A knowledge-based approach to project management for improved organizational performance

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Abstract

The world has become extremely complex and fast-changing, as we are rapidly becoming a global knowledge economy of eight billion minds. This presents both challenges and opportunities.

Traditional business and organizational models impede the flow of knowledge and will not work, especially in large organizations. In order to succeed in this new, global environment, organizations must be able to innovate and learn at a rate equal to or greater than the speed of change in the market. This means achieving greater alignment up, down, and across the entire enterprise.

This paper presents part of an overall conceptual framework whichwas developed over a period of ten years by researchers working on the Enterprise of the Future (enterpriseofthefuture.org), a program within the Institute for Knowledge and Innovation at The George Washington University.

An example of inter-enterprise integration is presented, along with an introduction to the notion of clockspeed. The paper follows with a top-level framework for achieving strategic alignment through better and more rapid knowledge creation and absorption, along with possible implications for project and technology management.

Keywords: strategic alignment; innovation; organizational performance; clockspeed; supply chain; knowledge management; knowledge creation; knowledge absorption.

Introduction

The changes we've seen just in the early part of this century have forever transported us into a new realm. They bring a formidable set of challenges: globalization; increasing disintermediation and complexity; shrinking development cycles; loss of pricing power; massive shifts in consumer and workforce demographics; to name a few.

On top of it all, the speed of change is accelerating. This poses a threat to the very survival of many organizations as old, traditional business models fall by the wayside.

Until now, there has been little help available to respond to these challenges in a systematic way. Competing on a sustained basis in a global, knowledge-based economy demands wholesale changes in the way we live, work and learn. Even how we think, both as individuals and organizations, needs to change dramatically. Some characteristics of this new transformation include the ability to:

- Quickly learn and adapt to changes in the environment
- Find value where others can't
- Make enlightened business decisions
- Quickly and effectively carry out those decisions
- Measure outcomes and make adjustments
- Continuously innovate – driving changes in the market rather than vice versa.

Doing this means dissolving the boundaries typically associated with traditional organizations. From now on, when you think of enterprise, think *ecosystem*. And not just a biological or business ecosystem. Rather, a *total* ecosystem, encompassing business, society, the environment, and now, of course, increasingly "intelligent" machines.

Simply stated, it all boils down to this…

If your speed of change – the rate at which your enterprise innovates and learns – is slower than that of your industry, you're continually falling behind in a vicious cycle.

Eventually you'll be out of business. If you want to succeed and grow, your enterprise needs to change at least as fast as, or faster than, the speed of change in your industry.

This paper provides a simple framework for increasing the speed of innovation and learning in an organization (Murray, 2018). But first, let's take a look at where we are today, in order to get an idea of where things are headed, and what you need to do not only to catch up, but hopefully lead the changes in your market.

1. Raising the bar: business at the speed of thought (almost)

The *Beer Game*,a business supply chain simulation, is in many ways as popular today as when it was first introduced at MIT's Sloan School in the 1960's (different versions are still available through free software downloads). It's based on a scenario in which a beverage retailer, a distributor, and a brewery play supply chain tag while a steady, reliable product named Love's Beer experiences a spike in popularity resulting from an appearance in a hit music video (Senge, 1990).

From beginning to end, the entire simulation spans a period of about six months, which in the '60swas considered to be a reasonable planning horizon. The object of the game is to maximize sales and profits regardless of your position in the supply chain. Although there are a few break-even and winning strategies, most players end up flying their "opportunity" straight into the ground, as orders go unmet and inventory levels pile up just as the popularity of the runaway fad begins to wane.

The simulation teaches the user to see the many intricate connections which make up the complex world of manufacturing and logistics. More importantly, it promotes looking for ways to increase the speed by which a thought becomes an idea which leads to an innovation which becomes a product which, after

working its way through a vast network of transportation, storage, distribution and delivery systems, ultimately results in sales.

As we move into the 21st century, the speed at which the supply chain operates begins to accelerate significantly. For example, in 2003 a beer game-like scenario was being played out across Europe. Only it wasn't a simulation, it was quite real.

In November of that year, Spain's Crown Prince Felipe and a television newscaster named Letizia Ortiz announced their engagement. At the press event, which was televised to the world, the princess-to-be wore a white pants suit. Although rather uncharacteristic for old-world royalty, it generated a wave of excitement among young female viewers.

Seizing the opportunity, a Spanish fashion company named Zara quickly designed, manufactured, marketed, distributed and sold hundreds of look-alike Princess Letizia outfits. In later years, the princess herself could be seen occasionally sporting Zara apparel and accessories, helping to further boost the company's growing popularity.

The following year, as Madonna was launching her "Re-Invention" tour in Europe, one of Zara's designers took note of the megastar's blouse. Within three weeks, Zara had pushed a similar blouse out to its retail outlets. Hundreds were quickly sold, and fans could be seen wearing the blouse at her final concert of the month-long tour.

Now you might think that producing and selling a few hundred pants suits and blouses at one time doesn't really amount to much. That's true, but only if your clock is running in the typical fashion industry cycle of spring, summer, autumn and winter. For Zara, their product cycle is as short as one week (the time it takes for them to cancel a product that isn't selling) to slightly less than a month. Zara replenishes its product line continually and opportunistically, rather than by a fixed, seasonal calendar. This results in customers visiting their 1,800 stores in major cities around the world three times more often than the industry average (Economist, 2005).

1.1 Knowledge creation and absorption in action: discovering and connecting new dots

What do fish, fashion, and the Kalahari Desert have in common? Certainly not much. At least not at first glance. But when you instill a passion for continued rapid innovation and learning, connecting such unlikely dots becomes commonplace.

It so happens that, in addition to fashion, the Spanish love to eat fish. They are second only to the Japanese in per capita fish consumption. And like the Japanese, slowing down the clock by selling frozen fish doesn't cut it. Their fish must be fresh.

The West African coast of Namibia is rich in the favorite and often rare varieties of fish the Spanish crave. But fishing is more an art than a science. And the catch of the day can vary widely, both in terms of variety and volume.The whole process, from net to table, usually takes from 24 to 48 hours.As soon as the net is raised from the side of the fishing boat, it's emptied into the refrigerated cargo hold below.

As the boat heads for port, the skipper is already on a satellite phone, forwarding the details of the catch to Spain-based Caladero, a global fish processor and distributor. As soon as the boat skipper hangs up, Caladero immediately begins soliciting advance orders from its vast network of food stores and retail outlets.

The boat arrives in port at Walvis Bay, Namibia. Since it's nearly 800 miles to the nearest suitable airport, the catch is quickly loaded onto refrigerated trucks with auxiliary fuel tanks needed to cross the scorching Kalahari Desert through Botswana and on to Johannesburg.

At the airport, the fish are loaded into a refrigerated warehouse, awaiting transfer to a Boeing 747 cargo plane. As you might expect, the process isn't always straightforward. Because the catch of the day varies in weight and volume, two critical variables in the world of freight, Caladero always keeps an eye open for other companies that might want to hitch a ride on the daily flight (Sheffi, 2012).

For example, Zara often has to quickly ship mohair and wool, both plentiful in South Africa, to respond to a celebrity "tweet," "like," or other instant trigger which puts the next rapid-turnaround fashion into motion. It's not co-incidental that both Caladero and Zara have major facilities at the 747's final

destination: a massive logistics complex in Zaragoza, a city of about 800,000 inhabitants in the somewhat remote region of Aragón, Spain (Mulligan, 2005).

In a world in which manufacturing is outsourced to countries with the cheapest labor, Zara keeps its manufacturing operations local. To remain competitive the company relies on maintaining a continuous cycle of rapid knowledge creation and absorption. From knowing their customer and always staying one step ahead of emerging trends, to optimizing millions of lines of code that control robots, conveyors, sorting and packaging machinery, Zara moves one million items of clothing daily, drawing from an inventory of about 34 million. That's a monthly turnover of slightly less than 90 percent, an enviable metric in their industry.

Will Zara be able to sustain its agility as competitors respond with their own disruptive innovations? Or will Zara stay one step ahead by continually re-inventing itself? Time will tell.

For now, Zara and Caladero together occupy a mere two percent of the 140 million square feet of space ultimately planned for the Zaragoza complex. Mentally extend that operation out to the remaining 137 million square feet, and you'll begin to appreciate the magnitude and scale of 21st-century logistics.

No matter what industry you're in, if you find yourself complaining about how long it takes to get something done, think about the amazing things happening in Zaragoza. If they can move fresh fish across thousands of miles of roads, desert, and ocean in less than 48 hours, there is no reason why your organization can't reduce your time-to-market cycle by up to fifty percent or more.

2. Enterprise and industry clockspeed

Here we define a key element that makes the fast-learning enterprise different from traditional organizations. While the contrasts are many, the main idea centers on the common themes of innovation(knowledge capture) and learning (knowledge absorption), the speed at which they occur, and their effectiveness.

2.1 A simplified enterprise model

An initial step toward building a knowledge-based enterprise is to express the main concepts and components diagrammatically as models, frameworks, and architectures. Let's start with a simple system flow diagram consisting of inputs, processes and outputs (see Figure 1).

At the center of any enterprise are people. People play a critical role at every point in the value network.
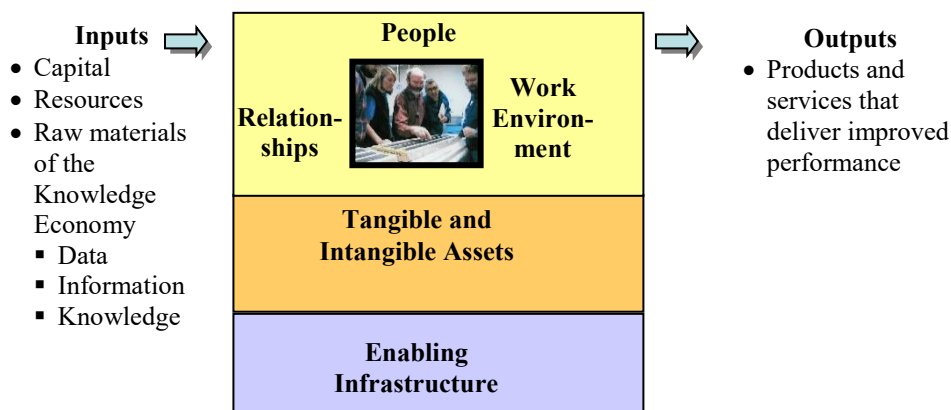

Figure 1. A basic enterprise system flow diagram

Even at points where activity is fully automated, people are involved in the design of the automation

system, monitoring its performance, stepping in when things go wrong, and thinking ahead to what the next generation of that system might look like.

A large percentage of an enterprise's value lies hidden in the relationships which tie everyone together, including clients, suppliers, advisors, stakeholders, and many others. In addition, the work environment you create for your people plays an important role in their performance.

The systems and processes for managing people, tasks and activities form the key assets of the knowledge enterprise. These assets fall into two categories: *tangible* and *intangible*, which are represented by the middle layer in the center of Figure 1. Tangible aspects are quite familiar: real estate, facilities, machinery, equipment, furniture, and the like. Intangible assets, such as intellectual property, brand, etc., which can account for more than eighty percent of an organization's total value, need far greater attention than they traditionally receive.

Aside from a devastating fire or similar catastrophe, you usually don't have to worry about your final assembly building being carted off by a thief in the night. But your intangible assets are another matter.Whether it be the sudden departure of a key employee or a cyber-attack resulting in the compromise of your most valuable trade secrets, these are often the most vulnerable and pose the greatest risk. While tangible asset management has been around for a long time, we are still trying to wrap our arms around the intangible, often not even knowing exactly what those assets are or what to call them.

Holding everything together is the enterprise's infrastructure, represented by the bottom block in Figure 1. Without an enabling infrastructure, the best-designed enterprise is lumbering and inefficient.

Taking a look at the various inputs, the traditional ingredients have been and still continue to be financial capital, natural resources such as air, water and fuel, and other raw materials feeding the production, packaging and delivery of finished goods. However, attention must now be given to the intangible raw materials of the knowledge economy: data, information and knowledge.

Like any system, when inputs are fed through and processed by the various elements of the enterprise, output products and services are produced, delivered and supported. Sustained success is determined by the value the market believes it is receiving for the enterprise's output. For a consumer it could mean a more comfortable lifestyle, or better health and well-being, all of which come from increased knowledge. For an enterprise, the perceived value is likely to focus on improvements in top and bottom line performance, improved chances for mission success, market growth, and the like.

Let's examine how these elements combine to perform the two of the most critical activities of a knowledge enterprise: knowledge creationand knowledge absorption.

2.2 Knowledge creation

While much of the attention in building knowledge enterprises is focused on aspects related to learning, such as *the learning organization*, we've recently seen increased emphasis on innovation and discovery. Both learning and innovation are equally important. Learning, i.e., knowledge absorption, can be viewed as looking in the rear-view mirror and adjusting accordingly. Innovation,i.e., the creation of new knowledge, can be thought of as turning off the GPS and plowing new ground.

One of the reasons innovation often takes a back seat to learning is that learning usually occurs as the result of the successes and failures of others. In other words, someone else has already taken the risk. Creating new knowledge usually requires embracing risk and accepting failure, albeit in a managed (as opposed to chaotic) way. The estimation that over 95 percent of attempted product innovations fail doesn't help matters, especially in cultures prone to punish, rather than learn from, failure (Nobel, 2011).

Back when things moved more slowly, many organizations applied the successful strategy of sitting back and watching others take the arrows. This meant creating knowledge by observing which innovations in their industry were gaining traction. They would then adopt those innovations while riding the uptrend. But given the growing number of companies performing at the level of Zara, the game of playing catch-up is growing ever more difficult.

So what's an organization to do? It may sound mundane, but the first step is to change the mindset of your workforce regarding innovation. One way to do this is to provide a safe proving ground where new ideas can be developed and tested. The more promising ideas can continue to advance in stages, while

failures are treated as learning experiences which benefit the entire enterprise. This is how the most valuable knowledge is often created.

2.3 Knowledge absorption

Learning is meaningless unless the lessons being learned are correctly *applied*. It's a continuous process, but it can be extremely difficult to implement in practice.As business author Frank Sonnenberg writes: "Lessons in life will be repeated until they are learned" (Sonnenberg, 2017). This is the essence of knowledge absorption.

For example, during an economic downturn, fear often takes over. Training budgets are among the first items to get slashed. This slows down the speed of knowledge absorption. Mistakes are repeated, making things even worse. In its most basic form, knowledge absorption consists of asking a few very basic questions…

What was done, when, and by whom? What was the result? What worked and why? What didn't work and why not? How can it be done better next time?

Repeatedly asking these five questions and putting the answers into a format than can be easily accessed and retrieved will substantially improve your organization's ability to reduce the number of, and time wasted from, repeated errors and redundant efforts.

2.4 Clockspeed

Understanding clockspeed is the key to designing and implementing the right knowledge creation and absorption strategies for your enterprise.

The notion of clockspeed was introduced into the mainstream in the late 1990s by MIT Sloan School professor Charles Fine.Fine's work covers several types of clockspeed. These include product clockspeed, process clockspeed, and organization clockspeed (Fine 1998).

Product clockspeed refers to the time between successive generations of a product family. This is a crucial aspect in many industries, especially consumer electronics, medical devices, and clothing.

Process clockspeed can vary significantly, ranging from periods of relative stability on one hand, to wild price and volume variations on the other. Organizations that do not continuously review and update their processes – at least at the same rate as the changes driving the value of their products and services – will suffer steady erosion of both profits and market share.

Organizational clockspeed covers everything from changes in the C-suite to ownership changes to complete business model re-design. For organizations closely linked to government, changes in heads of state, legislative bodies, or the judiciary can have equally significant impact.

For our purposes, *industry clockspeed*(see top of Figure 2) is the aggregate speed of change in your industry or market segment. It takes into account all three areas of product, process, and organization. On one end of the spectrum you have the decades-long clockspeed of highway construction and jet aircraft. On the other end, entertainment and consumer electronics. In today's complex world, industry clockspeed is driven by changes not only in technology, but in society, politics, and the environment as well.

Figure 2. Comparing enterprise and industry clockspeed
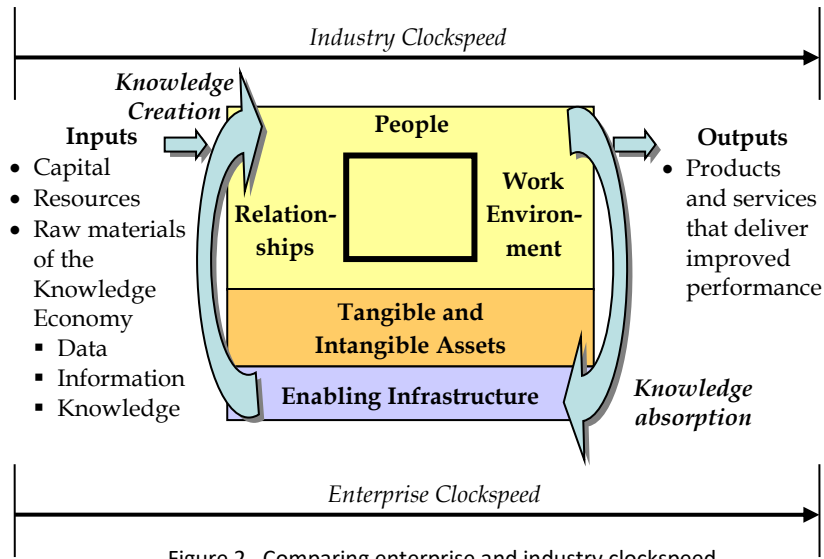
While industry clockspeed focuses primarily on external factors, *enterprise clockspeed* represents the speed at which an enterprise innovates and learns (see middle and bottom of Figure 2).

Although these will vary somewhat, some key elements which drive enterprise clockspeed include:
- Product development cycle times

- Design pipeline

- Employee engagement and turnover

- Learning rate (including ability to scale)

- External workforce characteristics such as:

  o Unemployment rate

  o Number of skilled workers.

As was mentioned earlier, be sure to keep in mind the following:

T*he speed at which your enterprise innovates and learns must be equal to or greater than the speed of change in the market.*

A note of caution: Because of the complexity of the many variables involved, Fine strongly advises against placing too much effort in coming up with hard numbers or metrics relating to clockspeed. Rather, it is more important to view clockspeed on a relative basis. In other words, it's more important to know if you are keeping pace or falling behind, rather than attempting to measure the precise rate of change.

With an improved understanding of clockspeed as a backdrop, we've set the stage for building a framework by which you can identify and manage the key elements which drive the speed of knowledge creation and absorptionwithin your enterprise.

3. A framework for strategic alignment

In order to understand strategic alignment, we first need a definition of strategy. Simply stated: *strategy consists of the guiding principles which define how an enterprise will meet its goals and objectives and achieve its mission.*

Strategy used to be synonymous with "long-term." Strategic plans spanning several decades were not uncommon, even in the recent past. But as industry clockspeeds began to accelerate, planning horizons dwindled. Now most organizations revisit their strategies annually, or more frequently if necessary. Having sufficient agility to change strategic direction can only exist in organizations where communications are clear and timely, and localized goals are closely aligned with strategic goals.

For any enterprise, achieving tight integration across internal and external components is a must. Former Procter & Gamble Chairman and CEO A. G. Lafley and Rotman School of Management Dean Roger L. Martin emphasize the importance not only of alignment but prioritization by: *clearly defining success; playing to your strengths; playing only where winning is possible*; *managing what matters* (Lafley and Martin, 2013).

Sustained performance simply isn't possible if there are gaps between the many organizational and infrastructure elements involved. These include business models, information and knowledge flows, human capital, research and development, marketing and sales, customer support, finance and accounting, physical plant and equipment, and intellectual property protection. Indeed, all of the elements of an enterprise, which have typically operated under their own separate processes and systems, need to perform as an integrated whole. This presents a significant management challenge.

When Bill Walsh took over as head coach of the last-place San Francisco 49'ers professional football team in the USA in 1979, he didn't instill a winning attitude and the goal of attaining the Super Bowl championship only in the players and coaches. Everybody, including the receptionists and janitorial staff, had to be on board. And it worked, as they proceeded to win three of their trips to the Super Bowl (Walsh, 2009).

A leader's greatest challenge is figuring out how to make strategic business decisions without restricting the organization's agility. This means maintaining close coupling up, down and across the organization. For example, if an organization chooses a product innovation strategy, it needs to understand the key performance drivers needed to support that strategy. In the case of the *3M Company* for example, rapid concept-to-market cycles are a key performance driver.

The underlying core capabilities needed to achieve the desired level of performance also need to be understood. These core capabilities must be woven tightly together, starting with R&D, and running through design, manufacturing, supply chain logistics, marketing, sales and support. Finally, the processes for managing the primary intellectual assets (human, social, structural and organizational) which enable rapid innovation and learning must be thoroughly understood and well-managed.

Figure 3 illustrates a framework for achieving such coupling, based on the notion of strategic alignment, in which a strategy is developed top-down, and the execution occurs from the bottom-up. Our experience has shown that the more closely these nine layers are aligned, the better the chance of successfully planning and executing a strategy, and making rapid adjustments as conditions change. A brief description of each layer follows.

Vision. As a leader, the place to start before planning any strategy is the vision for your enterprise. A vision is: *a description of the future you are trying to co-create*. Some examples of vision include:
- A world shaken by radical new technologies, such as:
    - producing living organisms in the laboratory
    - non-invasive surgery by nanorobots
    - dramatically increased lifespan through gene therapy and epigenetics
- Billions of people in developing countries coming online and having access to world markets
- New breakthroughs that will provide cheap, inexhaustible supplies of energy
- Mining and exploration colonies on Mars.

Mission. Having painted the vision, your next step is to *clearly and succinctly define the impact your enterprise will have on the world.* Examples include:
- "Preserving and improving human life."
- "A cure for cancer within our lifetime"
- The ability to travel anywhere on the globe in four hours or less.

Vision: *What the world you are trying to co-create will look like*

Mission: *The impact you will have on the world*

Strategic Goals: *The ultimate results you want to deliver, and the kind of organization you wish to become*

Strategic Objectives: *Measurable steps along the way – how you will know how close you are to achieving your strategic goals*

Master Strategy: *How you will align and focus your resources in order to achieve your strategic goals and objectives*

Performance Drivers: *The critical factors in your organization that will make the difference between success and failure*

Core Capabilities: *The ability of your organization to consistently produce a specific result*

Key Process Areas: *The most efficient and effective aggregation of people and work processes which consistently delivers the desired capability*

Key Enablers: *Methods, practices and technology infrastructure that enable sustaining high levels of performance*

Human & Social Capital

Organizational & Structural Capital

Figure 3. Strategic flow-down from vision to key enablers[7]

<u>Strategic Goals</u>. *Your strategic goals capture, in a measurable way, the end results you want to deliver to your clients, and the kind of enterprise you wish to become*. On the external side, client-centric strategic goalsclearly state the primary benefits clients receive from doing business with you. Internal goals may be more employee- and/or stakeholder-oriented, such as being recognized as one of the "*Top 50 Best Places to Work*," or making the "*Fast-Growth 100*" list. In either case, they should answer the question, "*Why would someone deal with you instead of your competitor?*"

A strategic goal should be anchored around one or two key elements. It could be size, measure of quality, or strategic positioning in the marketplace, to name a few. Two well-known client-oriented examples are:
- "*Delivered to your door within 30 minutes or it's free*"
- "*When it absolutely, positively has to be there*."

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[7] This framework was adapted from a four-tiered model developed by Accenture (Robert J. Thomas, Peter Cheese, James M. Benton, *Human Capital Development*, Accenture Research Note, November 1, 2003) and expanded to nine levels.

<u>Strategic Objectives</u>. *Your strategic objectives define how you are going to accomplish your goals.* For example, a strategic goal might be to become a billion-dollar company. In order to get there, depending upon where you're starting from, you may have to increase sales by fifty percent every year for the next seven years.

Strategic objectives and strategy are closely linked. One might drive the other and vice versa. For example, in a product-oriented strategy, a sales target of $1B might require a significant investment in R&D and marketing. Or the targeted sales growth might be achieved through acquisition.

Strategic objectives are measurable, and should stipulate a time frame. Examples include:
- Revenue growth of 50% per year over the next seven years
- Two new acquisitions per year
- Four new product innovations per year
- Become one of the "top five" in market share within five years.

<u>Master Strategy</u>. *Your master strategyis a clear, understandable statement of how you will align and focus your resources in order to achieve your strategic goals and objectives.* Master strategies are usually made up of one or more sub-strategies. Some master strategy examples include:
- Market domination through competitive pricing and value chain optimization
- Growth through acquisition
- Pre-eminence through world-class expertise and client education
- Gaining maximum leverage through strategic alliances.

Examples of sub-strategies which support the master strategy include:
- Marketing
  - Social networking
  - Saturation advertising
- Sales
  - Point-of-sale up-selling/cross-selling
  - Competitive pricing
- Product innovation
  - Planned product obsolescence in 2-year cycles
- Financial
  - Leveraged buy-outs
  - Licensing
- Human capital
  - 80 hours of specialized training annually
- Customer service
  - A real person answers the phone within two rings, 24/7/365
- Quality
  - Six-sigma, with advancement to seven-sigma.

<u>Performance Drivers</u>. *Your organization's performance driversare the primary factors that make the difference between success and failure in achieving your strategic goals and objectives.* For example, if your mission is speed-oriented, such as "*absolutely, positively by 10:00 a.m.,*" or "*delivered in 30 minutes or it's free,*" then your performance drivers should be speed-oriented as well. In this case, the performance demands will be focused on the logistics of preparation, packaging, and delivery.

Likewise, if your primary marketing message is "*if you are dissatisfied for any reason, return the product for a full refund,*" then your major performance drivers will be quality-oriented. A low-price strategy such as Wal-Mart's places huge performance demands on supply-chain systems. Other examples of performance drivers include:
- Consistency
- Efficiency
- Accuracy

- Responsiveness
- Cost control
- Reliability
- Availability
- Asset utilization
- Superior technical support.

Note that since *measurement* is a major contributor to successful project management, selection of the right performance drivers is essential.

Core Capabilities. *Your core capabilities arethe underlying competencies and capacities for producing the results you are promising to deliver*. We divide these into two areas: competency-focused capabilities (*human and social capital*); capacity-oriented capabilities (*organizational and structural capital*).

Examples of human and social capital include:

- Fully certified and accredited support staff
- Fluency in the native languages of our major clients
- Personalized service
- Recognized top experts in the field.

Examples of organizational and structural capital include:

- State-of-the-art testing laboratory
- Mobile showroom
- Electronic Data Interchange (EDI) and other supply-chain infrastructure
- Just-in-time inventory system
- Fully integrated design and production facility
- 24/7/365 call center.

Key Process Areas. We've now "drilled down" far enough to reach the point at which the work is actually performed. We define *work* as the activity that needs to occur in order to produce a specific result. *Work processes*are repeatable models of that activity. The activity can be performed by humans, machines, or both. The goal is to seek the most efficient and effective aggregation of people and work processes which consistently delivers the desired results.

Examples of human and social capital-intensive work processes include:

- Recruitment, hiring and retention
- Sub-contract management
- Relationship management
- Leadership development
- Training and certification.

Examples of organizational and structural capital-intensive work processes include:

- Proposal preparation
- Product life cycle management
- Project management
- Quality management
- Agile development and/or manufacturing.

Key Enablers. Key enablers are: *the methods, practices, and underlying technologies which support the execution of work processes in the most efficient and effective manner possible*. We define *methods* as repeatable formulas, algorithms, rules, techniques, or behaviors underlying a work process. Simply stated, the discovery of a more efficient algorithm, or a more complete set of business rules, could increase the efficiency and effectiveness of a given work process. Examples of methods include:

- Data mining algorithms
- Social media discourse monitoring and response systems
- Source selection methodologies
- Balanced scorecards.

A *practice* is the actual application of a work process within a given organizational context. Examples of practices include:

- Interviewing techniques
- Welcoming/onboarding new employees/associates
- Capturing and sharing lessons learned
- Guidelines for participating in a community of practice.

By technologies we mean tools, techniques and infrastructure that enable efficient and effective performance. Examples of technologies include:

- Platforms
- Data lakes/warehouses
- Virtual/augmented reality
- Mobility
- AI/robotics
- Data analytics and digital dashboards.

3.1 Improving alignment by unclogging the knowledge pipeline

By now it should be clear that in order to achieve high-speed innovation and learning, knowledge needs to flow unimpeded throughout the enterprise. The growing volume of information we have to contend with can slow things down to a crawl. Added complexity pushes back against the demand for faster response. In order to meet this challenge, knowledge must be allowed to flow quickly and easily throughout the enterprise, increasing in value at each step along the way.

All too often, the knowledge pipeline becomes clogged. The natural tendency for organizations to break up into silos is a commonly accepted reason for impeded knowledge flows. However, if we look a little deeper we find that even if organizational barriers are removed, knowledge still doesn't flow as freely as we would like. This is due to a condition we call *misalignment*.

We define misalignment as the condition whereby effective and timely communication is impeded. Within this context, we define communication as: *the process by which actionable information is transmitted by one agent and received by another* (Newman and Murray, 2010). Note that we use the word *agent* to account for humans, organizations and machines, since many activities leading up to critical decisions are performed by individuals, technologies, or systems consisting of both.

Misalignment often shows up when departments such as contracting, finance, HR, marketing and IT all need to be involved in an activity such as a joint problem-solving session. A large part of what makes managing knowledge flows so difficult comes from the many different perspectives and vocabularies among the agents which are communicating.

Consider, for example, the need for eliciting inputs for developing and marketing a new product from subject matter experts, software developers, users, and procurement officers. These inputs will be viewed by some in terms of functional capability, by others in terms of system design features and parameters, and by others in terms of costs, performance results, or outcomes. A supposedly simple notion of requirements ends up having many different meanings, depending upon the perspective of each of the parties involved. Unfortunately, such differences may not be discovered until after-the-fact, when a so-called "solution" is delivered only to be sent back to the drawing board at significant additional cost.

Differences in the knowledge, skills and abilities of people and their systems (especially databases) further contribute to misalignment. A familiar example of this occurs when experts attempt to transfer their knowledge to novices.This condition is often exacerbated when organizations attempt to force communications into a rigid template. Valuable context is lost by being squeezed through the narrow aperture of a single perspective.

An enterprise striving to achieve fast innovation and learning must focus on alignment from the outset: from planning to execution, from forming a team to developing requirements, and for all related problem-solving and decision-making activity. This especially applies when forming project teams. Don't leave essential people out because they might not fit in. At the same time, you can't drop a detail-oriented

accountant or engineer into a room with a group of impatient sales-driven marketing execs and expect a smooth transfer of knowledge. A facilitator needs to be added to the mix in order to help close the semantic divide.

Make sure your project team is facilitated by someone with the necessary soft skills to keep the conversation open and honest, with everyone contributing. This is where the "soft skills" of facilitation come into play. Skilled facilitators can pull the subject matter experts out of their silos, helping to build and grow a more unified brain trust. The biggest challenge is avoiding the temptation of trying to find the *least common denominator*, resulting in a subpar outcome.

Finally, misalignment directly translates into increased risk exposure. Not paying close attention to alignment means unnecessarily exposing your enterprise to adverse cost, schedule, and performance impacts.

4. Conclusions

4.1 Implications for project and technology management
A key aspect of project management is identifying and assigning resources. Understanding how the key elements in your organization align strategically means you can focus on what's most important, and gain the greatest leverage from the resources you have, including your IT infrastructure. By taking a knowledge-centric view of your organization, you can more clearly identify the decision points in your key processes, where the application of knowledge is vital to success. In an environment where time is of the essence and resources are constrained, the application of the Pareto Principle, or "80/20 Rule," is more important than ever.

The strategic alignment framework supports increased performance through better measurement and tracking. When key organizational components are aligned, it becomes easier to measure the contribution of each element to the overall performance of the enterprise. Likewise, the full extent of the impact of interventions on work processes, people, and financial metrics such as cash flow, can be more accurately estimated and verified.

The added emphasis on rapid knowledge creation and absorption places additional demands on the skills of the traditional project manager. Because of added speed and complexity, soft skills such as communication, facilitation, negotiation, are more important than ever.

4.2 Anticipated results

Empirical validation of frameworks is often problematic. Every organization is different, with its own context, culture, geography and makeup. In addition, it is impractical to set up experiments in which all but a few variables can be assumed away or held as fixed controls. However, we can formulate expected results based on plausible rationale, and make periodic observations over the long term to look for either confirmation, dis-confirmation, or non-conformation.Some expected results are discussed below. Any one of these changes alone will noticeably improve top and/or bottom line performance.

Because greater strategic alignment brings increased collaboration, one can expect an enterprise to improve in its ability to more quickly and effectively respond to and co-create new business opportunities. Given faster decision cycles and improved decision quality, the ensuing increases in knowledge worker productivity should result in increased overall competitiveness. The same goes for increased return on IT investment through more tightly aligned work processes, culture and enterprise architecture.

Growth in relative market value should result from improved development, application, and expansion of key intellectual assets. Improved learning and better decision-makingtend to reduce risk, costs, and liability due to errors. Streamlined, rapidly self-organizing collaborative processes should greatly increase your organization's ability to quickly respond to, and even lead, major changes in your market.

Another expected result is the improved ability to overcome cultural barriers which inhibit execution and resist change. Cultural resistance is difficult to overcome, especially in older organizations. As organizations mature, the original energy behind the founders' vision has long since dissipated, replaced

by localized goals and objectives. By reconnecting work processes with the overall strategy, the workforce begins to recapture the big picture, and shifts its focus to the achievement of the "greater goal."

Leading an agile, global, virtual enterprise requires a new brand of leadership, one which continually reinvents itself. The leader of such an enterprise uses every available tool, technique and practice to monitor and anticipate marketplace trends, identify value gaps and opportunities, formulate and execute the right strategy, and adjust accordingly.

In attempting to bring these various elements together, project and technology management have become an essential part of today's knowledge-based enterprise. However, traditional project management methods such as critical path are not enough. Knowledge flows, i.e., the creation and absorption of knowledge both within and across various projects and programs, must now occupy equal attention.

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