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IOS strategy, development and management

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Contents and aims

- Alignment of IT (IOS) and business strategy
 - IT alignment
 - (two levels: organizational inter-firm relationship and technological inter-firm system (IOS))
- IS from a strategic perspective:
 - Is it possible to gain competitive advantage from IT/IS ?
(especially standard software): the case of Internet technology
- Strategic development paths of IOS
- IOS sponsor/provider strategy and the sponsor – adopter gap
- IOS development: a life-cycle view
- Management of IOS (and IOS effects)

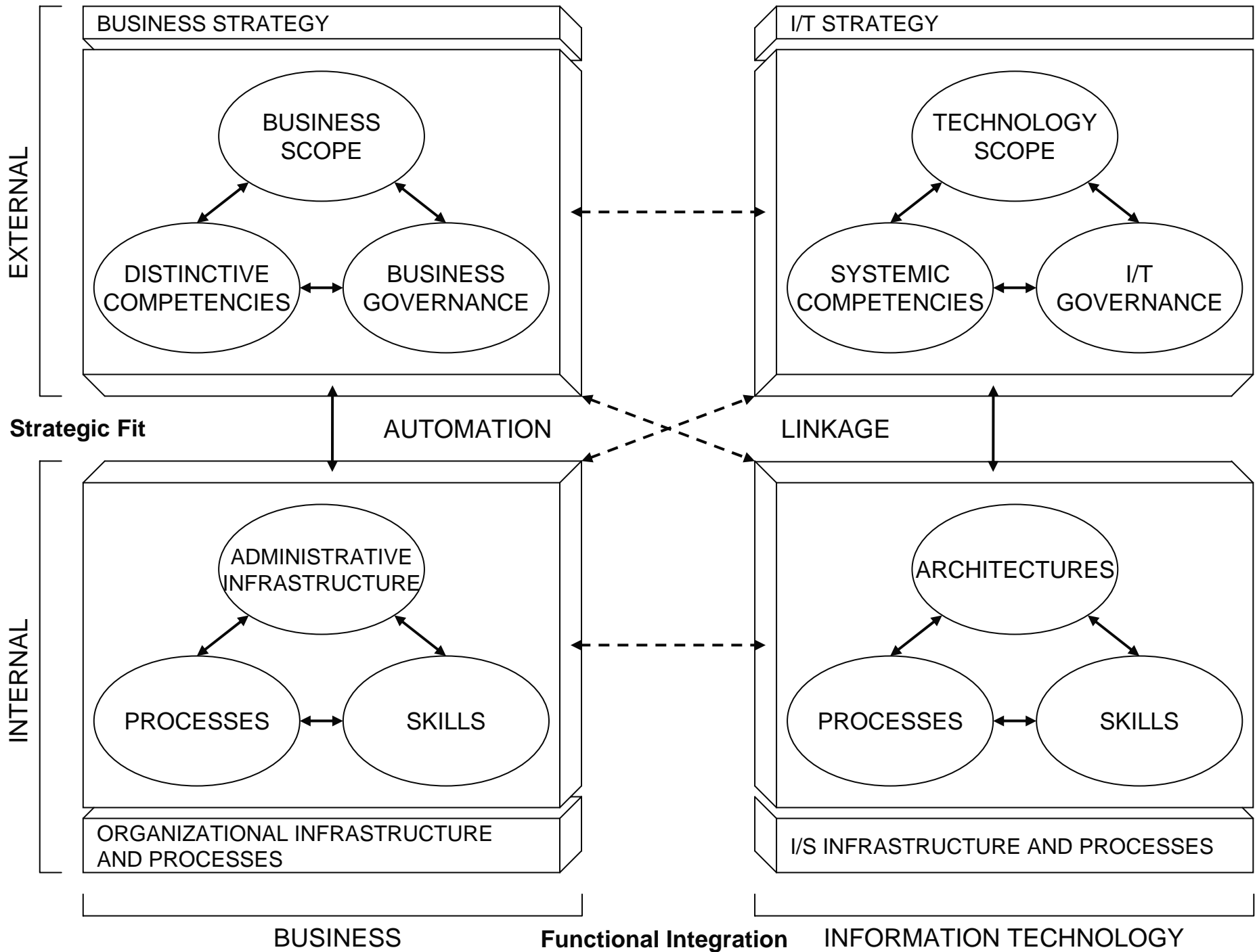
Strategic Alignment Model (Henderson; Venkatraman 1993)

Linkage between

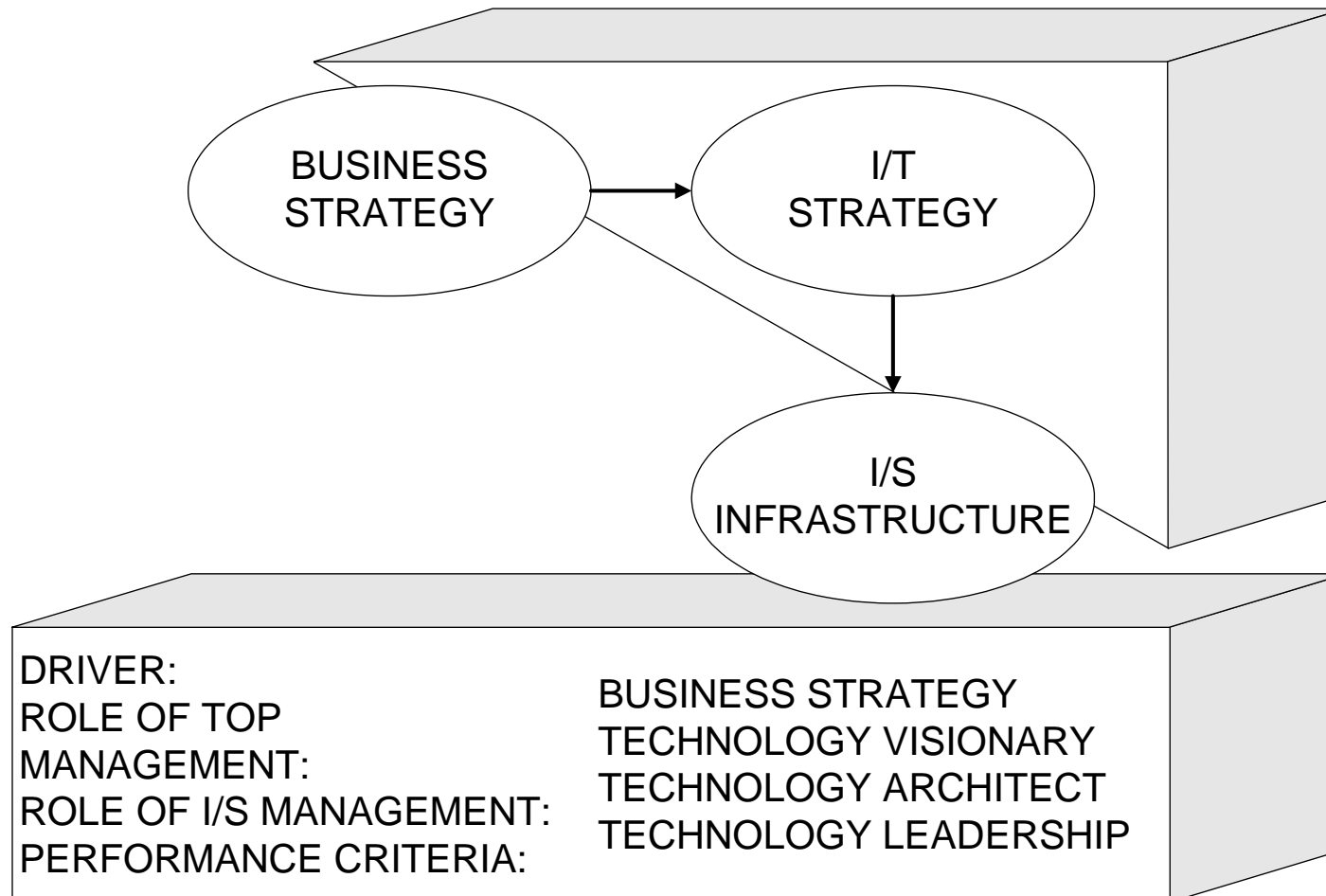
- external and internal view: strategic fit (*strategy and structure*)

as well as

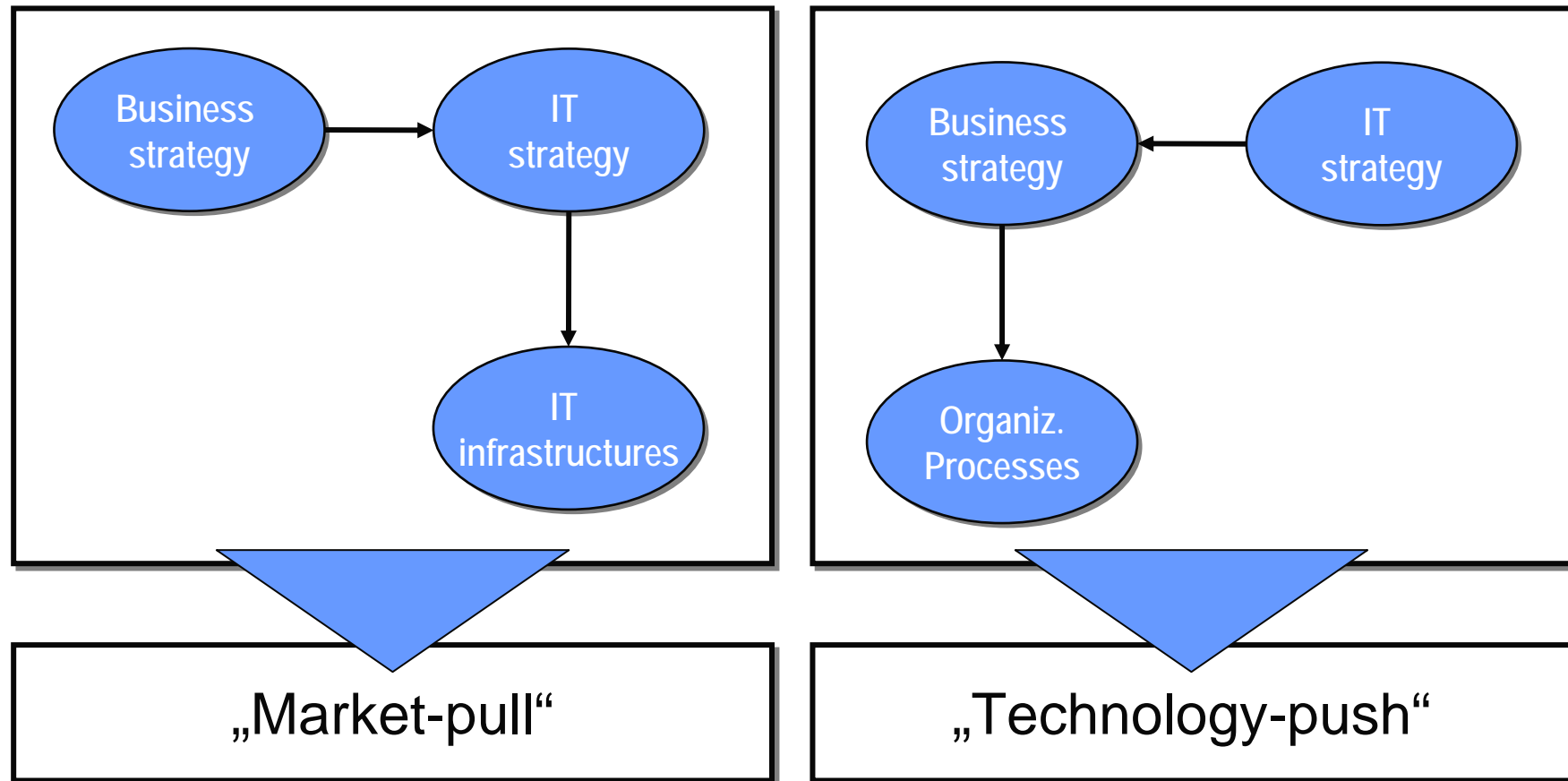
- business strategy and IT strategy: functional integration



Alignment examples



What role does technology play in strategic thinking?



„Market-pull“ versus „Technology-push“ in IS adoption

- **Market-pull**
 - driven by customer wishes or organizational needs
 - systems development to close an efficiency gap or to enhance service degree to better meet needs
 - more about improvement than real innovation
 - but a safe alternative with only low risk
- **Technology-push**
 - driven by technological opportunities (new technologies)
 - systems (prototypes) evolve from new ideas in engineering processes
 - after development a phase of diffusion/adoption starts
 - risks:
 - systems do not meet customer/organizational requirements
 - gap between user expectations and real benefits of systems
 - allows real innovation, has to be seen as a series of experiments
 - example: UMTS

The EDI/ IOS strategic dilemma:

- Strategic advantages through standardized applications?
- The case of Internet Technology as the major enabler of IOS:
 - according to Porter, Michael E. (2001): Strategy and the Internet, in: Harvard Business Review, 3 (2001), pp. 63-78.
 - explanation using the market-based view (five forces)

Remember: Porters Five Forces Model

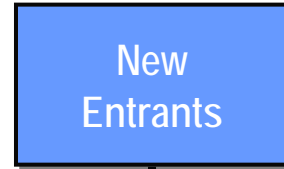
MBV

| |
|----------------------|
| 1. Introduction |
| 2. MBV and RBV |
| 3. Towards interfirm |
| 4. Network strategy |

Bargaining Power of Suppliers:

These factors tend to increase supplier power:

- Dominated by a few suppliers
- Suppliers more concentrated than buyers
- No substitutes
- Threat of forward integration (if suppliers can vertically integrate, their power increases)
- Supplier input to quality of products critical

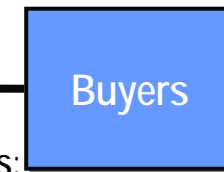
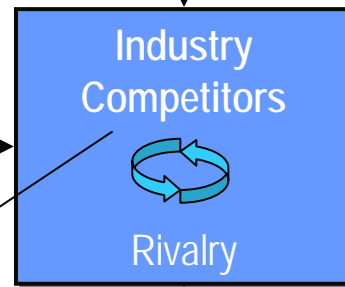


Threat of new entrants:

Depends on: Entry barriers.

Typical barriers are:

- Economies of scale
- Capital requirements
- Customer switching costs
- Government policies
- Access to distribution and suppliers



Bargaining Power of Buyers:

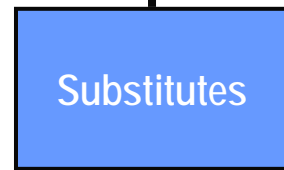
These factors tend to increase buyer power:

- Concentrated
- Low switching costs (standardized products or services), low profit margins
- Threat of backward integration
- Buyer has all relevant information

Rivalry among competitors:

Depends on:

- Numerous rivals, equally balanced power
- Slow growth
- Low differentiation, low switching costs
- High exit barriers
- Etc.



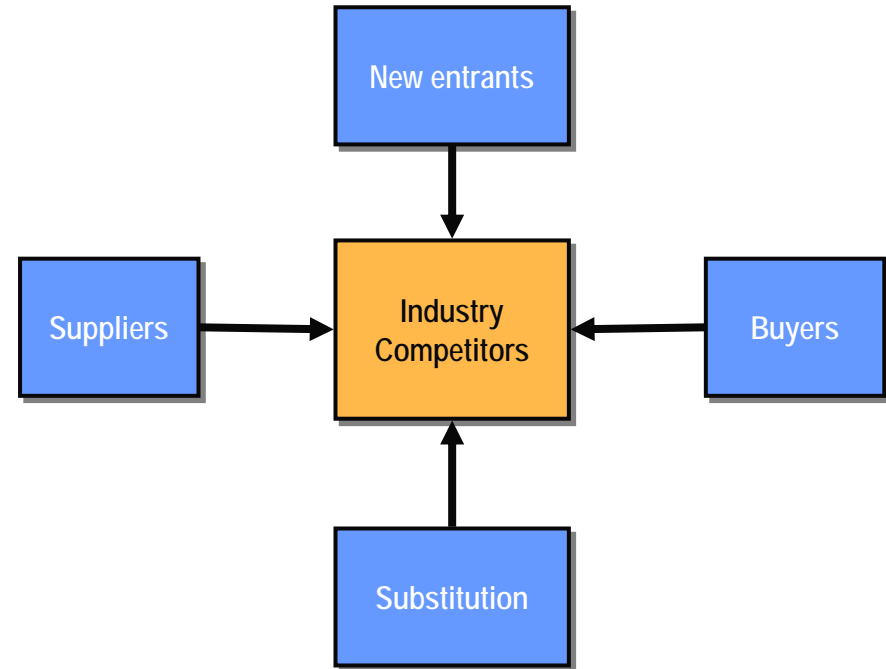
Threat of substitutes:

Depends on:

- Existence of equal-functioned products
- Customer switching costs
- Aggressiveness and profitability of producers

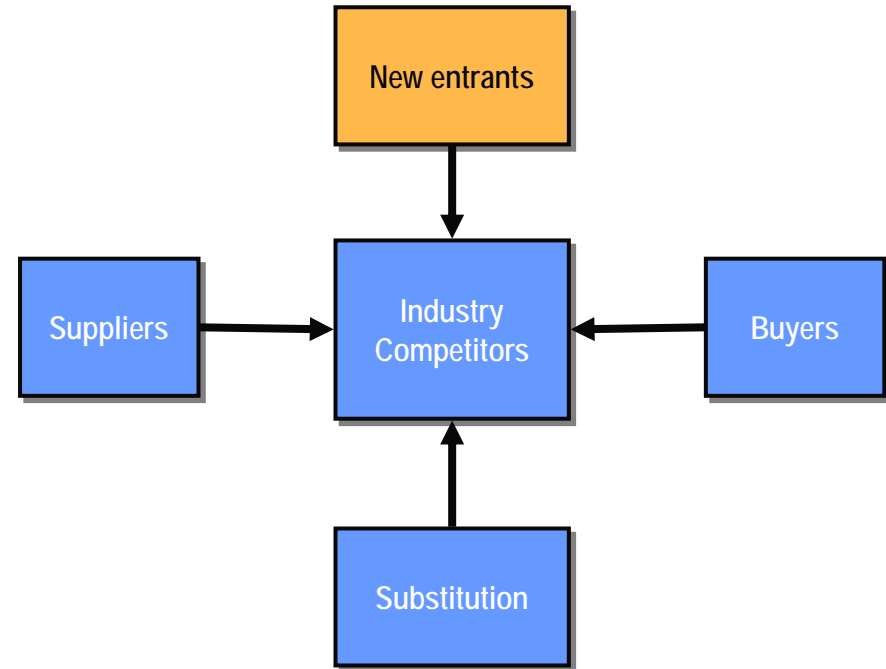
Internet impact on rivalry among competitors

- Reduces differences among competitors as offerings are difficult to keep proprietary
- Migrates competition to price
- Widens the geographic market, increasing the number of competitors
- Lowers variable cost relative to fixed cost, increasing pressures for price discounting



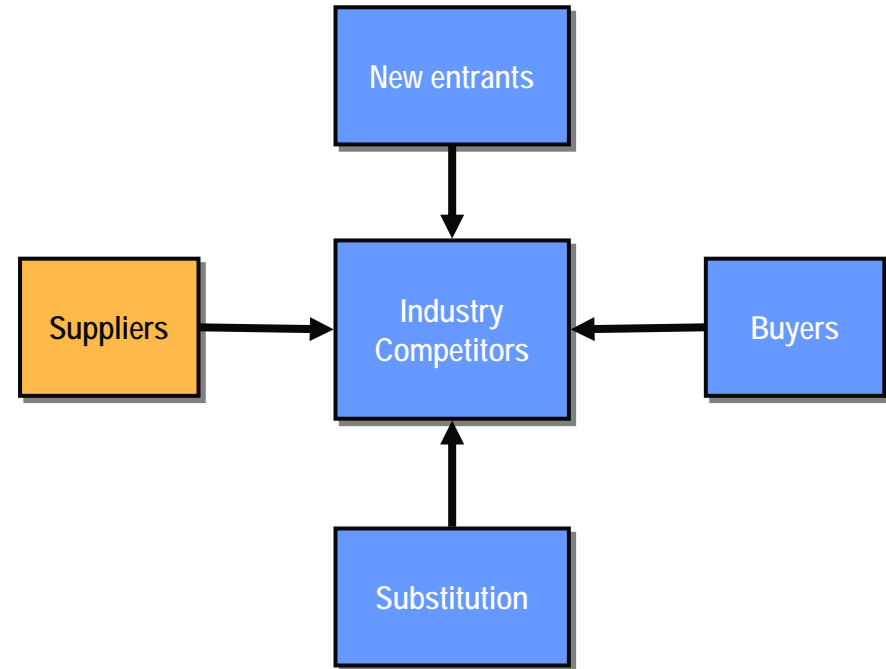
Internet impact on barriers to entry

- Reduces barriers to entry such as the need for a sales force, access to channels, and physical assets - anything that Internet technology eliminates or makes easier to do reduces barriers to entry
- **Internet applications are difficult to keep proprietary from new entrants**
- A flood of new entrants has come into many industries



Internet impact on bargaining power of suppliers

- + - Procurement using the Internet tends to raise bargaining power over suppliers, though it can also give suppliers access to more customers
- The Internet provides a channel for suppliers to reach end users, reducing the leverage of intervening companies
- Internet procurement and digital markets tend to give all companies equal access to suppliers, and gravitate procurement to standardized products that reduce differentiation
- Reduced barriers to entry and the proliferation of competitors downstream shifts power to suppliers



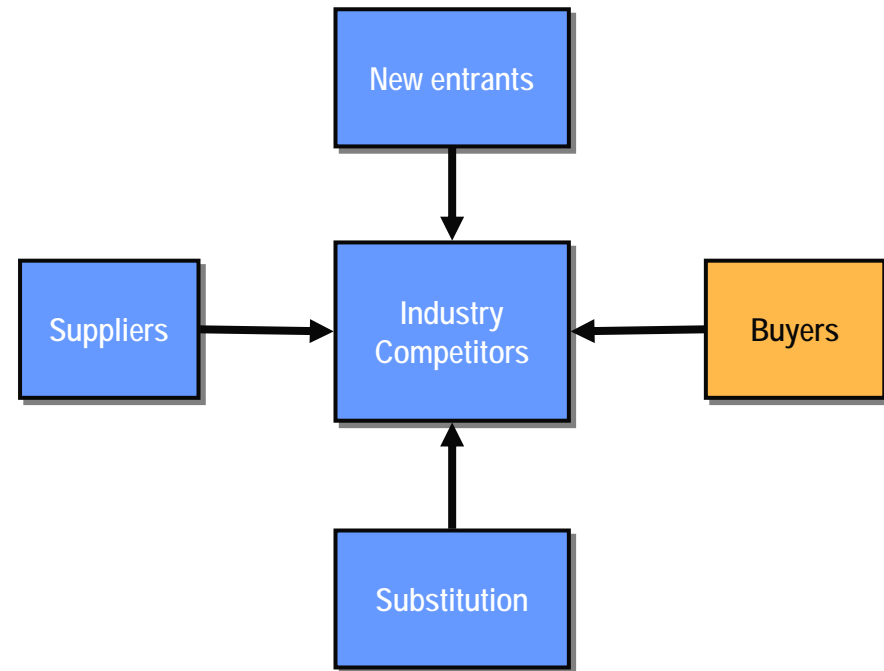
Internet impact on the bargaining power of customers (and sales channels)

Channels:

- + Eliminates powerful channels or improves bargaining power over traditional channels

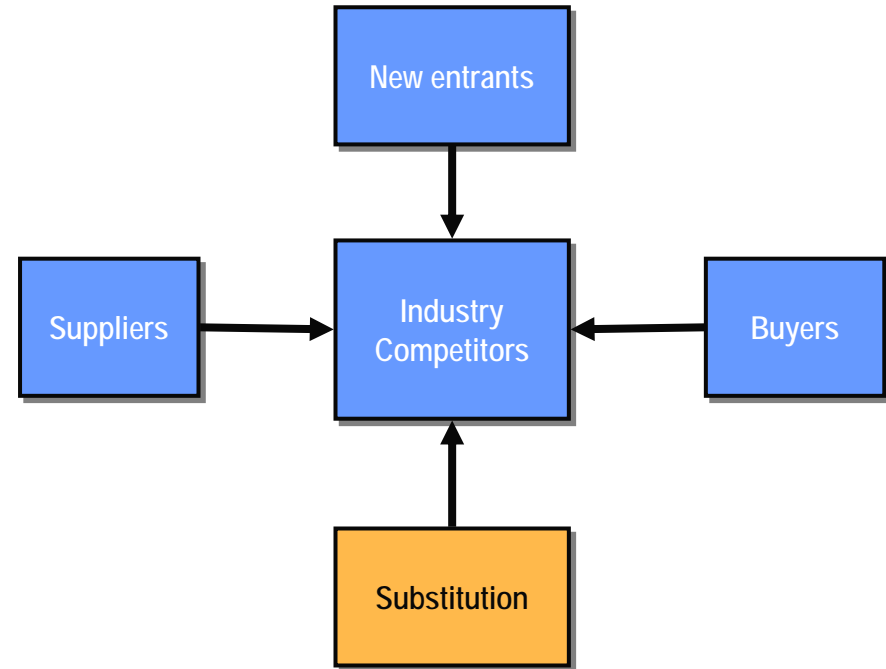
End users:

- Shifts bargaining power to end consumers
- **Reduces switching costs**



Internet impact on substitutes

- + By making the overall industry more efficient, the Internet can expand the size of the market
- The proliferation of Internet approaches creates new substitution threats



Ergo:

- „The great **paradox of the Internet** is that its very benefits –
 - making information widely available;
 - reducing the difficulty of purchasing, marketing and distribution;
 - allowing buyers and sellers to find and transact business with one another more easily –

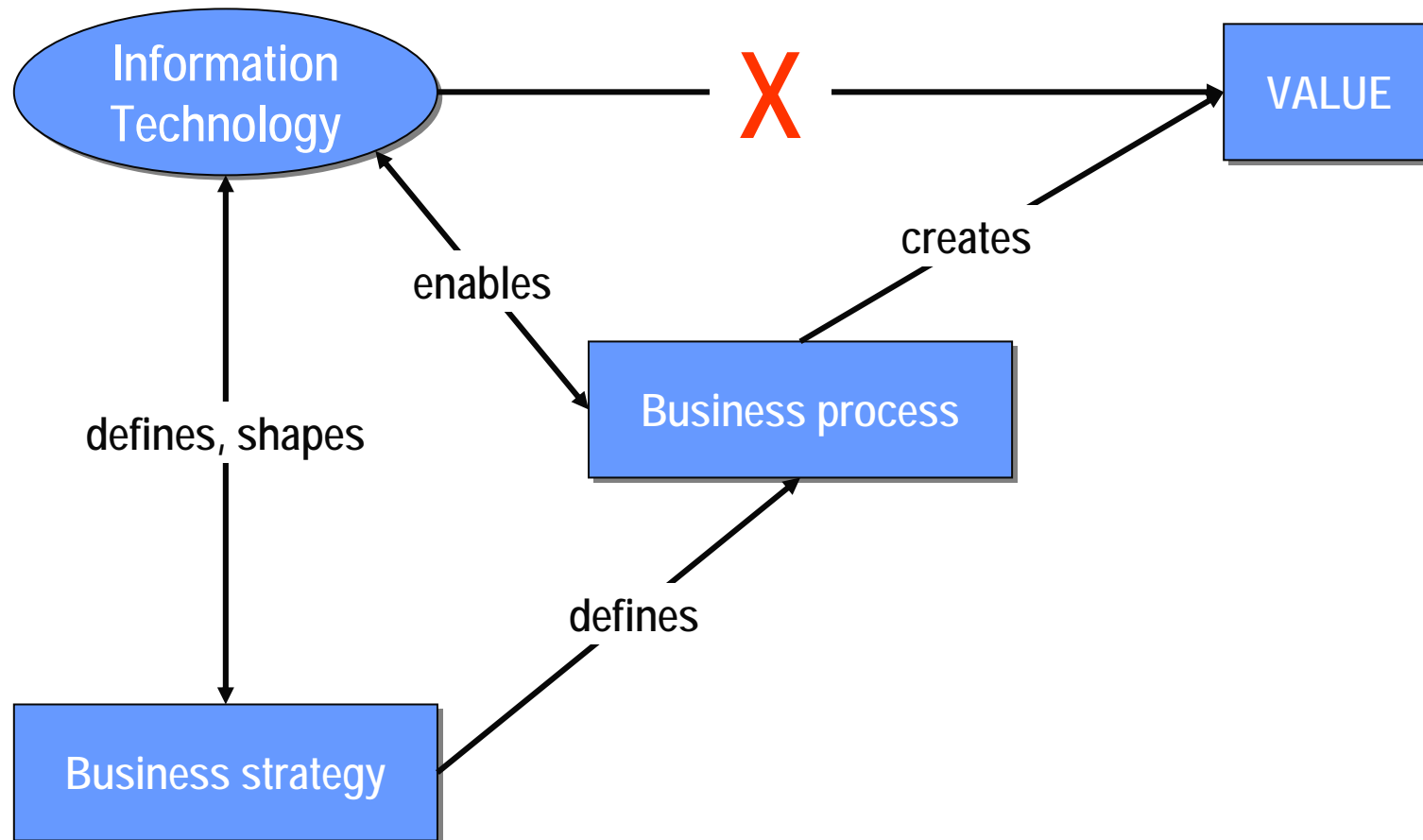
also make it more difficult for companies to capture those benefits as profits.“ (Porter 2000, S. 66)

- Besides the positive opportunities, the Internet **increases competition**.
- But the question is not about engaging in Internet technology or not (this is a strategic must to avoid loss of competitiveness), it is about **doing the right things**.
 - differentiate besides the mere usage

The need for strategy (Porter)

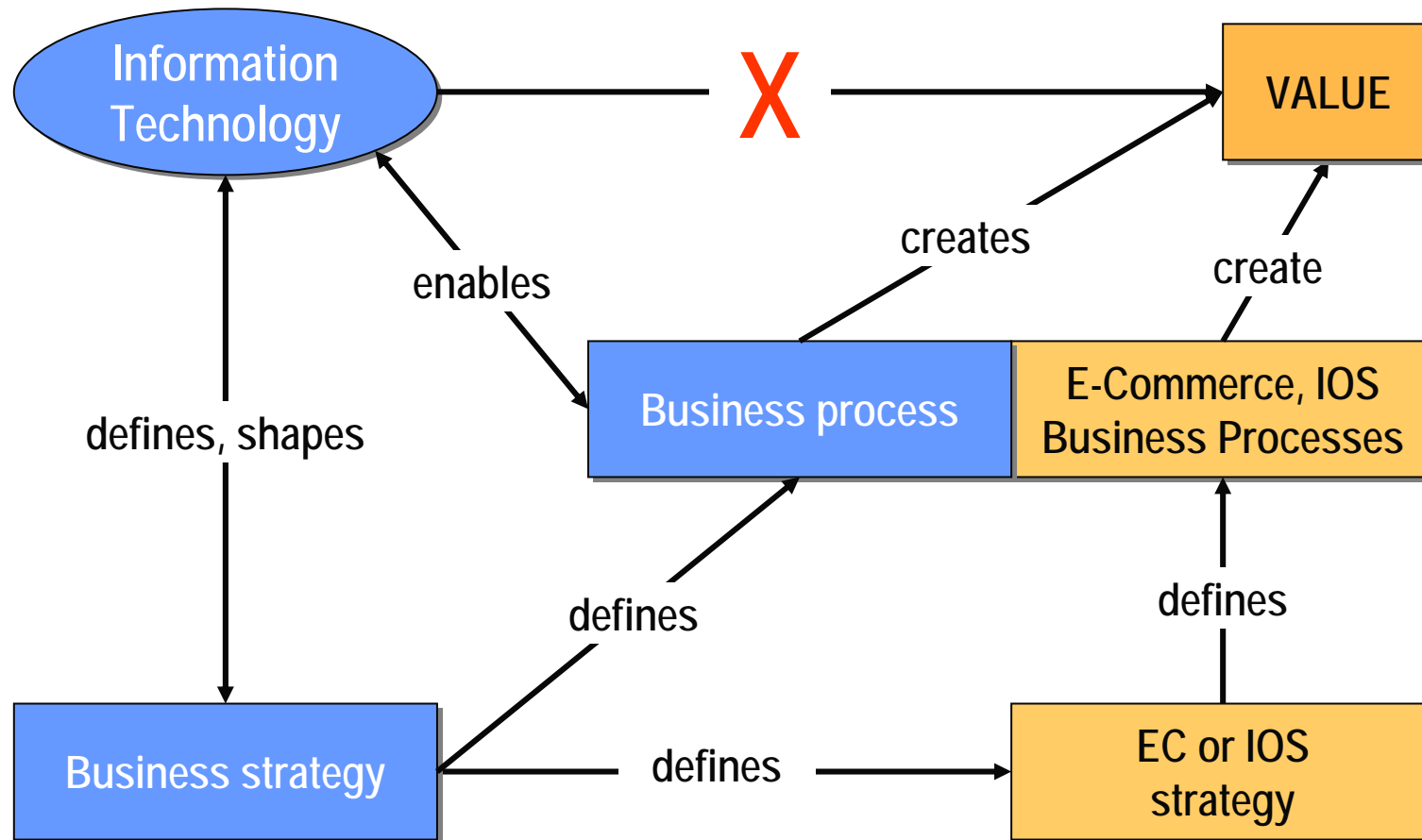
- „Instead of **emphasizing** the Internet’s ability to support **convenience, service, specialization, customization**, and other forms of value that justify attractive prices, companies have turned competition into a race to the bottom.“ (regarding prices)
- „To gain these advantages, however, companies need to stop their rush to adopt generic, „out of the box“ packaged applications and instead **tailor** their deployment of Internet technology to their **particular strategies**.“
- „Instead of talking in terms of strategy and competitive advantage, dot-coms and other Internet players talk about „business models“.“

The role of IT



Source: Wigand (1997), S. 13.

The role of IOS and E-Commerce





1. Internet and cost leadership: „doing the same things better“ (operational effectiveness)

- The Internet is a **powerful tool for increasing operational efficiency**:
 - Speed-up up and simplifies information processing
 - Openess of the Internet allows achievement of these efficiency improvements at relatively low cost
- But improvements can only be a source of competitive advantage in the case that they are higher in relation to competitors:
 - Due to the openness and the degree of standardization of the Internet all competitors may achieve nearly the same improvements.
 - This reduces in fact the range of differentiation opportunities
 - This may lead to a price-based competition
- Improvements in efficiency are a strategic need, but more important is a strategic differentiation...



2. Internet and differentiation: „doing different things“ (strategic positioning)

- The importance of differentiation grows the more the efficiency advantages are hard to realize
- „It requires a strong **focus on profitability** rather than just growth, an ability to define a **unique value proposition**, and a willingness to make **tough trade-offs** in choosing what not to do.“ (Porter (2000), S. 72)
- Therefore:
 - Seek for strategic opportunities
 - Configuration of a tailored value chain (or network of partners)
 - Achieve the advantages by managing the relationship, not only by implementing an IOS
 - Try to build up unique (in-imitable) assets (like for example relationships with suppliers, in which IOS are used).

What could be strategic drivers to set-up an IOS?

- **Cost reductions (efficiency)**
 - quality and efficiency improvements
- **Differentiation advantages**
 - new services, improved flexibility, improved customer service, reputation as technology leader
- **Time base competition**
- **Improved control and coordination of processes**
 - informational representation of processes, tracing and tracking
 - e.g. ECR
- **Advantages through integration**
 - network externalities, systemic rationalisation (SCM)

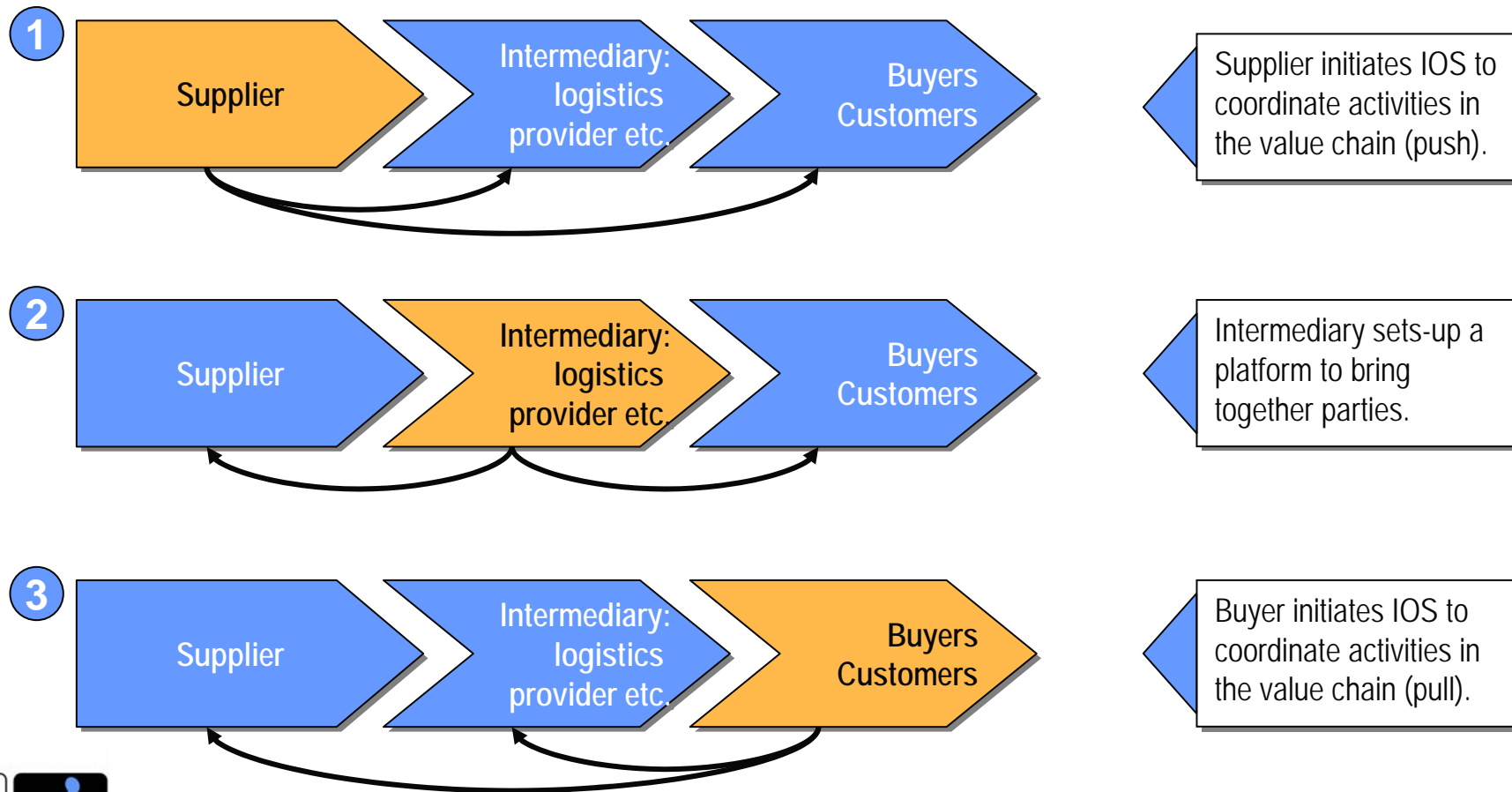
Excursus: Determinants of EDI benefits

| <i>level of integration with internal business processes</i> | <i>supported business activity</i> | <i>Peripheral</i> | <i>core</i> |
|--|---|--|--|
| | <i>low</i> | low integration in peripheral business activities | low integration but core business application |
| <i>high</i> | high integration with internal business processes, peripheral activity | high integration in core business activities | |

adapted from: Cox; Ghoneim (1994, 647)

Who initiates and sets up the IOS?

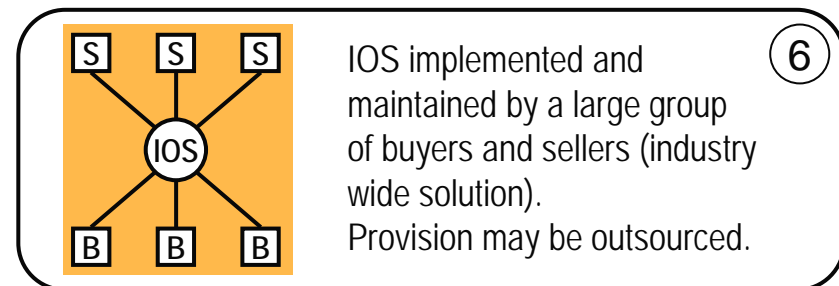
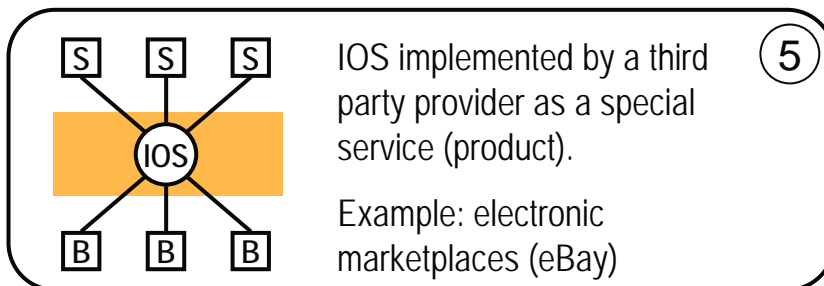
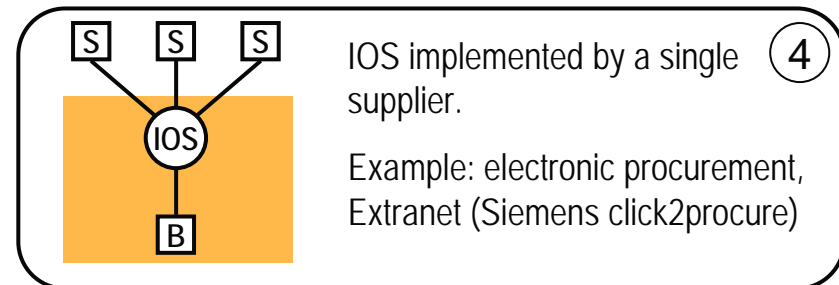
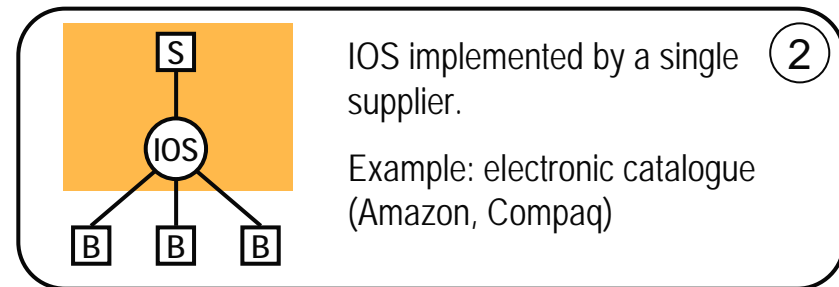
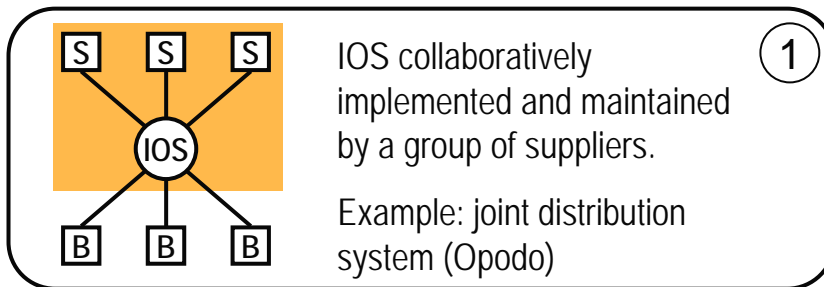
Sponsor and adopter roles along the value chain
(example: SCM or ECR initiatives)



Sponsor / adopter motives for IOS implementation (value chain view)

| Bus. relationship | Roles | Sponsor, initiator | Adopter | | |
|-------------------|--|--|--|--|---|
| | | | Supplier | Intermediary | Customer |
| 1 | Supplier | Cost reduction, customer relations, influence on the design of IOS solution | Avoiding competitive disadvantages | Improving competitive position, cost and coordination benefits | Administrative improvements |
| 2 | Intermediary: forwarder, logistics company | Centrality of IOS, integration benefits with and extending service scope towards shipping companies and consignees | Coordination benefits | Avoiding competitive disadvantages | Administrative improvements (delivery notes, delivery control and confirmation) |
| 3 | Customer, Buyer | Administrative and qualitative improvements, scale and scope, influence on the design of IOS solution | Maintain or improve (co-operative) customer relationship | Cost reduction and integration benefits | Best practice, pilot for future extensions, administrative improvements |

... or a bit more complex with a view on collaboration.



IOS provider strategies and usage models

| | IOS provision as adjunct to primary product or service | IOS provision as stand-alone business |
|--|---|---------------------------------------|
| IOS usage for competitive advantage | Competitors seek to differentiate primary product or service. (A) | |
| IOS usage as strategic necessity in industry | | |

Context A: Competitors seek to differentiate primary product or service

- IOS can be a powerful tool for first movers to differentiate their product or service (portfolio)
- the challenge is to sustain competitive advantage won by early introduction of IOS
- create win-win situation and gain collaborative competitive advantage (cp. group vs. group)
- necessary is a functioning relationship management to achieve and sustain the advantages on an organizational level and to ensure to obtain the optimal benefits

Taking the lead in IOS development

Motives for early movers:

- economic rationale
- proof of technological competence
- hook up customers
- control over a distribution channel
- competitive advantage
- influence on the system design

IOS provider strategies and usage models

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| IOS usage as strategic necessity in industry | | |

Context B: Technology provider looks for product application

- IOS introduction is initiated not by a product or service provider but by a technology provider looking for an application.
 - examples: Siebel, I2, Ariba, Commerce One, etc.
- There is the danger, that these systems do not meet the demands of their users due to a lack in domain knowledge.
- Success lies in the integration with the users' business system and processes.
- Here, the discussion on organizational networks comes into play!
- Also: critical mass problem

Remember: Market-pull versus Technology-push in IS adoption

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 - driven by customer wishes or organizational needs
 - systems development to close an efficiency gap or to enhance service degree to better meet needs
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| IOS usage as strategic necessity in industry | <p>Competitors may agree to cooperate on IOS development</p> <p>(C)</p> | |

Context C: Competitors may agree to cooperate on IOS development

- After a phase of IOS usage to gain competitive advantage, industry participants enter a stage where systems become a standard and therefore strategic necessity.
 - IOS easily to be copied.
- Thus, companies tend to develop/maintain IOS collaboratively to share costs/risks.
- Participants form organizational network to set-up IOS.
- Standards play an important role.
- Leads to a competition between systems.
- Also: critical mass problem

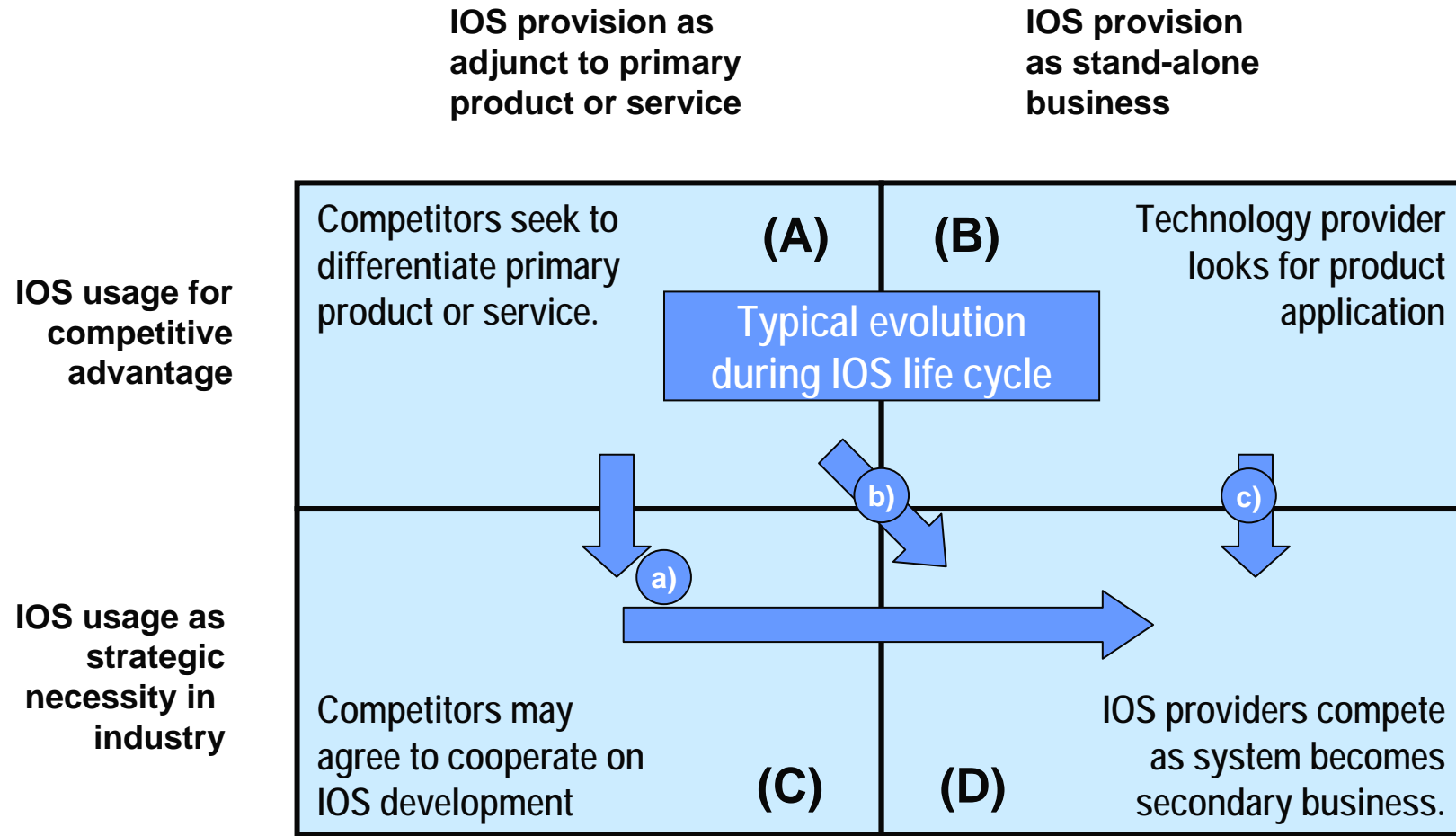
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| IOS usage as strategic necessity in industry | <p>Competitors may agree to cooperate on IOS development</p> <p>(C)</p> | <p>(D)</p> <p>IOS providers compete as system becomes secondary business.</p> |

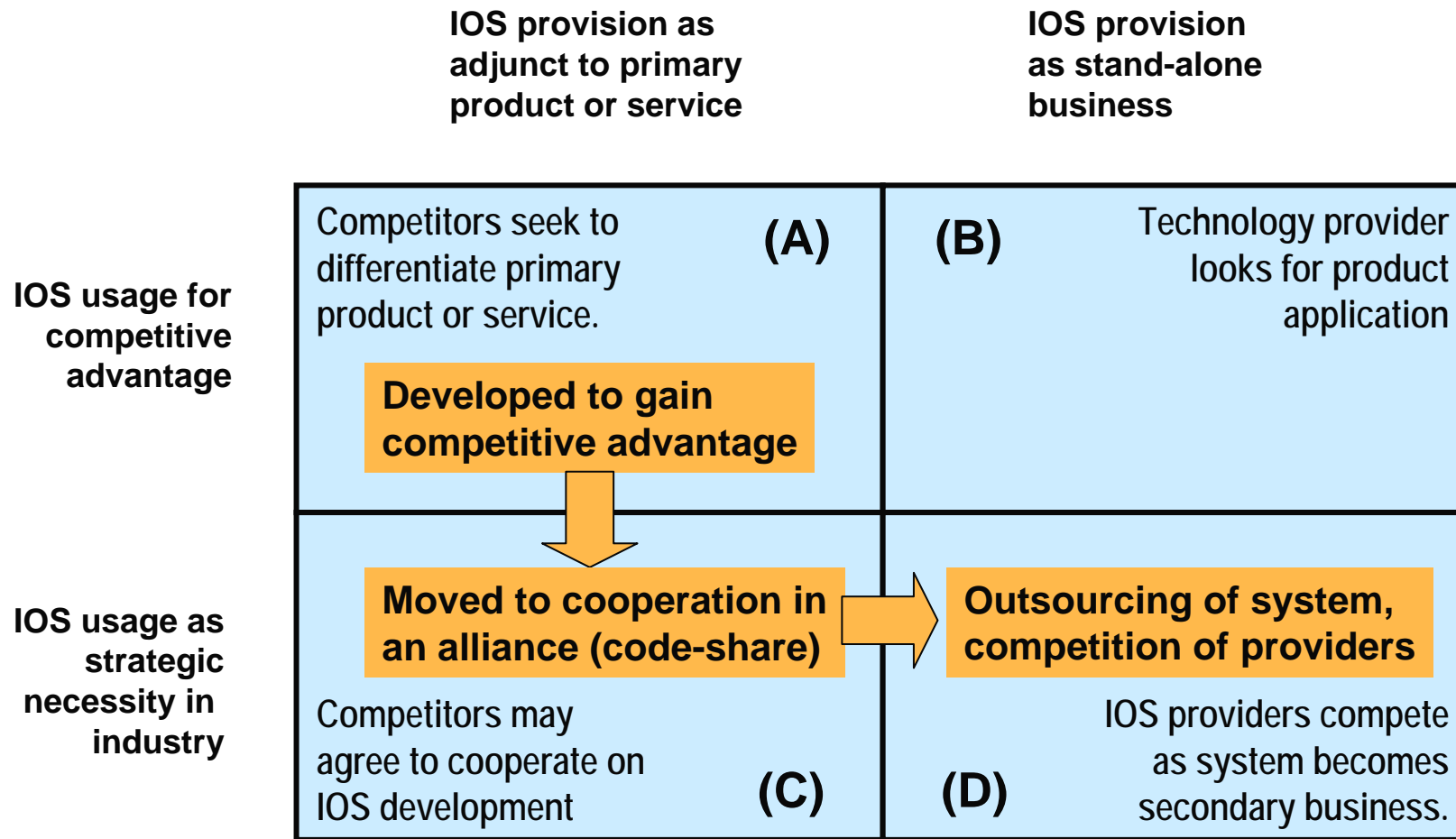
Context D: IOS providers compete as system becomes secondary product

- Once sufficient demands exist to make provision of IOS services a business in its own right, participants have other options besides the me-too investments and joint developments:
 1. treating the IOS provision as stand-alone, secondary business (profit center or spin-off)
 2. outsourcing the IOS to third party
- When IOS become increasingly complex, maintenance of IOS may extent far beyond core competence:
 - outsourcing and concentration on core competencies

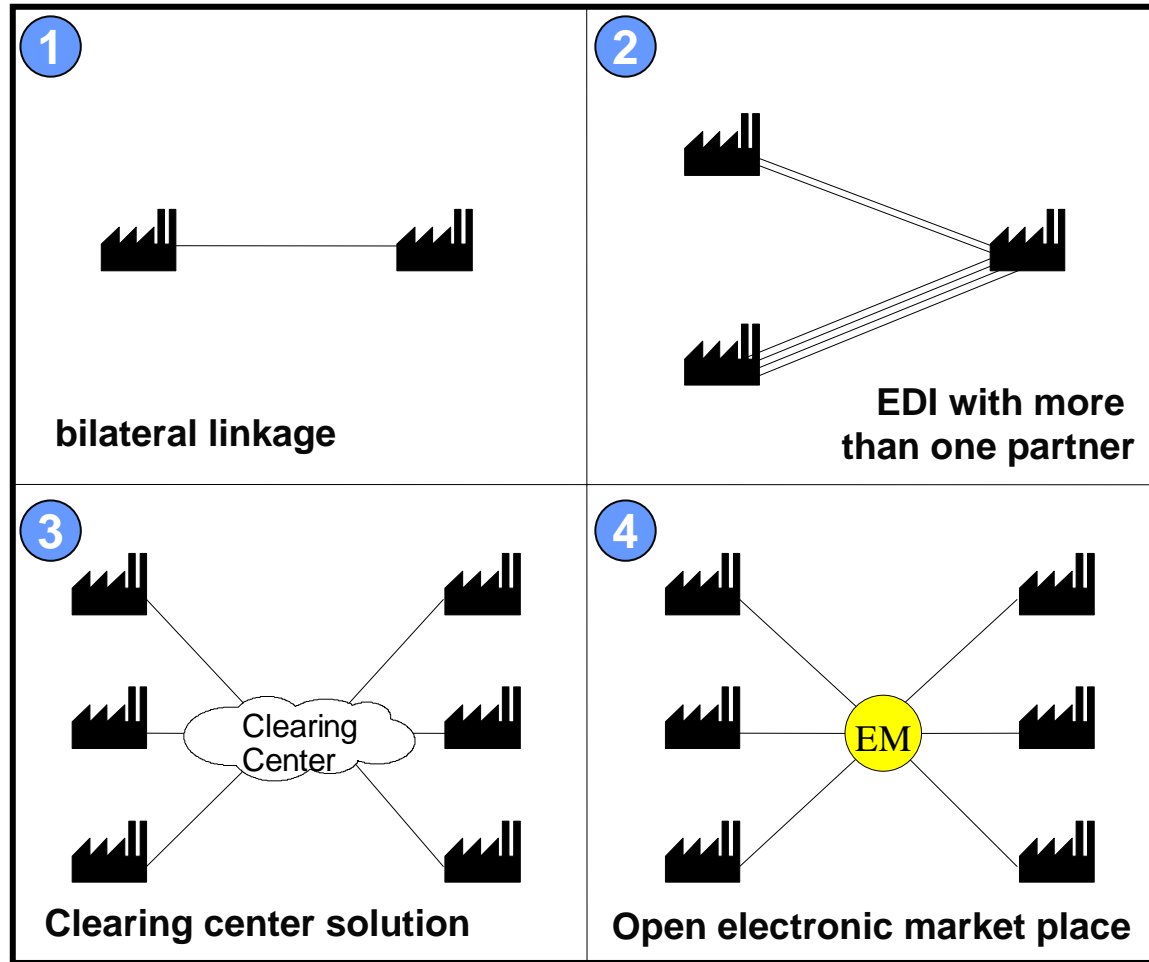
Summary: development paths of IOS



Example 1: Computer Reservation Systems in the Airline industry (e.g. Sabre)

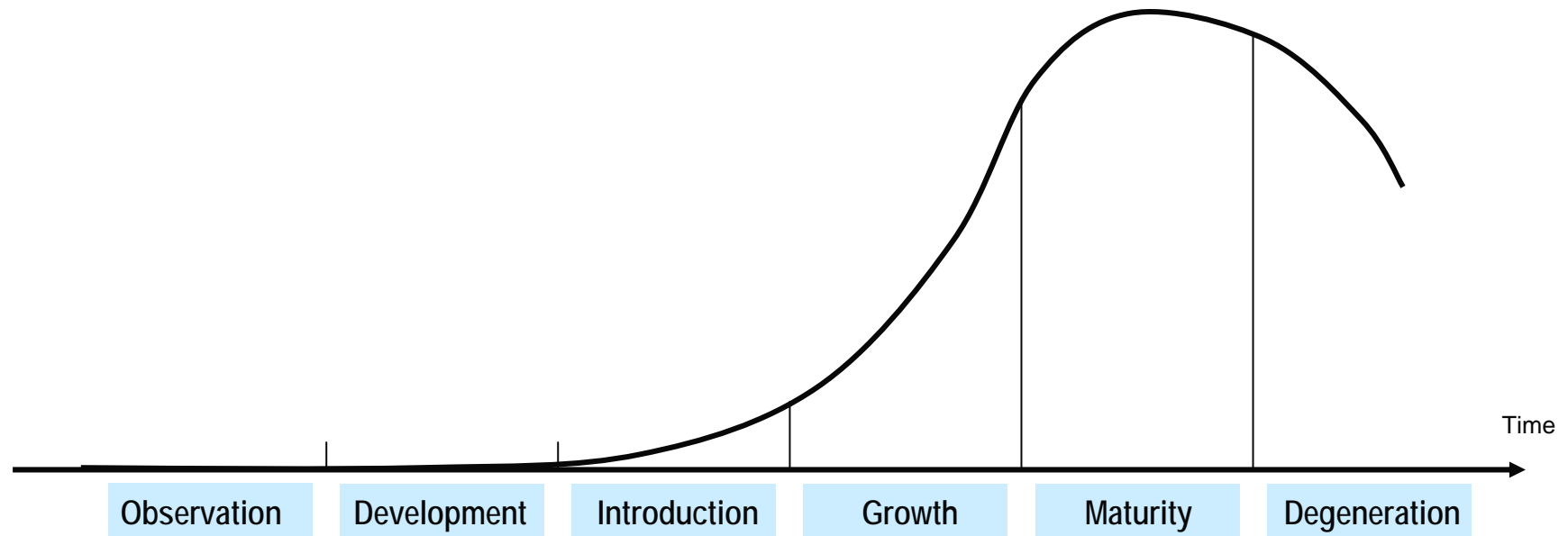


Example 2: Development paths of EDI: scale and scope



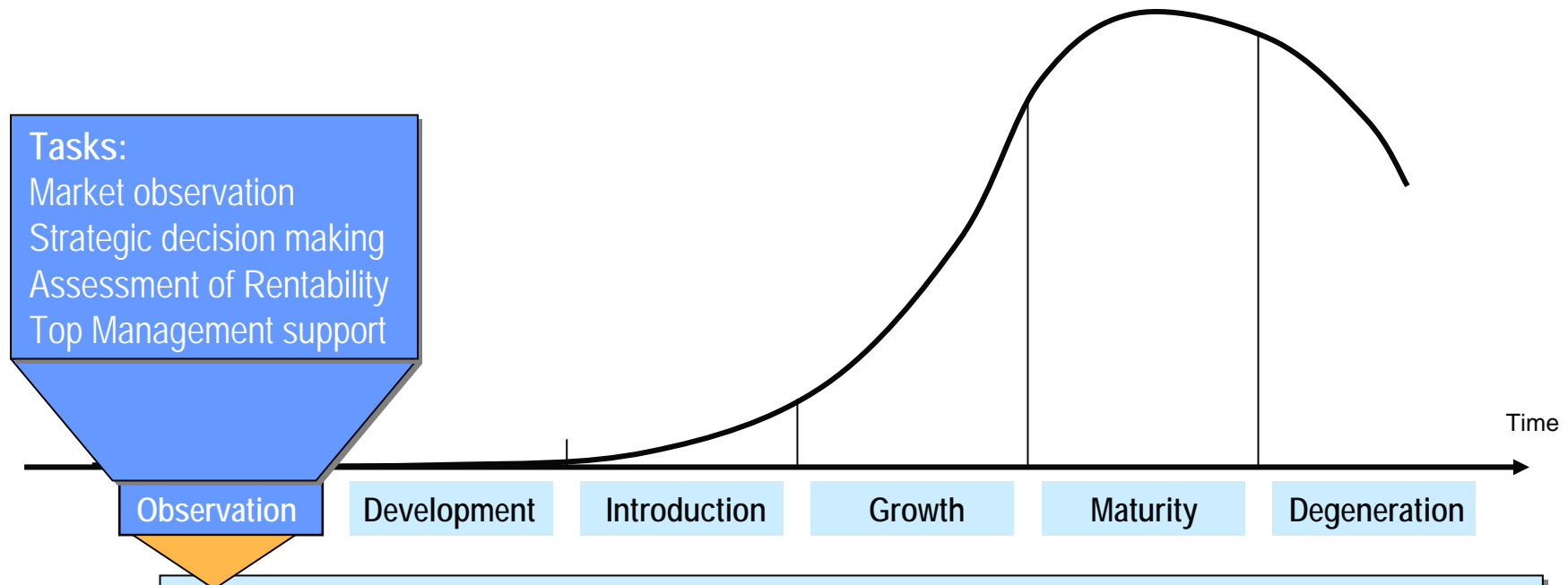
(cf. Ebers 1992)

IOS lifecycle



Cathomen, Ivo (1996): Der Lebenszyklus von Interorganisationssystemen, Dissertation, St.Gallen, 1996.

IOS lifecycle: The observation phase



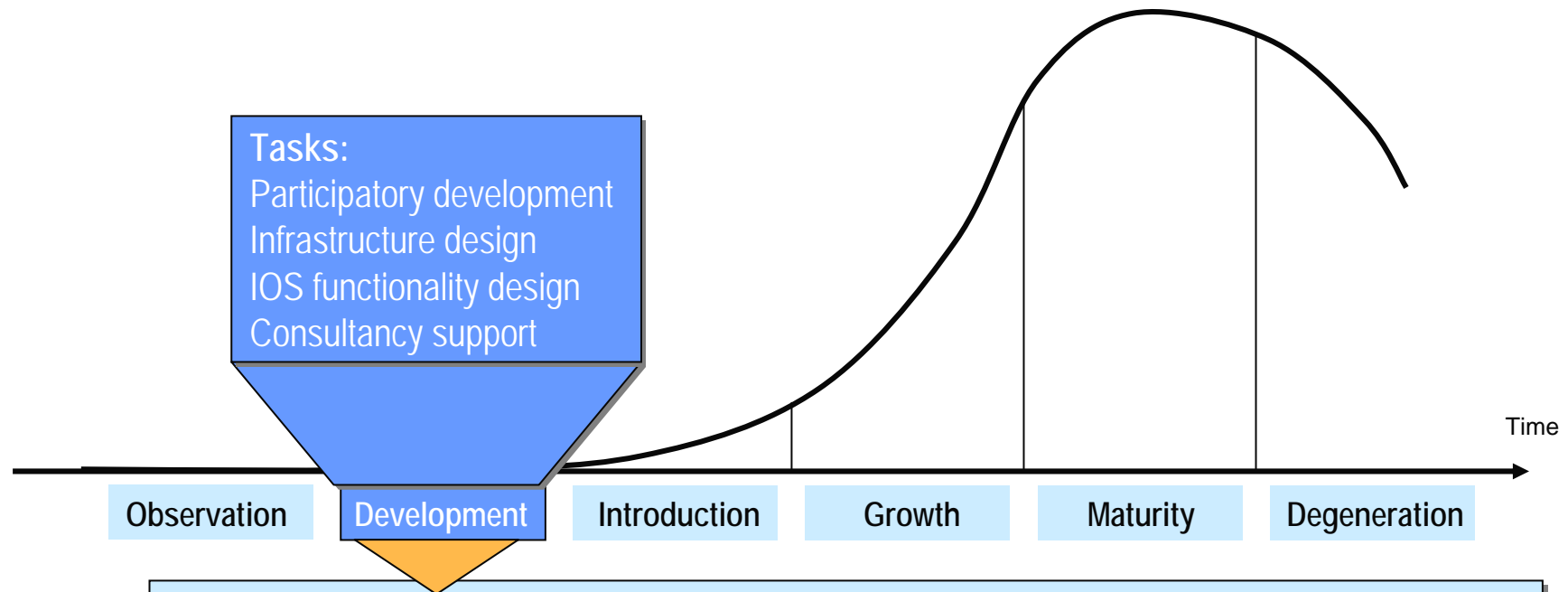
Motivation for IOS Development/Adoption:

- **Channel safeguarding:** Integration with suppliers and buyers for better coordination (efficiency) and new services.
- **Develop new channel:** e.g. Internet technology to establish new sales channel, eProcurement
- **Set-up IOS as a product/service:** e.g. set-up of an electronic marketplace (marketplace provider)
- (...)

Initiative for IOS set-up can come from:

- **Government or public associations:** industry-wide solutions (e.g. hugh EDI initiatives like Tradenet)
- **Single firm or group/network of firms:** e.g. along the value-chain: suppliers with OEM (SCM)
- **External provider, third-party:** e.g. a Bank sets up a clearing-center solution, electronic marketplace

IOS lifecycle: The development phase



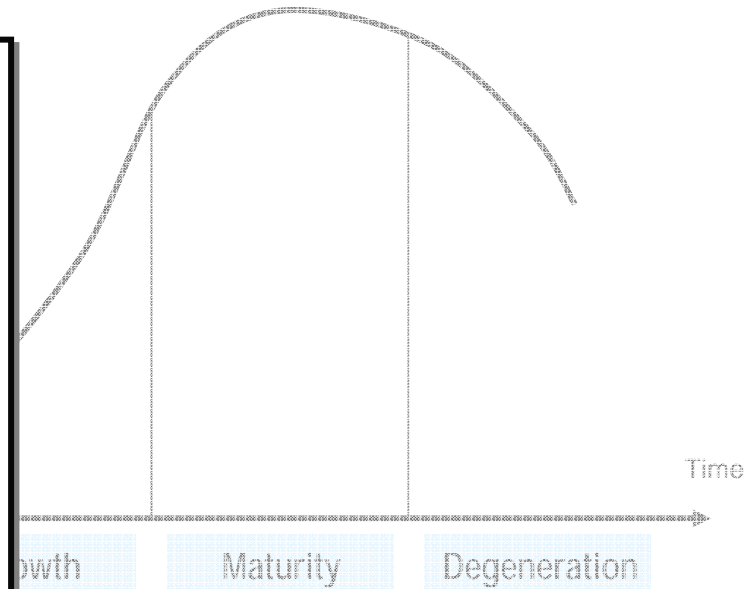
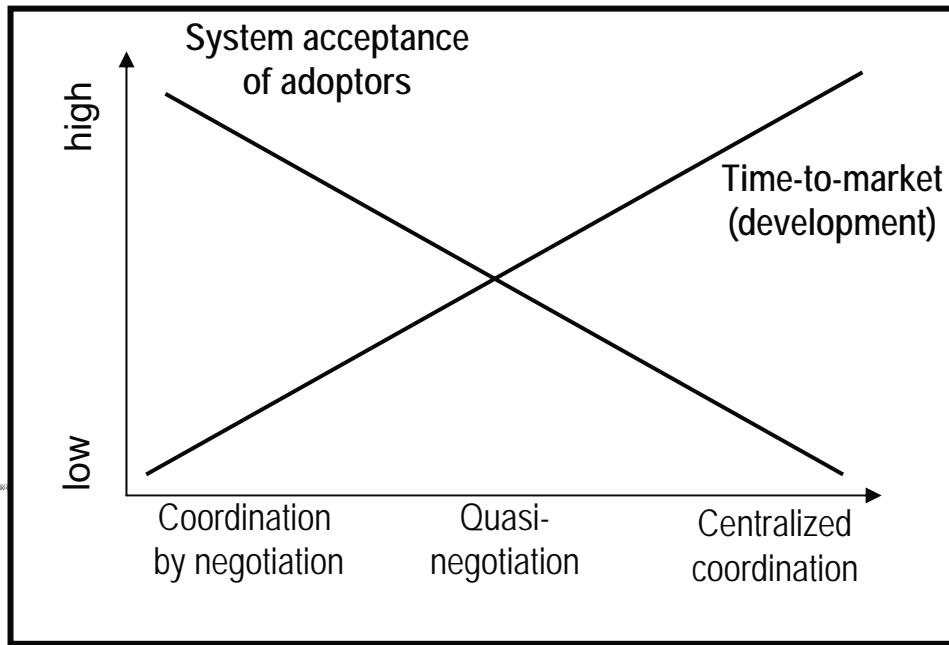
Initiation of IOS development:

- **Intra-firm initiative:** opening of internal systems, development of system and then promotion
- **Cooperative systems:** participatory IOS development: cooperation, network formation
- **Commercial systems:** development of an IOS as product, customizing and adoption of such an IOS

Levels of participatory coordination:

- **Coordination by negotiation:** participatory requirements analysis and development
 - **Coordination by quasi-negotiation:** one party collects all requirements, no participation later
 - **Centralized coordination:** one party designs and develops IOS, later phase of promotion/convincing
- here again relation to the concept of coordination mechanisms: market / network / hierarchy

IOS lifecycle: The development phase

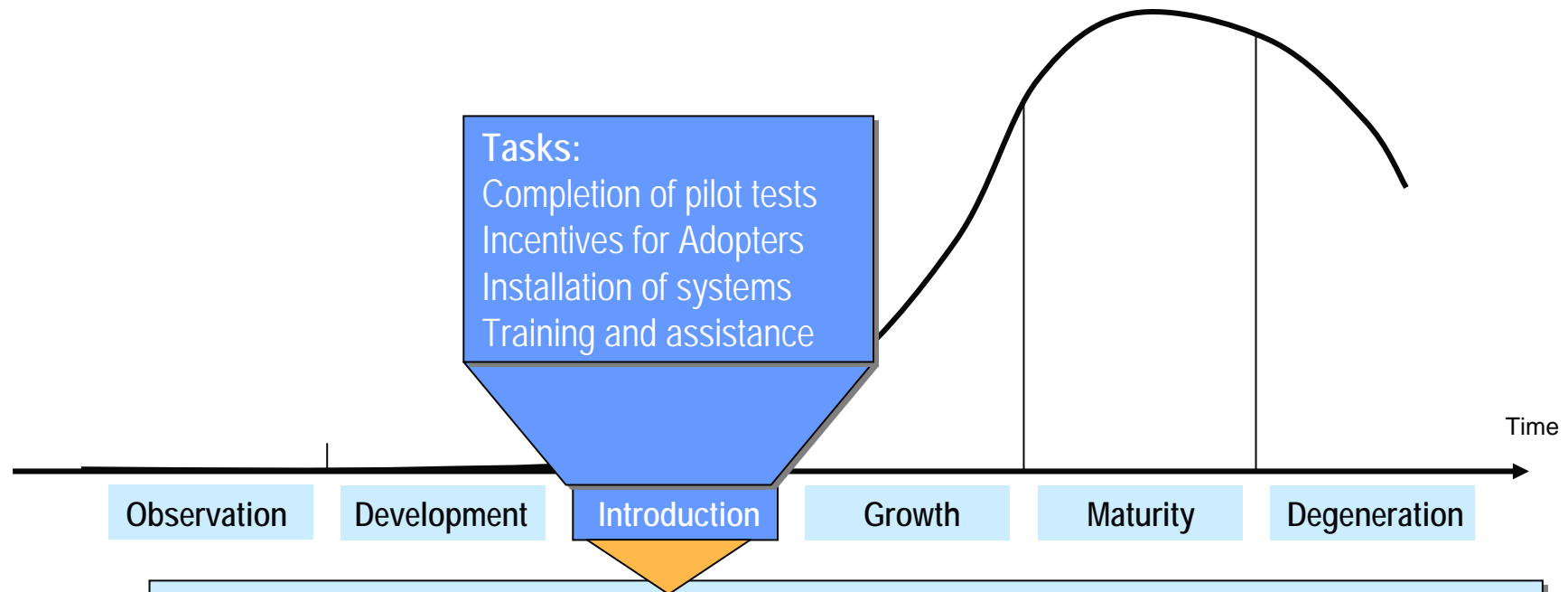


- Internal initiative: opening of internal systems, development of system and then promotion
- Coordinated systems: participatory IOS development: cooperation, network formation
- Coordinated systems: development of an IOS as product, customizing and adoption of such an IOS

Levels of participatory coordination:

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IOS lifecycle: The introduction phase



Critical Mass phenomenon:

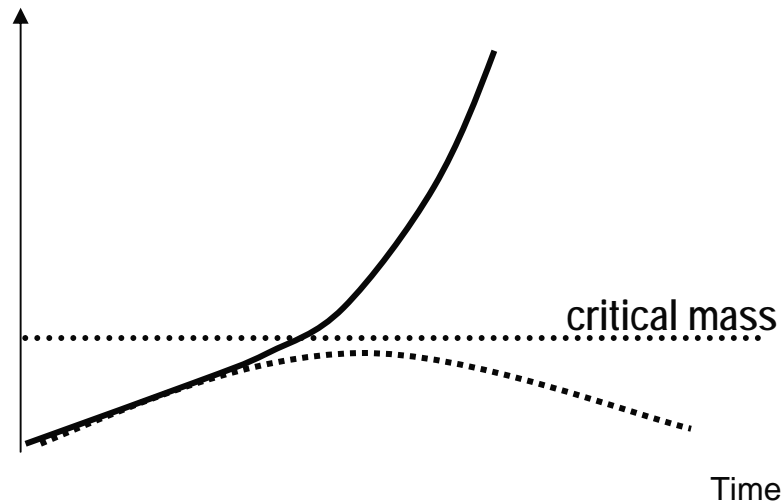
- Sponsor/Initiator and early adopters use system because of important effect even if critical mass point has not been reached.
- Other parties have to be attracted (incentives, management of negative IOS effects like lock-in)
- If critical mass cannot be achieved, the system fails / may fail.

Roles and tasks:

- Sponsor role may change from initiator/developer to an intermediary role, mediating in the process of action (data exchange) between the parties involved → provider.
- Provider has to take care of technical, organizational, administrative and legal issues.

IOS lifecycle: The introduction phase

Dynamics of successful and unsuccessful IOS.



Observation

Development

Degeneration

Critical Mass phenomenon:

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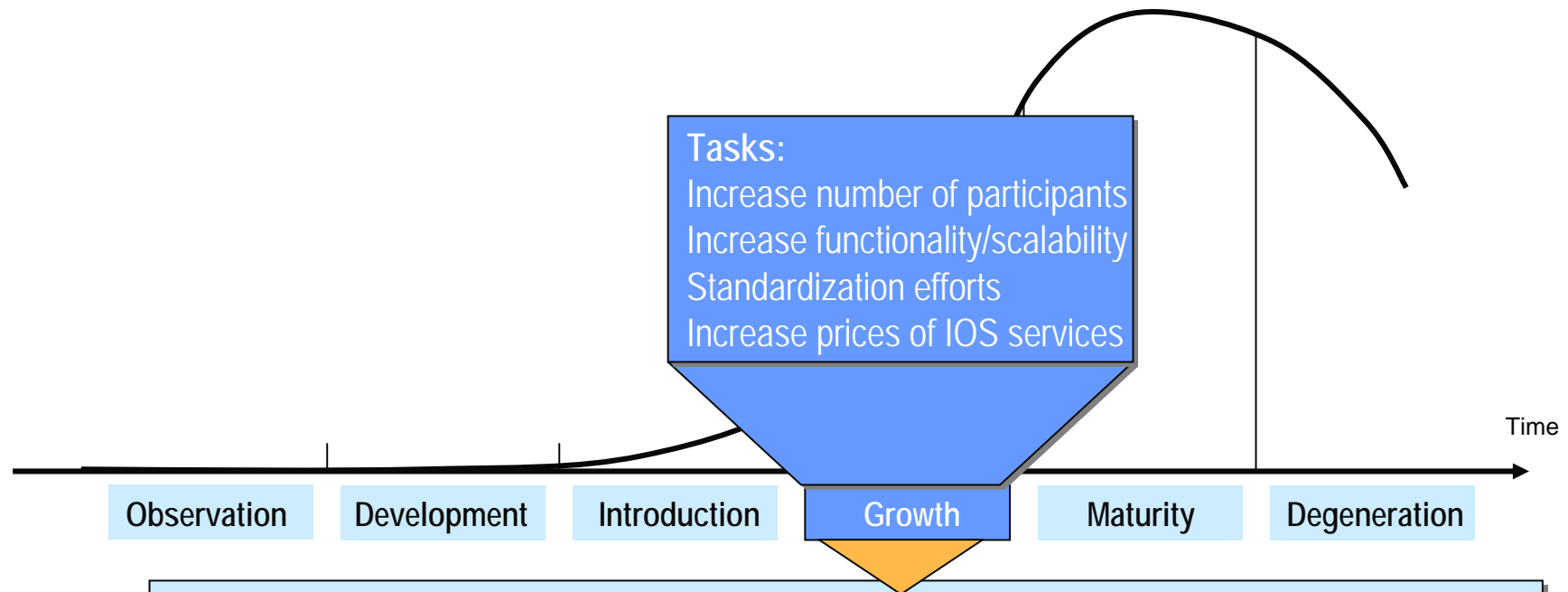
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Different types of Promoters

| Application Promoter | Cooperation Promoter | Technical Promoter |
|---------------------------------|------------------------------|--|
| Organisation of the Application | Coordination of IOS Partners | Technical Consultants, Software, Communication Services etc. |

IOS lifecycle: The growth phase



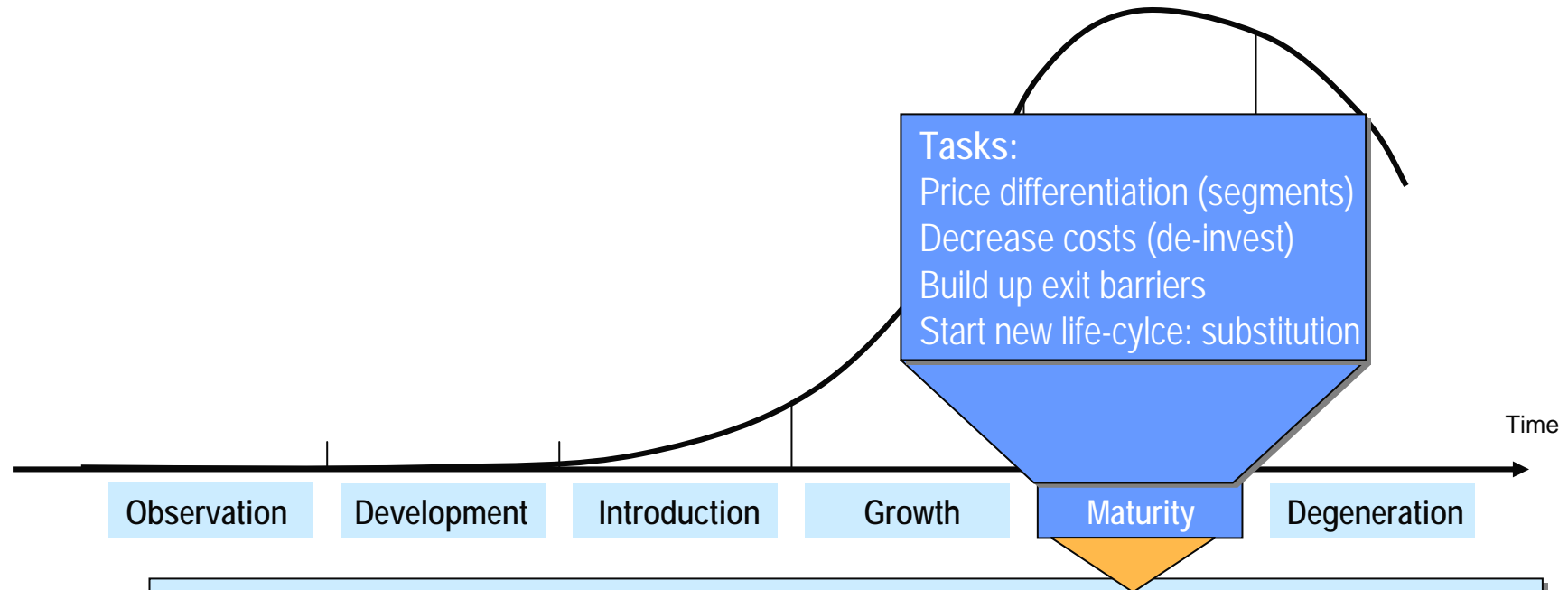
Adoption accelerates:

- After approaching the critical mass, growth of the user group may speed up.
- Processes begin to run smoothly, relative cost of IOS usage decrease.
- Relative benefits of participation outweigh the cost of IOS adoption.
- System reaches break-even point, investments pay off.

Increasing strategic relevance of IOS:

- Strategic position of adoptors may improve at the expense of non-adoptors.
- Non-adoptors may lack efficiency in comparison.
- This can either drive the adoption of the system (open systems) or the set-up of competing IOS.

IOS lifecycle: The maturity phase



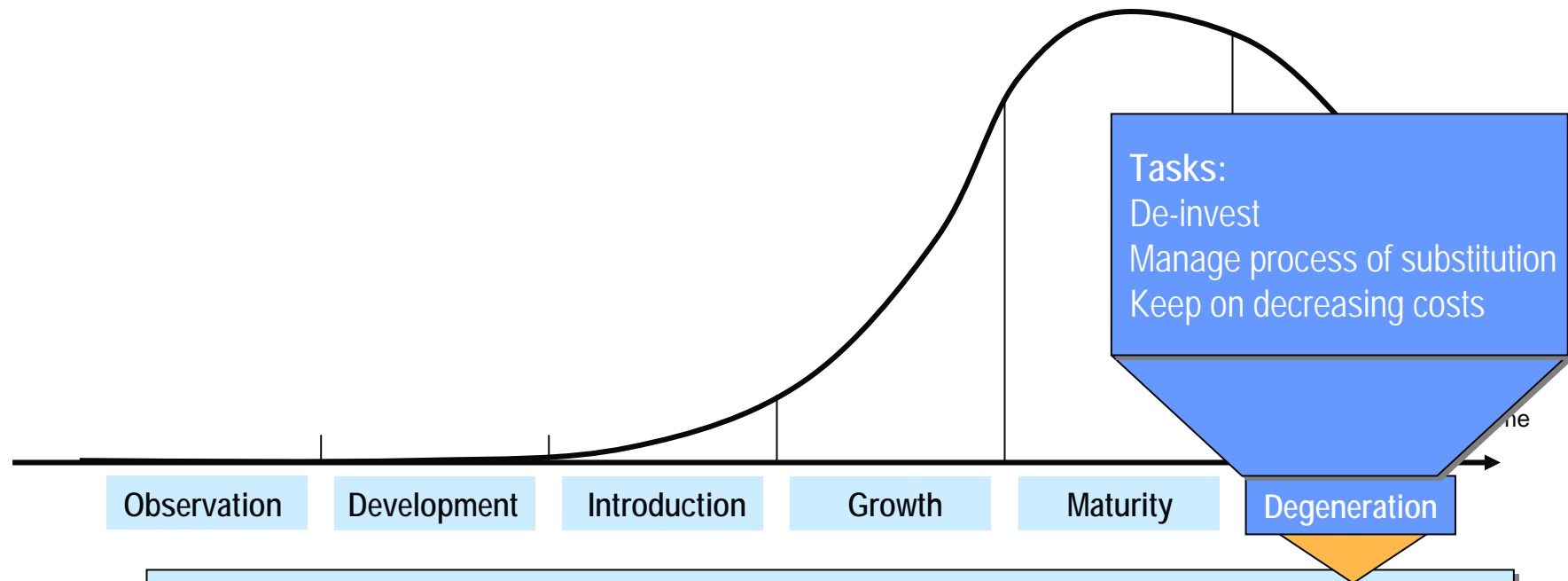
Growth slows down/shrinkage effects:

- Start price differentiation (increased price elasticity): build segments to optimize margin
- Start to de-invest from current IOS and start new life-cycle of substitution

Changing importance of the IOS:

- IOS becomes commodity, usage obligatory
- IOS does not have anymore the potential of deriving competitive advantages for the participants.
- Open IOS to become an open industry wide standard solution.
- Former entry barriers (lock-in effects) now become exit barriers, detaining participants to switch to another system.

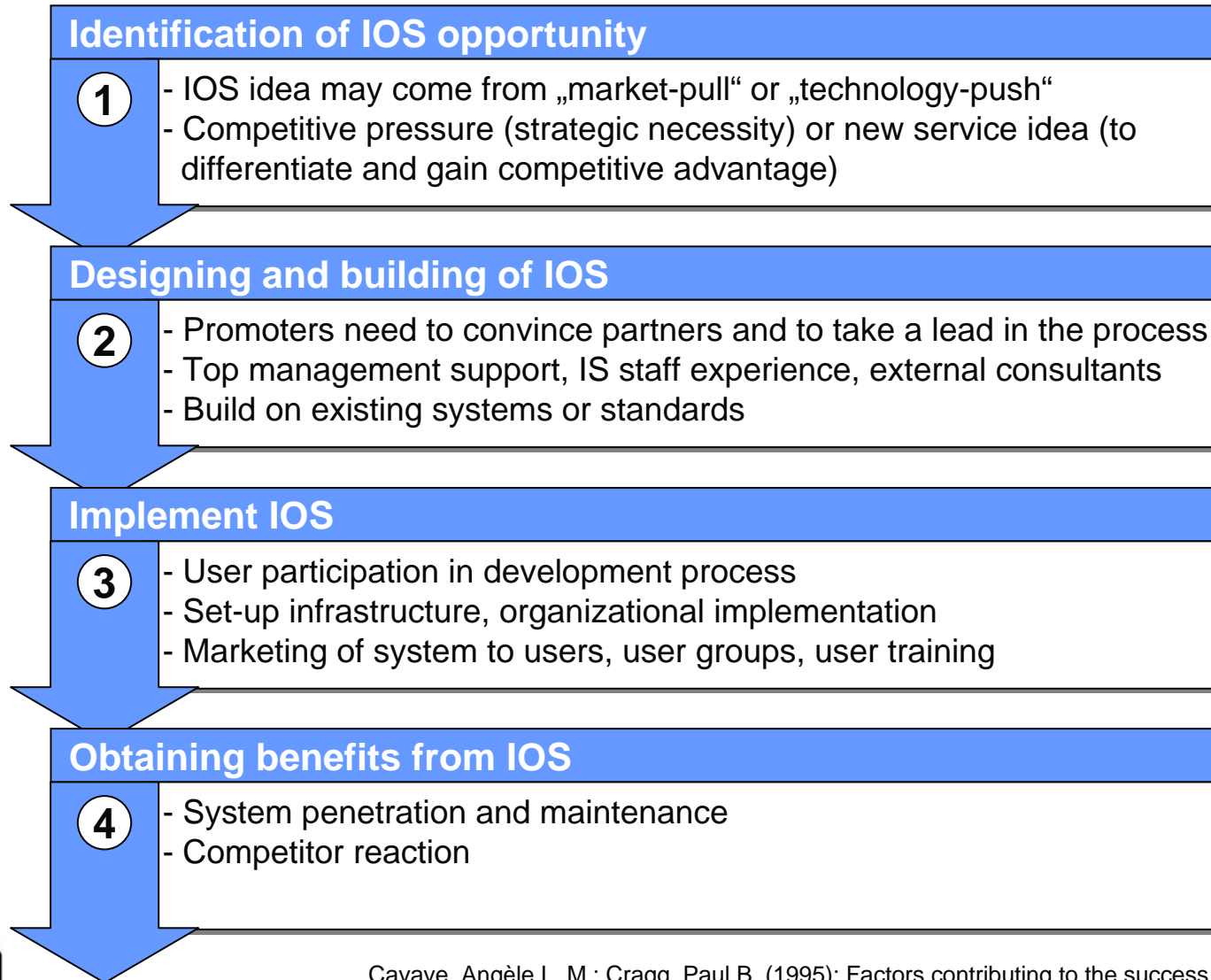
IOS lifecycle: The degeneration phase



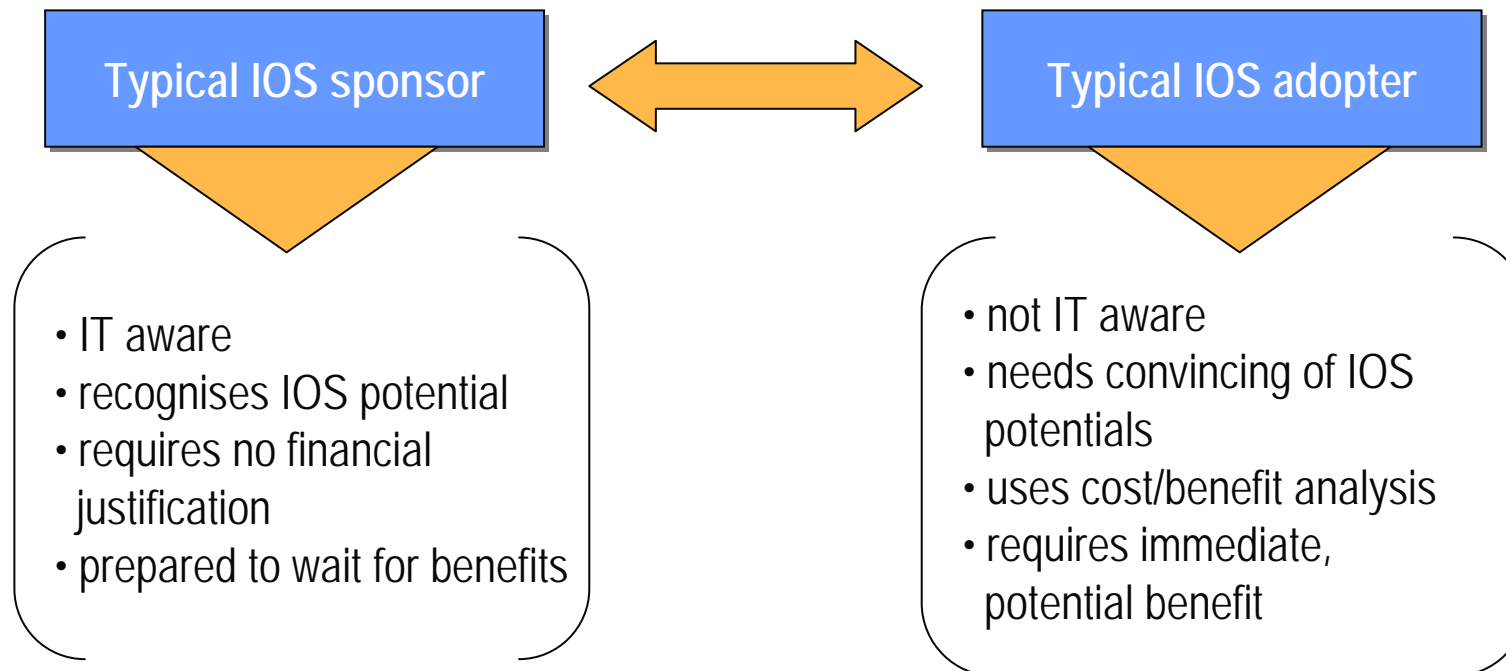
Typical evolution:

- Before degeneration there may be a plateau of usage which can last relatively long before new technologies and innovation make new investments necessary (depends on competition).
- Former relative advantages of the IOS can become relative disadvantages, in the case that better substitutes are available.
- Compatibility of the system decreases.
- Relative costs increase (per transaction) with decreasing number of users due to fix costs.

To sum up: Typical IOS development process



The sponsor-adopter gap



Cavaye, Angèle L. M (1995)

Some ideas on how to overcome the sponsor-adopter gap

- Sponsor:
 - has to be sensitive to the characteristics of adopters
 - has to communicate a lot and to provide support for adopters
 - help adopters to integrate IOS into their business processes
 - react on request for modifications of the system
- Adopter:
 - empower adopters to help themselves and to communicate with each others (user groups, communities)
 - recommendations from peers are more valueable then „selling“ activities by the sponsors

Organizational institutionalization of IOS according to strategic relevance

| | Cost Center | Service Center | Investment Center | Profit Center |
|--|--|---|--|--|
| Goals of IOS development | <ul style="list-style-type: none"> IOS follows existing strategy and existing business model (market pull) improve efficiency of IO processes Strategic necessity | <ul style="list-style-type: none"> Define new services (new business model) Achieve competitive advantages in existing business area | <ul style="list-style-type: none"> Define new services (new business model) Enter new market or new market segment (IOS innovation) | <ul style="list-style-type: none"> Define new services (new business model) as a new business area IOS services as stand-alone product on the market |
| Relevant measures | Costs of IOS usage | Service quality and product added value | Long-term investments | Turnover, profit, market share |
| Tasks and responsibilities of IOS management | <ul style="list-style-type: none"> IOS strategy follows business strategy Reactive behaviour of IOS management IOS management responsible for IOS costs | <ul style="list-style-type: none"> Support business strategy by exploiting IOS related potentials IOS manager needs to know about business and market strategy Responsible for IOS service performance | <ul style="list-style-type: none"> Proactive (re-)design of business strategy based on IOS opportunities Responsible for IOS investments | <ul style="list-style-type: none"> Define, price and market IOS services. Achieve critical mass Manage IOS like a product Responsible for profit gained with IOS |
| Metaphor | Supporter | Catalyst | Innovator | Entrepreneur |

Gaugler 2000, S. 196.

Pricing models for IOS services

| Characteristics | | Pricing concept | |
|-----------------|-------------------|---|--|
| direct | usage dependent | | Dependent on time of usage or amount of data processed |
| | usage independent | once | <ul style="list-style-type: none"> • Connection costs • Set-up cost • Licence costs |
| | | continuously | <ul style="list-style-type: none"> • Subscription • Fix continuous connection costs |
| indirect | | <ul style="list-style-type: none"> • Advertisement • Commission (e.g. percentage of turnover) • Subventions (e.g. by government) | |

cp. Gaugler 2000, S. 187.

Management of IOS effects → Opportunities and threats of IOS development and usage

1. Substitution effects

- (Gaugler 2000, p. 197, p. 84)
- Substitution of traditional paper-based communication (electronification)
- Rationalisation
 - Cost avoidance
 - Cost reduction
 - Increase productivity

2. Mediation effects

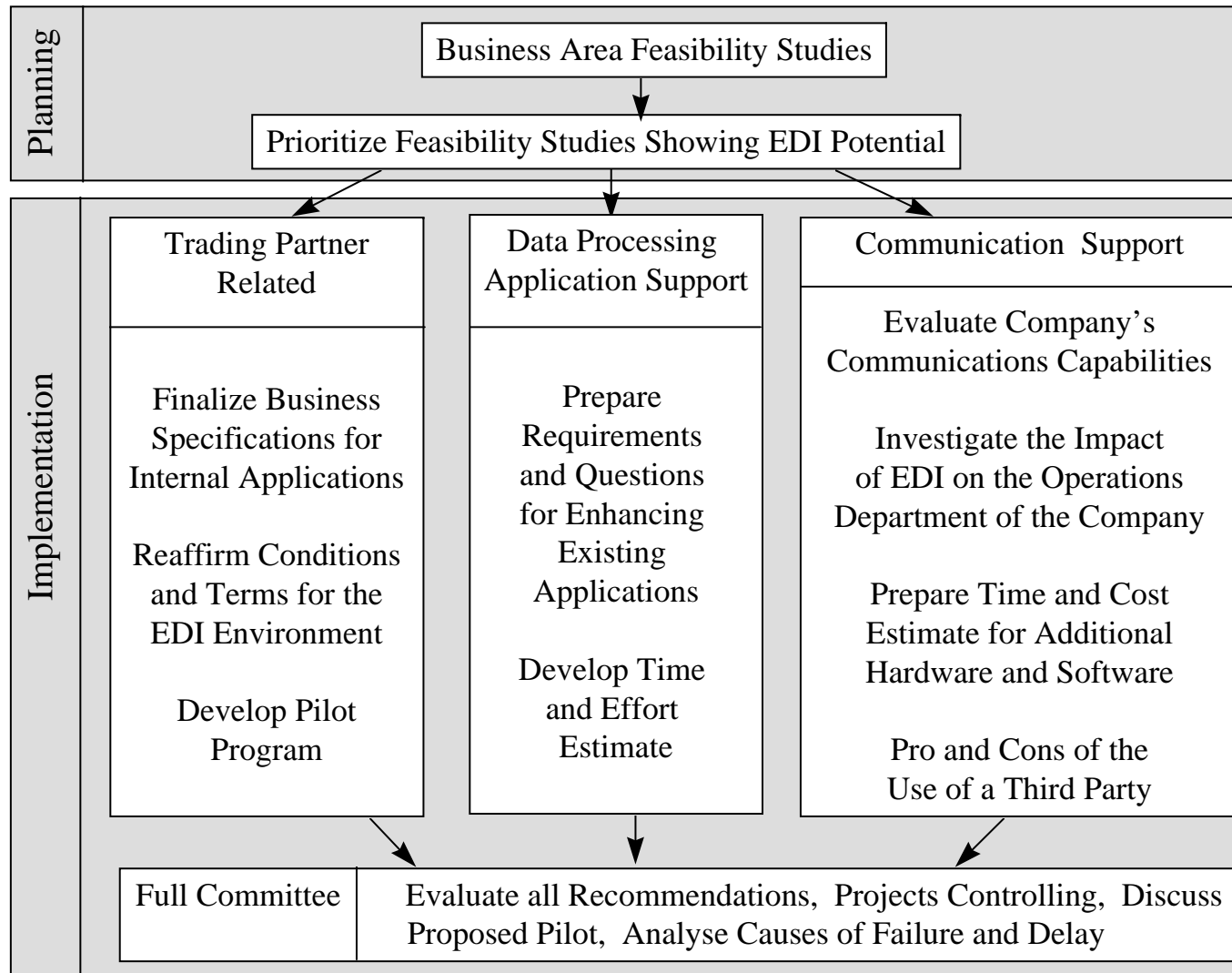
- Reduction of search costs
 - Strategy of suppliers and buyers (IOS along value chain) (Gaugler, p. 198-201)
- Disintermediation, Intermediation
 - Are there substitution within the value chain?
 - Will there be new intermediaries due to IOS implementation?
- Network externalities
 - Promoters/Initiators have to think of Incentives to overcome critical mass barriers
- Bypassing problems
 - in case of centralized IOS (think about eBay)

Management of IOS effects

3. Integration effects

- Integration of tasks and processes which have been fulfilled decentralized in various entities within the network of participating firms can be integrated within the IOS.
- Company-wide business processes
 - Integration of tasks to a standardized process
- Integration
 - technological, organizational and inter-company integration
- Lock-in effects and switching costs
 - High (perceived) switching costs can keep potential adoptors from using the system (think about incentives, argue for positive effects)
- „Shirking“
 - Excessive usage beyond agreement
 - Contamination
 - Thievery (of data)
 - By-Passing
- Changing competitive situation
 - Supply Chain/group Competition (users of system A versus users of system B)

Outlook: EDI/ IOS Implementation



Selected literature

- Cavaye, Angèle L. M (1995): The Sponsor-Adopter Gap--Differences Between Promoters and Potential Users of Information Systems that Link Organizations, in: International Journal of Information Management, 15 (1995) 2, pp. 85-96.
- Cavaye, Angèle L. M.; Cragg, Paul B. (1995): Factors contributing to the success of customer oriented interorganizational systems, in: Journal of Strategic Information Systems, 4 (1995) 1, pp. 13-30.
- Gaugler, Thomas (1999): Interorganisatorische Informationssysteme. Ein Analyse- und Gestaltungsrahmen für das Informationsmanagement, Wiesbaden: DUV, Gabler, 1999.
- Meier, Johannes (1995): The importance of relationship management in establishing successful interorganizational systems, in: Journal of Strategic Information Systems, 4 (1995) 2, pp. 135-148.
- Porter, Michael E. (2001): Strategy and the Internet, in: Harvard Business Review, 3 (2001), pp. 63-78.