3-01-05 Aligning Strategies, Processes, and Information Technology: A Case Study

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Payoff

A business alignment process guides information technology assessment, acquisition, and implementation. This case study demonstrates how business strategies, teams, operations, processes, and information technologies can be carefully and successfully aligned.

Problems Addressed

Process innovations and process redesigns frequently must employ technology in order to achieve major improvements in performance. Information technology has become an enabler for newly designed processes by eliminating limitations of time, location, or organizational structure or by providing a new basis for differentiation. This can only be achieved, however, when processes and information technology are carefully aligned with the overall organization's objectives and interfunctional teamwork.

While there is a general consensus among practitioners that business/IT alignment is necessary, the way to achieve it is often unclear. This is because business strategies are usually defined first and the operations and supporting strategies, including technologies, are then aligned. Such a sequential approach defines strategies, processes, and actions in the light of the technologies available, as opposed to identifying technologies that drive the critical success factors.

A better approach is one in which strategies, processes, technologies, and actions are defined and aligned concurrently. The aim of this article is to present a business alignment approach, one used and developed by Hewlett-Packard Co., for designing and implementing new business processes that are enabled and supported by new generations of information systems.

This approach has been practiced over several years, both internally and externally, generating a portfolio of best practices. The well-defined activities are closely linked and are applied by multifunctional teams for the purpose of business reengineering as well as redesigning core business processes. The whole approach is complemented by a strong focus on teamwork, specialized and objective-driven business units, and a commitment to quality and customer satisfaction.

Framework for Business Alignment

Strategies are only effective when they are translated into actions readily. This implies that supporting information technologies need to be highly responsive. Business processes

should be continuously optimized through the application of relevant technologies and carried out by high-performance teams. Strategies must therefore be:

- Formulated by closely examining the role of technology as an enabling source.
- Translated into actions through highly interactive processes that consider all current and future business factors.

In the past, the design of business processes and information technology applications was focused on achieving incremental benefits. Flexibility and ability to react to major changes were largely neglected. The business alignment framework in Exhibit 1 links any given strategy and its corresponding actions.

Business Alignment Framework

Linking Strategy and Actions

Strategies determine the critical success factors that in turn define the necessary business processes and their information needs. The availability, cost, and flexibility of different technologies may limit their selection, therefore business processes must be translated into feasible application models while information requirements are translated into workable data models. In this way, the gap between the ideal and workable solutions can be minimized, while ensuring a logical linkage between strategy and optimized actions.

The aim of such a framework is twofold:

- To make process changes without being restricted by or limited to existing technology, applications, and suboptimal data structures.
- To make visible the impact of new technologies on processes, and vice versa.

The business alignment framework takes into account the necessary process changes resulting from changes in the environment as well as potential advancements in technology. Because any change in strategy and technology potentially results in a change in the value system, culture, and team structures of the organization, it is vital to include these additional factors within the overall framework.

By employing this framework, Hewlett-Packard (HP) has experienced a number of benefits, including:

- Optimization of all the business processes with the support of integrated technology, as opposed to the suboptimization of individual processes and organization units with the support of fragmented technology.
- Consistent focus on processes that maximize stakeholder values.
- Common understanding of issues and future targets throughout the organization.
- High level of transparency and flexibility to act and react to changes stemming from the competitive environment as well as improvements in technology.

- High level of commitment from people throughout the organization.

In this framework, target processes, technologies, and standards drive the selection of potential solutions. User participation forms an integral part of the framework and helps to ensure fast and effective implementation.

Implementing the Business Alignment Framework

The business alignment framework is implemented by cross-functional teams that include members from different organizational and functional units. Team members are given a charter by senior-level management to initiate and implement major changes. To prevent tunnel vision, teams are sometimes supported by external consultants and a key role is assigned to management.

According to the structure of the framework, business processes and information requirements are defined in parallel to technology enablers and models, which are then linked throughout the alignment process. Objectives and measures are defined and reviewed in the light of the intended overall strategy, which leads to adjustments and refinements of existing results. The approach used to develop the business alignment framework includes the following modules:

- Breakthrough objectives and process links.
- Business models.
- Technology enablers and models.
- Solution mapping and selection .
- Functional mapping.

Breakthrough Objectives and Processes

The alignment process commences with the existing business strategy or strategic direction of the organization or organizational unit. Based on a strategy review, potential breakthrough objectives are defined. Breakthrough objectives create a distinct competitive differentiation in the eyes of the customer when implemented. This can be achieved through significant improvements in performance in the area of cost, introduction or distribution of new products, outsourcing of noncore activities, consolidation scenarios, or modification of supplier relationships.

After a comprehensive list of potential breakthrough objectives is defined, the most critical (usually two to five) objectives are selected. These objectives form the basis of critical success factors , which in this sense are all those factors that have to go right in order to achieve a breakthrough. In parallel, potential obstacles that prevent the achievement of the breakthroughs are identified. These may fall in different categories including management practices, technology support, training, and goal conflicts between different stakeholders.

Innovative, Core, and Supportive Processes

The next step is formulating the key processes that have a major effect on achieving the breakthrough objectives. These processes basically support the critical success factors. Processes that support several critical success factors are classed as innovative processes.

These usually involve multifunctional activities that directly create stakeholder value. They become the focus of business, process, and information models. Other process categories include supportive and core processes that, although important, do not result in a differentiation in the eyes of the stakeholders. This is because these processes usually correlate with only one or two critical success factors. Exhibit 2 shows diagrammatically the way in which breakthrough objectives and innovative processes are identified. Exhibit 3 demonstrates the classification process used to determine innovative, core, and supportive processes based on their potential impact on cost, quality, speed, and flexibility.

Breakthrough Objectives, Critical Success Factors, and Key Processes

Process Classification and Potential Impact

		Process Impact			
Major Processes	Process Classification	Cost	Quality	Speed	Flexibility
Manage Product and Parts Info	Core	x		x	x
Control Production	Innovative		x	x	x
Plan and Procure Material	Innovative	x	x	x	x
Manage Material Flow	Core–Innovative	x		x	x
Manufacturer Products	Core	x	x	x	x
Distribution	Core		x	x	x
Financial	Supportive				x

Business Models

Business models are developed for describing innovative processes and their role within the overall organization. HP designs business models not only for facilitating communications and achieving consensus, but also as a basis for identifying enabling technologies that will allow the organization to achieve major improvements in performance or differentiation. This requires three equally important views:

- The description of business activities or processes (process model).
- The definition of business information requirements (information model).
- The interaction between the business activities and information.

Business models can yield highly adapted and flexible IT infrastructures that are geared not only to specific needs but that provide benefit to the entire organization. At HP, the

creation of business models is performed by several cross-functional teams. The advantages include:

- Users can closely be involved in the modeling process and committed to the definition of their processes from the very early stage.
- Well-defined models can be reused and adapted to other business areas and subsidiaries.
- Work of parallel teams is more efficient if supported by a common structure and hierarchical decomposition.

The business models developed take a tree-shaped form in which each global process can be described as a collection of activities and subprocesses. While global processes are modeled by top-level management or core teams, the more detailed representations are produced by specialist subteams. In developing and linking the models, inconsistencies, omissions, and misunderstandings are observed and corrected. In parallel to developing the process hierarchy, information models are developed.

Information Models

Information models aim to identify and describe business data objects (e.g., assets, orders , locations) together with their interrelationships. For example, an order combined with a location creates the data object called Shipment. Information modeling is therefore concerned with two major questions: What information does the business need? and What interrelationship exists with other information?

To support this goal, data objects must be driven by business needs and defined in isolation from existing information systems and applications. This is in contrast to the approach used in the past, in which data was designed and created for a specific application system that supported a single function from a limited perspective. This method leads to a high level of data redundancy and inconsistency. Information models, however, regard information as detached from existing or potential applications with the aim of improving the timeliness, completeness, and accuracy of shared information while decreasing redundancy.

There are two levels of information models. At the highest level of abstraction, the global information model identifies the 10 or 20 data objects or clusters that are critical for the implementation of breakthrough objectives. This model is primarily used for communication with senior-level management and setting a framework for detailed modeling performed by dedicated subteams.

The second type of model contains a more detailed explosion with approximately 100 to 200 data objects. This model is also used to validate the appropriate process models in the process hierarchy.

Although the process and information models are developed independent of any application systems , they help to determine where technology can play an enabling role, as discussed next.

Technology Enablers and Models

The impact of information technology has several characteristics, the most important ones being:

- **Integrative.** IT supports the coordination and integration between different activities and processes.

- **Direct.** IT is used to improve the sequence of activities and processes so that they can be carried out faster and in parallel. Furthermore, unnecessary intermediaries may be eliminated.

- **Information.** IT is used to capture process information for knowledge generation, process analysis, and decision making.

Standards

Technology can be a cost-effective enabler only if certain standards are defined and adhered to. It is therefore necessary to examine and define which technology elements based on today's technology and standards as well as likely future trends can be applied in the implementation of the business processes.

The selected standards should not be seen as a limiting factor but rather as a mechanism that improves exchangeability of technology, flexibility, and cost-effectiveness and efficiency. The definition of standards, for example, in the area of IT may include such considerations as the design of the physical and logical network concepts including internal and external communications needs, operating systems, data bases, as well as the definition of potential hardware requirements and implementation scenarios including outsourcing and multivendor scenarios.

Solution Mapping and Selection

Once the business models and the technology standards are defined, the next step is to select solutions that best support and enable the defined business processes. This can be achieved by matching the defined process and information models to the process and data models of existing and potential newly developed solutions. This forms a top-down, bottom-up approach as shown in Exhibit 4.

Mapping Potential Solutions to Processes and Information Requirements

Using this approach, processes that can be enabled or supported by information technology are combined into clusters of potential applications. These could include financial systems, manufacturing resource planning, production control, sales tracking, and customer data bases. This clustering is performed at a very high level and as such does not yet include detailed functional requirements. In a parallel activity, key objectives for the selection of application solutions, together with importance ratings, are defined.

Based on the solution clusters and the selected objectives and weightings, a market analysis of existing application solutions is performed in which the top two to four candidates within each area are shortlisted then checked on their fit with the process and information models and the adherence to agreed-on standards and core concepts. In addition, business fit is evaluated according to such criteria as the vendor's size, availability of localized application versions, and references.

The selection process is continued by translating the process models into detailed functionality requirements; it may also include prototyping of selected processes or parts of the process. This analysis is used to determine whether:

- The newly defined business processes can be supported or enabled by using standard applications.
- It is possible to modify and adapt existing application solutions.
- It is necessary to develop custom application solutions.

Developing a Corporate Solutions Portfolio
During this step it is also possible to develop a corporate solutions portfolio of applications that can be shared across different organizational units or used for similar processes. Exhibit 5 illustrates the solution mapping and selection process.

Solution Mapping and Selection

Functional Mapping
Solutions and applications are selected on the basis of process and information models defined by teams of planners and users. Once a specific application is selected, it is possible to go back and really start the process of matching the key functions to the actual selected applications in order to determine the extent of application adaptation or process change required. This process is termed functional mapping.

Functional mapping (Exhibit 6) is the beginning of the implementation process; however, it must still be regarded as part of the overall business alignment framework because modifications and changes in business processes and solution adaptation are still possible.

Functional Mapping

The defined business processes are checked with users in terms of the detailed fit with specific business or process events and compared to the functionality of the selected solutions. In cases where a gap exists, two alternatives are examined:

- Modify the business process.
- Modify the application solution, which may involve minor changes such as report generation or major changes such as recoding of specific software modules.

In cases where the implementation of a breakthrough objective depends on the existence of a specific process, the decision will always be the modification of the application rather than sacrificing the process in the defined form. The process of functional mapping operates best if users can test to what extent the selected solution supports the newly defined processes; for this purpose, HP uses piloting centers and laboratories.

Industrial Applications

Two industrial applications demonstrate the potential of the business alignment framework. The first application reflects work carried out by HP for another organization in support of the construction of a transplant operation. This application illustrates the way in which the framework can be applied to a newly designed business and drive the selection of open

systems based applications to significantly reduce IT costs. The second application is internal and demonstrates the way in which the framework can be applied to redefine existing operations. It incorporates additional considerations, such as finding a compromise between conflicting goals and objectives of different groups involved in the process of change.

Application to a Greenfield Operation

Hewlett-Packard was selected to help a large multinational car manufacturer develop a new transplant operation in the US. This transplant was considered to be the first step in the redesign of the organization toward a worldwide network of factories and represented a "greenfield" operation, and as such was not subjected to existing technologies, processes, work methods, and support systems. The only constraints were the short implementation time frame (18 months), certain environmental conditions, and the network of suppliers, customers, and the parent company.

The first step involved the creation of teams together with the identification and definition of the key project requirements based on strategic considerations of the overall organization as well as internal and external benchmarks. The most important requirement was defined as achieving a premium on flexibility and adaptability in terms of new products or models, quantity, expandability, and "change of charter" (e.g., serving worldwide versus selected markets).

A balanced approach between using people and technology would allow the organization to adapt the transplant strategy or processes more rapidly with market requirements while at the same time being more motivational to the transplant personnel. The aim was to commit flexible resources at the latest possible moment in the production process, thus saving additional amounts of money. Another requirement was that the factory and infrastructures should be driven by innovative processes, thus allowing the acquisition and transfer of new knowledge and best practices. Finally, the project aimed at establishing new levels and types of partnerships, thus recognizing the role of the transplant as part of a larger network. After having identified these and other key requirements, their significance and the competitive deficit of the organization were determined in form of a gap analysis. The resulting focus pattern (Exhibit 7) drove the execution of the business alignment and was regularly used for control purposes.

Project Goals, Significance, and Competitive Deficit

The breakthroughs in the area of process innovation and technology enablers were defined using cross-functional teams from both organizations. The breakthroughs, together with some of the critical success factors for the project, are shown in Exhibit 8. The next step was to identify key processes that would have a major impact on achieving the objectives. High-level business models of the transplant and its environment were developed and subsequently translated into key processes. These key processes were segmented into innovative, core, and supportive processes in order to identify those that would have the strongest impact on overall transplant performance. These subprocesses were subsequently modeled by cross-functional teams in a hierarchical way as described previously. Exhibit 9 is a simplified representation of the highest level (A0) process model that contains the four subprocesses.

Breakthroughs and Critical Success Factors in the Area of Technology Enablers

High-Level Process Model

Each of the subprocesses was modeled and documented accordingly. While the top levels were modeled by a core team of planners, the subprocesses were modeled by dedicated and specialist subteams that included possible future users as well as experienced users of existing processes. This consistent modeling approach, supported by a computerized tool, made it possible to link the process models, rapidly and completely identify conflicts, and meet the required time frame. In parallel to the process models, information models were generated.

Using the hierarchical process models, structure and resource requirements for material, information, financial flows, and personnel could be defined. In addition, process report requirements, including manual and computerized methods and access to central systems, could be easily identified. The process models were applied in the specification of potential solutions by drawing up functional requirements lists for the activities within a certain process.

These functional requirements were then clustered into potential applications together with a market analysis of commercially available applications. The potential applications were then evaluated in order to determine the extent to which they would satisfy the functional requirements. It was possible to reduce the amount of applications to five potential final candidates. This was achieved by evaluating the functional fit of several potential applications for different solution clusters (e.g., bill-of-material, Material Requirements Planning, material flow) together with their level of integration. In the evaluation of functional fit, a level corresponding to 60% or above was considered acceptable. The analysis also served as a cross-check that commercially available solutions could be applied in the running of a transplant operation in general. If only one application would have scored above 50%, it would have been necessary to reconsider the decision to aim for commercially available solutions in the first place or to change the processes.

Besides functional fit, IT and business fit were also evaluated. The overall fit of each application was obtained by mapping all the applications with the help of a three-dimensional matrix. Exhibit 10 diagrammatically summarizes the process of application mapping and selection together with some example criteria used for the evaluation in each of the three dimensions.

Application Mapping and Selection

The project resulted in the selection of several standard applications that would support highly optimized processes, ensure effectiveness and efficiency, and maintain a high level of flexibility. The structured approach with which the project was performed, together with the standard solutions used, made it possible to achieve the intended implementation time frame without compromising the quality of the project outcomes.

Application to an Existing Business

HP has used the business alignment framework to redesign its order fulfillment process. Although the application of the overall framework remained the same as in the previous example, two additional dimensions had to be addressed:

- Because the business process already existed, it was necessary to evaluate the impact of potential changes.
- Because the process spanned several business units and product groups (some of which had conflicting goals), it was necessary to decide where and how compromises could be achieved.

In this case, the greatest benefits could be achieved when concentrating on improving on-time delivery, speed of new product introduction, and price performance in a common way. Other, group-specific factors were then dealt with independently by the different business units. This analysis also formed the basis for the definition of breakthrough objectives such as 100% delivery on customer date and cost reduction of 30% to 40% for each group and business unit that would clearly improve the performance of the overall organization for the selected business goals. Based on these and other breakthroughs, a new order fulfillment process was designed using an end-to-end perspective.

Strategy Impact.

Because different groups had differing requirements it was necessary to incorporate a vector called strategy impact. Determining strategy impact was used to fine-tune the overall process to the requirements of individual groups. It also made it possible to incorporate the changes arising from the competitive environment or product-specific marketing programs and adjustments of inventory levels due to specific component shortages or trends. Exhibit 11 is a high-level view of the redesigned order fulfillment process together with the strategy impact vectors.

High-Level Order Fulfillment Process and Strategy Impact

To ensure high levels of flexibility, the process models attempt to balance the use of human support and technology support; wherever no major improvements could be achieved, human support was favored.

Cost Justification.

Because order fulfillment processes were already in place that had evolved through numerous continuous improvement efforts, it was necessary to justify the implementation costs of the newly defined processes, including the cost of the new information technology systems and applications. The cost of nonalignment that represents the cost of tolerating non-value-adding activities had to be determined for comparison purposes. Here, different techniques were employed, including:

- Actually tracking a customer order from the moment of quotation to final delivery.

- Measuring the time involved in handling exceptions.
- Benchmarking with related and nonrelated industries.
- Reexamining core competencies that, for example, resulted in subcontracting the whole postmanufacturing delivery activities.
- Establishing common performance measures.

When it was determined that the cost of nonalignment outweighed the cost of new process development and implementation, the core processes and relevant subprocesses were modeled and translated into functional requirements so that potential solutions could be selected or developed.

Because the requirements for each business unit were different, it was impossible to select one uniform application. A portfolio analysis determined the best compromise for limiting the number of application solutions for implementation. Exhibit 12 shows the outcome of the portfolio analysis. For example, business units A and B have similar product portfolios for which application solutions can easily be applied. For business unit C, solution A lends itself to a limited number of products. Therefore a second application solution was necessary. These solution clusters allowed HP to implement the new processes using a few standard applications while redefining a speedy implementation and minimizing the overall cost.

Application Selection Alternatives in Multibusiness-Unit Environments

Recommended Course of Action

IS managers recognize the need for aligning strategies, people, processes, and technologies in dynamic business environments in which speed of implementation is critical. The two examples illustrate step-by-step how the framework can be applied to define new business models and modify existing ones. This structured framework for alignment allows the user organization to:

- Develop processes that focus on breakthroughs that make a clear difference in the eyes of customers.
- Identify and use appropriate enabling technologies.
- Achieve a high level of transparency and reduce redundancies.
- Use standard applications based on open systems wherever possible in order to reduce cost and implementation time while ensuring integration.
- Allow for flexibility that changes arising from the competitive environment as well as advancements in technology can be rapidly implemented.

Author Biographies

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Rainer Feurer is a research student at Cranfield University, Bedford UK. Previously, he worked as a strategic management consultant for Gruber, Titze & Partner and later Hewlett-Packard, Germany.

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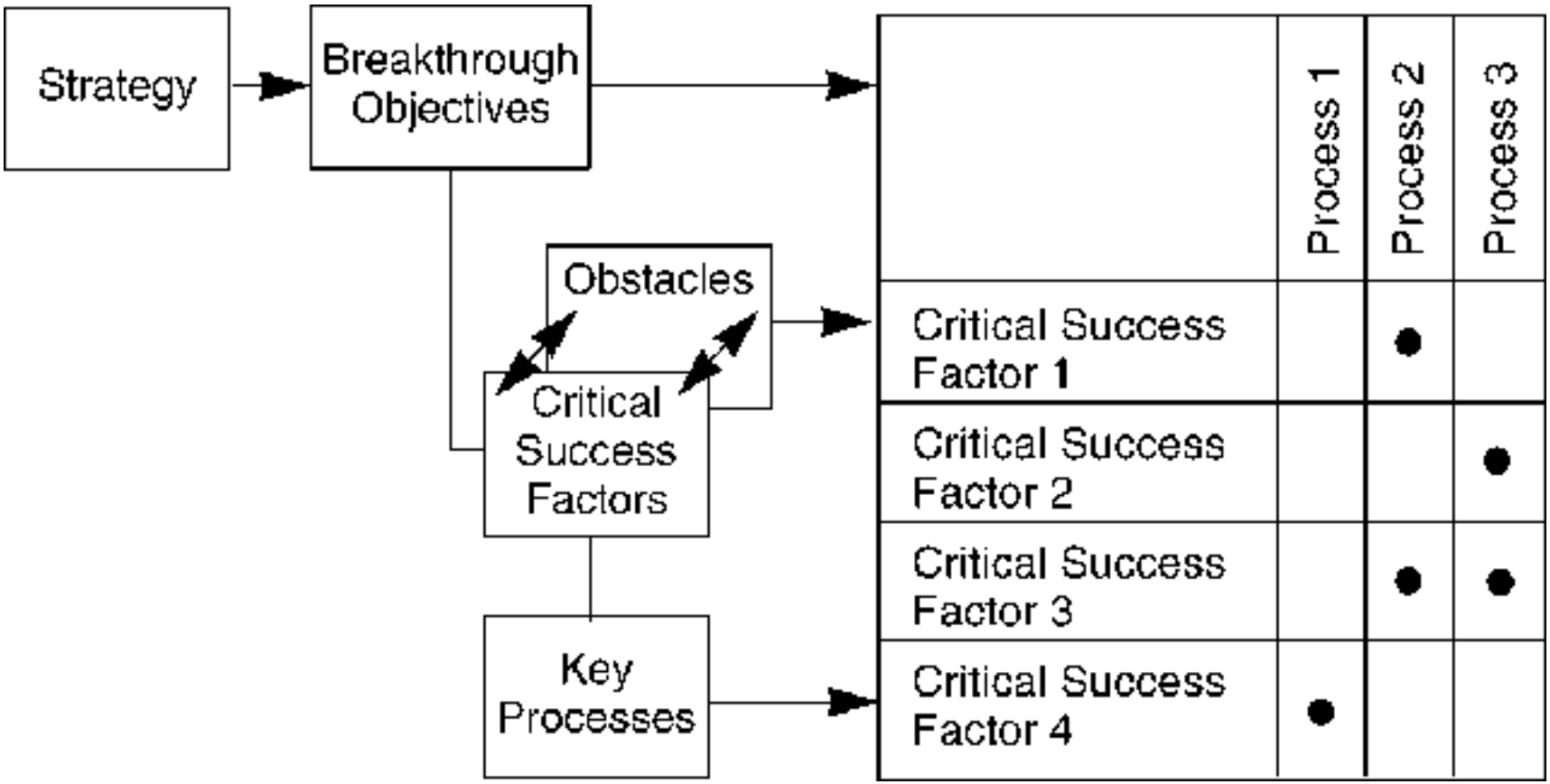
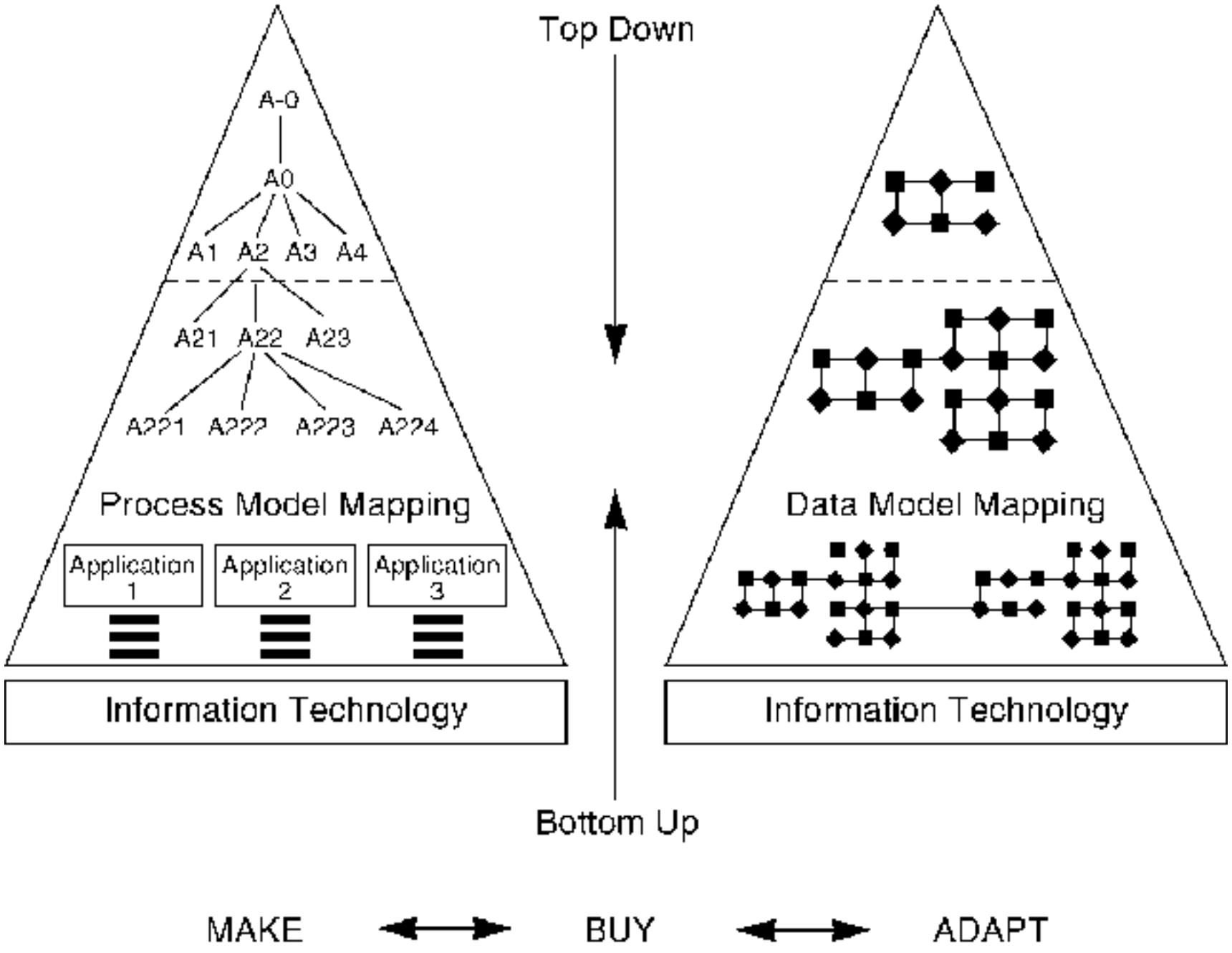
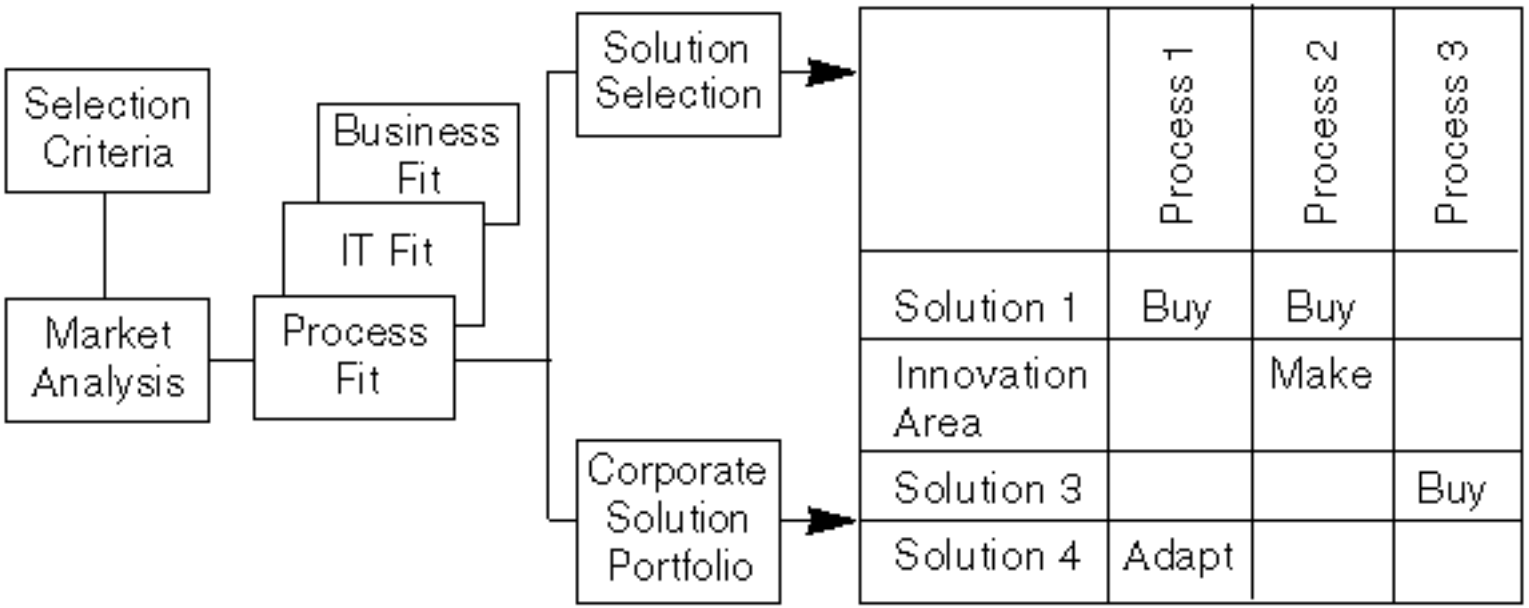
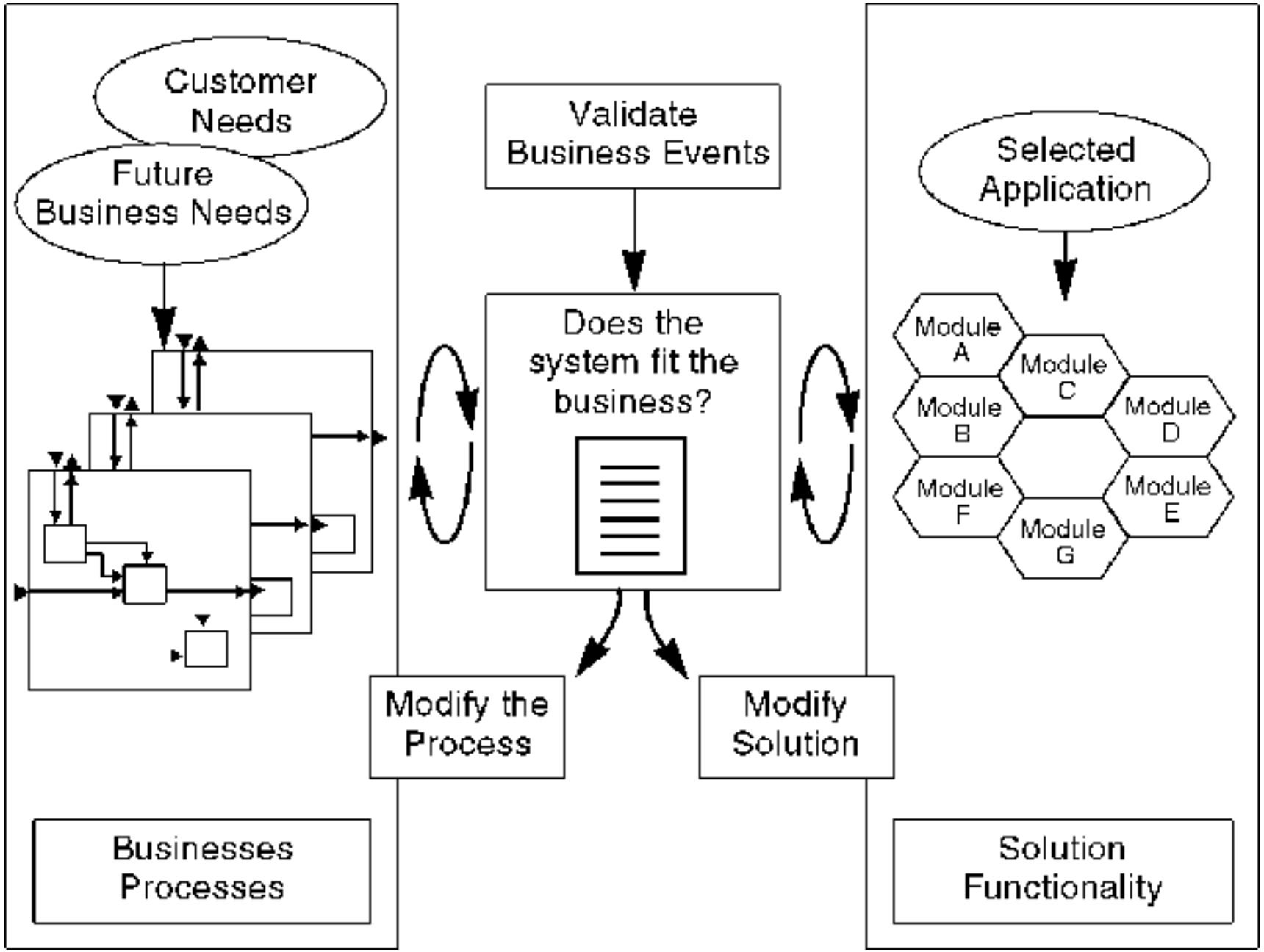
John Wargin

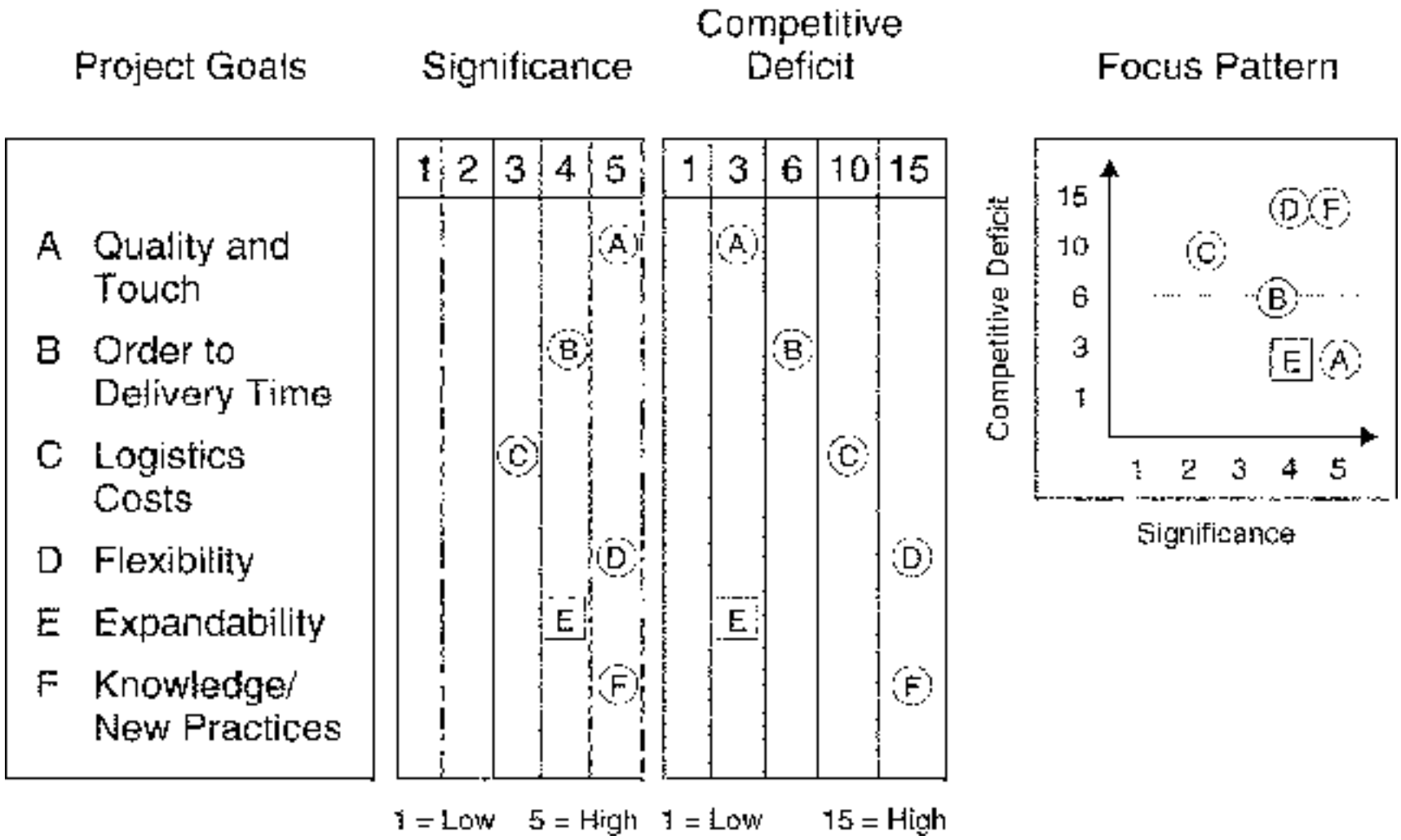
John Wargin is manager of Hewlett-Packard's strategic consulting and business alignment practice in Germany. He has extensive experience in the management of change and the redesign of processes using IT and in the automotive industries in Europe and the US.


Strategy
Breakthrough Objectives
Obstacles
Critical Success Factors
Key Processes
Process 1
Process 2
Process 3
Critical Success Factor 1
Critical Success Factor 2
Critical Success Factor 3
Critical Success Factor 4

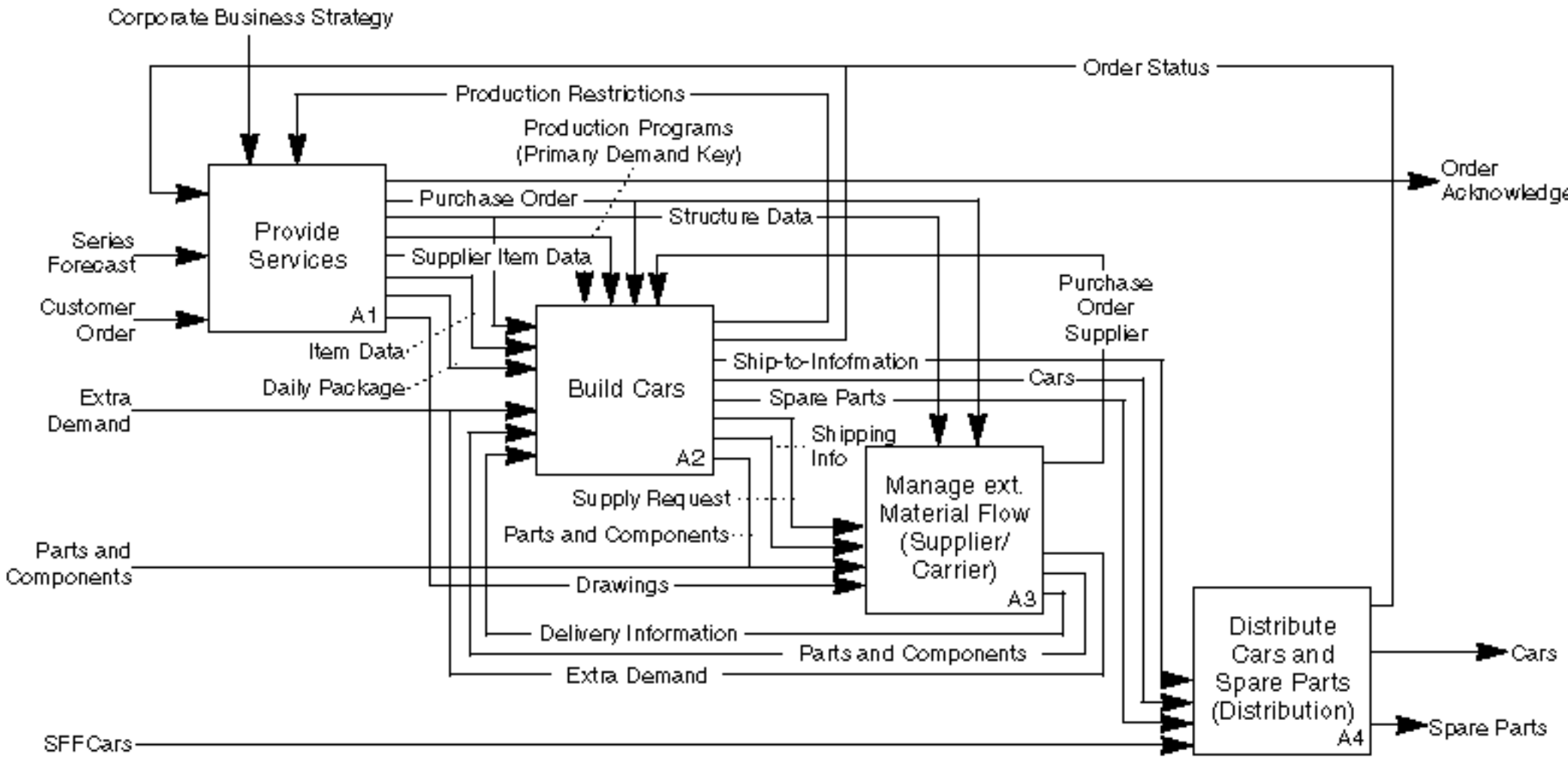

Top Down
A-0
A0
A1 A2 A3 A4
A21 A22 A23
A221 A222 A223 A224
Process Model Mapping
Application 1
Application 2
Application 3
Information Technology
Data Model Mapping
Information Technology
Bottom Up
MAKE
BUY
ADAPT


Selection Criteria
Market Analysis
Business Fit
IT Fit
Process Fit
Solution Selection
Corporate Solution Portfolio
Process 1
Process 2
Process 3
Solution 1
Buy
Buy
Innovation Area
Make
Solution 3
Buy
Solution 4
Adapt


Customer Needs
Future Business Needs
Validate Business Events
Does the system fit the business?
Selected Application
Module A
Module C
Module B
Module D
Module F
Module E
Module G
Modify the Process
Modify Solution
Businesses Processes
Solution Functionality


Project Goals
Significance
Competitive Deficit
Focus Pattern
A Quality and Touch
B Order to Delivery Time
C Logistics Costs
D Flexibility
E Expandability
F Knowledge/ New Practices
1 2 3 4 5
1 3 6 10 15
1 = Low 5 = High
1 = Low 15 = High
Competitive Deficit
15
10
6
3
1
1 2 3 4 5
Significance

Information Technology Breakthroughs \ Critical Success Factors	Open systems	Global vendors and suppliers	High level of transparency on process structure and interrelationships with other processes	Multifunctional teamwork	Multiple vendors	Scalability of systems	Standard solutions wherever possible	Incorporation of members of existing plants
Integrated and standardized applications (cost efficiency, flexibility, no vendor dependency)	•	•			•	•	•	
Process, team driven design and execution of approach			•	•				•
IT cost/product at 50% of cost level in existing plants	•	•	•		•	•	•	
Modularity of systems (for flexibility)			•		•	•	•	
Ability to transfer experience to other plants		•		•		•	•	•

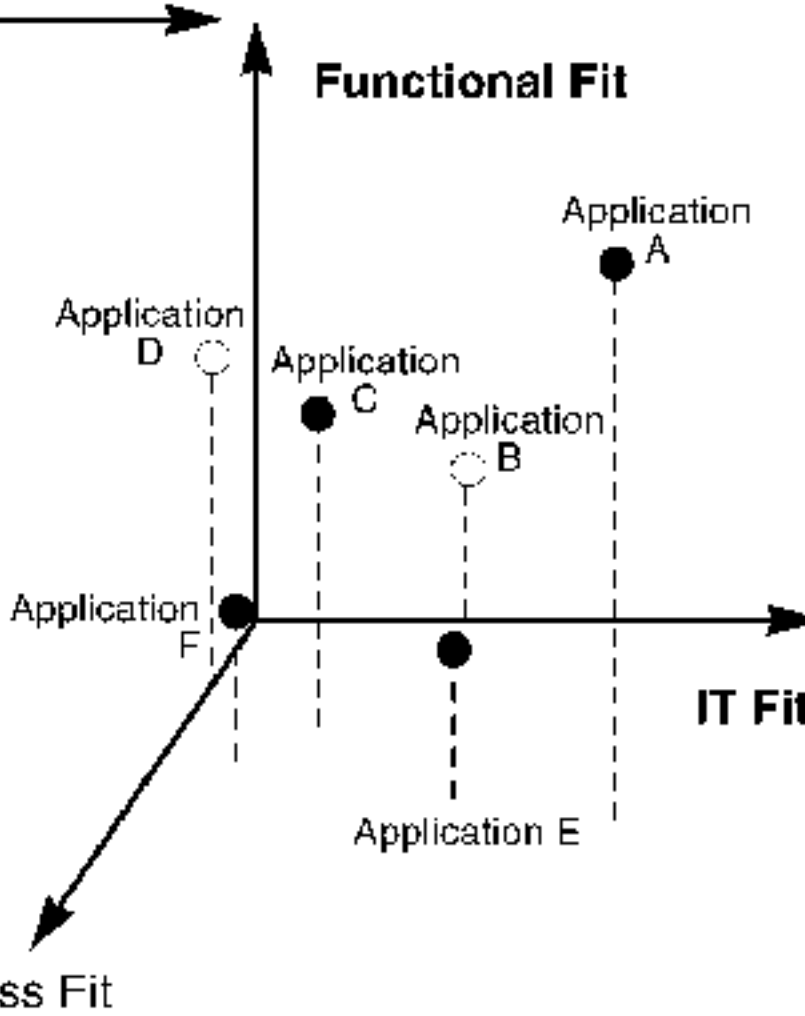


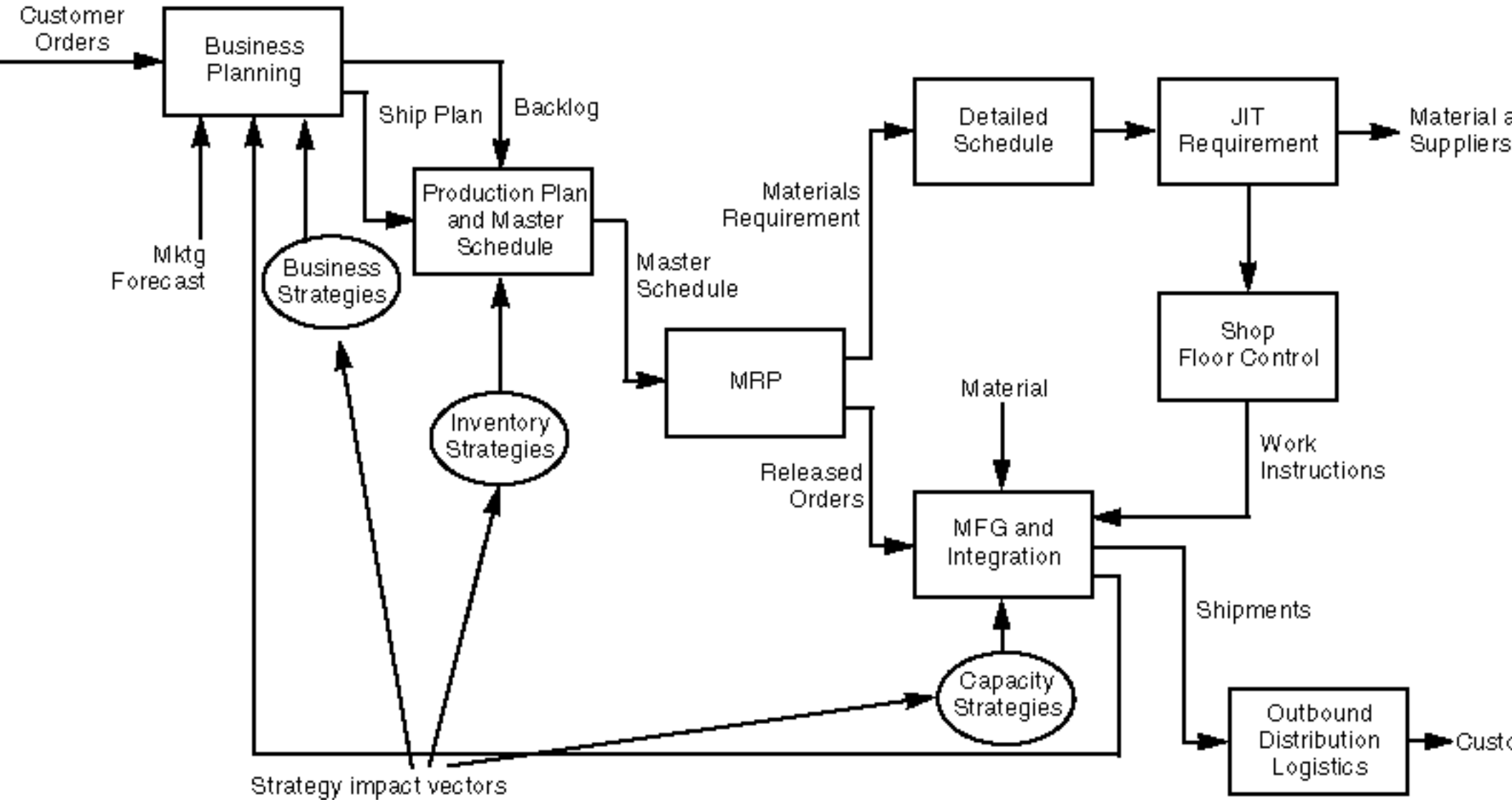
NODE: AD TITLE: Build and Distribute Manufactured Cars NUMBER:

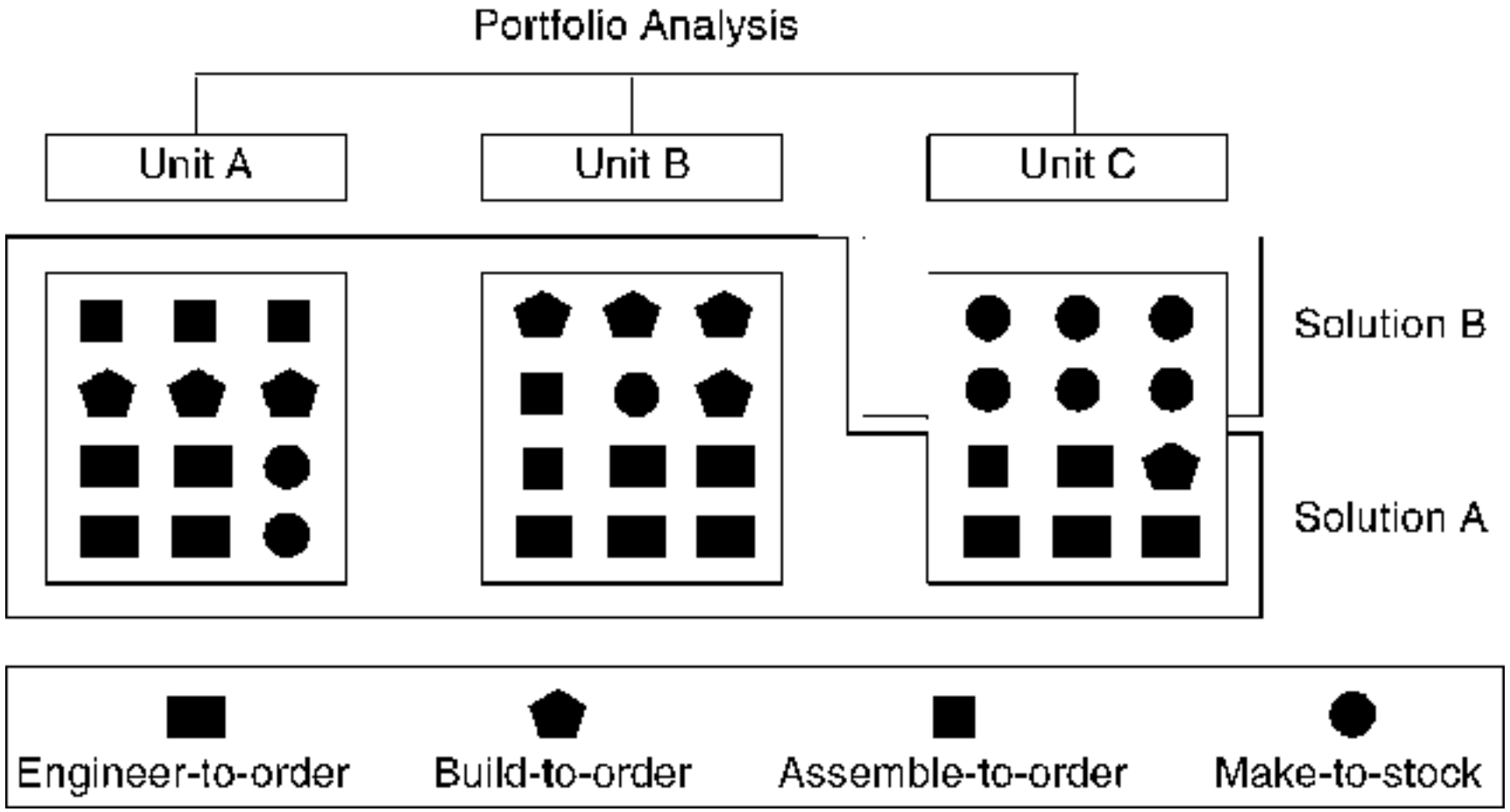
Functionality Fit Evaluation Criteria
Engineering change control and measurement
Bill of material with variant/option capabilities
Materials capacity planning
Release accounting
Integrated financials and controlling functions
EDI link and superior release

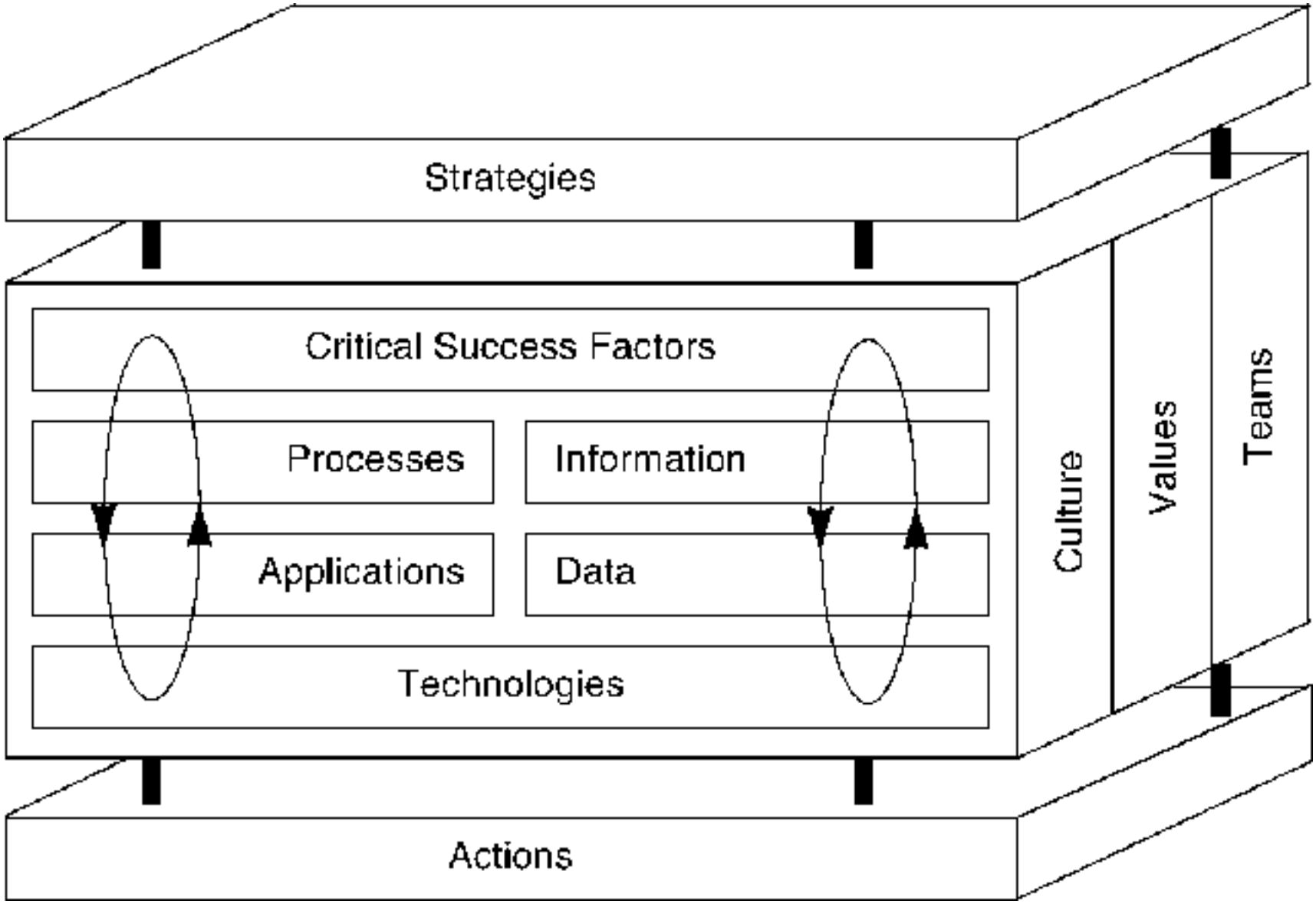
Information Technology Fit Evaluation Criteria
Platform must be open systems compliant
Operating system: UNIX and DOS/NT
Data base structure
Windows and Motif
C++

Business Fit Evaluation Criteria
Company established prior to xxxx
Presence and support in key markets
Provides implementation and training
Multilanguage versions available
Industry focus
More than 500 employees




Customer Orders
Business Planning
Ship Plan
Backlog
Mktg Forecast
Business Strategies
Production Plan and Master Schedule
Master Schedule
Inventory Strategies
MRP
Materials Requirement
Detailed Schedule
JIT Requirement
Material a
Suppliers
Shop Floor Control
Material
Work Instructions
Released Orders
MFG and Integration
Shipments
Capacity Strategies
Outbound Distribution Logistics
Custo
Strategy impact vectors


Portfolio Analysis
Unit A
Unit B
Unit C
Solution B
Solution A
Engineer-to-order
Build-to-order
Assemble-to-order
Make-to-stock


Strategies
Critical Success Factors
Processes
Information
Applications
Data
Technologies
Culture
Values
Teams
Actions