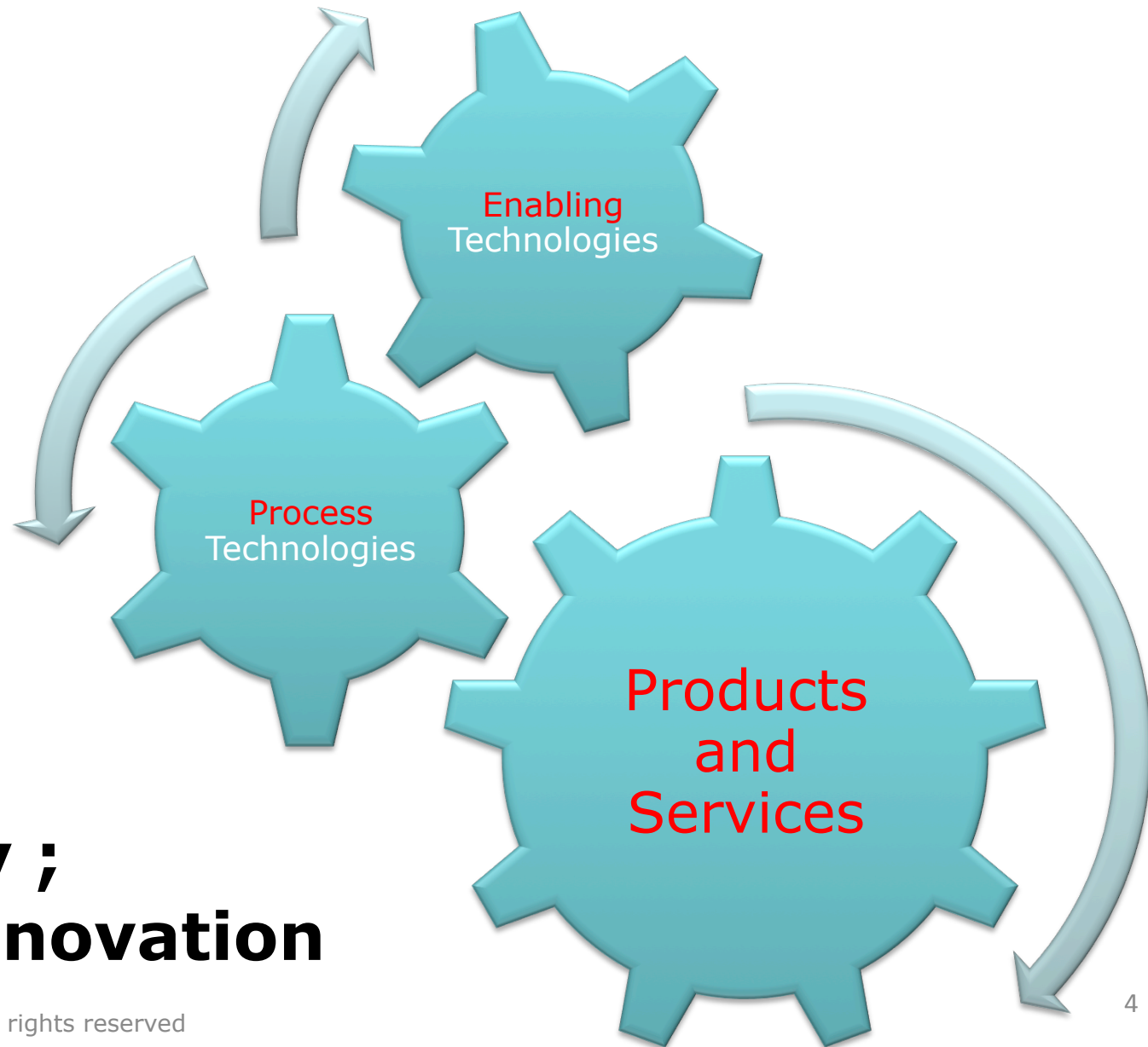
Enabling Technologies

Business Model Innovation

Value Proposition

Supply Chain

Target Customer



**Technology ;
levers of innovation**

Product and Services



- New products
- Enhancements of current products



McDonald's low-fat oil



Mobile phones



iPad

Process Technologies



- Manufacturing
 - Computer Supply Chain (Dell)
 - Auto manufacturing (Ford)
- Service delivery (Amazon, ebay)



Enabling Technologies

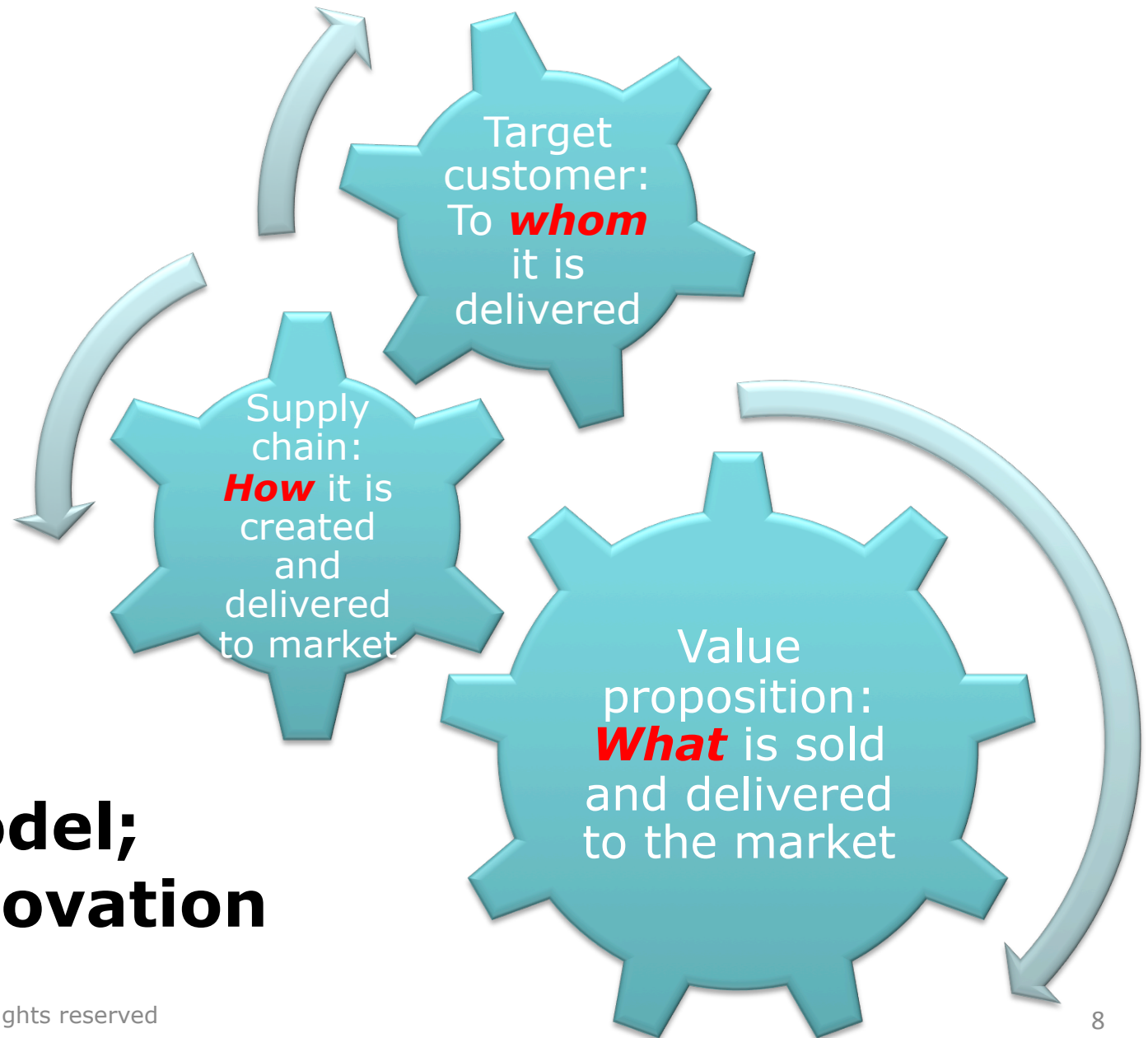


IT

- Wal-Mart's supply chain system (allowed it to track and manage partners, supply chains and finances)



Mapping Innovation



Business model; levers of innovation

Value Proposition (What?)



- New products
- Enhancements of current products



IBM

IBM shifts focus from products to services

amazon

Amazon moves from bookstore to mall

Colgate

Whitening toothpaste

Supply Chain (How?)



- Organization
- Partnerships
- Operations



- Vodafone created its VC arm to outsource and invest in suppliers



- Toyota's suppliers have an intimate relationship with Toyota, sharing in its successes and failures



- Microsoft's Xbox developers received support from Microsoft, since their games make or break the Xbox (Complementary assets)

Target Customer (Whom?)



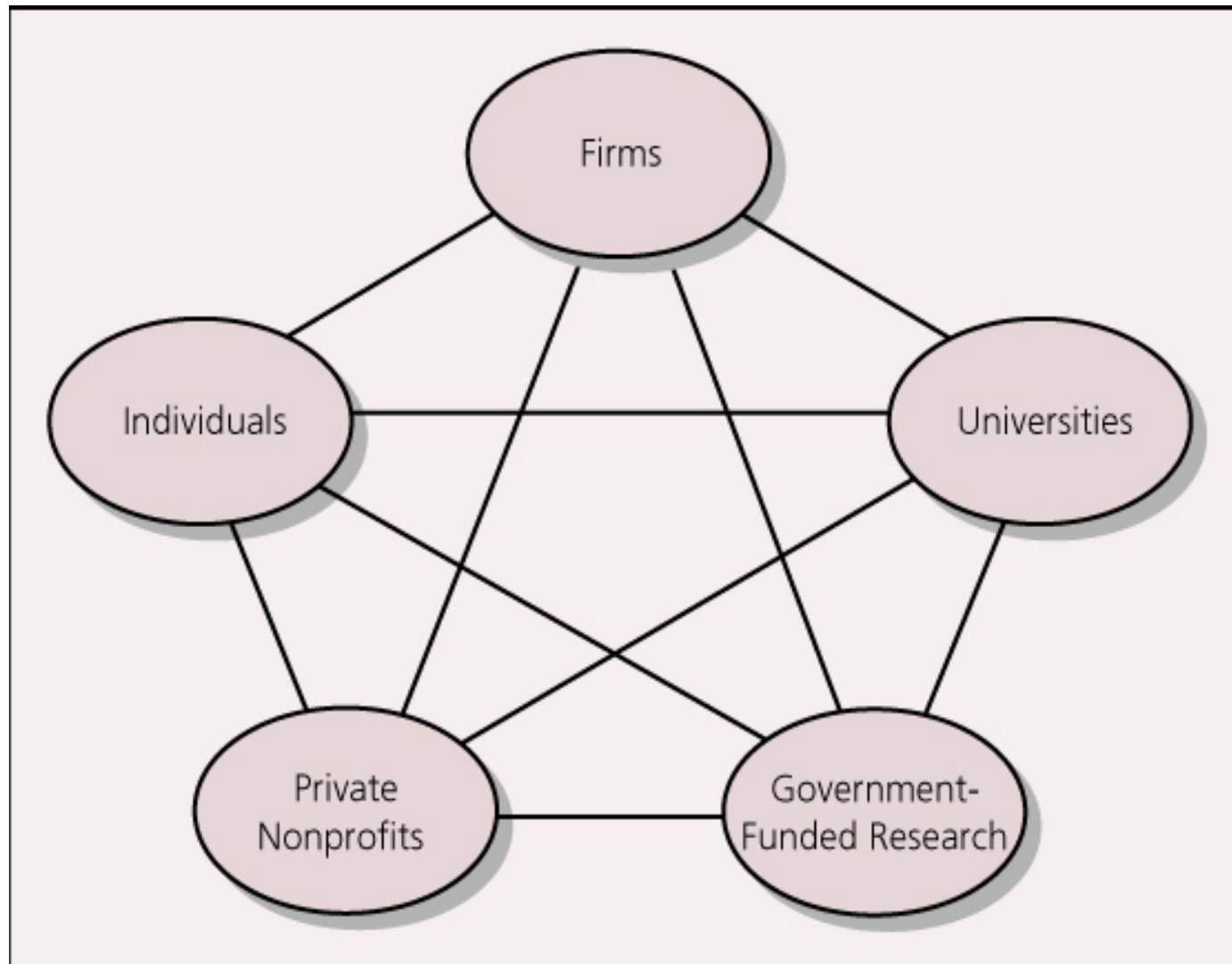
- Nutritional bars were originally marketed to athletes, but are now marketed to women



- Dockers clothing targeted the 'low-maintenance' men's segment

Sources of Innovation

Sources of Innovation





Going it alone; the solo option

- Availability of capabilities
- No suitable partner
- Protect proprietary interests
- Control over development and use



Honda's Hiroaki Yoshino:
*"it is better for a person to
decide about his own life rather
than having it decided by
others"*



Collaboration

- Access to missing skills or assets
- Reduce asset commitment, gain flexibility
- Source of learning; pooling knowledge base
- Share costs and risks
- Facilitate creation shared standard



Collaboration



Collaboration/Open Innovation toolbox

- Strategic alliance
 - cooperation agreement
- Joint Venture
 - new entity
- Licensing
 - contract to use technology
- Outsourcing
 - not producing in-house (firm or univ.)
- Platforms
 - R&D network

COMPAQ Outsources
Chip design



Lablets near
universities



Sells slack
production cap.



50% R&D ideas
from outside



Considerations in a licensing agreement:

- degree of exclusivity - exclusive, sole or non-exclusive
- scope - territory & type of end use
- period - no longer than licensor's IPR
- payment - royalty, lump sum or cross-license



Typical licensing agreement includes:

- grant of rights - exclusivity, territory, term
- transfer of know-how - support & training
- production & marketing - materials
- fees & royalties - levels & conditions
- protection of IPR - all parties rights & resp.
- termination of agreement - when & how



Benefits of licensing to licensor:

- reduce development costs & risks;
- reach a larger market;
- exploit in other applications;
- gain access to complementary technology;
- block competing developments;
- convert competitor into defender.



Benefits of licensing to licensee:

- access to know-how
- speed of market entry
- overcome internal resource constraints
- reduce technical & market uncertainties
- low cost acquisition of know-how

Collaboration Tradeoffs



	Time Speed	Cost	Control	Leverage existing competence	Potential to develop new competence	Access other firm's competence
Solo	▼	▲	▲	Y	Y	N
Strategic Alliance	▼▲	▼▲	▼	Y	Y	sometimes
JV	▼	share d	shared	Y	Y	Y
License IN	▲	▼▲	▼	sometimes	sometimes	sometimes
License OUT	▲	▼	▼▲	Y	N	sometimes
Outsource	▲	▼▲	▼▲	sometimes	N	Y
R&D Platform	▼	▼▲	▼▲	Y	Y	Y

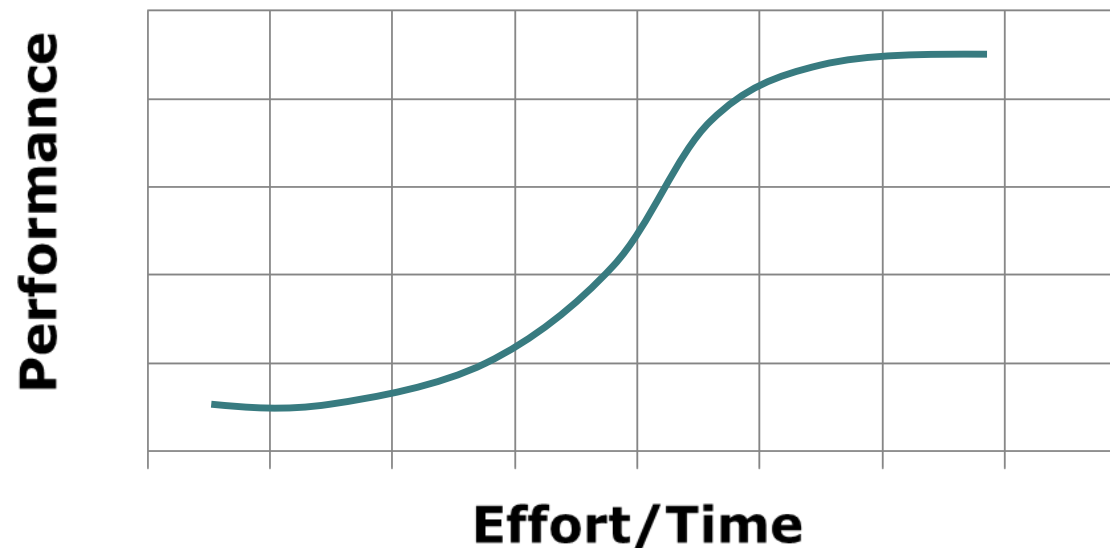
Technology S-Curves

Technology S-Curves



- Technological improvement in product performance typically follows an S-curve
- Rate of adoption and margins
- S-curve can be disrupted by radical innovations

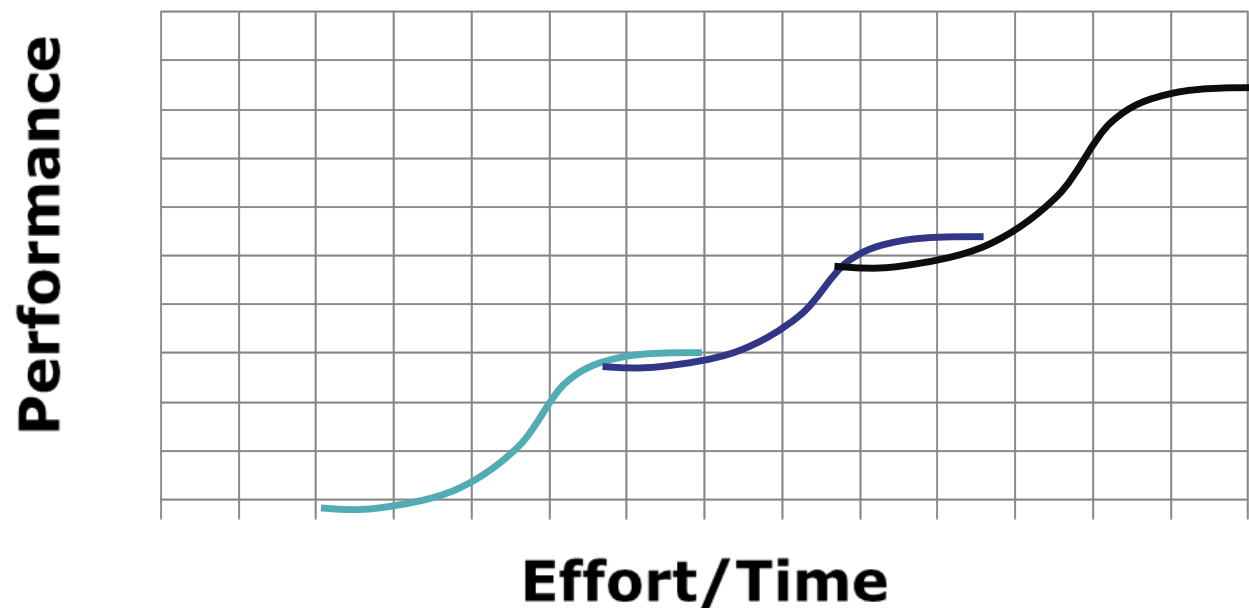
S-Curve



Technology S-Curves



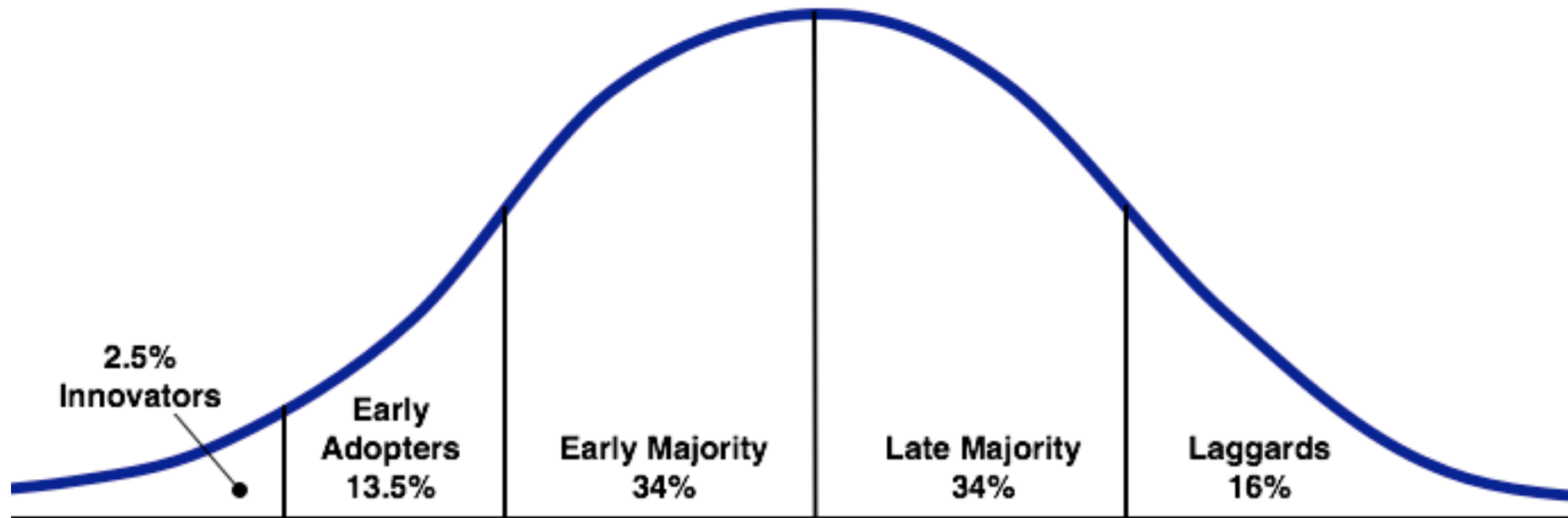
By plotting the S-curves of technologies that satisfy the same need against time, it becomes clear that the nature of innovation is cyclical



Technology S-Curves



Markets and technology innovation cycles



Source: Everett Rogers, Diffusion of innovations model

Technology is adopted by users when complementary resources exist

Dominant Designs

Multiple Dimensions of Value



- In many increasing returns industries, the value of a technology is strongly influenced by both:
 - Technology's Standalone Value
 - Increased returns to adoption
- **A Technology's Stand-alone Value**
 - Includes such factors as:
 - The functions the technology enables customers to perform
 - Its aesthetic qualities
 - Its ease of use, etc.

The Dominant Design



A major factor influencing dominant design selection is **increasing returns to adoption**

- A technology's value increases as it is adopted by more users



This occurs as a result of:

- **Learning** (greater tech use -> greater knowledge accumulation for producers & users)
- **Network externalities** (more customer adoption -> tech. valuable)
- **Complementary product creation** (high adoption -> more complementary products -> high adoption)

The Dominant Design



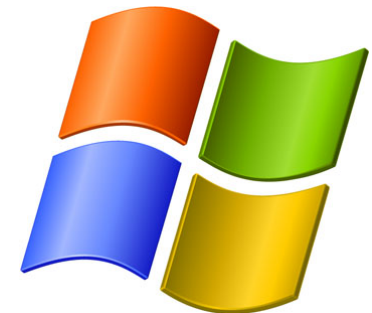
Network Externalities

increased benefits of using a good or service as more people use it

Microsoft Windows is popular because it maximizes the number of users your files are compatible with



- Includes the value created by:
 - The size of the technology's installed base
 - The availability of complementary goods (iTunes, battery, games)



Standards & Dominant Design



To overthrow an existing dominant design, a competitor must:

- Be significantly technically superior to the incumbent (Technology Stand-Alone Value)



- Be compatible with the existing user base (Network Externality Value)



Timing of Entry

Timing of Entry



First-mover:

- **Advantages**

- Brand loyalty and technological leadership (can shape customer expectations)
- Exploiting buyer switching costs
- Reaping increasing returns advantages

- **Disadvantages**

- High R&D expenses
- Undeveloped supply and distribution channels
- Immature enabling technologies and complements (batteries, hydrogen fuel cells)
- Uncertainty of customer requirements (Kodak vs. Sony)



Timing of Entry; winners and losers



Product	First Mover	Follower	Winner
8mm video	Kodak	Sony	Follower
Disposable diaper	Chux	Pampers	Follower
Microprocessor	Intel	AMD	First Mover
Microwave	Raytheon	Samsung	Follower
PC	Altair	IBM, Apple	Follower
VCR	Ampex/Sony	Matsushita	Follower
Video game console	Magnavox	Nintendo	Follower
Web browser	NCSA Mosaic	Netscape	Follower
Word processing	Wordstar	MS word	Follower



1. How certain are customer preferences?

- If customer needs are well understood, it is more feasible to enter the market earlier.

2. How much improvement does the innovation provide over previous solutions?

- An innovation that offers a dramatic improvement over previous generations will accrue more rapid customer acceptance.

3. Does the innovation require enabling technologies, and are these technologies sufficiently mature?

- If the innovation requires enabling technologies (such as long-lasting batteries for cell phones), the maturity of these technologies will influence optimal timing of entry.



4. Do complementary goods influence the value of the innovation, and are they sufficiently available?

- Not all innovations require complementary goods, but for those that do (e.g., games for video consoles), availability of complements will influence customer acceptance.

5. How high is the threat of competitive entry?

- If there are significant entry barriers, there may be less need to rush to market to build increasing returns ahead of others.

6. Are there increasing returns to adoption?

- If so, allowing competitors to get a head start can be very risky.



7. Can the firm withstand early losses?

- The first mover bears the bulk of R&D expenses and may endure a significant period without revenues; the earlier a firm enters, the more capital resources it may need.

8. Does the firm have resources to accelerate market acceptance?

- Firms with significant capital resources can invest in aggressive marketing and supplier and distributor development, increasing the rate of early adoption.

9. Is the firm's reputation likely to reduce the uncertainty of customers, suppliers, and distributors?

- Innovations from well-respected firms may be adopted more rapidly, enabling earlier successful entry.