

Managing Technology on a Global/Local Basis for Optimal Synergy

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Over the last decade, many large organizations have faced the challenge of intensifying international competition – within, their own domestic markets, across continents, and even worldwide. As their competition has become global, so too has their manufacturing, as they have tried to reap the twin benefits of scale and low-cost regional production. For most such organizations, there has been only one way to „go global“ fast enough: by acquiring local businesses as rapidly as possible to gain direct access to local markets. The rapid growth of ABB over the past decade exemplifies the formidable leveraging power of such a strategy.

But companies that have recently and rapidly acquired a number of other companies are subject to growing pains. Invariably they struggle with the question of striking an effective balance between maintaining local presence in all key markets (a requirement imposed by commercial rules) and achieving product globalization (a requirement imposed by industrial rules). Local presence is necessary to ensure very close relationships with customers, distributors, and end users; to maintain an image as a local producer; and to stay flexible enough to adapt core products to local requirements and local standards. But global scale is also required if the company is to benefit from a fast experience curve and from large-scale manufacturing, to reduce lead time, and to maintain a consistent worldwide image.

So first-generation multinational companies face a double challenge:

- How to rationalize their new, expanded product portfolios for maximum benefit
- How to manage the technology assets of the acquired companies for optimal synergy

Companies that fail to meet this double challenge face two difficulties:

- They end up developing products that are either too „global“ and thus inadequately positioned on local markets, or not global enough, leading to costly product proliferation
- Through lack of global management, they fail to capitalize fully on their R&D resources.

To resolve these difficulties, management needs to implement processes for managing technology competencies strategically and for formulating global product strategy. Without such processes, organizations are doomed to suffer costly redundancies in their R&D resources and to execute very similar development projects in their various R&D centers, often simultaneously. Besides the obvious waste entailed, such systems generate internal competition rather than cooperation among local sites, reducing development efficiency and demoralizing local – sometimes unique – technology experts.

Many companies have tried to improve global/local management of technology by applying organizational measures. Often, this approach merely increases the complexity of the structure by multiplying the reporting lines. In this article we advocate a process approach that offers the advantage of clearly defining the roles and responsibilities of the global unit versus the local units. This approach allows a more rational allocation of resources by clearly separating responsibilities, for example for the development of global product architectures and the realization of tailored product executions meeting local customers' requirements.

Naturally, the specific contents of these processes vary considerably, depending on the type of product, the industry, and the market structure. However, three main guidelines, common to most global/local organizations, can contribute to synergy in the management of technology:

- Allocate global/local processes.
- Think global product architecture.
- Use a common real-time language.

The allocation of global/local processes allows management to define unambiguously the roles and responsibilities of the various development units and provides a framework for allocating resources.

The determination of a global product architecture allows the organization to distinguish those core elements of the product that need to be managed globally from the specific adaptations that can be developed locally. It ensures an optimal rationalization of the product portfolio, hence an effective use of the company's resources.

The use of a common real-time language is essential to implement global processes across multifunctional, multiregional teams working on common projects or sharing common activities.

Allocate Global/Local Processes

The allocation of technology management processes among global and local development centers and the attribution of clear responsibilities in driving/coaching these processes is a key step in achieving synergy. When

the processes are clearly allocated and a consensus reached on everyone's respective roles, you can develop a detailed competence map, matching the global and local process requirements with the required competencies. Then you can design a migration plan to allow a progressive quantitative and qualitative adjustment of the competencies, avoiding both redundancies and gaps.

Allocating Processes. The first step is to unbundle the technology management processes, from technology forecasting (the most upstream process) to technical product maintenance (the most downstream technology management process in product creation). This step typically generates a list of 20 to 30 key processes (Exhibit 1).

The next step is to determine – for each technology management process – who should be driving or coaching the process and who should execute it. This allocation of responsibility should reflect specific centers of excellence within the organization.

It is helpful to think of technology management processes as falling into four categories: fully global, global with delegated execution, fully local, and leveraged local (Exhibit 2).

„Fully global“ processes – those driven and executed globally – tend to involve strategic issues and to have only limited local input. An example is the process of defining a technology strategy, often handled globally under the direction of the Chief Technology Officer (CTO). Through this process, the organization determines which technologies it will develop or phase out, which technologies it will license or outsource, which standards it will promote, etc.

Exhibit 1

Selected Technology Management Processes

- Dissect competitors' products
- Specify architecture constraints
- Anticipate technological evolution
- Optimize specification envelope
- Define a technology strategy
- Develop/engineer products
- Plan R&D resource need
- Develop manufacturing processes
- Choose innovation projects
- Run innovation projects
- Review project evolution
- Define product commonality
- Test products
- Maintain and support products

„Global processes with delegated execution“ are governed globally to ensure consistency, for example with the organization's technology policy and business strategy, but require local execution, for example, to maintain access to local customers and suppliers, take advantage of local technology centers of excellence, meet conditions determined during the acquisition process, or capitalize on local assets or local strengths. An example is the specification of a new generation of a global product, which needs to meet the differing requirements of many local markets. This process requires a global driver to make the necessary tradeoffs between conflicting demands. Execution, however, remains local, as each operating company is asked to provide real data, customer attribute ranking, market size and growth, likely pricing policy, local competitor features, etc.

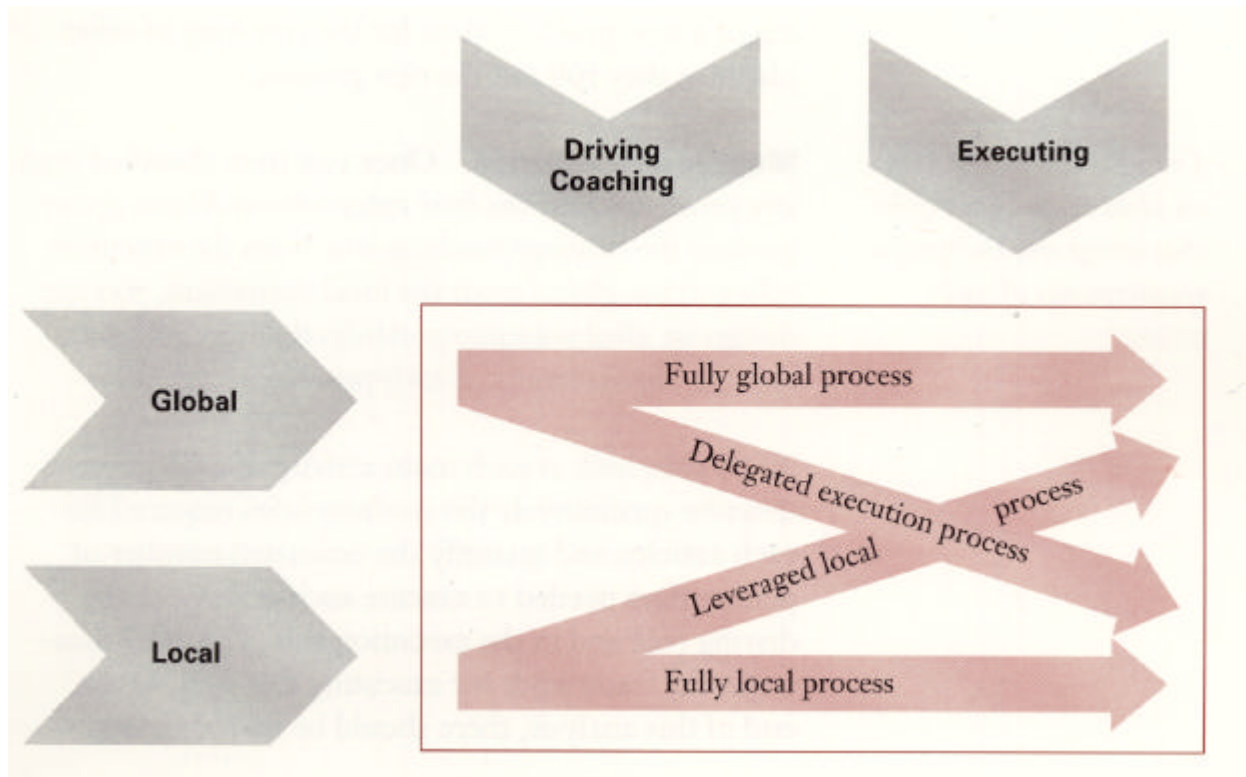
Another delegated-execution process is product development when it is based on local centers of excellence. The driving role (project review) remains global, while the execution role is shared across local units to capitalize on their specific competencies.

„Fully local“ processes – those that are both driven and executed locally – are entirely the responsibility of the local units, within a set of boundary conditions imposed by global management. As an example, the development of local product adaptations or specific options – often called local development – is entirely under the supervision and execution of local entities. Boundaries might be, for example, the maximum level of investment

allowed, the quality standards to be maintained, the use of common components, etc.

Exhibit 2

Categories of Technology Management Processes



“Leveraged local” processes are driven locally, although they may be executed by global resources. For example, a local center of excellence for a given manufacturing process might be responsible for the process engineering of a new product, then for the coaching of other plants as they roll out the new process.

Mapping Resources. Once you have classified your key processes into the four categories and have distinguished the driving/coaching role from the execution role and the global from the local dimension, you can design an ideal resource portfolio that integrates the specific requirements of each process.

To do this, look at each main activity of each process, describe qualitatively the competencies required for each activity, and quantify the estimated number of person-days needed to execute each activity, in the driving role and in the execution role. Exhibit 3 illustrates the framework for executing this step. At the end of this analysis, there should be no redundancy between global and local centers and no competence gaps. You can then develop a migration plan to transfer resources progressively from the global center to local units and vice-versa, ensuring consistent resource allocation over the long term.

Think Global Product Architecture

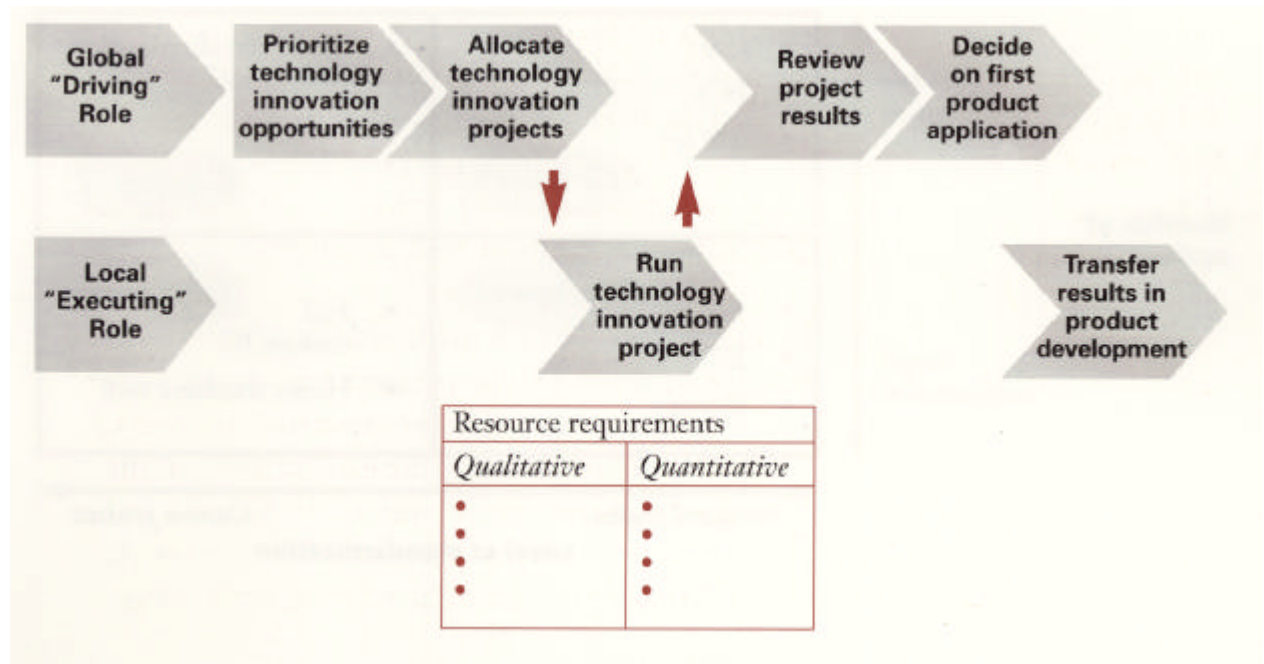
Global product management must meet local customer requirements – which are often highly disparate and conflicting – and, at the same time, achieve high levels of standardization. The solution is to come up with a global product architecture. For each product, this is based on two elements:

- The level of standardization of the product, i.e., the degree to which the same product fulfills the requirements of a broad range of customers without requiring customization
- The number of options the product must have to serve the market, i.e., whether the product is always delivered in the same form or in different configurations (Exhibit 4).

Thinking in terms of global product architecture is critical for products that admit many options. It is essential to identify a product core in order to permit both large-volume manufacturing and the flexibility to meet optional customer requirements.

Exhibit 3

Mapping Resources: A Technology Innovation Process Example

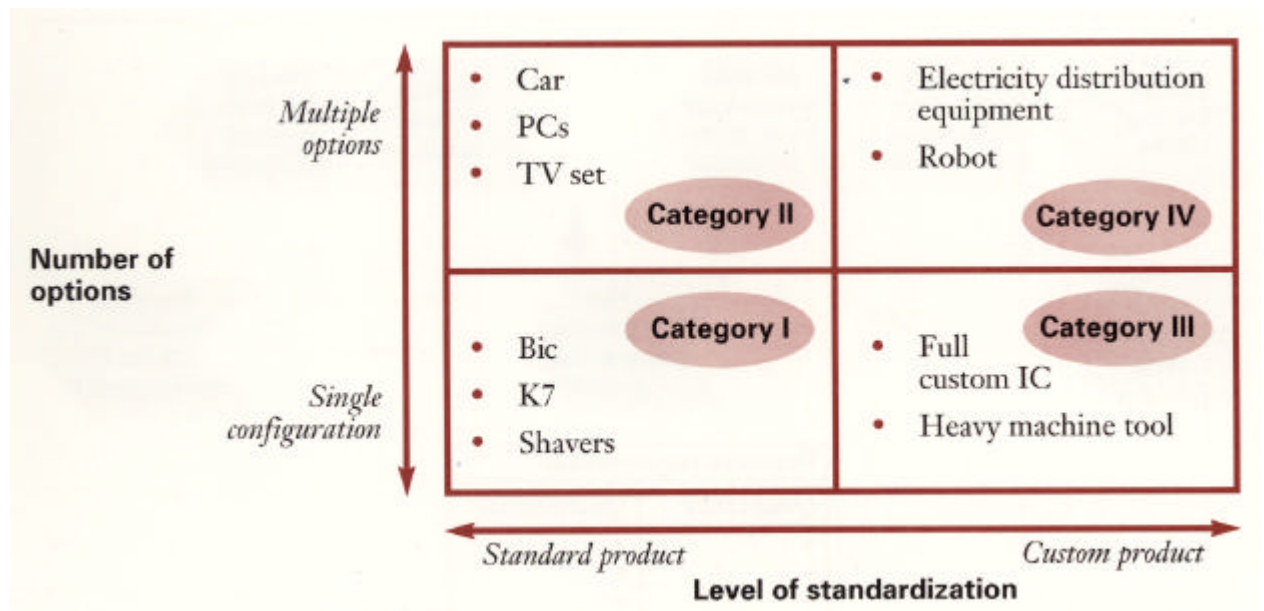


Designing a global product architecture requires mastery of two key notions: the *product platform* and *key elements*.

A *product platform* is the part of a product that drives most of the product configuration and determines many component characteristics. For example, the platform in a plane design is the seat area, determined by the number of passengers. This platform determines the size of the wings and therefore the size of the engines. In the automotive industry, the platform is the car chassis or underframe, which affects the car's engine size, suspension, steering wheel characteristics, etc. Platforms must be rationalized as much as possible and should exist in a very limited number of variants.

Exhibit 4

Product Categories

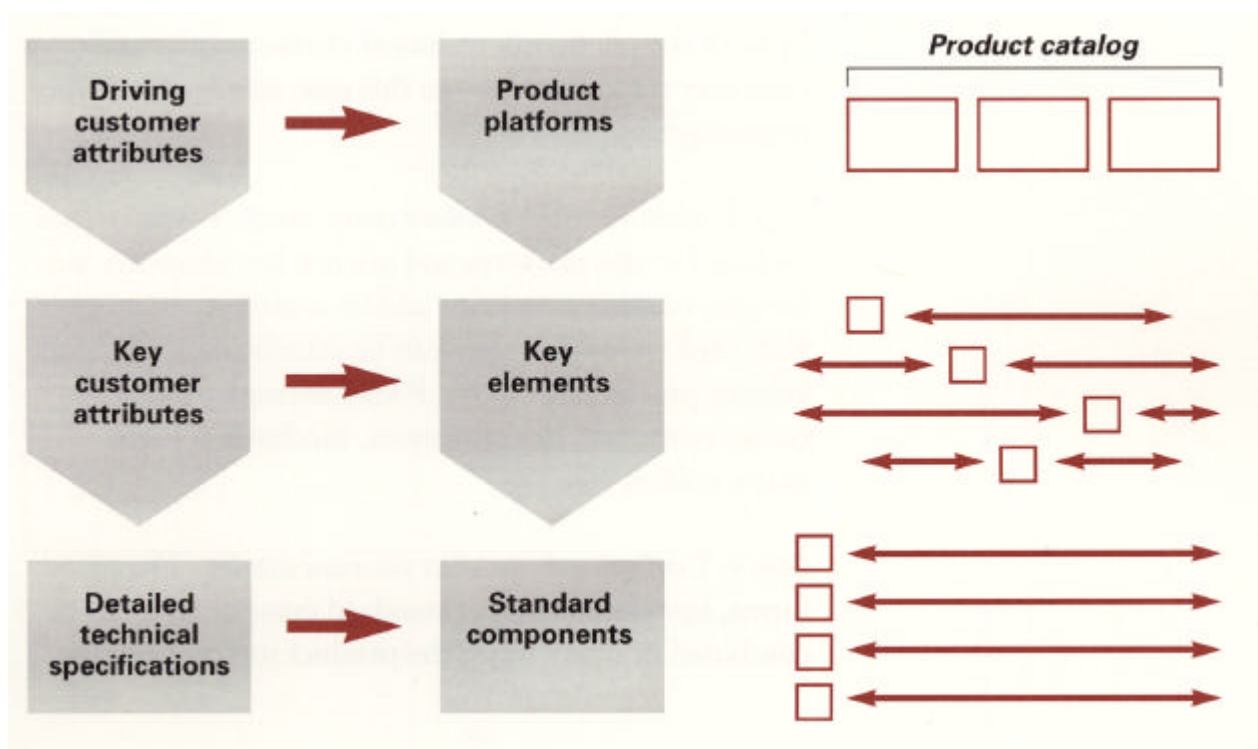


A *key element* is a component – or set of components – that because of the breadth of its specifications is deployable to more than one product in the product range and is therefore likely to be standardized, driving the other components' specifications. For example, an engine is a key element in a car design and a microprocessor is a key element in a personal computer. Together, product platforms and key elements constitute the product structure (see Exhibit 5).

The concept of a global product architecture can be derived from these two notions, following a four-step approach:

Step 1: Identify the product platform. The platform will be a standard part of the product, not to be modified even for local adaptation. To define the platform that best supports the product range, you must test various possible platforms against key criteria such as level of investment in manufacturing, development lead time, etc. The goal in a global product architecture is to limit the number of platforms to the smallest possible number to serve the largest possible customer base.

Exhibit 5 Product Structure



This step is best illustrated by looking at the architecture of small to medium-size PABXs. The number of lines (input/output) can be considered a platform. This platform is shaped by the switching configuration of the PABX. It will drive the processing requirement of the PABX, the physical size of the unit, and the overall performance of the product.

Step 2; Identify the key elements. These elements will be standard and will serve as building blocks to configure the product range. Their specifications are derived in two ways: directly from the platform, to optimize their integration at the system level; and indirectly, to meet the most important customer requirements and to ensure their broadest application.

In the PABX example, this second step will determine a number of key elements that can be optimally applied on the various platforms, for example the line interface, the power supply, the keyboard/display, and the audio amplifiers. Each key element is determined by both the platform's technical characteristics and customer requirements – in this case standard interface requirements.

Step 3: Identify other standard components. These are not included in the platform and are not key elements but, because of their simplicity and/or sensitivity to large-scale cost reduction, they can be standardized for high-volume production. In the PABX example, standard components will be connectors, mechanical parts, plugs, cables, etc.

Step 4: Configure the product internal catalog. The platforms, key elements, and standard components can be combined in many ways; the product internal catalog specifies which combinations are permitted. Within this catalog of possible configurations, some products should be relatively standardized to meet the needs of large market segments, while others should have the flexibility to adapt to local requirements – while still benefiting from the cost structure of a standard product.

Use a Common Real-Time Language

One of the most difficult issues in managing technology globally is the synchronization of tasks. Often teams working on closely related projects in parallel but thousands of miles apart – such as a design team and a production process team – need to share information and insight in real time. To reduce lead times and optimize the use of decentralized resources, it is vital to ensure that the same information, on both project management and detailed design, is available simultaneously to all the project participants.

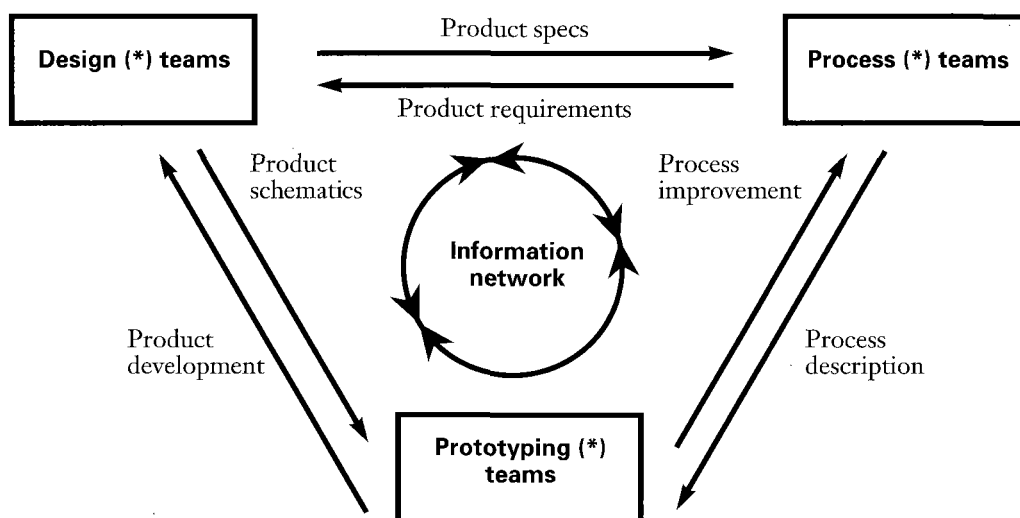
The most important guidelines in securing efficient real-time communication for project management are:

- Build a multicenter project management team.
- Use a standard format for project review (e.g., a uniform milestone structure, as described in the second quarter 1993 issue of *Prism*, pages 59-73).
- Organize multicenter project review.
- Communicate project review decisions (action plan modifications, etc.) in real time by using a common communication media.
- Similarly, organize a project „reference“ file along the same pattern, to communicate real-time decisions for detailed design.
- Use a common CAD system based on the same platforms, allowing data transfer between centers.
- Regularly communicate design modifications.
- Clearly communicate which design features have been „frozen“ and which are not yet final.

Information transfer based on a „paper free“ design approach using a common CAD is essential in coordinating design teams, process development teams, and fast-prototyping teams working in a concurrent engineering mode (see Exhibit 6).

Exhibit 6

Coordinating Teams in a Concurrent Engineering Mode



* Often located in physically separated centers

Conclusions

Managing technology on a global/local basis for optimal synergy is a multifaceted issue. Three dimensions – processes, people, and products – must be managed in an integrated way. Processes are best analyzed into their global and local dimensions to guide resource allocation. Similarly, the product dimension must be divided strategically between global and local issues and executed by the appropriate resource. Such an approach can ensure the optimal efficiency of both global and distributed resources.

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