

The Virtual, Networked Organization

How One Company Became Transparent

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Virtual teams live in much larger organizations and, as this handbook indicates, depend on collaboration. Indeed, without working together, the literal meaning of *collaborate*, organizations cannot innovate, produce results, or even conduct a proper teleconference. The previous chapters lay out the fundamental practices by which these new groups carry out their daily work. Here we examine the larger context in which virtual teams exist and bring a different perspective to what can be learned from the formal environments that embed them. The oldest, large-scale organizational structure—the hierarchy—may hold powerful insights that can aid the effectiveness of the newest, the subject of this book—the virtual team. What follows is the case study of one company’s experience taking a deep dive into its hierarchical structure, revealing information of immediate use to facilitating virtual working.

Although we have based the story told here on a real company and real people, the identities of both have been disguised in the interest of privacy.

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THE BIRTH OF THE ORGANIZATION

Mike Riverton had a problem: as the first chief executive of Eleum, a large unit of a major global energy player, he was asked to bring together a new organization. The new regional enterprise would comprise the merger of eight country-based companies owned by one of the oldest, biggest, and most successful global businesses. Once operational, the new organization would generate a significant portion of its parent company's multibillion-dollar income.

It would have been easier for Mike to build an organization that was a legal entity. Instead of incorporating a new company with officers, charters, and other paraphernalia associated with corporate endeavors, Mike's charge was to form a virtual organization. Each country-based company would continue to fulfill local country legal requirements; the debits and credits of business would continue to be carried out as if nothing had changed; people would go on receiving their paychecks from the company located in the country where they went to work.

What would change would be the way people carried out their work. Instead of eight human resource departments, there would be one; instead of eight finance departments, one; instead of eight production departments, the heart of the energy business, there would be one. It sounds like the old central model, which people complained about for decades and ultimately led to decentralization of functions. But Eleum would not be the same as the organizations of old. The functions and the organization's project teams would not colocate. Mike's direct reports, for example, would be in three countries stretching across Europe. And it was the same way down the line. Bosses were no longer sitting down the hall from employees, who were no longer eating in the same cafeterias as their colleagues.

Nevertheless, the new enterprise's design on paper looked a lot like any other traditional organization chart (what Europeans call an organigram) with Mike at the top, a senior team of direct reports, and so on down the line. The neatly stacked boxes and vertical lines of authority, however, scarcely reflected the complexity of operating in this new structure.

Eleum is not alone. Many organizations have charts that poorly depict how work is done. And this problem is getting worse as organizations suddenly disperse operations. Many experiments are underway to address the complexity of organizations like Mike's. One popular method is to map people's personal connections, their networks. An organization design approach wildly popular on the Web (think of the FaceBooks and MySpaces), social network analysis is finally

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getting the attention it deserves. With roots that go back decades, this view of organizations draws the lines of personal relationships: familiarity, influence, charisma. People's inner lives—their interests, passions, desires, and visions—are what make us come to work and what make us want to know one another as human beings. However, the personal connections among people, profound as they are, usually are not the starting points for designing new organizations or reorganizing old ones. An organization comes together to do something. Its structure is typically designed around its purpose and not, for the most part, on the basis of who knows whom.

Mike's challenge is a harbinger of the world to come for organizations regardless of size. Whether a global giant with an instantly recognizable logo like Eleum's or a small one working for a cure for cystic fibrosis, organizations need new maps for the new virtual world and many ways to look at themselves. Eleum's story is about those new maps.

LET'S HEAR IT FOR THE HIERARCHY

In the past few years, the fascination with networks has spread from domain to domain. The word *network* was originally a descriptor just for concrete things like airline routes, road systems, and telecommunication webs. For some time now, it has been used more broadly to describe groups of people with connections that cross boundaries.

In 2002, an unusually provocative book, *Linked: The New Science of Networks* brought new thinking about organizations as networks. A quantum physicist, Albert-Laszlo Barabasi, and his scientist colleagues in many fields had been studying the similar properties of diverse networks. Until the past few years, the now-classical scientific view was that the nodes—the key connecting points in networks—distribute randomly according to the familiar bell curve. This implies that most nodes have more or less the same number of links.

Starting with a study of the Web, the physicists found something very different: a remarkably consistent, nonrandom structure in networks across multiple domains—from the parlor game, Six Degrees of Kevin Bacon, to how HIV/AIDS spreads to bacteria in a Petri dish, to the distribution of routers (as well as pages) on the Web itself. What they confirmed is that most nodes in a network have very few links, but the hubs, which are about 20 percent, have very many links.

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The discovery that real networks have hubs—highly connected nodes—brings both good news and bad. On the upside, such a network is much more robust against accidents than one whose nodes are randomly connected and normally distributed, because there are only a few hubs. The negative side is that a network with hubs is more vulnerable to direct attack on these key points since only a few nodes need to be taken out to collapse the whole network. This explains the great interest in such ideas in a post-9/11 world, where the word *network* variously describes terrorists, energy grids, and the spread of viruses.

Provoked further by a May 2003, *Scientific American* article by Barabasi and Eric Bonabeau, we started to wonder whether something else was going on. When people unconsciously use the word *network* to describe their organizations, including those embedded in hierarchies like Mike Riverton's, might they literally be talking about the new organizational structure? Might hierarchies themselves be networks? And if they are, can we make them better and more fit for virtual working? Would organizations reflect the characteristics of scale-free networks?

We had to find out. If we could “see” the networks within the hierarchy, then we would be able to model them. We could apply the tools of the field that has spawned the Barabasis and Bonabeaus of the world the new science of networks—which, as a science, has algorithms, produces findings, and makes it possible to simulate and to optimize. We might be able to design better networks, more suitable organizations that make it easier for people to work across all kinds of virtual boundaries—whether language, time zone, discipline, or corporate border.

MEANWHILE, BACK AT ELEUM . . .

Mike named a program office that engaged hundreds of people in the organization's design. Over nine months, the design team, comprising the best and the brightest, meticulously detailed the requirements of each position, resulting in job descriptions for thousands of slots. Each job was spelled out in detail, even to where the person who occupied it would be situated. Mike also chartered a value-definition exercise to establish the core tenets of the new organization, involving most of those who would work there.

The new organization rolled out in stages, beginning with Mike's filling the first job, CEO, in December 2002. Then Mike and his colleagues defined the next level: approving job descriptions and selecting people to fill those positions. They

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designed and staffed the following level, and so on. When Eleum officially went live in fall 2003, all but a few of five thousand positions in nine functions were staffed. That was when we went back to Mike with our hypothesis.

The premiere strategic consulting company in the world had recommended the new organizational structure that Mike had just launched. Except for the leadership groups that Mike himself intended to pull together (variations on cross-organizational structures he had been trying out for years in prior postings), his new, distributed, border-crossing, truly virtual organization looked remarkably like every other organization chart he had ever seen. When we pointed him to the *Scientific American* article and suggested that the application of network science might produce some insights, the chief executive gave a green light to explore what this might mean.

Strategy as a Network

Rendering an organization as a network requires two things: data and a network mapping tool. First, we tackled how to define the data. Since a network comprises nodes and links, we had to identify their correlates in the organization. Thus, we shifted our focus from the network of people who staff the organization to the network of positions that comprise the organization's structure. In technical terms, positions are interconnected niches in the organizational landscape, jobs that are either occupied or vacant. Every organizational hierarchy is made up of positions connected through lines of authority to every other position. In network science terms, a position is a node, and the reporting relationship is a link.

Second, we had to find, or make, a tool. This proved a bit more complicated and required some development. Simply speaking, we took a hyperbolic viewer—a network modeling tool invented at the fabled Xerox PARC and commercialized by Inxight—and modified it to visualize the organization chart and generate metrics about it.

With the data defined and a tool for testing it in hand, we were ready to model the hierarchy as a network. We figured we could add less accessible maps of relationships later—leadership groups, locations, nationalities, projects, and even service organizations that cross organizational boundaries—and layer them on top of the base hierarchy map.

To gather our sample data, we worked with Patrick Robertson, Eleum's chief of strategy, who was especially interested because of his responsibility for industrial

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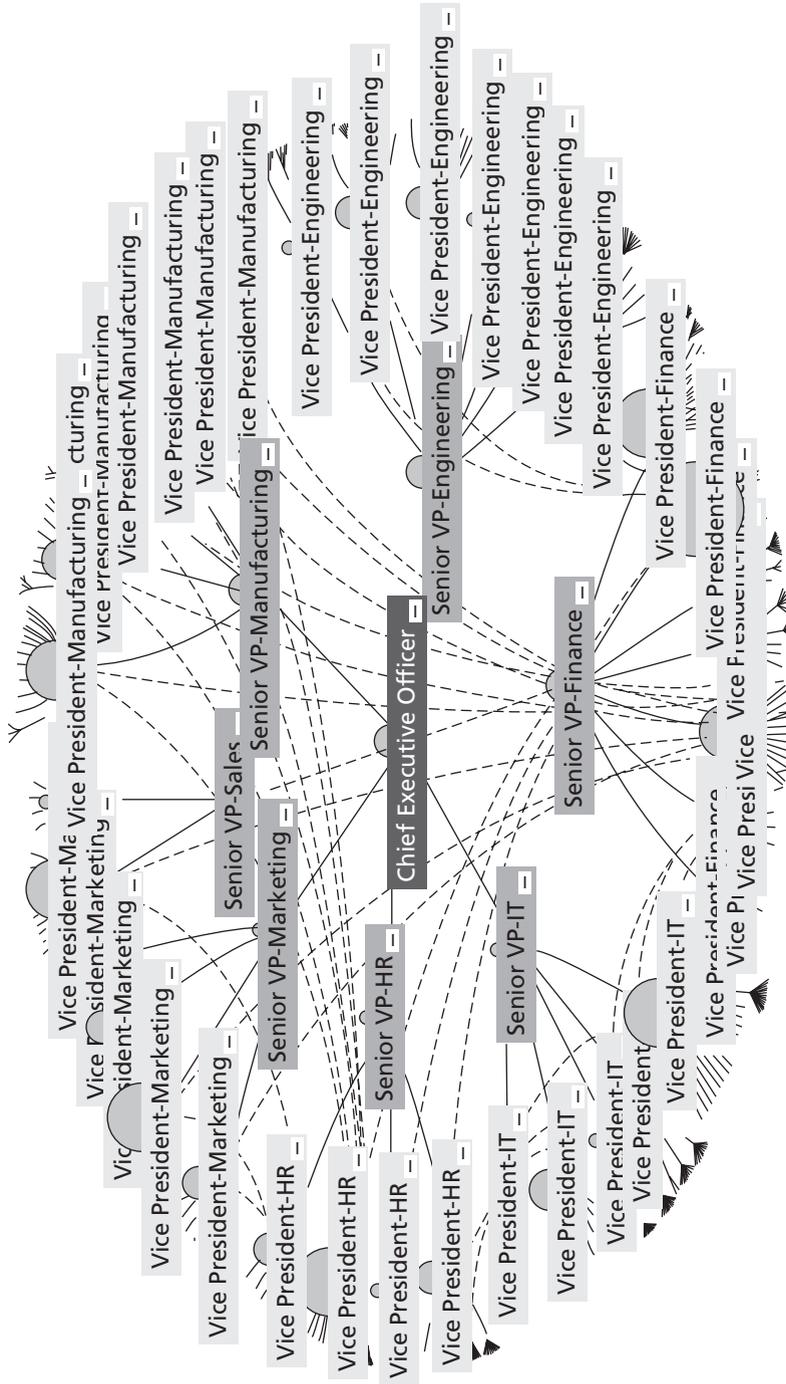
safety. Although his own organization had barely 250 people, Patrick needed thirty separate organization charts to fully represent it. By entering his data into the network mapping tool, we could click and zoom through his whole organization, interconnected and at once.

The results of the strategy department's mapping exercise circulated quickly among Mike's leadership team. The map itself was illuminating, as it quickly became clear that certain positions were more linked than others. At this point, Robin Christopher, the head of organization development, came forward. He suggested that we take data directly from the company's human resource system, housed in SAP. The enterprise-wide database contained exactly the information we needed about positions to allow us to construct a complete map of Eleum. Each position's record included its title, the name of the organizational unit that it belonged to, the name of the person who occupied it, where it was located, and, most critical for our purposes, the position it reported to—a direct link to another position in the data set. From that simple pair-wise relationship, we could construct Eleum's 5000-position organization chart. What would it look like as a network?

It took us a week to process the data and prepare for display. When we finally ran the model, we saw something we had never seen in our quarter-century of work with networks. Crude as it was, the picture that emerged whole out of the myriad data points seemed to be a glimpse of the true face of an organization. The logic of the hierarchy morphed into spidery strands of nodes and links, tracing now-visible patterns of a giant network that could be viewed from afar yet examined in intimate detail. We dubbed our new network mapper "OrgScope" for its ability to render the obscure visible. (See Figure 30.1 for an example data set similar to Eleum's.) In this example, the nodes represent the positions linked by their direct reporting relationships. Simply stated, this is the organization chart shown in an unusual radial orientation rather than the more conventional top-down view, the same logical hierarchy that makes more efficient use of limited display space, whether on paper or a computer screen.

Once we placed every position in the organization in relationship to all the rest on the map, we could test our hypothesis. Did some of the nodes (that is, positions) have more links than the rest? Or did all the positions have approximately the same number of links (that is, reporting relationships)? In other words, did most _____ **Short** _____ people manage about the same number of people? Did most of the managers _____ **Optimal** _____ have an average span of control? We were trying to find out whether there were _____ **Long** _____ hubs in the hierarchy, just like Barabasi discovered.

Figure 30.1
Hierarchy Network with Hubs



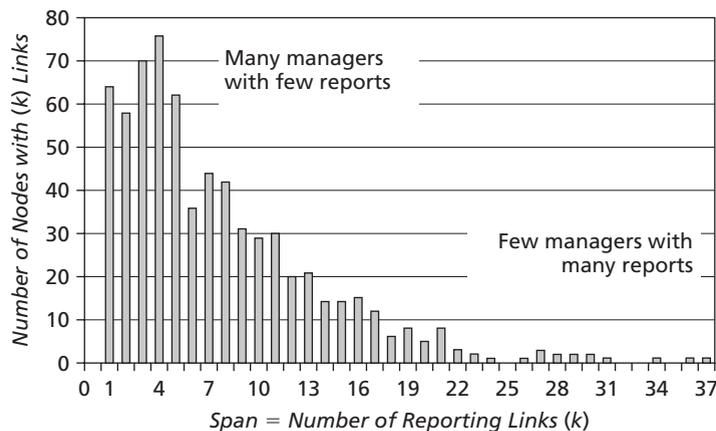
Note: The number of reporting relationships is indicated by the relative size of the wafer next to the hub.

It turned out that in Mike Riverton’s organization, roughly 20 percent of the managers had 80 percent of the people reporting to them, and 80 percent of managers had 20 percent of the people reporting to them (see Figure 30.2). In other words, Mike’s formal hierarchy had the characteristics of a scale-free network. Certain positions—just by the design of the formal hierarchy—were clearly hubs. Although there is a practical limit to how many people could report to one manager, that number in Mike’s organization varied widely, from one to nearly forty. Our guess is, based on our experience at Eleum, that there are seemingly scale-free spans resident in the management of nearly every large organization.

After finding hubs, we took a look at where managers and employees were situated in the organization, that is, how many reporting links away from Mike they were. We thought we would find the classic pyramid, with increasingly more people at each level down the line. Notably, when we asked Patrick how many levels were in the new organization, he said five, by design. According to the numbers? Eight.

Then the next surprise: the organization’s shape, according to the number of positions at each reporting level, was a diamond, not a pyramid. We could see the diamond shape by turning the diagram that distributed the positions by level on

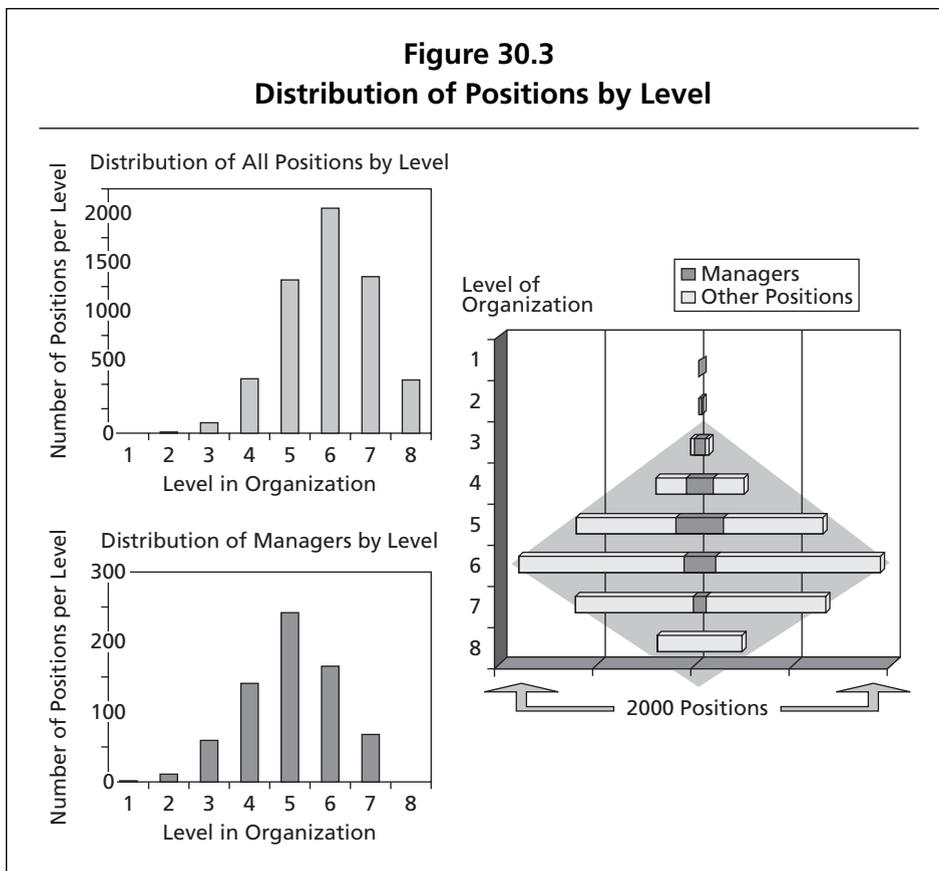
Figure 30.2
The 80/20 Power Law at Eleum



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its side. What looks suspiciously like a normal distribution across levels suggests this different shape may be a common one for large organizations. In Figure 30.3, the organization is arrayed by level from top to bottom, with the CEO at level 1 and the lowest-ranking employee at level 8. The width of each bar indicates the total number of employees, the sum of nonmanagement staff (the light bars) and managers (the dark bars).

At Eleum, the management structure was centered at the fifth level, meaning that level 5 has the largest number of managers, while the largest number of employees was situated at level 6. In fact, there were managers at the fifth level with organizations larger than those of some people reporting directly to Mike. Down deep in the organization, below the waterline of what the people at the top



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could see, a number of people ran very large organizations but were not included in leadership groups.

We presented the first maps at a face-to-face meeting of Mike's entire senior team (with one person calling in by videoconference from northern England). They said they found the pictures both very familiar, like any other organization chart they had seen, and utterly novel. They noticed that some positions had many lines coming into them and others just a few, and the people at the top of the organization (themselves) were not necessarily the ones with the most lines.

At that first meeting, Mike and his leadership team put together a list of questions provoked by the maps:

- What is the distribution of people on the line?
- Where are the hubs? How are they distributed by level?
- What is the impact when matrix reports are added?
- Do we have the right people in the leadership groups?
- Based on results, do we need to change our engagement model?
- How complete is the picture? Do we need to include contractors?
- What is the compelling story about reporting relationships that this has enabled?
- What is the leadership profile at each level?
- What is the shape of our hierarchy? Where is the organizational center of gravity?
- What importance do levels have as an organizing principle?

We continued to explore with them what the maps were telling us. When we looked several levels down, we found additional surprises: the organizational topology was immensely varied, not at all the regular tree structure we typically associate with hierarchies. While some Eleum organizations were relatively flat, others were quite steep. Some were relatively flat for the top few levels and then dropped off into deep crevices at lower depths. Some organizations at the same level were shallow and small, with others relatively large and deeply entrenched.

And to our collective great surprise, hubs showed up throughout the organization—at least according to the data from the SAP system. Eleum's executives wondered whether the data were correct. Maybe, they speculated, the maps were generated by faulty data. But as it turned out, the data, even those used in our first trials, were

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highly accurate: they came from the database used by the human resource that fed the payroll, which required accuracy. Even so, Eleum's commitment to making certain that the information we were using was accurate was so strong that during our data collection period, they carried out two more company-wide efforts to improve it. They also put time into two rounds of identifying the key matrix (dotted-line) relationships. By the time this data washing was complete, we had in hand a benchmark data set to analyze, which would enable us to name and order Eleum's hubs in a context transparent to all.

How Virtual Is Virtual?

Like other organizations working in multiple locations, Mike and his leadership team were considering providing virtual team training across the board. For any company, this is a big undertaking, so we ran the numbers.

Because the location of each position is part of its human resource record, we could tell which managers ran virtual teams. The data revealed that approximately one-third of the formal management teams were in more than one location. This allowed Eleum to target scarce virtual team training at the teams most in need. Even with the bold new cross-border design, people tended to have managers who sat nearby and might be annoyed by a broad-brush campaign that they did not really need.

Our focus on the properties of the management groups led us to the next consideration: the real-world working groups, the true virtual teams that carried out the company's business. Mapping and analyzing all the working groups in the company would have required considerable effort. We started by analyzing one key function that reached across many others: the safety function, Patrick Robertson's original concern. It turned out that this group was very virtual and much larger than the formal organization chart indicated. The safety function, according to the number of employees assigned to that unit, totaled approximately one hundred. When we added in all the nodes in the safety network—including contractors, matrix reporting relationships, and clients—the organization was four times as large. And it was extremely virtual, physically located in "virtually" every Eleum location—dozens in all. Likewise, the matrix reporting relationships were unevenly distributed. Most of the employees—80 percent—had at least two bosses, and 10 percent of those had three or more bosses.

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So What?

What did all this mean to Mike? A lot. Mike's company had facts about its organizational design that it could work with, real data to inform their decisions about creating the most effective structure in virtual times. While metrics provided objective information for diagnosing potential trouble spots and for focusing scarce resources, they also could have an impact on corporate communications.

The new analysis explained why Mike's (and everyone else's) cascade theory of communication was not working. When he wanted to send a message down the line, perhaps about new safety precautions or about business performance, Mike brought together the people at the top, either electronically or face-to-face, and passed along the message, which these people were to pass along to their people. By the time the message got to the part of the organization where most of the managers were—and where most of the people were—valuable time would have passed, with the message being degraded with each transmission, time that in the fast pace of their industry could never be recovered.

So they made changes. They revised their approach so that it was no longer “whisper down the line.” They turned their communication strategy sideways; Mike started to communicate horizontally to the managers—about 20 percent of the organization. In one click, Mike could reach the entire organization. “That worked,” he said. “We were able to get very quick response when we needed it.”

They added people who managed the largest organizations, regardless of their level, to their leadership groups. They added other layers of nodes and links to their hierarchy map, like the safety network, which made it easier for organizations considering redesign to see their true job-to-job working relationships. And by recognizing the actual distributed nature of the organization according to the data—not just people's impressions—they were able to decide objectively where to provide precious resources for virtual team training. Mike made his organization chart transparent and thus much more useful to the people in it.

THE AGE OF THE NETWORK

Organizations like Mike's, ones that are virtual and networked, are coming of age, visible in corporate blueprints that link geographies within and between regions while respecting cultural, economic, and legal realities. People thread through the system at all levels in these new organizations, and teams, often global, usually virtual, are everywhere—from senior executives to frontline employees.

To support the many conversations going on across and within levels of organizations and across organizations, we advocate networked hierarchies, drawing new maps that allow people to see where they are and to whom they are connected. These new images are the orienteers needed to make work and home life simpler, not more difficult, no matter where people are located.

As companies cope with increased complexity, with people situated in more locations—bosses here, employees there, and teams in time zones that are so varied that even a teleconference is impossible unless someone gets up in the middle of the night—the structure of the organization becomes more important than ever before. The new science of networks, until now applied only to the scientific domain or to the social one, reveals important data about how to manage-and thrive—in the twenty-first century.

References

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