# DESIGNING THE FIRM TO FIT THE FUTURE

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**Abstract:** Most firms identify market opportunities for their new technologies after they have been developed. This article discusses the design of a "futures group" which can help to synchronize a firm's technology and market development. A futures group designed to span more than one organization could lead to simultaneous market development for multiple technologies.

**Keywords:** Organizational alignment; organizational fit; technology commercialization; market intelligence

In the world of design, form is expected to follow function. An architect designs a building to meet a specific purpose, and an aeronautical engineer designs an aircraft to meet specific flight requirements. Similarly, firms are designed to produce goods or services for a particular market with organizational features and costs specified in their business plans. Thus, it follows that how the organization's resources and guidance mechanisms are arranged should draw early and detailed managerial attention. Logic, however, may not prevail, and the design of the structures essential to house the organization's resources, and the processes necessary to direct and control them, tend to become the focus of management attention only after problems arise. Moreover, in today's increasingly competitive global economy, design flaws will become more costly and belated managerial attention more injurious as the pace of innovation accelerates, requiring firms to rapidly assemble and apply complex technical and market knowledge. Indeed, it appears that firms in many industries are entering a period in which they will need organizational designs that help them *anticipate* rather than follow technological and market developments.

In this article, we discuss a common organizational problem: Although market intelligence regarding potential technology commercialization opportunities is clearly valuable (Frishammar, Lichtenthaler, & Rundquist, 2012), firms are not equally adept at guiding their innovation efforts with both technical and market knowledge (Burgers, Van Den Bosch, & Volberda, 2008). As a result, lengthy and costly time gaps may occur before a firm can find market applications for its technological innovations. Building on our ongoing research, as well as several examples of firms which have attempted to solve this problem, we describe the essential features of an entrepreneurially oriented "futures group," an organizational mechanism that firms can use to explore and develop future markets for their new and emerging technologies.

## A RECURRING CHALLENGE

In organizations, the interaction of function and form is a recurring challenge. Over the past two centuries, the development of new technologies has stimulated the growth of new industries populated by new firms bringing new products and services to an expanding set of markets. During the co-evolution of technologies and markets, new capabilities have been utilized in new firm processes organized and managed in new ways. In recent decades, attention has been directed at economic sectors such as biotechnology and information processing where research draws on multiple scientific knowledge bases to create a large and growing body of technical knowledge awaiting full application in innovative products


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and services.

As knowledge-driven product/service complexity increases, individual firms often have difficulty envisioning the full market potential of emerging technological innovations. Although applications in existing markets may be foreseeable, applications in adjacent markets typically are not. Therefore, new firm and even inter-firm strategy-structure designs need to be developed if the global economy is to take full advantage of expanding knowledge to drive product and service innovations.

Several years ago, Miles, Miles, & Snow (2005) speculated about the shape of organizational strategies, structures, and processes capable of producing major increases in knowledge utilization, suggesting that future organizational designs should enable the formation of collaborative communities of firms in which multiple complementary technologies are combined to produce a continuous stream of new products for existing and related markets. Such designs would allow the formation of collaborative ventures across markets and technologies – ventures that would broaden the technology and market vision of community member firms and stimulate further innovations by combining knowledge across firms' business models and customer markets. However, while one successful collaborative community of firms has been studied (Snow, Fjeldstad, Lettl, & Miles, 2011), it focuses on only a single technology with flexible employability (the blade processor technology in the computer server industry). Although experiments with new community-based designs are underway, the development of a multi-technology collaborative community of firms may be years away. It is, therefore, much easier to imagine how individual firms can move toward innovation-facilitating organizational processes, designs which will inevitably include at least some inter-firm collaboration involving related technologies, products, and/or markets.

The overall challenge is to design a firm in a manner that enhances its entrepreneurial capabilities. Entrepreneurs typically create wealth by adapting existing technologies or products to serve new purposes in new markets, a process that is facilitated by inter-firm collaboration across complementary markets. Entrepreneurial innovation of this sort, however, violates the logic built into most organizational designs, a logic that links existing technical knowledge with existing product or service lines. How can a firm improve its ability to expand into new markets, either by adapting its technologies or by linking to related technologies? And how can it speed up the process of doing so?

## FUTURE FIT DESIGN EXPERIMENTS

Technical and market knowledge can be infused directly into firms through government action (Link & Siegel, 2007). In contrast to the free-market approaches of the US and the UK, where government-supported research finds its way entrepreneurially into firms clustered around major research universities, both Taiwan and the People's Republic of China have created governmental agencies that offer technical and market assistance directly to firms. The Taiwanese approach evaluates technologies developed elsewhere for possible matches with Taiwanese firms (Mathews, 1997; Mathews & Cho, 2000). Agency employees are even free to form their own firms to take advantage of promising technologies. This approach produced a new player (Acer) in the global computer industry in an economy functioning mostly as a components supplier and original equipment manufacturer for firms in other countries (Mathews & Snow, 1998). The newer and massive PRC investments are less easily evaluated at this point but are expected to have major long-term impact across several industries in the global economy.

A recent experiment in France aimed at enhancing the flow of technical knowledge across firms in the Grenoble region falls between the planned government investments in China and the entrepreneurial university-firm knowledge flows found in the US and UK. CEA-LETI, a redesigned version of several government agencies originally created to stimulate both military and civilian applications of atomic energy, is now charged with providing research knowledge to nanotechnology, computer chip, and other high-tech firms in the Grenoble region (Scaringella & Miles, 2011). CEA-LETI performs and provides research to firms for a fee, and it can create its own start-up enterprises in new product areas and markets. To date, CEA-LETI has created over 40 high-tech start-up firms, many of which have been acquired

by larger firms. In addition to CEA-LETI, the Grenoble-based CEA agency has created two new units within the past eight years, one focused on a cluster of software firms close to Paris and the other aimed at supporting the flow of technical knowledge into new energy systems for housing and transportation.

In the private sector, one company that has successfully wrestled with the problem of how to organize to explore new businesses while operating mature businesses is IBM (O'Reilly, Harreld, & Tushman, 2009). After an internal company analysis revealed six major reasons IBM routinely missed new technology and market opportunities, the firm developed the Emerging Business Organization (EBO) initiative in 2000. The elaborate EBO process systematically explores, creates, and tests new business units that are then either grown or terminated. In less than ten years, 25 EBOs were launched. Three failed and were closed, but the remaining 22 now produce more than 15% of IBM's revenue. Of course, IBM is a huge corporation with enough internal resources to explore and experiment. Smaller, less well-endowed firms need organizational units that can emulate EBO's entrepreneurial process without overwhelming their available resources.

Lastly, an important component of a "future fit" organizational model designed to push new technologies beyond current market uses, and in the process suggest directions for further technological development, may be emerging in the wireless communications industry where firms such as Apple have encouraged and facilitated communities of designers who create applications that extend the information seeking and processing uses of the core technology. Knowledge flows within such communities combine market and technical knowledge in a most entrepreneurial fashion. Indeed, the wide array of available applications represents an ongoing exploration of consumer needs and desires, with usage data pointing the way to future technological and market developments.

Both the public and private sector efforts discussed above suggest mechanisms that could be incorporated into the design of an organizational unit focused on the continuous and simultaneous development of technologies and markets. The purpose of such a unit would be to integrate technology development, market expansion, and the venture capital needed for research, experimentation, and capability development.

## A POSSIBLE FUTURE FIT DESIGN

One can generally imagine an organizational unit that combines emerging technical and market knowledge to guide next-stage product/service innovations, a unit that contains many of the features described in the examples above. The challenge is to design the structure and the managerial processes that would assemble, maintain, and direct such a unit within the resource constraints of a typical firm. Assembling the R&D or technological component seems the lesser challenge, as one can simply extract technical specialists from the firm's existing R&D units and assign them to the firm's futures group. The key design issue for this segment is how to arrange those technical specialists so that they can both share the skills and knowledge that define their disciplines and explore knowledge combinations and applications outside their normal uses. The solution is to develop a matrix-like design that simultaneously groups specialists by discipline and by current and potential markets. Creating the matrix axis focused on current and related markets seems straightforward, assuming that the firm is willing to search inside the organization and out for entrepreneurially inclined individuals and to reach across into complementary firms in what we imagine will be an ever-broadening set of related or potentially relatable markets. For example, the French agency's knowledge transfer unit that addresses the software industry is arranged as a matrix while the very newest unit focused on energy systems is organized as a single adaptive team structure.

A large initial financial investment is required for a futures group, an investment that encourages and empowers a start-up period of knowledge sharing not only across markets but across scientific fields as well. A futures group would focus on first one, and then another, nearby or more distant market segment, looking at both the technical knowledge employed and the product/service innovation stream and market response over recent years. Such broad discussions seem likely to elicit a beginning stream and then a rush of suggestions for expanding current product/service innovation efforts and exploring possible new technical

and market domains.

The key resource allocation decision, we predict, will quickly turn from encouraging interest to forming and launching innovation projects. Resource allocation and guidance in the futures group are provided by the entrepreneurial axis of the matrix, with each entrepreneur/manager free to launch one or more market-serving ventures using an initial pool of funds to buy the time of the needed technical talent. The exact amount of funds provided initially to each entrepreneur will vary by firm size and current resources, but a portion of the funds is already available in the budgeted salaries of the technical specialists and the entrepreneurs recruited from existing departments. As projects move forward, additional funding will be required. This suggests the need for an in-house venture capital fund and allocation committee, a process that a number of firms, notably Hewlett Packard, have used successfully in the past. More recently, Shah, Ortt, and Scholten (2010) have described venture development mechanisms in three large firms noted for their innovation efforts: Royal Dutch Shell, Nokia, and IBM. The Shell approach encourages bottom-up ideas that are evaluated and funded by a team of upper-level managers and directed toward either internal development or external venturing with selected partners. Nokia uses similar mechanisms to encourage both internal development of new technologies and external ventures across a wide group of affiliates. Lastly, IBM's exploration efforts, as illustrated by the EBO initiative described above, are guided by top-down decisions, but the development of market applications usually involves a variety of partner firms.

Clearly, a wave of experiments with new product /service designs outside the firm's existing innovation stream requires coordination mechanisms and collaboration capabilities. One key mechanism we have suggested is an "idea bank" into which each entrepreneurial venture is entered and updated as progress occurs (Miles et al., 2005). Such a data source will quickly reveal both potential paths for collaborative action across project teams and potential duplications. Duplications can and probably should be contained by the venture capital decision-making process, and collaborative developments can be facilitated by top management encouragement and support. It is our view that a futures group will both attract and expand collaboratively inclined technical and market-focused talent and that managerial endorsement, reinforced by venture funding decisions, will guide the group toward further collaborative behaviors. In addition, reward structures within the futures unit will need to be designed to reinforce collaboration across the entire set of innovation projects undertaken.

Once product/service prototypes begin to emerge across the firm's current and related markets, next-stage procedures must be in place. A single firm can handle only a few of the entrepreneurial ventures one can imagine emerging from the futures group. Two potential routes to market success are common across high-tech firm clusters: the spin-off venture and a collaborative multi-firm alliance. The futures group, assisted by the venture capital committee, can approve a limited number of spin-offs, with an equity position taken by the mother firm and remaining funding coming from outside venture capital investments that validate the spin-off's entrepreneurial promise. This is an internal version of the start-up activities undertaken by the French agency described earlier and is a common practice in the Shell, IBM, and Nokia examples.

A second route to market is a collaborative venture with one or more firms in complementary markets. A given firm's futures group, with entrepreneurial talent drawn in part from complementary markets, may well have potential collaborative relationships built into it, but such firm-to-firm linkages are dependent on the exploring firm's demonstrated commitment to equitable treatment of potential partners. The conditions essential for both internal and external collaborative relationships are described in Miles et al. (2005). A firm that demonstrates its trustworthiness in its initial collaborative ventures is likely to find numerous potential partners for its future collaborative ventures. In our view, collaborative entrepreneurship is the most powerful mechanism for generating multi-disciplinary knowledge-driven innovations. Moreover, one firm's successful futures group could inspire similar units across firms in complementary markets, units that are inclined from the beginning toward initiating and responding positively to inter-firm collaborative initiatives.

If a firm's futures group flourishes, it will be vulnerable to both the up-side and the down-side challenges of organizational success. The up-side challenge is how to maintain

and grow its own resources to prevent entrepreneurial stars from either jumping to other firms or starting up their own ventures, likely taking with them members of their project teams. The down-side challenge is how to manage possibly deteriorating relationships with the firm's less entrepreneurially oriented units which have generated the venture capital that the futures group employed on its way to success. Indeed, the mind-set and stylistic differences between a futures group and established units focused on current products and markets mirrors the continuing challenges inside most firms created by the interaction of R&D and marketing. R&D, if it does its appointed job, is focused on evolving science and its longer-term implications, while marketing is focused on near-term success and failure across existing markets. Clearly, these are predictable challenges that require well-designed intra-firm collaborative mechanisms. Also, firms must consider how reward systems will evolve as entrepreneurial ventures succeed, including designs that increase the managerial and financial rewards flowing across both the forward-looking and stable segments of the firm to reflect their joint contributions to firm performance. Successful firms, it appears to us, become proficient in combining the capabilities to exploit existing technologies within current and related markets with the capabilities to explore related technologies and their potential market applications.

One approach to dealing with the challenges of success is to pose them in advance to the leadership teams occupying the entrepreneurial axis of the futures group's matrix. One of the skills of entrepreneurs is bridge building, a useful orientation and skill if one is inclined toward serial entrepreneurial activities. Ideally, an internal entrepreneurial unit could become an initiating agency in the creation of both internal and multi-firm innovation communities.

## CONCLUSION

The global economy has entered a period in which scientific and technical knowledge is becoming more complex and faster flowing. Taking full advantage of this dynamic resource represents a potential competitive advantage to firms and a potential comparative advantage to national and regional economies. The challenge to the firm is to exploit its current market-focused technology while simultaneously exploring the full range of market opportunities that its technical knowledge might engage. What we know is that most existing organizational arrangements, which tend to separate knowledge generation from knowledge application, result in only a fraction of available knowledge finding profitable use.

In our view, organizational design experiments aimed at capturing all of the market opportunities presented by new and combined technologies are clearly warranted. We have suggested one such experiment in the form of a futures group. Entrepreneurial units of this kind may be threatening to established organizational units and, if attempted, even more challenging if they succeed. It is, however, just this sort of design challenge that successful firms point to as crucial turning points in their efforts to become more innovative. Based on our continuing research, we believe that entrepreneurial talent and motivation are far more abundant than most organizational processes recognize and use. The design and implementation of a futures group aimed precisely at giving such skills and interest both the freedom and the support to flourish seems to be a worthy objective.

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