

Cracking the **complexity** code

There are two types of complexity. Understanding where to intervene is the key to managing them to create value.

**Suzanne Heywood, Jessica Spungin,
and David Turnbull**

One view of complexity holds that it's largely a bad thing—that simplification generally creates value by removing unnecessary costs. Excessive complexity, according to this argument, should be addressed by reducing the number of countries where a company operates, streamlining its product range, or creating an organizational structure that focuses primarily on one dimension, such as geographies or functions.¹

But our recent work supports a more nuanced view. When companies treat complexity as something they must overcome, they miss an opportunity. If complexity, in all its aspects, is seen as a challenge to be *managed* and potentially exploited, not as a problem to be eliminated, businesses can generate additional sources of profit and competitive advantage.² Managed well, complexity can also increase the resilience of a company by enhancing its ability to adapt to a changing world.

To understand how to manage complexity, executives need to view it on two levels:

¹ Keith Aspinall and Mark Gottfredson, "Innovation versus complexity: What is too much of a good thing?" *Harvard Business Review*, November 2005, Volume 83, Number 11, pp. 62–71.

² For an in-depth discussion of the relationship between complexity and the creation of economic value, see Eric D. Beinhocker, *The Origin of Wealth: Evolution, Complexity, and the Radical Remaking of Economics*, Boston: Harvard Business School Press, 2006.

Article at a glance

Executives should distinguish between two types of complexity—institutional and individual. The former concerns the number and nature of interactions within a company, the latter the way individual employees and managers experience and deal with complexity.

Most businesspeople focus primarily on institutional complexity and thus fail to see that some forms of complexity, if managed well, can create value and do not have to generate excessive complexity at the individual level. Institutional complexity can enhance organizational resilience and enable companies to take on new strategic opportunities.

Companies must get three things right to manage complexity for value: organizational design, coordinating processes and systems, and capability building. Each requires thinking about complexity at the individual level, though executives should always be alert to the possibility that a complete organizational redesign may be necessary.

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- First comes institutional complexity, a consequence of the number of nodes and interactions within an organization (as well as outside it, in the case of networked businesses). This kind of complexity stems from strategic choices and the external context (such as the regulatory climate) and from major choices about organizational and operating systems.³ It grows as an organization adds units or increases the number or diversity of the interactions among them—for instance, by moving into a new geography, serving a new customer, or opening a new manufacturing location.

- Second, there is what might be termed individual complexity: the way employees and managers experience and deal with complexity—in plain English, “how hard it is to get things done.”

Although the two levels are closely related (Exhibit 1), the distinction between them is important. Most companies, we find, focus exclusively on institutional complexity—often a legitimate target. But when the proposed solution involves, say, eliminating a product area or exiting a new market, it could destroy value.

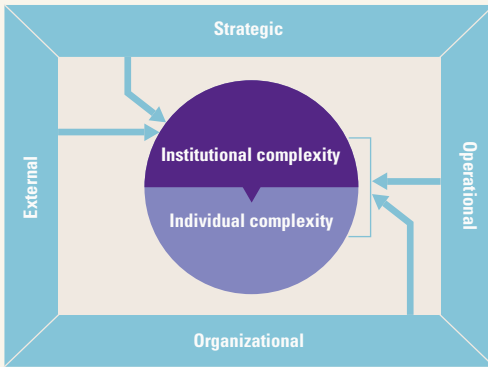
A better response is to focus on identifying and reducing the degree of individual complexity by making detailed organizational and operating-model choices, including clarifying roles, refining key processes, and developing appropriate skills and capabilities among the employees and managers beset by complexity. Concentrating on it from this perspective creates room to increase institutional complexity and thus to seek value in fresh strategic challenges.

³Trond Riiber Knudsen, Cédric Moret, and Evan S. Van Metre, “The power of a commercial operating system,” *The McKinsey Quarterly*, Web exclusive, August 2006.

EXHIBIT I

Mapping complexity

Interrelated levels of complexity

**Strategic choices**

- Number of products and services
- Number of countries
- Sources of competitive differentiation

External context

- Regulatory changes
- Intensity of competition
- Speed of competitive evolution

Organizational choices

- Structural design
- Role definition
- Process refinement
- Development of capabilities
- Culture

Operational choices

- Manufacturing (eg, lean), R&D, value chain
- Use of technology

More complex, less complex

We have developed our insights into complexity with the help of more than 1,000 middle and senior managers around the world. Combined with our own experience of working with companies, this research (see sidebar, “About the research”) has helped us to understand how institutional complexity can create value if organizations manage individual complexity well.

What’s driving value

As managers instinctively know, many things that increase the degree of institutional complexity—operating in more countries, serving more customers, offering more products and services—can also help to create new value. The reassuring discovery of our research is that institutional complexity doesn’t necessarily generate individual complexity. In our sample, companies that had lots of business units, a presence in many countries, large numbers of products, or multitudes of customers did not report degrees of individual complexity greater than the rest.⁴ Nonetheless, managing individual complexity is important: the companies reporting that they didn’t have much of it also had the highest returns on capital employed and returns on invested capital.

Comparing an airport with a road system nicely illuminates the significance of individual as opposed to institutional complexity. A road system is far more complex than an airport: more directions for vehicles to travel, more

⁴As measured by how difficult managers said they found it to get things done.

About the research

We carried out our research in three main stages. First, we conducted company studies to explore the core issue of complexity. Second, we conducted three focus groups and a series of qualitative interviews with business leaders in a range of industries. From these, we developed the definition of individual complexity as the difficulty of getting things done.

Finally, we surveyed about 1,150 senior executives in private and listed companies that employ at least 1,000 people globally. All respondents were no more than four levels from the global CEO. Thirty percent of the respondents were from Asia, the rest from Canada, Europe, and the United States. The survey was conducted in the form of an online questionnaire and was made up of about

90 questions. The first section covered 49 factors that our earlier research suggested might generate complexity: the size of a company, the number of countries where it does business, how many employees and suppliers it has, the degree of regulation, the extent of outsourcing, and the level of management capabilities. The second section asked respondents to grade, on a scale of 1 to 10, how much each factor in the first section contributed to individual complexity (making it easier or harder to get things done) and how much it contributed to or destroyed value. The final few questions asked about the organization's overall level of individual complexity and ability to create value.

vehicles, more intersections. In a road system, however, no one person has to deal with all this complexity; it is distributed among all road users, so the degree of individual complexity for any one of them is relatively low. An airport, by contrast, is far simpler at an institutional level, with few runways and even fewer ways to use them. But the degree of complexity that air traffic controllers experience is elevated because all of the complexity is concentrated in a small number of highly expert people and roles.

The implication for businesses is clear: they can manage higher degrees of institutional complexity if they reduce the degree of individual complexity—either by distributing institutional complexity across larger numbers of employees (as in the road example) or by focusing it in a few pivotal roles and mitigating it with strong capabilities in those positions (as in the airport example). Institutional complexity can then be exploited to pursue more challenging (and value-creating) strategies and to increase the organization's resilience: companies provide some insurance against changes in the world by learning to cope with the complexity involved in pursuing different opportunities simultaneously. Highly simplified companies (in extreme cases, offering only one product to only one type of customer) are usually more vulnerable to such changes. What's more, companies that manage complexity well are arguably harder to imitate, since doing so requires their competitors to replicate their organizational and operating-model decisions in detail.

Only a few things really matter

Our research provided new insights by examining the different factors widely assumed to aggravate individual complexity in companies. The full set of factors, compiled from earlier focus groups, covered the external environment (issues such as the fragmentation of market share), strategic choices (such as the number of countries where a company competes), and organizational and operating-model choices (for example, clarity of targets and the degree of centralization in decision making). We also queried executives about the managerial capabilities and the corporate culture of their organizations—matters whose importance, in our experience, tends to be underestimated.

Only 12 of the 49 factors we tested (grouped below in three categories) correlated strongly with individual complexity.

Organizational design. Effective organizational design at the individual level can minimize complexity, even in organizations that make complexity-creating organizational-design decisions at the institutional level. Low individual complexity, for example, characterizes organizations that have matrix structures and multiple reporting lines but also take steps at the individual level to eliminate redundant activities and to create clear accountability and targets. Deciding to centralize or decentralize decision making, at the institutional level, did not seem to matter so long as companies eliminated duplication and made accountability and targets clear at the individual level.⁵

Misaligned processes. Processes and systems, as you might expect, are important drivers of individual complexity. Our data show clearly that executives of companies with effective management processes (for instance, performance-management and capital-allocation systems), operating processes (management, sales, and R&D processes), and supporting IT systems report a low degree of individual complexity. Companies whose systems and processes are well integrated (for instance, those where strategy and HR processes are closely linked) had even less of it.

Weak capabilities. We asked managers to evaluate two types of organizational capabilities. The first type involves general-management skills—for example, team, functional, and change leadership capabilities. The second, dubbed “ambidextrous” capabilities by London Business School professor Julian Birkinshaw,⁶ focuses on how effective managers

⁵The one exception is rapidly growing companies; for them, centralization helps reduce individual complexity.

⁶Julian Birkinshaw and Cristina Gibson, “Building ambidexterity into an organization,” *Sloan Management Review*, Summer 2004, Volume 45, Number 4, pp. 47–55.

are at taking the initiative and working outside a narrow definition of their roles. The results show that the degree of individual complexity decreases as the degree of general-management skills increases and that the correlation is even stronger in organizations with strong ambidextrous capabilities.

As Exhibit 2 illustrates, companies with strong general-management and ambidextrous capabilities can make strategic decisions that increase their institutional complexity while also increasing their ability to add value. Executives of companies with the strongest capabilities (the top line in the exhibit) actually found it easier to create value when these companies added more countries, customers, and products to their portfolios. In contrast, companies with the weakest capabilities (the bottom line in the exhibit) seemed to hit a “tipping point”; beyond it, further strategic additions are perceived to destroy the ability to create value.

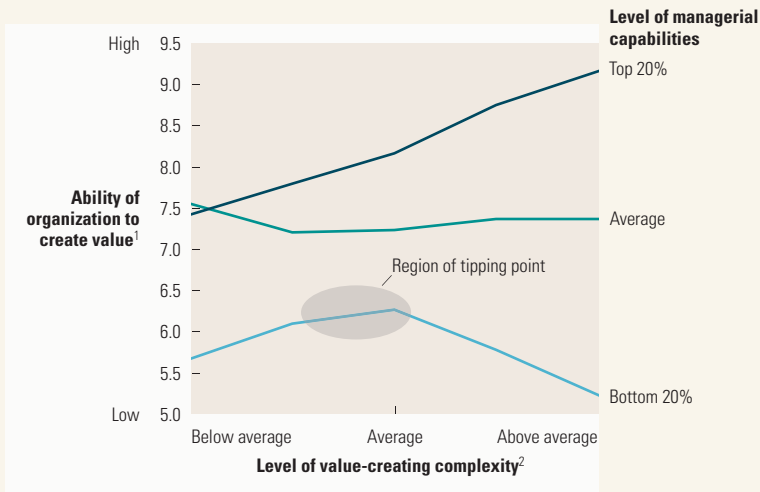
Shifting the focus

Our findings suggest that companies should change their approach to complexity. How? Not by changing strategies: our research and experience suggest that executives too quickly and too often look to strategy when grappling with complexity. We know, for example, of one large global company (operating in an asset-intensive industry) that had expanded

EXHIBIT 2

Creating value from complexity

Impact of capabilities on ability to manage complexity for value



¹ Assessed by respondents on scale of 1 to 10.

² Based on number of products, countries, customers.

Source: 2006 McKinsey survey of >1,000 senior executives in Asia, Canada, Europe, United States

through a series of mergers and acquisitions as well as organic growth. Its senior managers therefore struggled both to manage day-to-day operations and to deal with the sheer number of interactions it required. Even after downsizing its portfolio, the company found that the day-to-day jobs of most senior managers were no less complex than before. No difference was felt until it clarified roles and accountability within the remaining organization—in other words, until it reduced the degree of individual complexity.

Companies should of course fix their strategies if poor strategic choices destroy value. Otherwise, however, they will be better off focusing on the reduction of individual complexity through well-sequenced activities. First, companies must identify where complexity is held within the organization and define the pivotal and nonpivotal roles accordingly. Then they need to adjust their processes and to develop the appropriate capabilities to manage complexity.

Decide where to hold complexity

The first important area for action is finding where complexity lies within the design of the organization (Exhibit 3). Some organizations, for example, concentrate complexity in a few key roles at the corporate center, while everything else operates in a very simple, silo-based way. That may make sense for the relatively few remaining truly disaggregated organizations, where linkages between silos create little value. For most others, managing that interface—perhaps through mechanisms for sharing knowledge or identifying talent—is a value-creating activity.⁷ But this approach also creates complexity, both institutionally and in the ability of individuals to get things done. Optimizing the location and scale of the required interactions to minimize this complexity may involve reallocating and redistributing responsibilities and accountability.

Consider the case of a company where managers in one part of the organization were finding it hard to get things done. On closer examination, it turned out that accountability for all elements of the profit-and-loss statement had been brought together in a single area of the business. Managers there struggled to deliver the P&L without getting embroiled in negotiations with other functions, such as sales, production, and distribution. In some cases, these functions acted as though they had P&L accountability over their own areas. The solution was to distribute P&L

⁷For stimulating ideas (which may not be applicable for every type of company) about intra-enterprise markets for talent and knowledge, see, respectively, Lowell L. Bryan, Claudia I. Joyce, and Leigh M. Weiss, “Making a market in talent,” *The McKinsey Quarterly*, 2006 Number 2, pp. 98–109; and Lowell L. Bryan, “Making a market in knowledge,” *The McKinsey Quarterly*, 2004 Number 3, pp. 100–11.

EXHIBIT 3

Where is complexity held and why?

<p>Top management roles</p>  <p>Pros</p> <ul style="list-style-type: none"> • Efficient, concentrated location for complexity • Easier to develop clear accountability for the entire organization <p>Cons</p> <ul style="list-style-type: none"> • Senior leaders must be highly capable of managing in a complex environment <p>What you need to believe</p> <ul style="list-style-type: none"> • The top team can truly collaborate and operate in a complex environment and the culture supports this • Complexity can be centralized at the top 	<p>One sliver of organization (business, function, geography)</p>  <p>Pros</p> <ul style="list-style-type: none"> • Majority of people have straightforward roles • Complex interactions are focused on the interface between the extracted sliver and the rest of the organization <p>Cons</p> <ul style="list-style-type: none"> • A distinct part of the organization could develop its own rules and norms, which could breed resentment <p>What you need to believe</p> <ul style="list-style-type: none"> • Complexity can be focused in 1 area of the organization, and it will be possible to manage this area effectively to create value
<p>Specific level within organization</p>  <p>Pros</p> <ul style="list-style-type: none"> • Clarity on where pivotal roles in the organization need to be • Many people dealing with the same complexity issues: 1 job description goes a long way <p>Cons</p> <ul style="list-style-type: none"> • Usually results in more people having to manage complexity • Relies heavily on processes and linkages to ease complexity management; very difficult to set clear accountability for people in the layer <p>What you need to believe</p> <ul style="list-style-type: none"> • Complexity can be focused in 1 layer • The organization can build capabilities in a broad group to make this work 	<p>Throughout organization</p>  <p>Pros</p> <ul style="list-style-type: none"> • Flexibility and adaptive qualities are embedded throughout the organization, with highly capable people in most roles <p>Cons</p> <ul style="list-style-type: none"> • Achieving clarity of accountability will likely be difficult; therefore it will also be hard to manage the performance of individuals • Difficult to source talent: even junior people have to be highly skilled at operating in a complex environment <p>What you need to believe</p> <ul style="list-style-type: none"> • Managing complexity is a competitive advantage; highly adaptive leadership and a flexible organization create value

accountability so that it wasn't all concentrated in a few roles. At the same time, the company clarified its targets. As a result, the organization now manages individual complexity more successfully, and decisions are made much more quickly.

Network analysis can help identify not only where complexity lies but also where it should.⁸ This technique allows companies to map networks of relationships and to highlight critical roles. Alternatively, or in addition, a simple diagnostic questionnaire can test the complexity of different roles and the factors that drive it. Companies can then identify and address pockets of complexity-related problems and key interfaces either by tweaking the system or through more fundamental change.

Crucially, once companies know where the complexity is, they can focus on reducing individual complexity in those pivotal roles. To do so, they will

⁸Robert L. Cross, Roger D. Martin, and Leigh M. Weiss, "Mapping the value of employee collaboration," *The McKinsey Quarterly*, 2006 Number 3, pp. 28-41.

have to make accountability more clear (by defining roles and decision rights) and to eliminate duplication (sometimes by improving processes).

Resist the urge to standardize every process

Our research affirms the importance of coordinating processes and systems. Yet companies should refrain from standardizing all processes—a solution that is often costly and could make the roles of employees more complex. Three other factors instead appear to matter for processes.

- *Clarity of accountability.* If one of the most important causes of complexity is a failure to clarify accountability, processes can compensate even if structural roles can't be made clear. Consider, for example, a key interface between sales and central manufacturing—an interface where the division of accountability between the two functions is problematic. One solution is to use very clear and integrated processes for transfer pricing and for planning sales and orders. By “clear” we mean defining how, when, and who is involved; how and by whom decisions are made throughout the process; and who arbitrates when a decision can't be reached.
- *Control in key areas.* The few processes that an organization standardizes should underpin its source of value creation; banks, for example, often standardize risk management to ensure effective control. Operating systems are important for some retailers, particularly in sectors where on-the-shelf availability is vital to customers (food retailing, for example). When companies impose standardized control selectively, moreover, they cut the cost of the central bureaucracy to the operating businesses. Indeed, selectivity often inspires companies to reduce or even altogether eliminate processes, and this move can have real impact on the overall ability to manage complexity.
- *Coherence.* Companies can further reduce individual complexity by making sure that the data from a given process can be used for others and that the overall calendar of processes unfolds in an integrated way. Many organizations, for example, capture extra value by running the people-planning process after the strategic-planning one, feeding data from the latter into the former. Companies suffer most from complexity when processes and their supporting IT systems don't communicate.

Build the right capabilities where they matter

Capability building emerged from our research as one of the biggest levers for reducing complexity. After a company examines its organizational design and its processes, building capabilities is the next step. In some cases, the existence of specific capabilities—or their development—may provide

the capacity to increase institutional complexity. The CEO of a global minerals and mining company, for instance, recently decided to strengthen its global functions, particularly operations and marketing. Although he knew that this move would make pivotal roles in the regional businesses more complex, he also realized that the people playing those roles had the capabilities to deal with this change and that their jobs had until then involved very little individual complexity. Clearly, the organization had the capacity to increase its institutional complexity.

Once a company knows where its complexity lies and has used structure and other mechanisms to minimize interaction costs, it must build the capabilities of the individuals who will assume the roles that may be pivotal to managing that complexity, particularly focusing on the ambidextrous capabilities described earlier. To develop them effectively, the company should create a culture that encourages collaboration and initiative taking. This, admittedly, is no simple task, but leaders should at least recognize that without an effective corporate culture, it is hard to build management capabilities, particularly ambidextrous ones.

Changing the architecture

Complex organizations don't always behave in a linear way. Altering cultural, organizational, and operating systems can therefore have unintended consequences that may generate even more complexity.

W. Brian Arthur, an economist at the Santa Fe Institute, uses the story of the jet engine's evolution as an analogy for the challenge. Propeller aircraft were first powered, at the turn of the last century, by a basic combustion engine. Over time, it evolved through countless tweaks to generate more power and let planes fly longer distances faster. Eventually, the engine became so complex that its power output fell. The answer was not to go on tweaking the design but to adopt a new archetype: the jet engine.

The question for organizations is whether accretion—the kind of intervention we have described at the individual level—is sufficient to manage complexity or whether they should consider a new organizational archetype (say, a functional rather than a matrix structure) at the institutional level. Managers should instinctively be wary of major organizational change. McKinsey research has shown that this rarely creates value⁹ and that a company should redesign itself only if it has “compelling evidence that the current structure is suboptimal” and “can't address this shortcoming less invasively.”

⁹ Cathy H. Fraser and Warren L. Strickland, “When organization isn't enough,” *The McKinsey Quarterly*, 2006 Number 1, pp. 9–11.

Yet changing the architecture may sometimes be the only way of dealing with complexity. We have laid out a number of “less invasive” tactics companies can explore by focusing on the individual level: defining accountability, removing duplication, sorting out and streamlining processes, and building skills and capabilities in the right places. But if fundamental issues can’t be addressed at this level, the moment may be right for a bigger rethink.

Complexity is increasingly unavoidable in companies, but the answer is not to pare back and simplify at all costs. Executives should instead try to understand where complexity matters and how to build the right processes, skills, and culture to manage it. Embracing complexity on an institutional and individual level—not just a strategic one—can bring competitive advantage. Companies that understand this concept will create more value than their rivals, become more resilient, and make it harder for others to replicate what they are doing. *Q*

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Suzanne Heywood and **Jessica Spungin** are principals
in McKinsey’s London office, where **David Turnbull** is a consultant. Copyright © 2007
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