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Jean Phillips and Stan Gully, *Editors*

Designing Creative High Power Teams and Organizations

Beyond Leadership

Eric W. Stein

BEP BUSINESS EXPERT PRESS

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I dedicate this book to the memory of two of my mentors and giants of social systems thinking that I had the opportunity to work with while at the Wharton School of the University of Pennsylvania: C. West Churchman and Russell Ackoff.

Abstract

The very best firms today are poietic organizations; that is, they are exceptional at streamlining the processes of ideation, creation, and production. Toward that end, poietic organizations do two things well: (1) they design and develop high power teams, and (2) they create an organizational culture and context that supports improvisation, design, experimentation, aesthetic awareness, and strengths development.

Great teams exhibit the same characteristics: trust, commitment, and energy. The first half of this book shows the reader how to assess team member strengths using personality factors and multiple intelligences theory. Following the assessments, the book illustrates how to best represent and share this information to promote team development. Three types of high performance teams are examined: improvisational teams, design teams, and research teams.

The second half of this book examines the major models and images upon which organizations are constructed, and the pros and cons of these choices. Next, we look at the rise of the poietic organization and its characteristics; that is, ones that innovate on a frequent basis. The differences between ordinary organizations and poietic organizations are highlighted, and why being a poietic organization confers competitive advantage. Finally, we look at ways to transform your organization into a poietic organization.

In summary, this book is about how to design and develop creative high power teams and organizations, and explains why some firms lead the way to blue oceans while others languish in red seas.

Keywords

aesthetics, business, change, design, development, experimentation, human resources, improvisation, innovation, leadership, learning, management, organizations, poiesis, strategy, strengths, teams, transformation

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Preface

> *Leaders must encourage their organizations to dance to forms of music yet to be heard.*
>
> —Warren G. Bennis, leadership scholar and author

This book is about developing creative high power teams and organizations. Great teams grow out of a solid foundation of *creativity*, *trust*, *knowledge*, *commitment*, *and leadership*. Great organizations are built from metaphors appropriate to the world we live in. Not based on the images of machines or organisms, great organizations are built on the view of the organization as a *community of practice for performance*, *design*, *and creation*. This is the focus of the book.

Those interested in developing personal and professional creativity are referred to my book *Fostering Creativity in Self and the Organization: Your Professional Edge*, which is also available from Business Expert Press. The reader will find further resources on these topics at ideasmethod.com, which covers material from both of my books and the author's website (ericwstein.com).

Acknowledgments

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Special thanks to Joy Field of Boston College for leading me to Scott Isenberg of Business Expert Press. Many thanks to Scott for getting my proposal to the right people at Business Expert Press and special thanks to David Parker for giving this project the green light. Special thanks to Destiny Hadley and the Exeter Team for a job well done on the production of my first book, as well as collection editors, Jean Phillips and Stan Gully for their constructive feedback on this manuscript and *Fostering Creativity*, my first book with Business Expert Press. I also want to thank Stewart Mattson for embracing new methods of delivering and marketing content at BEP.

My appreciation for those who have inspired me by building great, creative communities of practice that have had a huge impact on the world: Jeff Bezos, Steve Jobs, Elon Musk, and many others. To all who have contributed to this conversation, past, present, and future, thank you.

CHAPTER 1

Introduction

> *Coming together is a beginning. Keeping together is progress. Working together is success.*
>
> —Henry Ford, American industrialist, 1863–1947

> *Individual commitment to a group effort—that is what makes a team work, a company work, a society work, a civilization work.*
>
> —Vince Lombardi, American football coach, 1913–1970

The Rise of the Poietic Organization

Apple, Google, Facebook, PayPal, and Amazon have all dramatically changed the basis for competition by unveiling game-changing products and services, new methods of bringing goods to market, and great design. We are interested in how these great organizations, through organizational design and by leveraging the power of IDEAS (improvisational capacity, design proficiency, experimentation, aesthetic awareness, and strengths[1]), have developed creative high-performance teams and workplaces; that is, how they maximize *poiesis.*[2]

Poiesis is the Greek word for production and creation, or simply "to make." What is distinctive about *poietic organizations* is that they fully master three types of knowledge, which are illustrated in Figure 1.1.

- *Theoria* pertains to knowledge accruing from a study of the natural world.
- *Praxis* pertains to knowledge of the world of action and practice (e.g., medicine).
- *Techne* pertains to knowledge about the creation of art or craft.

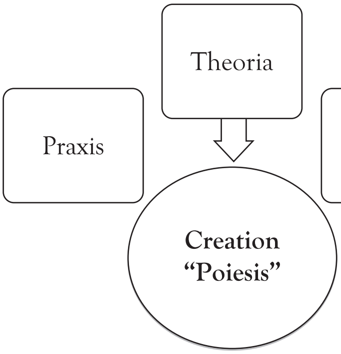


Figure 1.1 Knowledge essential to creativity and production

Poietic organizations learn to apply all three types of knowledge (theory, practice, and craft) in the production of innovative products and services. They invest in the domains of knowledge listed in Table 1.1 in order to excel at what they do.

For example, it has been shown that *improvisational models* from jazz are relevant to new product development. Much more so than "making due," improvising organizations leverage existing processes and procedures by learning to adapt and modify them to changing conditions. Companies such as Nest, Virgin Air, OXO, and Apple take advantage of the power of *design* to craft award-winning, highly differentiated products and services that are hard to imitate. They are very aware of the role of aesthetics in product and even workplace design. They embrace new emerging models of organization that tolerate uncertainty, duality, creativity, and even chaos. *Experimentation* is the cornerstone of science, but poietic organizations also use *experimentation* and *tinkering* to learn.

Poietic organizations also leverage core competencies (Prahalad and Hamel 1990) in science, technologies, and systems to their benefit. They are adept at managing change, embracing processes of transformation, building superior teams, and reinventing themselves. By making these investments in their knowledge base, they consequently excel at production and creation. At the individual level, they help their employees to realize their creative potential; that is, to become creators. They then pair creators with great managers, leaders, and *knowledge workers* (i.e., those who infuse teams with new data, information, and knowledge) to create

Table 1.1 Knowledge essential to organizational creativity and production[3]

Creation and production (poiesis)		
Practice	**Theory**	**Craft**
• Managing • Leading • Decision making	• Scientific methods/theory • Systems and organization theory • Theories of human potential	• Improvisation • Design • Experimentation • Aesthetics
Strengths and core competencies		

great teams. The purpose of this book then is to focus on how to transform your team and organization to compete with these top creative companies.

Competitive Advantages of the Poietic Organization

Poietic organizations have several competitive advantages over others. Consider the primary ways that businesses compete: cut costs or increase revenues. This insight derives from the equation fundamental to all businesses:

Profits = Revenues – Costs

These generic competitive strategies were first articulated by Michael Porter in the 1980s. In his model, a firm assumes either overall cost leadership or differentiation (Porter 1980, 34–46). Cost leadership requires paying attention to business processes and resource management. Differentiation requires attention to marketing and enhancing the overall *value* of the product or service. This is accomplished by increasing the *quality*, *aesthetics*, *functionality*, or *flexibility* of the product or service. Kim and Mauborgne (2005) take these concepts further by suggesting that companies can differentiate and cut costs at the same time. They offer some very useful tools such as the *Strategy Canvas* for mapping out how to simultaneously eliminate or reduce high-cost components of the product or service, while at the same time increasing or adding new dimensions of value. Poietic organizations are highly effective at implementing these concepts.

Let's look at the iPhone as an example. To begin, Apple began by increasing the overall quality of mobile phones. During design and development, Apple also increased and paid close attention to aesthetics and the look and feel of the phone in customer's hand. It is elegant and makes a fashion statement. Apple also added a new component of value to go along with the phone: Apple Store support, which distinguished Apple from its Android smartphone competitors such as Samsung, Nokia, and others.

Beyond its ability to make phone calls and send text messages, what makes most smartphones exceptional are the multitude of apps that can be downloaded to the device by consumers, a concept introduced by Apple. Hundreds of thousands of apps are available that can turn the phone into everything from a browser to a shopping tool to a carpenter's level to a radio to a GPS device to a game machine. Consumers love choice and smartphones provide it. In short, they deliver value and buyers are willing to pay more for these features. The iPhone is therefore not a budget item and the product of a low-cost/low-price strategy. Apple charges premium prices for most of its products. Interestingly, despite the quality of Apple products, Apple has fine-tuned its supply chain and invested heavily in advanced manufacturing technologies to reduce its production costs at the same time.[4]

For Apple to differentiate its products and services required an understanding of *aesthetics*, which concerns itself with an appreciation of form (from the perspective of the consumer). Aesthetics goes hand in hand with *design*, which considers both form and function (from the perspective of the designer). By function, we mean, "What kind of experience is created for the user?" To create the best designs, Apple *empathizes* with its users. Designing its products and services required flexibility, adaptability, and the ability to *improvise* and *experiment*. Great design companies like Apple learn from their mistakes and move on to the next iteration of the product or service. They take risks.

So this book is about how to restructure your organization like a *poietic organization* to leverage the creativity needed to differentiate products or services and thereby raise the value proposition. That same creativity can be mobilized to dramatically improve the operations side of an organization as well. Amazon is a terrific example of a company that redefined methods of distribution that are now copied by all major retailers who are desperately trying to catch up.[5]

How This Book Is Organized

This book is structured in the following way. In Chapters 2 and 3, we examine the general characteristics of high power teams and introduce ways to assess teams and help them to develop. In Chapter 4, we examine the power of roles as a part of team design. In Chapters 5 through 7, we look at the unique characteristics of high power improvisational, design, and research teams.

In the latter half of the book (Chapters 8–11), we bump up to the systemwide, organizational level to examine the characteristics of different types of organizations, models of organizations, methods of transformation, the emergence of *poietic organizations*, and new methods of organizational transformation.

Readers interested in team development can focus on the first half of the book. Those interested in change at the organizational level can jump to the second half. However, in order to get the complete picture, readers are advised to read the entire work.

Creative Organizations Require Creative People

In the companion book to this one *Fostering Creativity in Self and the Organization: Your Professional Edge*,[6] I explored five essential creative skills for 21st century professionals:

- Improvisational capacity
- Design proficiency
- Experimental and scientific thinking
- Aesthetic awareness
- Cognitive, kinesthetic, interpersonal, and emotional strengths.

These five qualities, which are easily remembered as IDEAS, are defined as follows:

1. ***Improvisation*** is the ability to make effective real-time decisions in new and complex situations using current information and appropriately chosen (or modified) routines, scripts, and patterns.

2. ***Design*** is the ability to envision and construct an object or a process that meets the goals and requirements of a particular user.
3. ***Experimentation*** is the ability of an observer to decide between two competing goals, courses of action, or viewpoints by designing a process that yields sufficient information to rank each choice according to certain criteria. This process is often referred to as an *experiment*.
4. ***Aesthetic Awareness*** is the ability to discriminate between various sensory inputs (e.g., visual, auditory), to recognize the feelings and thoughts invoked, and to rank the object of reflection in terms of certain criteria such as beauty.
5. ***Strengths*** pertain to the multiple intelligences possessed by all people that can be targeted for development and creative expression.

My goal in writing the book *Fostering Creativity* was to help the reader increase his or her improvisational capacity, develop design proficiency, learn to experiment and tinker, expand aesthetic awareness, and to leverage natural abilities and strengths. By applying these concepts to their careers, individuals can make themselves more valuable in the marketplace and to their organizations through their unique creative skills and abilities.

This new book represents a continuation of that theme. Teams are the fundamental building blocks of organizations, and without them, nothing would get done. Organizations are the context within which teams operate and their effectiveness is a function of good design and development. This book is about how to develop creative high power teams and organizations that are populated by creative people who exercise these skills and core competencies.

Who Should Read This Book?

This book is suitable for executives, managers, team leaders, and human resource professionals. It addresses the following needs:

- You want to develop the creative potential of your people
- You want to turn an average performing group into a creative high power teams

- You want to improve your ability to lead and manage creative people
- You need to redesign your organization to be most effective
- You want to attain competitive advantage

For faculty, it can be used as a textbook or supplemental text for a class on organizational design, creativity, change management, design and systems thinking, strategy and innovation at the graduate and undergraduate levels.

Other Resources

This book is also meant to be used in conjunction with other resources and activities:

- In conjunction with the companion book *Fostering Creativity in Self and the Organization: Your Professional Edge*, which is also available from Business Expert Press
- In the context of a corporate training class
- In the field, that is, in an organization undergoing change, development, or transformation
- In the context of a university class

The Ideas Method™ website[7] (ideasmethod.com) and the author's website (ericwstein.com) provide additional tools and resources for team and organizational development.

CHAPTER 2

Team Assessment and Development Using Personality Factors

> *We continue to shape our personality all our life. If we knew ourselves perfectly, we should die.*
>
> —Albert Camus, philosopher

> *Personality is everything in art and poetry.*
>
> —Johann Wolfgang von Goethe, writer

Overview of Team Design and Development

Teams drive organizations. The goal for this first section of the book is to examine the design, development, and performance of creative high power teams. We break this task into the following topics:

- General characteristics of high performance teams
- Team assessment and development
- The power of roles
- The unique characteristics of high power improvisational, design, and research teams

We begin with a brief overview of the general characteristics of teams and of high performance teams in particular. Next, we look at team assessment and development using personality types. In Chapter 3, we examine the use of multiple intelligences theory for team assessment and development. In Chapter 4, we look at the power of roles in team development and functioning. Finally, in Chapters 5–7, we examine the unique characteristics of high power improvisational, design, and research teams.

General Characteristics of High Power Teams

What are the general characteristics of high power teams? The answer is important because it provides us with a goal toward which we can make progress. In terms of output, high performance teams excel at problem-solving, real-time decision-making, designing products and services, performing, and making recommendations. In other words, they produce (1) declarative knowledge (e.g., solutions, recommendations, etc.) in the form of reports and other documents; (2) artifacts such as products; and (3) procedural knowledge (i.e., scripts) such as services and process designs. See Table 2.1.

Teams of course vary in their performance abilities. Tuckman's seminal study (Tuckman 1965) parsed team development into four

Table 2.1 Team outputs and activities by type

Team type	Output	Activities
Design teams	Artifacts (e.g., products and processes)	• Needs analysis • Ideation • Evaluate and refine • Financial and manufacturing implementation and review*
Improvisational teams	Real-time Performances	• Pre-performance preparation • Performance • Post-performance after action reviews
Research and experimental teams	Knowledge	• Gather information about past experiments • Formulate hypotheses • Design experiment(s) to test hypotheses • Interpret results of experiments • Refine theory
Management teams	Decisions Solutions Plans	• Formulate problem or opportunity (e.g., perform a SWOT analysis)** • Review and reflect on organizational goals • Develop means to achieve goals • Create resource plan • Obtain feedback and monitor implementation

*Method used at LEGO.

**SWOT: strengths, weaknesses, opportunities, and threats stages: *forming, storming, norming,* and *performing*. In other words, teams are formed and as members get to know one another, they engage in varying degrees of conflict over personality differences, egos, values, roles, and so forth. They attempt to formulate operating norms. If successful in this effort, what emerges is a functional team.

There are several key factors that differentiate between merely functional (or low performing) teams and ones that can be considered *high performance* teams. A study by Chong (2007) found that high performing teams were characterized by trust, good communication, high commitment, and good time management among team members. Furthermore, team "…role characteristics defined by creativity (PL role), good co-ordination (CO role) and good cooperation (TW role) when measured collectively are correlated with team performance" (Chong 2007, p. 212).

Trust, Communication, Coordination, Commitment, Time Management, and Creativity. These are the critical success factors (CSFs) that can transform average teams into high performers. We will explore these and other factors in greater depth over the next several chapters.

The Impact of Personality on Teams

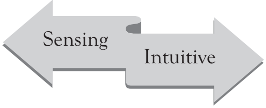
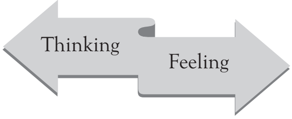
We know from a long history of research on personality types that people can be classified according to several dimensions of behavior and cognition. Many instruments have been designed to measure aspects of personality. One that has the most statistical evidence in support of its efficacy is the Five Factor Model (FFM) based on the work of Digman (1990). The Big Five factors are *openness, conscientiousness, extraversion, agreeableness,* and *neuroticism*, which goes by the acronym OCEAN. However, one of the most widely used instruments in practice is the Myers–Briggs Type Indicator (MBTI). The MBTI is based on an interpretation of Carl Jung's theory of personality types by Katharine Cook Briggs and her daughter Isabel Briggs Myers. Given the accessibility and widespread use of this instrument, we will illustrate how personality types can be used for team assessment and development with the understanding that these results may be duplicated with other instruments such as the FFM. We begin with a brief history of the development and characteristics of the MBTI.

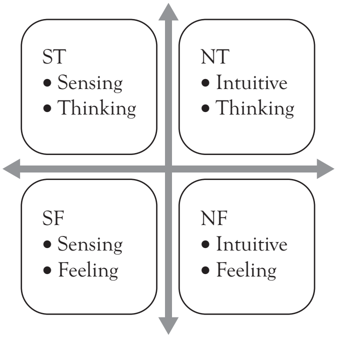
History and Background of the MBTI

In 1921, Jung theorized that people had preferences for certain cognitive functions. He proposed two primary dichotomous functions as illustrated in Table 2.2.

These two functions pertain to (1) *how you gather information* and (2) *how you process that information* once it is collected in order to make decisions and take action. Sensing types tend to gather detailed information through their senses but oftentimes cannot see the big picture. Intuitive types tend to grasp the big picture but miss or ignore details. Once the information is collected, people either make a decision *by thinking about it* or by *getting a feeling* for the situation. Taken together these functions produce a profile of your *problem-solving type*. A map of the four types is illustrated in Figure 2.1. These two dimensions account for half of the MBTI.

Table 2.2 Jung's problem-solving dimensions

Information gathering	 Sensing Intuitive
Information processing	 Thinking Feeling



ST
• Sensing
• Thinking
NT
• Intuitive
• Thinking
SF
• Sensing
• Feeling
NF
• Intuitive
• Feeling

Figure 2.1 A 2D map of personality types based on problem-solving dimensions

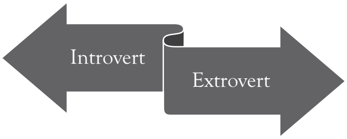


Figure 2.2 The introvert-extrovert expression of personality

Jung further proposed that these types are represented in *introverted* (inward-turning) and *extroverted* (outward-turning) forms (see Figure 2.2). Extroverts tend to gain energy from interacting with other people (and things) and by taking action. They tend to lose motivation and energy if they are not taking action. Introverts gain energy in the process of reflection when they are alone. They prefer thought to action. Taking action and interacting with people tends to sap their energy. To recharge they must re-enter the world of concepts, thoughts, and reflection.

Myers and Briggs added a fourth dimension to the mix, which indicates whether an individual favors the rational-judging functions or the irrational-perceiving functions. So a *J* will more likely display their Judging mode to the world whereas a *P* will tend to display their Perceptive mode to the world.[1] In other words:

> All people use both **judging** (thinking and feeling) and **perceiving** (sensing and intuition) processes to store information, organize our thoughts, make decisions, take actions and manage our lives. Yet one of these processes (Judging or Perceiving) tends to take the lead in our relationship with the **outside** world. ... while the other governs our **inner** world.
>
> A Judging (J) style approaches the outside world WITH A PLAN and is oriented toward organizing one's surroundings, being prepared, making decisions, and reaching closure and completion.
>
> A Perceiving (P) style takes the outside world AS IT COMES and is adopting and adapting, flexible, open-ended and receptive to new opportunities and changing game plans (PersonalPathways 2014).

These four primary dimensions included in the MBTI characterize any individual as shown in Table 2.3.

Table 2.3 The four dimensions that classify personality type using Myers-Briggs

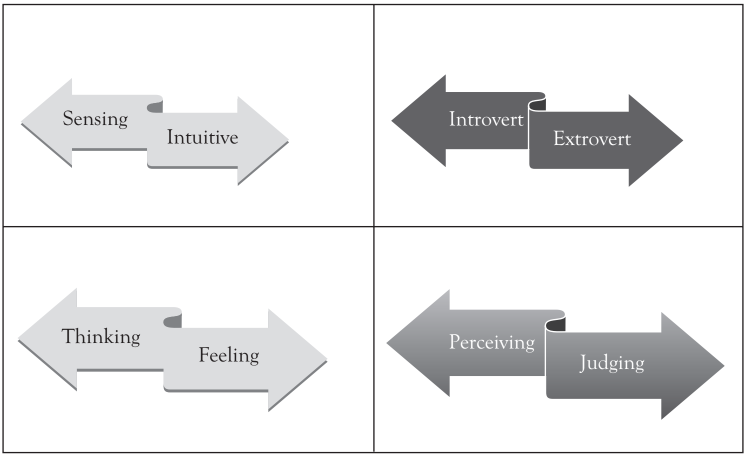
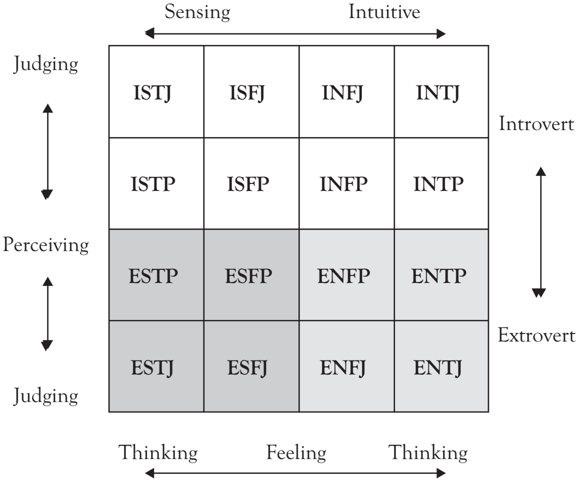

Sensing
Intuitive
Introvert
Extrovert
Thinking
Feeling
Perceiving
Judging

Table 2.4 The Myers-Briggs 16 personality types


Sensing
Intuitive
Judging
Perceiving
Judging
Introvert
Extrovert
Thinking
Feeling
Thinking

ISTJ	**ISFJ**	**INFJ**	**INTJ**
ISTP	**ISFP**	**INFP**	**INTP**
ESTP	**ESFP**	**ENFP**	**ENTP**
ESTJ	**ESFJ**	**ENFJ**	**ENTJ**

Taken together, these four dimensions produce 16 personality types (see Table 2.4).

Individual Assessment of Personality Using MBTI

The MBTI assigns an individual to one of the types such as ENTJ, ISTP, and so forth. Assessment tools are widely available on the web.[2] My suggestion

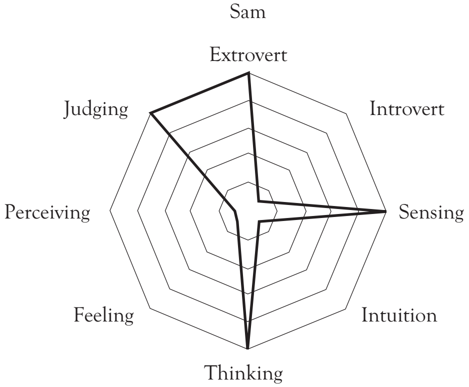


Figure 2.3 MBTI scores of a hypothetical person Sam

is to execute a Google search for "Myers-Briggs Inventory" or "MBTI" to find the most up-to-date links.[3] Once a person is typed, the data may be represented as a radial chart or in an equivalent form. Figure 2.3 illustrates the profile of hypothetical member of the team "Sam" who is an ESTJ.

Representing the Composite Personality Types of the Team

After each team member has taken the assessment, one option is to represent the information for the group in tabular and visual form with the understanding that there are technical limitations to doing so (discussed at the end of the section). To illustrate, let's look at the data for a hypothetical team of four people (see Table 2.5).

Table 2.5 shows the self-described MBTI types for Sam, Wendy, Mike, and Linda, where a "1" indicates the preferred dimension for each category. The last column is simply the sum of the individual scores. This information can be rendered in visual form to show the relative strengths of the team in terms of the MBTI dimensions. In Figure 2.4, the diameter of the circles are scaled according to the collective MBTI scores for the team (e.g., the values in the total column).

Figure 2.4 shows that this team has collective strengths in the modalities of thinking, sensing, and extroversion. It also indicates that it is relatively weaker in the dimensions of intuition and feeling.

Table 2.5 MBTI scores of a hypothetical team

	Sam	Wendy	Mike	Linda	Total
MBTI type	**ESTJ**	**ESTJ**	**ISTP**	**ESTP**	
Extrovert	1	1		1	3
Introvert			1		1
Sensing	1	1	1	1	4
Intuition					
Thinking	1	1	1	1	4
Feeling					
Perceiving			1	1	2
Judging	1	1			2

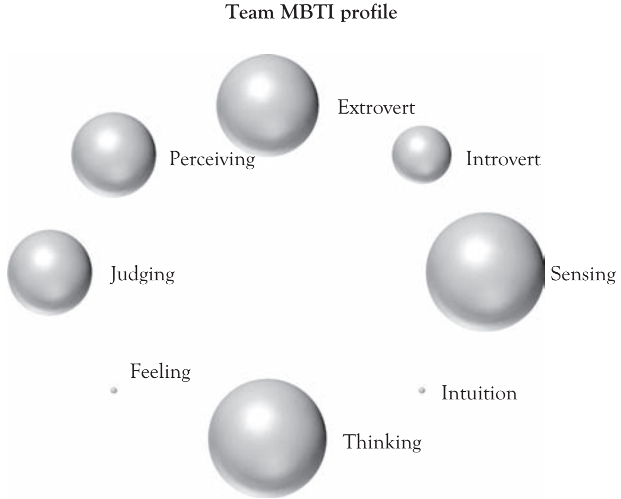


Figure 2.4 Composite view of MBTI dimensions of a hypothetical team

Another useful representation for rendering team strengths is the *composite radial diagram*, which appears as follows in Figure 2.5.

As can be seen in Figure 2.5, three out of four members are extroverts. All members are sensing and thinking types (e.g., ST), which may be a strength in some contexts but not others (see next section). Again, a potential weakness of this group in certain contexts is that there are no team members who scored high on the feeling and intuitive dimensions

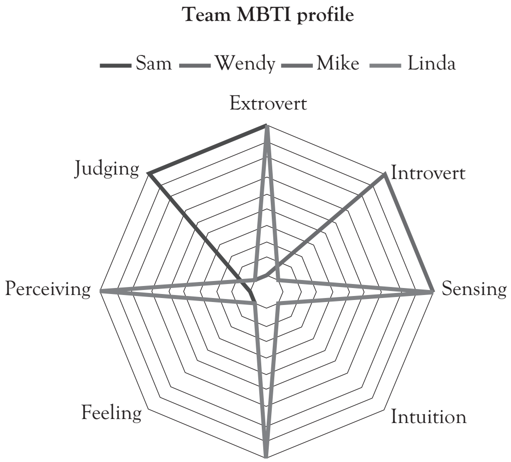


Figure 2.5 Composite radial diagram of MBTI dimensions in hypothetical team

of personality. I recommend that teams use these representations to learn about their relative strengths.

Now, having introduced these visualizations, a few technical caveats are in order. The MBTI is referred to as an *ipsative* assessment tool as opposed to a normative tool. Ipsative measures are good at illustrating the *relative strengths* of certain factors such as personality *within* an individual. They are not designed to compare the scores *between* individuals. For instance, given two self-described introverts, we do not know which person is *more* introverted than the other; we only know that they view themselves as introverts. Consequently, we have to remind ourselves that the summed scores that appear in Table 2.5 and the figures 2.4 and 2.5 are approximations at best and meant to promote discussion and learning rather than true assessment.

Compatible Versus Complementary Teams

Two common types of distributions will be obvious from the MBTI team assessment:

- Compatible teams: Ones that are populated with *similar* personality types. Only a few of the eight functional dimensions of personality are concentrated among the members.

- Complementary teams: Ones that are populated with *dissimilar* personality types. The eight functional dimensions of personality are relatively evenly distributed among the members.

There are pros and cons to these two types of teams. A study by Amato and Amato (2005) found that some complementarity in groups (i.e., ones that are populated with dissimilar personality types) may be preferred over highly *compatible* groups (i.e., ones that are populated with similar personality types).

> Our results … raises the possibility that the ideal point is not either extreme but somewhere in the middle. Groups that are too similar may lack synergy, whereas excessively divergent teams may provide no common ground (Amato and Amato 2005, 49).

Team effectiveness is thus a result of functional and well managed diversity. A little bit of conflict between members resulting from personality clashes can lead to creative synergies, as long as it is not too great.[4]

On the other hand, there is also support that *compatible* teams assigned to tasks that require specific abilities or knowledge may benefit from the concentration of a particular personality dimension. For example, teams populated with a majority of members who pay close attention to detail (e.g., S-types) or who exercise strong organizational and decision-making skills (e.g., J-types) may be more effective than complementary groups for certain types of specialized tasks or projects (Amato and Amato 2005).

Another interesting question is whether the presence of certain personality types can have a positive (or negative) influence on the team's performance. Kuipers, Higgs, and Tolka (2009) found that four types (ISFJ, ESFJ, ENFJ, and ENTJ) had a significant positive effect on team processes and output. This interesting finding is worthy of further exploration.

However, outside of the last finding, there is *limited statistical evidence* to support the use of the MBTI as a predictor of team processes, selection, or even overall effectiveness. Kuipers et al. write:

> The results show that only a small number of MBTI personality profiles have a significant relationship with team processes. Overall, the composition of teams in terms of MBTI profiles does not seem to predict team development very well (Kuipers, Higgs, and Tolka 2009, abstract).

This conclusion was arrived at based on a sample of 1,630 people working in 156 teams in an industrial organization. Team processes included internal relations, task management, external relations, processes, and improvement (p. 447). Similar results were found by Varvel et al. (2004): "Findings were that there was not a significant correlation between psychological type dimensions and team effectiveness" (Varvel et al. 2004, abstract). So, although the distribution of MBTI types is only a limited factor in predicting team success, it can be used for other purposes.

Using Personality Type Assessments for Team Development

The literature has shown that the best use of the MBTI is for *team development*.

For example, while Kuipers, Higgs, and Tolka (2009) found little evidence to support MBTI scores as a predictor of team processes, they did find it to be a very useful tool for *helping the team members* to develop an understanding of one another and thus function better as a team. They write:

> The current study does not support the hypothesis that MBTI is a useful predictor of team development processes.... This would leave the MBTI predominantly as an instrument for personal development and as a vehicle for group members to gain a better understanding of each other. We would not underestimate the value of the MBTI for such purposes (Kuipers, Higgs, and Tolka 2009, 459).

Other studies reach similar conclusions.

> The majority of participants reported that knowledge of team member's personality types was helpful in understanding team member behavior and was used in managing team dynamics (Clinebell and Stecker 2003, abstract).
>
> Findings showed that there was not a significant correlation between psychological type dimensions and team effectiveness, but individuals' training on the type of personality of team members helped them to improve communication, trust, and interdependence, essential characteristics of an effective team. Therefore, understanding and tolerance of individual's behaviors and actions are the largest benefit that the Myers-Briggs test has to offer as a contribution to teams' effectiveness (Varvel et al. 2004, abstract).

So we can conclude that knowledge of MBTI types can be used to help team members better understand their behaviors and decision-making styles, which can in turn help the team to develop trust, cooperation, and overall effectiveness. In practice, team members can take the MBTI survey and once they understand their types, engage in processes to share that information with other members of the group or to engage in exercises to reveal both their strengths and weaknesses.

For example, in my experience as a graduate school business professor, I have assembled groups of students of the *same problem-solving type* (e.g., STs, NFs, etc.) and tasked them to solve a management or design problem. For example, I might have a group of NTs design an employee development process or user interface for SFs (and vice-versa). Inevitably some of the teams impose *their* view of the world on the other groups because *they cannot see how the other team members process information*. This is a classic case of not knowing what you don't know. However, once these issues are surfaced and we talk about it, the teams start to appreciate and understand the differences of those who *think* differently, which has an immediate application in the workplace. In summary, the MBTI is an excellent tool for promoting a better understanding of communication problems, personality types, and problem-solving styles. Sharing this knowledge can lead to a higher performing team.

Chapter Summary

The MBTI is one of many personality instruments. Given its widespread use in industry, it is a useful starting point for both individuals and teams, although the recommendations in this chapter could be duplicated with any other instrument such as the Big Five Personality trait model.[5] The MBTI assigns individuals to one of 16 types based on 4 primary personality dimensions largely derived from the work of Carl Jung: (1) information gathering (sensory data versus intuition); (2) information processing (feeling vs. thinking); (3) introversion versus extroversion; and (4) judging versus perceiving. These data may be represented in a variety of ways but radial profiles and spheres scaled according to MBTI scores are particularly useful. Once the team members have completed their profiles, the information may be super-imposed on a radial or scaled sphere diagram to get a sense of the composite strengths of the team, technical issues aside. Although there is limited support for the use of the MBTI as a tool for team selection, it is quite useful for *team development*. Having the group set aside time to share the MBTI scores of the members leads to greater understanding of personality differences, as well as synergies, which can in turn lead to better communication, coordination, and trust. These outcomes are all ingredients for creative high performance teams.

CHAPTER 3

Team Assessment and Development Using Multiple Intelligences Theory

> *We should take care not to make the intellect our god; it has, of course, powerful muscles, but no personality.*
>
> —Albert Einstein, Physicist

> *I know that I am intelligent, because I know that I know nothing.*
>
> —Socrates, Philosopher

> *Failure is simply the opportunity to begin again, this time more intelligently.*
>
> —Henry Ford, Industrialist

In the previous chapter, we looked at the role of personality factors in team development. In this chapter, we examine how knowledge of the multiple intelligences (MI) of the team members can also be used for team assessment and development.

What Is Multiple Intelligences Theory?

Howard Gardner (1994, 1996, 1998a, 1998b), a noted educational theorist from Harvard University proposed a different approach to the standard IQ. He argued that we need to measure a wider range of what he referred to as intelligences (also referred to as strengths). The standard IQ and other tests such as the SAT focus on verbal, mathematical, and logical abilities. Although these are useful, he argues, after observing hundreds and hundreds of children and adults, that we have a broader

Table 3.1 Multiple intelligence areas

Area	Description
Verbal-linguistic intelligence	Well-developed verbal skills and sensitivity to the sounds, meanings, and rhythms of words
Mathematical-logical intelligence	Ability to think conceptually and abstractly, and the capacity to discern logical or numerical patterns
Musical intelligence	Ability to produce and appreciate rhythm, pitch, and timber
Visual-spatial intelligence	Capacity to think in images and pictures, to visualize accurately and abstractly
Bodily-kinesthetic intelligence	Ability to control one's body movements and to handle objects skillfully
Interpersonal intelligence	Capacity to detect and respond appropriately to the moods, motivations, and desires of others
Intrapersonal intelligence	Capacity to be self-aware and in tune with inner feelings, values, beliefs, and thinking processes
Naturalist intelligence	Ability to recognize and categorize plants, animals, and other objects in nature

range of intelligences. These include the eight intelligences as indicated in Table 3.1 and Figure 3.1.

He also speculated that there is also a "half-intelligence" that he calls "existential intelligence." Existential intelligence is defined as having a sensitivity and capacity to tackle deep questions about human existence, such as the meaning of life, why do we die, and how we got here. These intelligences are not given at birth but can be molded and shaped throughout a person's lifetime.

Gardner examines some of the more notable examples of people who have risen to the top in each of these categories (see Table 3.2).[1]

He argues that each of these individuals attained exceptionally high levels of performance because they may have had certain innate talents in certain areas as children *and* they worked very hard for several years to attain mastery of his or her craft.[2]

Herbert Simon's work on expertise confirms that people need to accumulate at least 50,000 "chunks" of learning episodes to really master a domain (Chase and Simon 1973). This period is on the order of five to ten years. Gardner observes that the average interval of time between

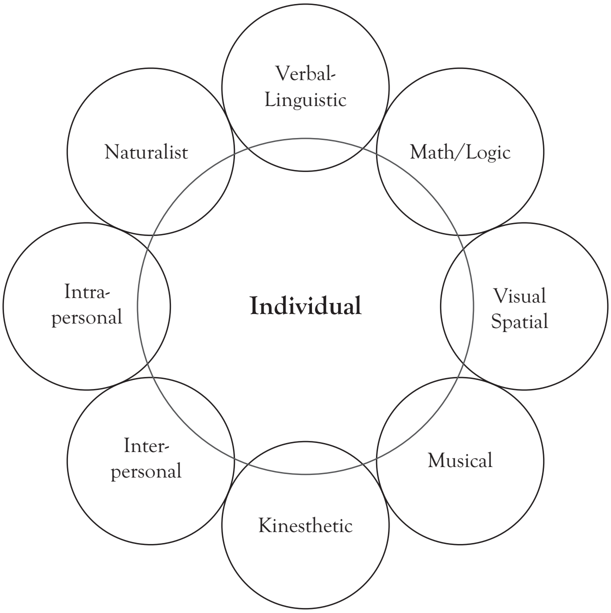

Verbal-
Linguistic
Naturalist
Math/Logic
Intra-
personal
Individual
Visual
Spatial
Inter-
personal
Musical
Kinesthetic

Figure 3.1 Areas of multiple intelligence

Table 3.2 High performers representing multiple intelligence areas

High performer	Multiple intelligence area
Virginia Woolf	Verbal-linguistic intelligence
Albert Einstein	Mathematical-logical intelligence
Mozart	Musical intelligence
Picasso	Visual-spatial intelligence
Martha Graham	Bodily-kinesthetic intelligence
Margaret Thatcher	Interpersonal intelligence
Gandhi	Intrapersonal intelligence
Charles Darwin	Naturalist intelligence
Rene Descartes	Existential intelligence*

* Considered a half-intelligence.

major creative works is also about 10 years (Gardner 1994, 1996, 1998). Malcolm Gladwell (2008) suggests that 10,000 hours is the period of time required to reach critical mass in terms of expertise and insight. This relationship between practice, mastery, and creative skill level is illustrated in Figure 3.2.

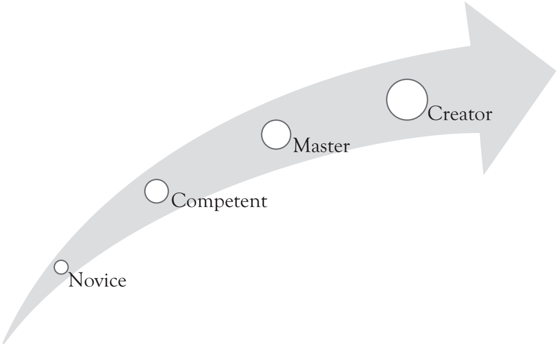


Figure 3.2 Development of skills leading to mastery

According to Gardner, Simon, and others, hard work, not just natural abilities or high IQ, determine a person's ultimate success and level of expertise in a particular *métier* or domain.

Individual Assessment of MI

To start, each person on the team should determine his or her MI profile; that is, identify relative areas of strength. There are many tools on the web for this purpose, and executing a Google search for "multiple intelligences assessment" will yield the most up to date links.[3] Each member of the team should obtain a full profile of his or her MI.

Next, each should look at the rank order of the MI areas and identify his or her top two or three intelligences, which yields 2-D and 3-D assessments of that person. For example, Barack Obama, like most successful politicians, exhibits both high Verbal-Linguistic Intelligence and Interpersonal Intelligence in his 2-D profile. These unique combinations are representative of a person's current areas of strength and positioning.[4] A useful means of representing these data is in a radial chart as indicated in Figure 3.3. This figure illustrates the relative MI strengths of a hypothetical member named Linda.[5] As can be seen in the figure, Linda's top two MI areas are interpersonal and kinesthetic intelligence.

One other metric that is interesting and worth exploring is the combined scores of *interpersonal* and *intrapersonal* intelligence. Gardner was one of the first to highlight the importance of these two intelligences.

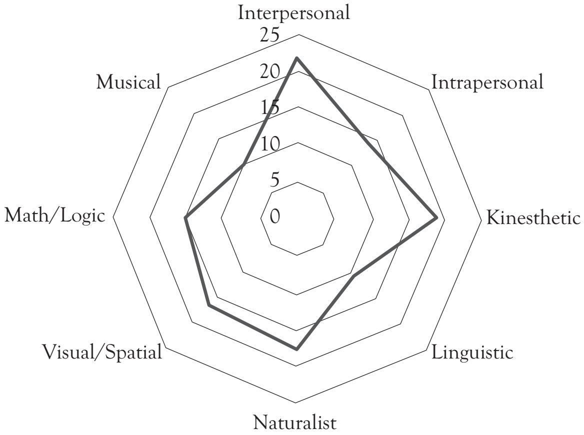


Figure 3.3 MI profile of hypothetical member Linda

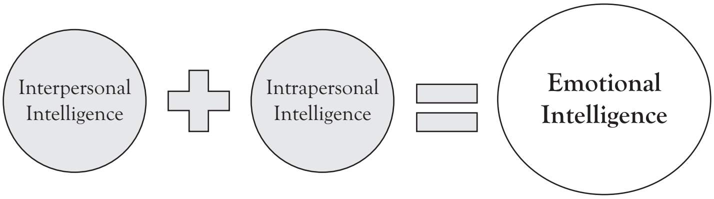


Figure 3.4 Components of emotional intelligence

- Interpersonal Intelligence
    - The capacity to detect and respond appropriately to the moods, motivations, and desires of others.
- Intrapersonal Intelligence
    - The capacity to be self-aware and in tune with inner feelings, values, beliefs, and thinking processes.

Taken together, a person with high levels of both have what is now referred to as *Emotional Intelligence* (EQ) (Goleman 1995) as seen in Figure 3.4. Emotional intelligence has been shown to be correlated with success in academic and workplace settings as well as other life outcomes.[6]

I recommend that the individuals examine their summed scores of interpersonal and intrapersonal intelligences to gain insight into their emotional intelligence profiles.

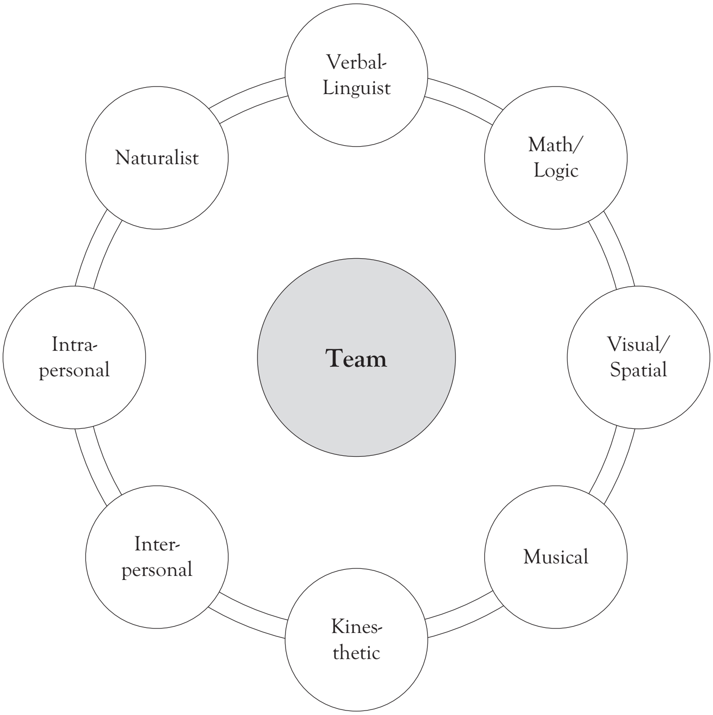


Figure 3.5 Illustration of team multiple intelligences

Representing the MI of the Team

Once each member of the team has taken the assessment, a team assessment can be performed. As illustrated in Figure 3.5, the team image represents the collective multiple intelligences of the members of the group.

There are few ways to represent the collective MI areas of a group of people. To begin, it is useful to array members according to each MI area as illustrated in Table 3.3. The table should include a column representing the sum of scores of the individual members and then be sorted accordingly (e.g., from high to low). It is also useful to highlight the top two MI scores of each individual, which is indicated by shading in the relevant boxes in the table. Emotional Intelligence Quotient (EQ) and MBTI scores can also be included to complete the profile.

From the table we can see that three of the four members possess high levels of interpersonal intelligence. Two of the members also possess high

Table 3.3 Composite MI profile of a hypothetical team

	Sam	**Wendy**	**Mike**	**Linda**	
MBTI	**ESTJ**	**ESTJ**	**ISTP**	**ESTP**	
MI Area					Team MI Total
Interpersonal	23	23	15	22	83
Intrapersonal	23	20	21	14	78
Kinesthetic	20	20	19	19	78
Linguistic	22	22	19	11	74
Naturalist	17	17	19	18	71
Visual/Spatial	16	16	20	17	69
Math/Logical	19	19	15	15	68
Musical	15	25	17	10	67
EQ	46	43	36	36	161
High Scores: Interpersonal, Intrapersonal, and Kinesthetic; high emotional intelligence					
Low Scores: Visual/Spatial, Math/logical, and Musical; no *feeling* MBTI types					

levels of intrapersonal intelligence. The emotional intelligence of the team may be higher than the average given the dominance of these scores and given that EQ is the sum of interpersonal and intrapersonal intelligence.

One way to highlight the relative strengths of the team is to scale the size of each MI area according to the relative concentration of skills contributed by members of the team. For example, if three members of a five person team score high on mathematical and logical intelligence, then that box could be scaled larger than the others to illustrate the weight of that factor. An example of what this looks like for our hypothetical team is shown in Figure 3.6.[7]

We can also place the names of the members of the group in the MI boxes that correspond to each person's top one or two strengths. For example, we could insert the names of Sam and Mike in the box associated with intrapersonal intelligence. Finally, we can superimpose the MI scores of all team members on a radial chart as illustrated in Figure 3.7. Areas of strength are indicated by multiple intersecting vertices at a particular MI box. In this case, interpersonal and intrapersonal intelligences converge at the edges, thus indicating a team strength.

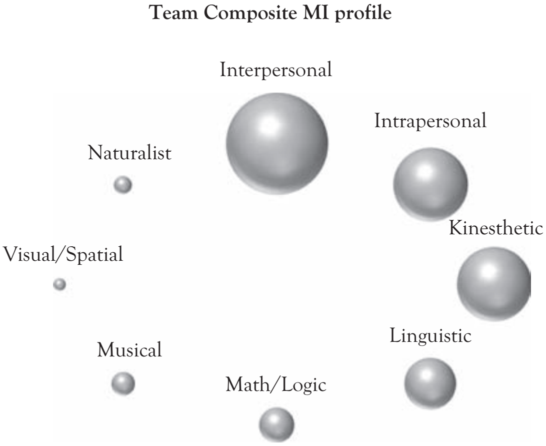


Figure 3.6 Relative strengths of MI areas in a hypothetical team

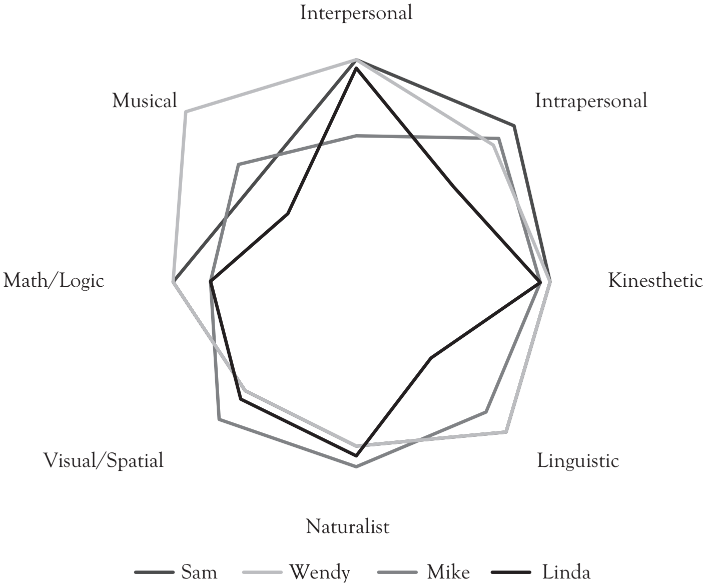


Figure 3.7 Super-imposed MI scores for all team members

Two common types of distributions will result from the MI team assessment:

- Strengths will be concentrated within just a few MI areas.
- Strengths will be relatively evenly distributed among the MI areas.

In the first case, concentrations in a few MI areas illustrate depth but not breadth of experience and skill sets. For example, in an extreme case, we might have a team where member skills are almost entirely concentrated in the areas of Mathematical and Logical and Visual-Spatial Intelligence. While such a group might be excellent at solving engineering and technical problems, it may not be as effective at solving managerial, marketing, or highly unstructured problems that require extensive dialectic. As a consequence, they may need to augment their skill sets. In another case, a group that has a uniform distribution of MI areas represented in its collective profile might be better equipped to handle a more diverse set of tasks but may not have the requisite skills to handle highly specialized ones. Through dialog, these strengths and weaknesses can be surfaced and planned for accordingly (see next section).

Using MI Scores for Team Development

The most fruitful use of the knowledge of the MI characteristics of the team members is to help individuals on the team to better understand their strengths as well as the strengths of others; that is, to use MI profiles for *team development*. This conclusion is also reached by Green et al. (2005) and Martin (2006). Martin tested several hypotheses regarding knowledge of MI and its potential impact on trust and knowledge sharing in groups. She writes:

> In conclusion, these findings offer indications that the introduction of Gardner's thinking may be useful in changing people's understanding of their own abilities and those of others, fostering respect for the abilities of others and contributing to a climate of trust. (Martin 2006, 212)

Teams should reserve time for the sharing of MI characteristics in the context of team building. One member should be assigned to compile the profiles of all the team members. Once completed, the team should meet to discuss their relative strengths and weaknesses, both individually and collectively. Through dialog, members will better understand their cognitive, kinesthetic, and interpersonal strengths, which can in turn help the team to develop trust, cooperation, and overall effectiveness. In my experience, the use of MI in the classroom with MBA and leadership students has been very effective at accelerating team development (Tuckman 1965) leading to higher performance.

Other Potential Uses of Team MI Profiles

Finally, there is also some limited research that supports the hypothesis that teams can use MI to find the best match between project types and team composition. For example, Green et al. (2005) suggest that MI profiles may be used to match members with project task requirements. Teams with more diverse arrays of MI profiles might be better equipped to engage in lateral, divergent creative thinking interactions based on the potential for less group-think and livelier group discussions.

Another interesting study by Barczak, Lassk, and Mulki (2010) found that teams with high levels of emotional intelligence experience greater degrees of trust, which in turn can lead to a collaborative culture. They also found that higher EQ scores were correlated with increased creativity of the team. While preliminary, these findings are intriguing and invite exploration. Finally, MI scores can be used to help assign *team roles*, a subject for the next chapter.

Chapter Summary

Multiple intelligences theory offers another means of assessing a person's relative strengths and abilities that go considerably beyond the standard IQ. It is based on the idea that each person has at least eight areas of strength: Interpersonal, Intrapersonal, Kinesthetic, Linguistic, Naturalist, Visual or Spatial, Math or Logical, and Musical intelligence. There are several assessment tools available on the web. Once the members of the team have completed individual assessments, the data may be tabulated in a master table for the further representation of the group. Radial and scaled sphere diagrams reveal the relative strengths of the team as a whole and the overall distribution of MI areas. These data may be used to help the team members learn about each other in the context of team development. Studies have shown that an understanding of MI assessments can help a team to achieve the critical success factors present in high power teams: trust, commitment, creativity, and coordination.

CHAPTER 4

Team Design with Roles

The progression of roles you take strings together a portrait of an actor, but it's a completely random process.

—Meryl Streep, Actor

The Power of Team Roles

The roles we play have a huge impact on who we are and what we do. The beauty of roles is that they are voluntary and adopted, not given and static. Biddle argues that people "….are members of social positions and hold expectations for their own behaviors and those of other persons" (Biddle 1986, abstract). Roles can be what we want them to be.

Let's explore the key roles necessary for high performance teams working to produce innovation for their organizations. Organizational roles break into three primary functions:

- Creating and building
- Organizing
- Informing

The *Creating and Building function* is about (1) generating new ideas and solutions and (2) building those ideas into artifacts, designs, and performances. The *Organizing function* pertains to managing and leading team members toward the accomplishment of team goals. The *Informing function* fulfils the need to bring new data, information, and knowledge to the members to inform the processes of creation and production.

A number of studies have identified a multiplicity of roles adopted by team members to help the team accomplish its goals. Let's begin with an examination of the creator roles.

Table 4.1 Primary functions and work roles identified in the literature

Functional category	Belbin (1993) study	Kelley and Littman (2005) study	Mumford et al. (2008) study
Creating and building roles	• Plant(er)	• Builders • The experience architect • The set designer • The caregiver • The storyteller	• Creator
Organizing roles	• Resource investigator • Coordinator • Shaper • Team worker • Implementer • Completer-finisher	• The hurdler • The collaborator • The director	• Contractor • Completer • Cooperator • Communicator • Calibrator • Consul • Coordinator
Informing roles	• Monitor evaluator • Specialist	• The anthropologist • The experimenter • The cross-pollinator	• Critic • Contributor

Creator Roles

Although the creator roles appear in several studies, they have hardly been given the attention that leaders or managers have in the management literature. Here is a sample of three important papers on the topic, one appearing in a practitioner's journal and two published in academic journals (see Table 4.1).

As can be seen in Table 4.1, the role of the Creator appears in these and several other studies. Belbin (1993) refers to the creator as a plant (er): "Creative, imaginative, unorthodox. Solves difficult problems."[1] Mumford et al. (2008, 254) write this of the creator role:

> The Creator provides new, innovative, or compelling visions of the team objective and approaches to the task or strategies for accomplishing the task. These behaviors may involve a "reframing" of the team's objective and the means that should be used to accomplish it; looking at the big picture; and providing creative solutions to the task's problems (Mumford et al. 2008, 254).

Creators include people who design, improvise, solve problems, and perform. Creators are the sparks that ignite innovation and growth for teams and organizations. The literature supports the assertion that creators are essential to team performance. For instance, a recent study found that the plant(er) role was positively correlated with high performing teams (Chong 2007, 212). Creators may thus be an *essential* not just a "nice to have" role for high performance teams.

Howard Gardner[2] clarifies that creators lead others indirectly through symbol creation as opposed to directly through their words or actions. He argues that they do this on a regular basis in a given domain. Paraphrasing, we can define creators (Gardner 1998) in the following pragmatic way:

Creator

- A creator can be defined as someone who creates or performs on a regular basis, fashioning ideas, concepts, and objects in a given domain in new and novel ways that are ultimately accepted by the community of which they are a part.

Gardner (1998) also observes that creators fall into different categories. He distinguishes between *masters* and *makers*. Masters become highly proficient based on the current rules of the domain of knowledge. In music, one can identify Mozart as a master who fully exhausted the boundaries of early classical music; there was not much left to say using the dominant tonality of his day. It took a *maker* such as Beethoven to establish a new paradigm for music that extended the boundaries of the earlier masters. Freud too was a maker because he *invented* psychoanalysis. Teams and organizations benefit from both types of creators.

In addition to simply providing a creative spark, creators are *builders*. They construct artifacts, script performances, and develop solutions. Kelley and Littman (2005) identify four important ways creators (which they refer to as *builders*) make contributions and express their creativity; that is, by constructing experiences, contexts, processes, and stories (these roles are fully articulated at the end of the chapter). The *experience architect* designs experiences for customers such as what CEO Richard

Branson does to ensure a quality experience for passengers who fly Virgin Atlantic. The *set designer* designs public spaces (e.g., stadiums, airports) and work environments that encourage innovation, produce energy, and motivate performance. The *caregiver* renders scripts to meet customer service needs. The *storyteller* constructs compelling narratives to support team and organizational goals.

In summary, it is very important to understand that being a creator is a role and *not* a God-given talent. It can be cultivated with persistence and perseverance. While we are most familiar with those who have excelled in a particular area of expertise such as music (e.g., Mozart) or mathematics (e.g., Einstein), all sorts of genius lurk at the intersections of two or more areas of intelligence as discussed in a previous chapter. For those interested in developing individual creative potential, the reader is referred to *Fostering Creativity in Self and the Organization: Your Professional Edge*, which is also available through Business Expert Press.

In summary, for the person who is assigned the role of creator on a team, it is an opportunity for him or her to apply intelligence and imagination to achieve new solutions to existing problems, design new artifacts, or craft new experiences to meet specific needs.

Organizing Roles

The next function pertains to organizing; that is, how the work gets done among a group of people. Mumford et al. (2008) identify seven sub-roles within this category that address the functions of cooperation, completion, communication, advocacy, negotiation, and mediation. Belbin (1993) identifies a very similar group of functions that are task or relationship oriented. Kelley and Littman (2005) identify three sub-roles in this category: *hurdler, collaborator,* and *director*. These roles help to (1) overcome obstacles, (2) increase levels of collaboration in the group, and (3) lead and mobilize the talents of the members. In short, this set of functions is about *leading* and *managing*.

Leadership is a key organizational and social role. Hundreds of books have been written about leadership[3] and it has been dissected in numerous ways by academics and practitioners. Scores of academic programs have been developed to teach leadership skills. While it is outside the scope of this work to wade deeply into issues regarding leadership, let me begin with a working definition of the concept and a few observations.

What is leadership? Gardner (1998) defines a leader in a way that is both behavioral and measureable and we shall adopt here (Gardner 1998):

Leader

- A leader is an individual who affects the thoughts, feelings, and behaviors of significant numbers of people in the absence of coercion through their linguistic and interpersonal talents.

Leaders are effective in three areas of strength: *linguistic intelligence, interpersonal intelligence*, and *intrapersonal intelligence* (Gardner 1998). That is, leaders have superior linguistic skills (i.e., they are great communicators), they understand the needs and desires of large masses of people, and they understand their own values, needs, and goals. *Leaders thus lead audiences directly through the stories they tell and the lives that they lead.*

Gardner's research on the characteristics of great leaders also revealed that they tend to have the following characteristics (Gardner 1998):

- Exhibit high energy
- Take risks
- Challenge authority
- Recognize the need for a social network or institutional base to work from
- Take advantage of opportunities for reflection
- Experience a rhythm of success and failure

One of the primary functions of the leader is to create a vision for the team and motivate members to achieve that vision.

While sometimes confused with leaders, *managers* offer a set of skills that are distinct from leaders, but equally important to the success of the high performance team. Without managers, the works developed by creators or the vision provided by leaders would be short-lived. Managers excel at organizing the many tasks required to bring creative ideas to fruition. The following table provides a useful guide to the complementary skills of leaders and managers (see Table 4.2).

Table 4.2 Complementary skills of managers versus leaders

Being a leader means	Being a manager means
Motivating, influencing, and changing behavior.	Practicing stewardship, directing, and being held accountable for resources.
Inspiring, setting the tone, and articulating the vision.	Executing plans, implementing, and delivering the goods and services.
Managing people.	Managing resources.
Being charismatic.	Being conscientious.
Being visionary.	Planning, organizing, directing, and controlling.
Understanding and using power and influence.	Understanding and using authority and responsibility.
Acting decisively.	Acting responsibly.
Putting people first.	Putting customers first.
The leader knows, responds to and acts for his or her followers.	The manager knows, responds to and acts for his or her customers.
Leaders can make mistakes when: 1. They choose the wrong goal, direction, or inspiration, due to incompetence or bad intentions; or 2. They over lead; or 3. They're unable to deliver on, implement the vision due to incompetence, or lack of follow-through commitment.	Managers can make mistakes when: 1. They fail to grasp the importance of people as the key resource; or 2. They underlead, that is, they treat people like other resources, numbers; or 3. They are eager to direct and control but are unwilling to accept accountability.

Source: Adapted from Lorenzi (2004), p. 286.

Leaders and managers work in tandem to ensure team success. Together, they perform all the functions required for organizing. Therefore, rather than invent new roles around organizing, I will use the terms *Leader* and *Manager* to designate the roles in this category with the understanding that they perform the *functions* such as *communicating, allocating resources, inspiring, building trust,* and so on as noted in the literature.[4]

Informing Roles

The last role category is the informing function. When we inform we impart information or knowledge to another person. The functions of those who inform are the following:

- Gather existing data, information, and knowledge for the team.
- Enact processes that help the team to learn.

- Apply scientific and experimental methods to discover new knowledge for the team.
- Critically evaluate creations produced by the team in an effort to improve them.

Information Gathering

This function is self-explanatory and is the most common. Access to and familiarity with information gathering, sorting, and filtering technologies is critical. This is similar to the business intelligence function that many organizations formalize. One of the most important aspects of this portion of the role is boundary spanning. Kelley and Littman refer to this sub-role as one of cross-pollination. *Cross-pollinators* are those who look outside the group, industry, culture, or even the country for new ideas for the team or organization.

Enacting Learning Processes

In addition to the more technical activity of gathering information for the team, the informer manages the overall flow of knowledge in the group and promotes opportunities for the team members to learn. Thus, the position involves social processes as much as technical processes. Mumford et al. refer to this function as the *contributor*:

> Behaviors that function to contribute critical information or expertise to the team. They include being assertive when dealing with areas that are within the domain of the team member's expertise and sharing critical knowledge within the team, and they may involve enough self-promotion to convey the Contributor's credentials to the team. The Contributor clarifies team member abilities, resources, and responsibilities and trains individual team members, as well as the team in general (Mumford et al. 2008, 254).

So much more so than a technical library assistant, the informer is a knowledge and learning management specialist for the team. Kelley and Littman identify this part of the role as the *anthropologist*. In their view, anthropologists focus on the rules that govern human behavior and interaction. Fundamentally they are observers who share those observations with the group. Anthropologist may also apply qualitative methods such as *participant-observation* in order to inform the group of its evolving set of interactions.

Applying Scientific Methods

This skill is less common in organizations. The scientific method is one of the most effective and powerful ways to validate and generate new knowledge.[5] While it is used extensively in the pharmaceutical industry to validate drug claims and efficacy, seldom is it used to improve the effectiveness of decision making of the other business functions. The exception is marketing, which in some companies set up experiments to test the efficacy of various advertising media options such as web, print, cable, and so forth. However, experimentation could be used much more extensively in all aspects of the organization, from sales to engineering, to general management. Kelley and Littman refer to this role as the *experimenter*. Their notion of an experimenter is one of *tinkerer*; that is, someone who learns through trial and error. Experimenters therefore will actively promote *action learning* to glean new knowledge for the group.

Critical Evaluation

Mumford et al. (2008, 254) identify this role as the *critic*. They write:

> Behaviors related to going against the "flow" of the team. They function to subject the ideas or decisions of the team to critical evaluation and scrutiny. The Critic questions the purpose or actions of the team or ideas proposed within the team, even if a formal "leader" has sponsored an idea. The Critic insists on evaluating "worst case scenarios," points out flaws or assumptions the team is making, and must be willing to present negative information to the team (Mumford et al. 2008, 254).

Thus, the critic serves as a kind of devil's advocate, arguing for the opposite position taken by the group at the start of the process. Having a member serve in this role helps to prevent *groupthink* and avoid the conformity imposed by the group on the individual as exhibited through the Asche Effect (Soloman 1952).

Another important means of generating knowledge and promoting learning is through *dialectic process*. Dialectic process was first defined by Plato as a means to arrive at truth (one of the ideal states) through reasoned dialogue or argumentation (Plato n.d.). Plato's Republic itself exemplifies the dialectical process through the conversations of Socrates and Glaucon. Plato revered the dialectical process, putting it above mathematics, science, and other forms of inquiry. For him, it was a pathway to truth. He writes:

> But when a man begins to get older, he will no longer be guilty of such insanity; he will imitate the dialectician who is seeking for truth, and not the eristic, who is contradicting for the sake of amusement; and the greater moderation of his character will increase instead of diminishing the honour of the pursuit (Plato 2012).

The idea is that through logical reasoning and conversation, the truth emerges. This notion of thesis and antithesis is one that underlies our modern legal system. In a legal framework, the defense argues in favor of innocence (thesis) versus the prosecution which argues for guilt (antithesis). The judge and jury then determine which position is "true." However, sentencing often allows for a synthesis of the opposing views. While seldom employed, there is no reason why dialectic processes cannot be implemented in organizations to help employees learn and generate syntheses. The informer is the team role that promotes and manages such activity.

In summary, the set of functions in the informing category is focused on helping the team to develop its base of knowledge and to learn. This role is an extension of the idea of the *knowledge worker*, a term first coined by management guru Peter Drucker back in the late 1950s (Drucker 1959).

Applying Roles to Team: A Balanced Scorecard Approach

Any successful high performance team needs to assign key roles representing the functions of *creating, organizing,* and *informing* to its members. These roles can turn an average team into a creative high performance team. These roles are clarified in Table 4.3.

Table 4.3 Primary functions and roles necessary for high performance teams

Category	Outputs	Role	Description
Creating and Building	• Solutions • Designs • Procedures • Scripts • Performances	• Creator	• Generates new ideas • Exercises imagination • Produces new works
Organizing	• Actions • Decisions • Communications • Behaviors	• Leader • Manager	• Leader frames the vision for the team, builds support for project, and helps motivate team members • Manager executes the various functions required to realize the vision framed by the leader
Informing	• Data • Information • Knowledge	• Knowledge worker	• Gathers existing data, information, and knowledge for the team • Applies scientific and experimental methods, and action learning to discover new knowledge for the team • Enacts processes that help the team to learn • Critically evaluates creations produced by the team in an effort to improve them

For a team to perform at its highest level, *all* of the roles must be represented on the team for it to be effective. We can use a *balanced scorecard* (Kaplan and Norton 1992) approach to assess the team as illustrated in Figure 4.1.

The balanced scorecard method proposed by Kaplan and Norton is used at the strategic level to ensure that a firm is achieving quantitative and non-quantitative results in the four areas of customers, learning and growth, finances, and internal business processes. Each area of performance is aligned with *objectives, measures, targets,* and *actions*. Similarly, we can assess the relative strengths of each functional area of the team using roles. Clear objectives for each role, along with measures, targets, and initiatives should be identified. Assembling these data may be part of

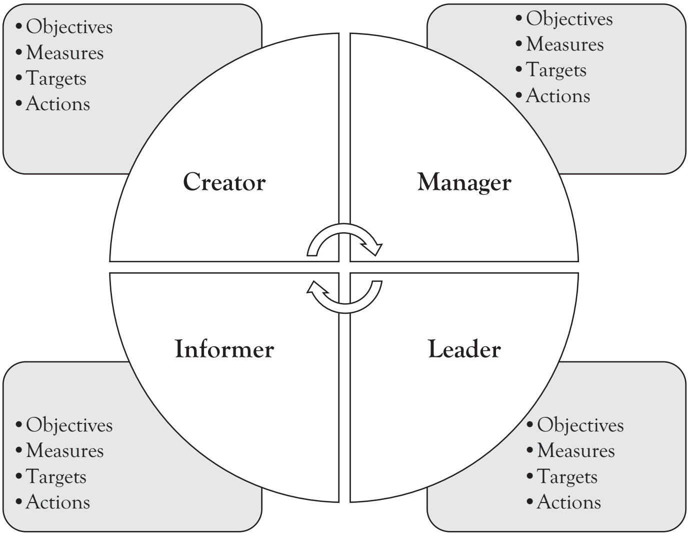

• Objectives
• Measures
• Targets
• Actions
Creator
• Objectives
• Measures
• Targets
• Actions
Manager
Informer
• Objectives
• Measures
• Targets
• Actions
Leader
• Objectives
• Measures
• Targets
• Actions

Figure 4.1 A balanced scorecard approach to team roles

a team development process. The metrics that are identified may be used to gauge the performance of the team over time and to take corrective action as necessary. These metrics will thus help teams to learn over time. It cannot be stressed enough that these roles are taken voluntarily and can be changed at any time; that is, creators can become leaders, managers can become informers, and so on.

Chapter Summary

While personality characteristics are relatively enduring over time, people can take on different team roles by choice. Roles are critical to creative high performing teams. Roles serve three primary functions: (1) to provide the raw ideas and energy for the creation and building of new products, services, and processes; (2) to help organize the various tasks required of the team in order to accomplish its goals; and (3) to keep the members informed by supplying data, information, and knowledge in support of team objectives. Consequently, each team needs team members to fulfill the roles of creator and builder, leader and manager, and knowledge worker.

Unlike personality, roles are *voluntary* and can be chosen by the members. No one person has to always perform in a certain role and it may be advantageous for team development if people are assigned to roles they would not normally inhabit. The key is to experiment.

Finally, we know that cooperation and coordination are positively correlated with team performance (Chong 2007). "High performing teams (are) characterized by trust, good communication, high commitment and good time management amongst team members" (Chong 2007, 212). We need to leverage the power of roles to help produce these outcomes.

CHAPTER 5

High Performance Improvisational Teams

> *I like people who are working on practical things and who are working in teams. It's not so important to get the glory. It's much more important to get something that works. It's a better way to live.*
>
> —Freeman Dyson, Scientist

Types of Improvisational Teams

In this chapter, we examine a very special type of high performance team: the *improvisational team*. What are improvisational teams? These are teams that operate under conditions of dynamic real-time decision making. These range from jazz groups to military platoons, to surgical teams, to a group of fire-fighters (see Table 5.1).

Several conditions are necessary to allow opportunities for individuals and teams to engage in improvisational behaviors at a high performance level as indicated in Table 5.2.

The *first* condition is that the team of two or more people comes together for a specific purpose, whether to solve a problem, perform, or execute a script. Several antecedent conditions lead to opportunities for improvisation. These include but are not limited to the following:

- Unexpected problems
- New or revised goals
- Changes in the structure of the problem space
- Changes in the environment
- Knowledge limitations

Table 5.1 Examples of improvisational teams

Jazz team[1]	Military team[2]
Surgical team[3]	Firefighting team[4]

[1] A view of the rhythm section of the Ray McKinley band, with exception of John Chance, bass, and Louis Stein, pianist, who are not shown, (left to right) Paul (Sneezy) Kashian, drums; Mundell Lowe, guitar; McKinley, tympani; and the backs of both vocalists, Chris Adams and Teddy Norman. In accordance with the wishes of William Gottlieb, the photographs in this collection entered into the public domain on February 16, 2010. Reference: Gottlieb Collection Assignment No. 219.

[2] Public domain image from the Commons Getty Collection. Reference: http://www.flickr.com/photos/soldiersmediacenter/513468440/

[3] Public domain image.

[4] Public domain image.

Problems that emerge unexpectedly can trigger improvisational behaviors by the agents. Apollo 13 is a dramatic example of the role of antecedent conditions. The explosion in the fuel line of the spacecraft sent the crew and ground support group into a frenzy of improvised problem-solving by necessity.[1]

Second, the context is real-time; that is, decision must be made within minutes, hours, or days. *Third*, members of the team are assumed to possess *deep* knowledge of the domain and the accompanying tasks. They are also aware of the risks and uncertainty of the task setting. *Fourth*, they are highly trained. To be most effective, members are aware of a playbook of courses of action and referents that guide and constrain the performance. For example, when the commandos raided the Bin Laden compound in

*Table 5.2 Necessary conditions for team improvisation**

Element	Description
Goals	• Goals are selected to respond to antecedent conditions or needs
Context	• Real-time setting
Team members	• Two or more people • People are brought together to achieve goals; e.g., perform a musical piece; contain an emergency situation; perform a surgical operation • Each person must possess knowledge of the task and of the norms that govern team behavior • Each person accepts the risk and uncertainty of the task setting
Set of COAs	• Team members will choose appropriate courses of action (COAs) from the available set to meet goals
Referents	• A *referent* is a cognitive tool that constrains the task and COAs • In music, it is the harmony or score. In organizations, routines or SOPs
Opportunity to perform	• Each "performance" is a *realization* or variation of the referent that is unique to that situation

*See Stein (2011). Reproduced with kind permission from Springer Science + Business Media B. V.

Pakistan in 2011, they had logged hundreds if not thousands of hours of preparation prior to the real-time event.

The standard routines, protocols, and procedures that are employed by team improvisers are identified as *referents*. A referent is a starting point for action and decision making. It may be modified according to real-time conditions and the context. The unique realization of the standard procedures is considered a *performance*. The degree of modification of the referent occurs as a range as indicated in the following:

- Replication (i.e., no improvisation)
- Interpretation
- Embellishment
- Variation
- Improvisation (i.e., full improvisation)

Replication is just a simple copying of the original with all its structural and functional features intact. *Interpretation* involves subtle changes to the referent. *Embellishment* is an active and purposive act of changing the referent, but within well-defined boundaries imposed by the genre. Embellishments typically enhance the major qualities of the referent by reinforcing them and accentuating them rather than diminishing them. A *variation* is an active modification of the original referent to achieve a certain effect. Finally, an *improvisation* encourages the participant to modify all structural and functional features of the referent under certain guidelines imposed by the domain. The ability to modify a referent in real-time is the essence of improvisation.[2]

Improvisational Contexts

As introduced in *Fostering Creativity in Self in Organization: Your Professional Edge,*[3] we can identify four primary types of real-time contexts (see Table 5.3). The degree of structure and the magnitude of consequences determine the type of context the improvisers are performing in.

Structure refers to the degree that the problem solving domain can be conceptualized and that procedures, methods, and decision aids be developed to support the decision maker. For example, frequently performed surgical procedures tend to become structured problem spaces over time as the surgery is refined and standards evolve. On the other hand, introducing a new smartphone or novel technology into the marketplace is

Table 5.3 Typology of improvisational contexts*

STRUCTURE	Hi	**High structure/low risk** Examples: –Traditional jazz music –Business simulations	**High structure/high risk** Examples: –Surgical procedures –Military operations
	Lo	**Low structure/low risk** Examples: –"Free" jazz music –Free form brainstorming	**Low structure/high risk** Examples: –Emergency management –Fixing the world financial system
		Lo	**Hi**
		Magnitude of Consequences	

*See Stein (2011). Reproduced with kind permission from Springer Science + Business Media B. V.

considered a low structure context since limited experiential knowledge is available to the decision makers.

Magnitude of consequences captures the notion that actions that result in more severe consequences (e.g., death, dismemberment, etc.) are deemed to have higher moral intensity, all other things being equal. Magnitude of Consequences (MoC) is defined as "…the sum of the harms (or benefits) done to victims (or beneficiaries) of the moral act in question" (Jones 1991, 374). Low risk environments include most forms of the performing arts (although dance could result in physical injury), the visual and literary arts (although inflammatory material can carry civil and criminal penalties), and simulations used in business, engineering, and healthcare.

High risk environments are typical in business, medicine, and engineering practice such as emergency management, crisis management, complex surgical procedures, and logistics. In these cases, poor decisions can result in physical, psychological, and financial harm to one or more stakeholders (Stein and Ahmad 2009). Although some high risk contexts such as doing complex surgeries or executing a military missions benefit from a fair degree of problem structure, they are nonetheless risky.

The triple disaster (i.e., tsunami, earthquake, and nuclear meltdown) that struck Japan in 2011 was a *low-structure and high risk* context that demanded immense creativity and improvisation. Unfortunately, the Japanese were not prepared to deal with such an event.[4] Consider this early review of the Japanese response to the crisis:

> From the beginning, the Japanese response to the Fukushima Daiichi nuclear disaster has been a constant improvisation. After the double blow of a quake and a tsunami knocked out power to the plant, officials have desperately tried to keep nuclear material at active reactors and spent fuel pools cool, to prevent overheating and more wide-scale radiation release. They've tried flooding the reactors with seawater. They've tried using riot control high-pressure water cannons to spray the reactors, and later fire trucks with more powerful hoses. They've tried using helicopters to dump water from above on spent fuel pools, which are running dangerously low. There are even efforts afoot to connect long extension cords that might power up the plant's cooling system again.

> As Ken Belson writes in the *New York Times*, the MacGyver-like nature of the Japanese response to the crisis is either a sign that they were dangerously unready to deal with a nuclear accident on this scale—or that they're simply trying to do the best they can with an unimaginable situation. Either way, though, more creativity is going to be needed because the disaster seems to be getting worse by the day (Walsh 2011).

Interestingly, the author of this article confuses the meaning of *bricolage* and improvisation. Improvisation is not making do with what is at hand in a seat-of-your-pants kind of manner; that is bricolage. Improvisation is based on disciplined preparation for contingencies and the two concepts could not be further apart from each other.

Improvisation Defined

Improvisation is often defined as an ability to "invent, compose, or perform something extemporaneously"[5] The roots of the word come from the Latin derivative proviso, which means to stipulate beforehand or to foresee. The prefix "im" means not; that is, the negation of what follows. Hence, the word improvisation can be interpreted to mean unforeseen or to take action in the moment.

While these distinctions capture the real-time aspects of improvisation, they gloss over the deeper meaning of the concept. Barrett writes, "Improvisation involves exploring, continual experimenting, tinkering with possibilities without knowing where one's queries will lead or how action will unfold" (Barrett 1998, 606). To be able to *tinker* you need something to tinker with; that is, a base of knowledge from which to work. This is the *referent* we referred to previously. The referent (i.e., score, procedure, recipe) is modified and altered in such a way as to produce the intended outcome.

> Improvisation involves reworking pre-composed material and designs in relation to unanticipated ideas conceived shaped and transformed under the special conditions of performance, thereby adding unique features to every creation (Berliner 1994, 241).

Bricolage, on the other hand, emphasizes only the real-time and "make do" aspects of the concept, rather than the immense knowledge and preparation required to be a great improviser. Improvisers come from all fields of endeavor and include jazz musicians, entrepreneurs, firefighters, surgeons, and pilots, among others. Some of my favorites include Miles Davis (jazz musician), Len Bosack, and Sandy Lerner (founders of Cisco Systems), Mark Zuckerberg (founder of Facebook), Captain Chesley Sullenberger (airline pilot), and the crew of Apollo 13. More information on these people is provided in *Fostering Creativity in Self and Organization: Your Professional Edge*, also available from Business Expert press. One may think of improvisers as real-time designers that craft performances to meet real-time needs. To be adept at this activity requires considerable training and experience in a particular field or *métier*. Improvisation thus focuses on the *quality of the performance* as opposed to the artifacts that may result from such activity.

Here is a useful and pragmatic working definition of improvisation that we will employ in this book:

Improvisation

- Improvisation is the ability to make effective real–time decisions in new and complex situations using current information and appropriately chosen (or modified) routines, scripts, and patterns.

Each member of the group must therefore be trained thoroughly in a common base of knowledge and be willing to accept and manage risk to be an effective part of the team.

Critical Success Factors for Effective Team Improvisation

In order to improvise effectively, the team members must have cultivated several skills, abilities, and conditions. See Table 5.4.

To begin, the team must have developed effective communication capabilities. Effective communication is defined as communication that

Table 5.4 Cultivating effective team improvisation[*]

Element	Description
Ability to communicate	• Improvisation in a team is a conversation • Requires excellent listening skills • People must have a *vocabulary* of *words/phrases* to communicate
Relationships of trust	• Members must trust each other to promote free and open communication
Ability to self-monitor	• Requires ability to self-monitor and listen to self; i.e., engage in retrospective and real-time sense-making[†]
Knowledge base	• Members must have complementary bases of knowledge and expertise • Members must share a common base of knowledge related to task environment • Requisite variety of knowledge helps handle discontinuities
Working memory	• Members need extensive working and/or external memory to perform
Leadership	• Each team has a de facto leader • Leadership may be temporarily shared among the group members during performance
Client/recipient awareness	• Members of the team must be aware of the unique characteristics of the client/recipient and tailor responses, and procedures, accordingly

[*] See Stein (2011). Reproduced with kind permission from Springer Science + Business Media B. V.
[†] Weick (1998); Berliner (1994).

produces the intended effect in the recipient, not just simply sending the message from one point to the next (Tagiuri 1972, 1993). For example, effective communication requires excellent listening skills and the members of the team must have developed a vocabulary of words, phrases, and ideas specific to the domain to establish meaningful conversations. In jazz music, these are the note sequences that fit specific harmonic structures. In surgery, it would be the vocabulary that identifies the tools, methods, and aspects of human anatomy that intersect during complex tasks.

The second requirement is that the members of the team must *trust* each other. This is absolutely critical. Trust is a key aspect of team and organizational performance (Six and Sorge 2008) and especially so in real-time decision making contexts. *Third*, the members of the team must be able to self-monitor. As was stated earlier, “If you are not affected and influenced by your own (notes) when you improvise then you're missing the whole point" (Weick 1998; Berliner 1994, 193). Self-reflection in real-time is also key. While engaged in conversation with other members of the team, the agent must also listen to him or herself speak the vocabulary of the domain as the interaction unfolds and make modifications accordingly. *Fourth*, the team must possess a base of common knowledge specific to the domain as well as other referent domains. This knowledge guides and constrains the choice of *permitted* courses of action selected by the team. *Fifth*, the team must have at its disposal both in context *memory* (i.e., memory of the earlier parts of the current performance) and of previous performances.

Sixth, the members of the team may rotate and share leadership throughout the performance. For instance, when jazz groups perform, there is a passing of the baton of leadership from one member to the next as each soloist takes his or her turn (see Figure 5.2). The transition from one to the next is swift and effortless. Shared leadership allows each member to perform at his or her highest level of ability, alternating between *sideman* to featured soloist. Together, these factors drive teams to be effective in their improvisations. On the other hand, it should be pointed out that most groups have a de facto leader, and although

Figure 5.2 Shared leadership in a high power improvisational jazz group

Source: Photo from the author's personal archive. The performers in the band include Charlie Ventura (tenor sax), Kai Winding (trombone), Lou Stein (piano), Bob Carter (bass), Shelly Manne (drums), and Buddy Stewart (vocals). Location is at the Three Deuces Jazz Club sometime in 1947.

leadership may temporarily shift during performance, the primary leader may assume control at any point during, preceding, and following the performance. This understanding is implicit among the members.

Finally, the team must tailor the performance to the unique characteristics (and limitations) of the client or recipient. In jazz music, this is relatively trivial (i.e., the performers must take into account the responses of the audience, who may cheer, boo or usher the performers off the stage). In healthcare, this is of crucial importance and can mean the difference between success and failure. Although all patients are human beings of a certain age and gender, the variance between patients of a given class may be significant based on differential life-style and environmental factors. The *performers* must therefore adapt existing routines to match the unique characteristics of a given individual.

Performance Preparation and Support

Pre-performance Support

Contrary to common thought, improvisers from Second City comics to jazz musicians train extensively to gain the facility to create in real-time. This paradox of preparation to enable more freedom is not widely understood. However, when a surgical team improvises out of necessity, we instinctively understand the role and importance of prior experience and knowledge. In light of this need, we identify several support options technical and otherwise. See Table 5.5.

Information systems offer the potential of providing support for extensive learning drills and preparation in the procedures of the domain. Easy access to videos and other multimedia illustrations by domain experts are

Table 5.5 Pre-performance support*

Support area	Support method
• Rehearsal support • Feed-forward	• Drills and training methods and procedures • Reviews of experts in similar contexts
• Domain learning	• Simulations
• Referent support	• Declarative knowledge libraries
• Trust	• Build trust of members through social networking

*See Stein (2011). Reproduced with kind permission from Springer Science + Business Media B. V.

also very useful. Simulations in a variety of contexts can prepare the user for several scenarios. Fast access to the declarative knowledge of the domain is also necessary for study and preparation, especially for newcomers. Finally, the pre-performance component should have a social networking feature like Facebook or LinkedIn to facilitate communications among users. This facility will increase trust and familiarity with current or potential team members. It also will be a means by which novices and peers learn from experts or other peers by cultivating a community of practice (Stein 2005).

Performance Support

Improvisation is episodic by nature and the improviser needs support throughout the total performance from beginning to end. Teams can benefit from the following types of support during performance and execution of scripts and procedures. See Table 5.6.

To support relatively routine contexts where replication is the goal, making available libraries of patterns, routines, SOPs, and scripts is useful. Other useful forms of external history-based support include case support and a knowledge base of the task domain. Support for the real-time aspects of the performance include data feeds and representations of current data indicators. The latter is analogous to a real-time

Table 5.6 Performance support*

Support area	Emphasis	Support method
Referent support	Historical	• Libraries of routines, SOPs, scripts • Decision tree logic libraries
Case support	Historical	• Histories of previous cases
Knowledge support	Historical	• Knowledge base of task domains
Supporting real-time sense-making	Real-time	• Real-time data feeds and representations of current data according to task environment
Conversation analysis and support	Real-time	• Natural Language (NL) processing of encoded conversation streams • Detect and anticipate problem situations, errors • Verbal cues, emotions • Allow agents to issue verbal/non-verbal commands to system to execute tasks

*See Stein (2011). Reproduced with kind permission from Springer Science + Business Media B. V.

executive information system (Watson et al. 1991) or business intelligence system (Turban et al. 2007). The most important feature of the system is an ability to analyze conversations of the team members and to make assumptions about changing needs. The system can utilize natural language processing of encoded conversation stream to detect and anticipate problem situations and errors. Verbal cues, emotions of the team members, and other verbal and nonverbal behavior analysis can be employed. This latter feature is essential to anticipate the need of the team to move from executing routine procedures to higher degrees of improvisation. Because of the multitasking requirements of the team, the system should be able to respond to verbal and nonverbal commands issued by the members to execute commands and tasks.

Post-performance Support

The primary goal of post-performance support is to support retrospective sense-making, reflection, after-action reviews, error analysis, and feedback. The consequences of these support features for the organization and team are individual and organizational learning and memory (Stein 1995; Stein and Zwass 1995). See Table 5.7.

Many have stressed the importance of reflection (Gardner 1994, 1996, 1998) and sense-making (Weick 1998) to help people to learn and interpret prior experience. Members of improvisational teams need time to process the rich experiences they encounter in context in order to learn. Decision support should therefore include the use of rich media

Table 5.7 Post-performance support*

Support area	Post-support type
• Retrospective sense-making • After-action reviews • Error analysis • Feedback	• Rich data and video capture of events • Data on recipients and outcomes • Templates for knowledge capture • Records indexing to enable the review of event data to support after-action reviews, feedback, and error analysis • Social networking support • Access to libraries of procedures and knowledge for comparison to actual

*See Stein (2011). Reproduced with kind permission from Springer Science + Business Media B. V.

(e.g., video) to capture events for later review and reflection. Given the intensity of real-time situations, it is even likely that participants fail to remember details given a complete immersion in "flow" (Csikszentmihalyi 1994, 1996). Providing real-time capture of events is therefore critical. The data can then be used to support sense-making, after-action reviews, and error analysis. These activities are indispensable to both individual and organizational learning. The provision of a social networking feature promotes social learning within the team and community of practice (Stein 2005). Finally, feedback on recipients and their outcomes (e.g., patients) is crucial to after-action learning.

Chapter Summary

The ability to improvise is a critical skill for individuals, teams, and organizations. Improvisation occurs when improvisers have a shared goal to be accomplished in real-time, sets of routines and knowledge to draw from, and the temperament to tolerate risk. Each time a group improvises can be thought of as a *performance*, which varies from full improvisation to more subtle variations and embellishments. Improvisation can take place in a variety of contexts from ones in which there is a high degree of structure based on a knowledge of previous routines and procedures to ones in which the participants have never faced the problems or challenges posed. In many cases, the risks associated with making a "wrong" choice are minimal while in others it can be catastrophic resulting in impacts felt by many people or including loss of life.

To be effective, several factors must be present among the team members: ability to communicate, trust, and self-monitor and have a common base of knowledge to draw from and strong leadership. To gain proficiency as an improviser, team members can practice, rehearse, and use simulations. Information systems can be leveraged by providing case support, conversational analysis, real-time sense-making, and support with standards and procedures. After-action reviews can be conducted to help the team to learn and become more effective over time. In short, improvisation is the ability to make effective real-time decisions in new and complex situations using current information and appropriately chosen (or modified) routines, scripts, and patterns.

CHAPTER 6

High Performance Design Teams

> *Design must reflect the practical and aesthetic in business but above all... good design must primarily serve people.*
>
> —Thomas J. Watson, founder IBM

> *Engineering, medicine, business, architecture and painting are concerned not with the necessary but with the contingent—not with how things are but with how they might be—in short, with design.*
>
> —Herbert Simon, Noble Prize Economics

In this chapter, we examine another type of special high power team: design teams.

Design Teams

Design is the process of generating and screening ideas, converting them into schema, building them into concrete artifacts or processes, and distributing them to markets. In short, designers transform ideas and needs into products and services.[1] Examples of the tasks assigned to design teams include developing new software, automobiles, spacecraft, toys, MP3 players, phones, customer service experiences, industrial processes, and pharmaceutical drugs, to name a few (see Table 6.1).

In theoretical terms, design has been described as the passage from a functional description to a physical description of an artifact (Hooker 2004). More broadly, design is a form of problem solving. Not all, but a majority of design efforts involve the solution of *ill-structured problems* (Simon 1960). Ill-structured problems are not easily framed, have many possible solutions, and may not be easily represented. Design problems

Table 6.1 Tasks assigned to design teams as evidenced by the products produced

Lego blocks[1] 	Skyscrapers
MP3 player 	Car

Notes: All images in table are public domain unless otherwise noted.

[1] Author: Alan Chia. This file is licensed under the Creative Commons Attribution-Share Alike 2.0 Generic license. http://www.flickr.com/photos/13403905@N03/2080281038/

thus do not have a clear right or wrong answer, just varying degrees of satisfaction. Design is thus a highly knowledge-intensive activity:

> Whether it is an electronic circuit, a house, a new entree for a restaurant, a musical composition, an essay, or any other product or system, designing requires applying general and domain-specific schemas as well as procedural knowledge (Jonassen 2000, 14).

To best capture these ideas, I have included a practical working definition of design for use throughout the book.

Design

- Design is the ability to envision and construct an object or process that meets the goals and requirements of a particular user.

Table 6.2 Typology of design contexts

STRUCTURE		
Hi	**High structure/low risk** Examples: –Designing a print advertisement –Designing a new computer	**High structure/high risk** Examples: –Designing a bridge –Designing a power plant
Lo	**Low structure/low risk** Examples: –Designing a new social networking service –Designing a new search service (e.g., Google)	**Low structure/high risk** Examples: –Designing a new transportation system (e.g., Boston's Big Dig) –Designing a new healthcare system
	Lo	**Hi**

Magnitude of consequences

Design Contexts

Like improvisation, there are several design contexts based on the risk and the structure of the problem space (see Table 6.2). Unlike improvisational contexts, there are few real-time constraints; that is, actions are not necessarily taken in real-time and can extend over hours, days, months, or even years.

Design contexts are classified according to (1) risk of failure, that is, the magnitude of consequences and (2) the problem structure. For instance, designing a print advertisement or a standard computer are highly structured problems because of the enormous experience we have with such tasks. They are considered low risk since the worst outcomes typically are financial risk or impacting someone's reputation.

Designing new products such as Facebook are low-risk but also lower structure problems because we have less experience with social networking software than say word processing software. Designing a bridge or a nuclear power plant is a high risk design task but one that is highly structured. The most challenging design problems are low-structure *and* high risk. These include building new transportation systems such as Boston's Big Dig or a new healthcare system because of the immense complexity of such tasks. Failure in this case can lead to loss of life and so the risk is considered high.

A General Theory of Design

In his seminal work, *The Sciences of the Artificial*, Herbert Simon (1969) was one of the first to recognize the need for a general theory of design. In contrast to the natural sciences that saw a focus on processes in the natural world of atoms, cells, and stars, Simon saw the need to study how human beings think, solve problems, and design new artifacts to attain goals. Whereas the natural sciences describe how the world is, the design sciences study "how things ought to be to attain goals" (Hatchuel 2001, 262).

Since then there have been several attempts to articulate a theory of design applicable to a variety of fields. Given the ubiquity of information systems (IS) design, much of the recent work in constructing a theory of design has occurred in the IS literature (Walls et al. 1992; Gregor and Jones 2007). However, some have argued that defining a science of design is logically flawed. For example, Hooker (2004) argues that since design is a practice, it can never be codified. While this is true to an extent, I am of the opinion that *theory that approximates design* activity is useful because it clarifies the essential elements of this activity across a variety of domains.

What are the components of a useful design theory? Gregor and Jones (2007) identify eight elements as shown in Table 6.3.

The first requirement is that all designs need a clear statement of goals or purpose. The design must then be put into some form of representation; for example, a blueprint. Principles of form and function are vital. Changes must be accounted for. There must be some testable propositions about design in general. The theory of the product may be embedded in other theories. The theory will contain important information about how to implement the design such as in production. For example, in the pharmaceutical industry, the referent theory would be bio-chemistry. Finally, the theory will be accompanied by a physical artifact that embodies the design.

To better understand these concepts, let's take an example from the realm of product design and development; for example, the design of a new MP3 player (See Table 6.4).

As can be seen in the table, design theory helps the designer to flesh out the requirements of any product or service in a highly comprehensive and detailed way. In the next section, we look how organizations design products and services as a practical matter.

Table 6.3 Components of a theory of design

Component	Description
Purpose and scope	"What the system is for." The set of meta-requirements or goals that specifies the type of artifact to which the theory applies and also defines the scope, or boundaries, of the theory.
Constructs	Representations of the entities of interest in the theory.
Principle of form and function	The abstract statement or architecture that describes the artifact; that is, the product or method.
Artifact mutability	The changes in the state of artifact anticipated in the theory; that is, to what degree is modification of the artifact encompassed by the theory.
Testable propositions	Truth statements about the design theory.
Justificatory knowledge (Kernel theories)	The underlying knowledge or theory from the natural, social, or design science that gives a basis and explanation of the design.
Principles of implementation	A description of processes for implementing the theory (either product or method) in specific contexts.
Expository instantiation	A physical implementation of the artifact that can assist in representing the theory both as an expository device and for the purposes of testing.

Source: Adapted from Gregor and Jones (2007). I have adapted and generalized their exposition which was defined in the context of information systems.

Table 6.4 Design theory applied to product development (MP3 player)

Component	Description
Purpose and scope	A device that plays music in MP3 format
Constructs	Drawings, images, circuit designs
Principle of form and function	Form: GUI interface, pocket sized, metal/plastic frame Function: Enables user to play music and to multitask
Artifact mutability	Ability to account for 1st, 2nd, and N generations of the product
Testable propositions	Sound quality difference between MP3's and music encoded on CDs is undetectable by the average listener
Justificatory knowledge (Kernel theories)	Electronics, manufacturing, software, sound reproduction, recording, media, databases
Principles of implementation	How to source and manufacture the device
Expository instantiation	Prototype of an iPod

The Product Design and Development Process

From what we have learned, design is about constructing artifacts in accord with our goals. Design ultimately rests on the two pillars of *form* and *function*. Form is the physical or outward appearance of something. It is what is perceived by an observer. Function is how the artifact works (Greene 2010). If the object of the design is a Porsche, function pertains to the way the car functions in terms of transport. However, function is much more than this. Function also refers to the quality of the user experience when he or she is positioned behind the wheel. Form and function thus go together. You cannot create great forms that suffer from impaired function; that is, a mockup of a car that does not drive is not a car. Similarly, pure function rarely inspires sustained sales unless it is the lowest cost item or the only one available. The Yugo automobile is a case in point.

There are several steps that are common to the product design process, which include general design principles and applied methods used by business organizations. Some approach the process in an ad hoc way. Other companies have a well-defined method. Let's look at how some well-known organizations design their products and services.

Case Study: LEGO

LEGO was founded in 1932 by Ole Kirk Christiansen to promote "good play." Lego is an abbreviation of the Danish words *leg godt*, which means to play well (Lego 2011). Today, LEGO is one of the premier design companies in the world (Greene 2010) and teams are a central part of its success. A snapshot of its performance from the 2012 Annual Report is shown in Table 6.5.

As can be seen in Table 6.5, LEGO experienced huge successful growth from 2008 to 2012. Revenues increased by more than two-and-a-half times. Profits increased nearly four times. Employment doubled. Margins all increased. It is an enviable record, especially in a market that had been relatively flat.

Design teams are central to LEGO's success. LEGO employs over 120 designers at its Denmark office and another 20 to 30 people at offices in the UK, Japan, and other locations around the world (Design Council 2010). Each team includes key roles such as marketing, a project

Table 6.5 LEGO's financial performance 2008-2012

Consolidated income statement					
(mDKK)	2012	2011	2010	2009	2008
Revenue	23,405	18,731	16,014	11,661	9,526
Expenses	(15,453)	(13,065)	(10,899)	(8,659)	(7,522)
Operating profit	7,952	5,666	4,973	2,902	2,100
Financial income and expenses	(430)	(124)	(84)	(15)	(248)
Profit before income tax	7,522	5,542	4,889	2,887	1,852
Net profit for the year	5,613	4,160	3,718	2,204	1,352
Employees:					
Average number (full-time)	10,400	9,374	8,365	7,286	5,388
Financial ratios (%)					
Gross margin	71.1	70.5	72.4	70.3	66.8
Operating margin	34.0	30.2	31.1	24.9	22.0
Net profit margin	24.0	22.2	23.2	18.9	14.2
Return on equity (ROE)	66.7	66.8	84.8	82.3	72.2
Return on invested capital	140.2	133.4	161.2	139.5	101.8
Equity ratio	60.3	54.1	49.9	42.3	31.8

leader, and a design manager (Design Council 2010). This structure was a deliberate choice:

> Part of the objective of this structure, says Torsten Bjørn, creative director, was to "align our activities and focus them around the development of strong propositions where collaboration between functions became better, the D4B methods and tools have helped to leverage this" (Design Council 2010).

This structure is consistent with the roles defined earlier in the book: a creative function, an informing function, and leadership and management functions.

LEGO teams turn ideas into artifacts using its well-known design innovation model known as D4B which stands for Design for Business. LEGO's product development process is one of the most structured, and extensive, in business. It bears exploration because it can help an average team perform at higher levels due to its well-thought-out structure.

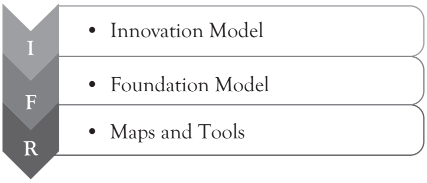


Figure 6.1 LEGO's D4B product design and development process

There are three components to the D4B framework: an *Innovation Model*, a *Foundation Model*, and *Maps and Tools* (see Figure 6.1).

The Innovation Model functions to determine to what degree do aspects of the *organization* need to be redesigned, which include the business, the product, organizational processes, and methods of communication (Design Council 2010). According to Paal Smith-Meyer and Torsten Bjørn, creative directors at LEGO, the purpose of the Innovation Model is to:

- participate in a dialogue early on in the process to define objectives for the project and the innovation approach needed to deliver this;
- anticipate and acknowledge the resources and skills required for succeeding;
- enable the assessment of results against set objectives at different stages of the project (Design Council 2010).

Teams may implement four levels of change according to the model, ranging from no change to a full redefinition of the process (see Table 6.6).

The next component of the method, the *Foundation Model* provides the structure for the product development itself (Greene 2010, 76–79). It includes four prototyping phases and five manufacturing phases. The key elements of the model are identified in Table 6.7.

The first stage is called P0 and is a time to review trends, consumer needs, and business opportunities. In stage P1, the focus is on *ideation*; that is, brainstorming new ideas to meet identified needs. In P2, ideas are *evaluated and refined*. Prototypes may be constructed to flesh out the design ideas. At LEGO, the final stage, P3, is the point when account executives and managers *review manufacturing costs* and other financial data to determine the best designs to bring to market. Once completed,

Table 6.6 Levels of change allowed in the LEGO innovation model

Action	Description
No change	• Product or process is currently fit for purpose
Adjust	• Minor changes and optimization of known parameters are used to update products or modify processes in order to improve performance
Reconfigure	• Known processes are put together in new ways in order to better meet existing business and/or customer needs
Redefine	• An entirely new approach and offerings are introduced in a business area or market sector • Existing products and processes may undergo fundamental modifications

Table 6.7 LEGO's Foundation Model for design and development

Phase	Title	Tasks
Prototyping		
P0	Portfolio kick-off	Needs analysis
P1	Opportunity freeze	Ideation
P2	Concept freeze	Evaluate and refine prototype
P3	Portfolio freeze	Financial and manufacturing review
Manufacturing		
M1	Project kick-off	Refine product definition and business plan
M2	Business freeze	Finalize product design
M3	Product freeze	Packaging, marketing, communications focus
M4	Communication freeze	• Physical aspects of product finalized • Supply chain organized
M5	Procurement freeze	Manufacturing is started and product launched

the work is passed to the manufacturing component of the model. In phases M1 through M5, product designs are finalized and the real-world constraints of production dominate the process until the product is manufactured and launched.

LEGO implemented this structured method in 2004 and by 2007, all of its products were being designed this way. According to the company, design costs *decreased* by 55 percent over this three-year time period, while its sales *increased* by 42 percent (Greene 2010, 77). Another interesting feature of their design process is that they actively solicit input on designs from their most dedicated customers.

Maps and tools: To keep the team on track within each of these phases, LEGO employs a variety of tools and techniques. For example, they use a *roadmap* to keep track of progress during prototyping and manufacturing. Another tool is the LEGO *Design DNA*, which helps to (1) integrate products within each product group and (2) differentiate product groups from other product groups. Another important innovation is the LEGO *Design Practice*. The latter is a knowledge management (KM) tool that helps designers identify, use, and share best practices (Design Council 2010), thus contributing to organizational memory (Stein 1995; Stein and Zwass 1995). To support the artistic process, LEGO artists and designers have access to a 3-D CAD tool that allows them to develop virtual renditions of products in development.

In summary, LEGO is an extraordinary company that has structured creativity, design, and innovation like no other. Contrary to popular belief, structure does not stifle but helps to liberate creative expression. Creative Director Torsten Borg remarks:

> I think it allows us to be more creative, because now our designers don't have to think about how they are going to structure a new project as a design manager, they don't have to spend time and suffer pain trying to reinvent things that somebody has already done. Through this we become more efficient and effective as a design team (Design Council 2010).

Within the structures and support systems provided by LEGO, teams are empowered to channel creative impulses into marketable products and services. While there are many lessons learned, the chief one from LEGO is that structure can turn an average performing team into a high performer.

Design Team Lesson Learned

- Implementing a highly structured (and successfully tested) product development process can improve the level of performance of a team and turn an average team into a high performer.

Other Approaches to the Product Development Process

Design does not have to be an in-house capability. The successful kitchen and consumer products company, OXO,[2] outsources its design to a company named Smart Design. The impetus for the company's formation was the founder Sam Farber's desire to design simple yet effective kitchen tools for *all* people; that is, right handed people, left-handed people, people with small or large hands, and those with physical handicaps. In the field, this is known as universal design.

> It's the idea of creating products that are easy to use for the widest spectrum of customers—young and old; male and female; left- and right-handed; European, Asian, and American; and those with physical challenges such as arthritis (Greene 2010, 91).

OXO and Smart Design use a design process that is structured but relies on somewhat "softer" forms of information. "It puts a great deal of weight on intuition rather than traditional market research. And it relies on the marketplace, not focus groups, to validate its ideas" (Greene 2010, 103). The four-step method includes *exploration, refinement, design and development*, and finally *prototyping and manufacturing* (Greene 2010). A comparison of the design process of LEGO and OXO is provided in Table 6.8.

The company begins by generating a design brief that documents the problem it wants to solve, which it then brainstorms with Smart Design. Next, the two refine their ideas and generate sketches and models. If the models don't make sense or address the original need, they start from scratch. In the next phase, they design the product with the intent of

Table 6.8 Comparison of product development processes

Phase	LEGO	OXO
Phase 1	Needs analysis	Exploration
Phase 2	Ideation	Refinement
Phase 3	Evaluate and refine	Design and development
Phase 4	Financial and manufacturing review	Prototyping/manufacturing

Table 6.9 Awards for innovation and design earned by OXO 2011–2013[*]

Award	Organization	Year	Item
"Top Pick"	Consumer Reports	2013	Tot Sprout Chair
Good Design Award	The Chicago Athenaeum	2012	Tot Booster Seat
Good Design Award	The Chicago Athenaeum	2012	Mini Measuring Beaker Set
Good Design Award	The Chicago Athenaeum	2012	3-in-1 Avocado Slicer
Red Dot Award—Product Design "Best of the Best"	Design Innovations 2011 Competition, Design Zentrum Nordrhein Westfalen, Germany	2011	Tot Sprout Chair
Red Dot Award—Product Design	Design Innovations 2011 Competition, Design Zentrum Nordrhein Westfalen, Germany	2011	Tot Feeding Line
10 Most Innovative Companies in Consumer Products	Fast Company	2011	OXO

*http://www.oxo.com/Ourawards.aspx

manufacturing it. The final phase is where they set up the manufacturing process and produce the initial runs of the product. Unlike LEGO where standardization of the design process decreased costs, it actually increases costs for OXO. However, the company would rather really get the product right rather than skimp on design (Greene 2010). They view their process as an investment. The cost of messing up is far worse.

Its investment in high quality design has earned it numerous awards (See Table 6.9). Since 1990, OXO has won over 150 international honors for product design, packaging, and corporate identity.[3]

Not all companies use formal methods for product design yet they are successful, albeit perhaps less so. For example, Clif Bar, maker of energy and sports bars, is much more seat-of-the-pants (Greene 2010, 141). The notion that design has to be serious and methodical is also not sacrosanct and can be built on other metaphors. Design can be artistic and whimsical. Virgin Atlantic, Sir Richard Branson's airline that has won all sorts of design awards, views service design as *theatre*.

> Its creating props for our cast, our cabin crew. The props are the knives, the pajamas, the meal. The set includes everything from

> the lie-flat seat to the full walk-up bar, and goes down to the more subtle touches like Swarovski crystal panels at the front of the cabin (Greene 2010, 180).

According to Joe Ferry, Virgin's head of design, humor is also another important aspect of design (Greene 2010, 180). Branson notes, "The only reason the Virgin brand has survived so long is that people trust that the actual end products that they are going to get from Virgin are good ones" (Greene 2010, 189). *Conde Nast Traveler* has consistently awarded Virgin America its Readers' Choice Award as best domestic airline including most recently in 2013. So good design does pay off and the metaphor seems to be working.

Chapter Summary

Design thinking is one of the most fundamental core competencies (Prahalad and Hamel 1990) for any organization. Design teams are a critical subset of the organization because they translate ideas into products and services. Design is the ability to envision and construct an object or process that meets the goals and requirements of a particular user. Like improvisation, there are several design contexts based on risk and the structure of the problem space. Most companies like LEGO or OXO structure the design process into a series of steps such as a needs analysis, ideation, evaluation, and translation into manufacturing specifications. Great design teams lead to great companies that maintain competitive advantage as evidenced in the marketplace.

CHAPTER 7

High Performance Research and Scientific Teams

> *I believe in innovation and that the way you get innovation is you fund research and you learn the basic facts.*
>
> —Bill Gates, co-founder Microsoft

Scientific research teams are a specialized and highly important type of organizational unit. The purpose of this chapter is to explore the function, structure, and processes of research teams and organizations.

Defining Science

Science is about the discovery of patterns and the underlying order that appears to be woven through the fabric of the natural world.[1] It is systematic and disciplined. Taken together, it represents the collective learning of humankind about natural phenomena. All human design is based on this knowledge. For example, you can't design a building without a deep understanding of materials science, physics, and structures.

Most importantly, science is a process of knowledge validation that ensures that bridges and buildings remain standing after an earthquake. While there are many methods of inquiry (Churchman and Ackoff 1950), the most commonly known method is the scientific method, which has at its core *experimentation*.

Small Science

Throughout much of the history of humankind, great scientific discoveries were made by lone individuals (Archimedes, Copernicus, da Vinci, Galileo, Newton, Maxwell, and Einstein) or pairs working in relative isolation (Crick and Watson).[2] In fact, Einstein may have been one of the last great solo researchers the world has ever seen.

Table 7.1 Great scientific leaders and their theories in physics and related disciplines

Thinker	Theory/model	System type	Discovery timeframe
Democritus	Intuitive/logical	Macroscopic/microscopic	500 BC–1700 AD
Newton	Newtonian physics	Deterministic-simple	1700–1900
Pascal	Statistics and probability	Predictive and Stochastic systems*	1800–1900
Hadamard	Chaos theory†	Non-linear systems	1880s and 1960s
Einstein	Relativity theory	Relativistic systems	1900–1920s
Bohr	Quantum theory	Quantum systems	1930s

*Statistics is a branch of mathematics but its contribution to progress in the sciences is undisputed and immense.

† Chaos theory is a historical oddity. Although discovered in the 1880's it was not until the 1960s with the invention of the computer that significant progress was made on the theory.

In many cases, great scientists came to represent a theory or school of thought as indicated in Table 7.1.

For instance, Democritus, without the use of modern equipment, was able to infer the existence of atoms and molecules. Newton, using only simple optics and mathematics (part of which he invented including the calculus), was able to deduce Newton's Laws, the law of gravity, and other aspects of mechanics. Pascal was one of many early statisticians who, using mathematics, pioneered our understanding of the power of large numbers, regression to the mean, probabilities, and numerous statistical tests. As a consequence, statistics saves us innumerable amounts of time and money in data collection and testing hypotheses. Jacques Hadamard correctly predicted the possibility of *input-sensitive systems*, also known as *chaotic systems*, almost 80 years before computers demonstrated their ubiquity in nature and other types of systems. Einstein also using just mathematics made many predictions such as the bending of light in a gravitational field decades before such findings were confirmed empirically. Finally, using relatively crude equipment by today's standards, Neils Bohr and his colleagues peered into the structure of the atom to infer that subatomic states were quantized and that uncertainty was the rule.[3]

Scientific discovery has benefited most from structured imagination at the hands of the great thinkers. The formal designation of this process

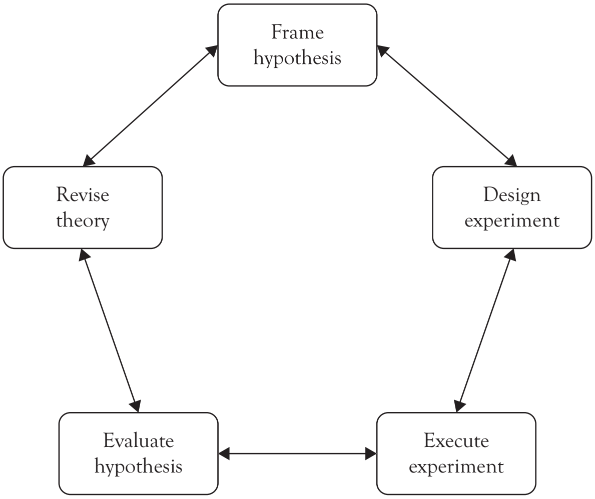


Figure 7.1 The scientific method

is the *scientific method*. The components of this process are illustrated in Figure 7.1. The process begins with the framing of a hypothesis. Next, the researcher designs an experiment to collect data about the object or event being investigated. Once analyzed, the results are used to either refine the model or to reject it. This cycle of *theory-test-revise* remains ongoing for years, even centuries.

Experimentation is thus the cornerstone of scientific discovery. The experiment itself is an opportunity to observe an event or object under certain conditions. Scientists collect sensory input (i.e., data) to test hypotheses and assumptions. Once the data is collected, it is analyzed for patterns and regularities. The next step is to invent a model that helps to explain the data that has been collected. Here is a working definition of experimentation that we shall use in this book:

Experimentation

- Experimentation is the ability of an observer to decide between two competing goals, courses of action, or viewpoints by designing a process that yields sufficient information to rank each choice according to certain criteria. This process is referred to as an experiment.

In the early days of science, scientists framed hypotheses and tested the latter themselves. In other words, many scientists were both *theoreticians* and *experimentalists*. With the advent of *big* science however, that changed.

The Transition to "Big Science"

Up until the early part of the twentieth century, very little equipment was needed to perform experiments, and solo pioneers were common. However, since the 1930s, science has taken on a new look. The complexity and scope of the projects increased dramatically thus demanding the formation of research teams and institutions. The size of research budgets escalated from thousands to millions or billions of dollars, thus ushering in the era of *big science*. For example, many particle-smashing machines designed to probe the inner workings of the atom cost several billion dollars to build and run.

Big science is defined by *big budgets* (millions and billions of dollars), *big staffs* (hundreds and thousands of people), *big machines* (costing millions or billions of dollars and years to build), and *big laboratories* (staffed by hundreds or thousands of people). In this new environment, teams play a critical organizing role in the search for new knowledge. We see this in both government and industry. For instance, large pharmaceutical firms conduct research and development with massive budgets and multiple teams of people. Government, both civil and military, has played an important role in spurring innovation through the works of the Human Genome Project, the Advanced Research Projects Agency (ARPA), Lawrence Livermore Labs, and many others. Let's look at the workings of one of the most important research labs in the world: CERN.

Case Study: CERN

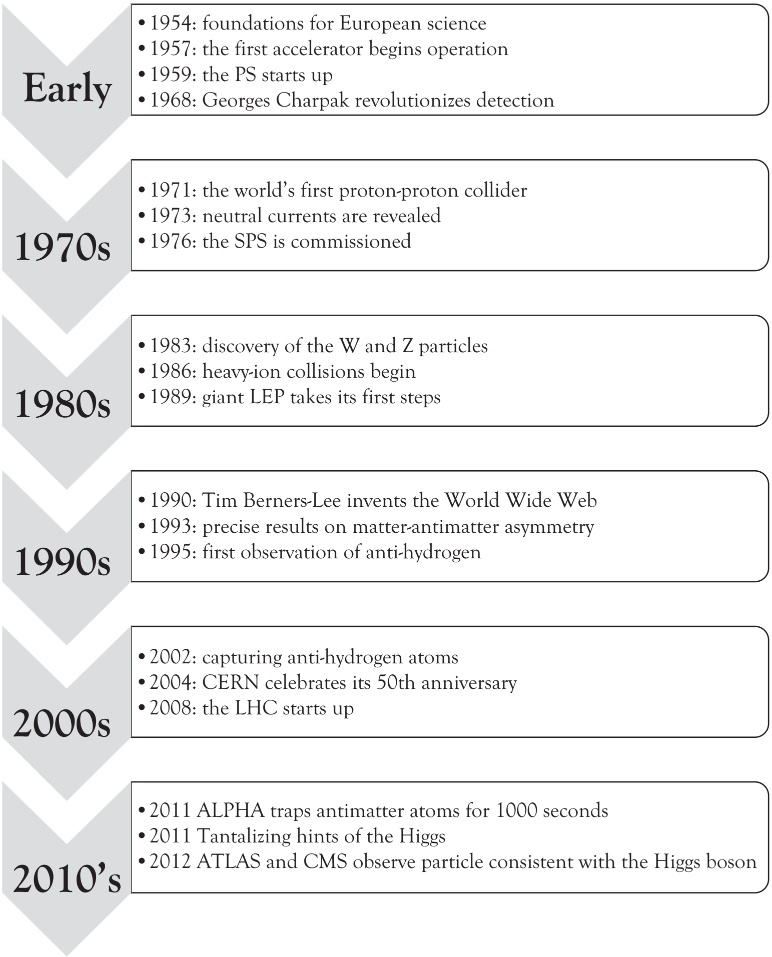
CERN is one of the most interesting and impactful large-scale international research enterprises in the world. CERN is outstanding because it involves the collaboration of over twenty countries, scores of research projects and teams, and massive amounts of data and money. Tim Berners-Lee, who is credited with designing the World Wide Web in 1990, is an employee of

CERN. His work was the result of trying to find a way to allow researchers from all over the world to share research results. Little did he know that his innovation would change the planet and its people in so many ways. The history of CERN is an interesting one. From the website:

> CERN is the European Organization for Nuclear Research. The name is derived from the acronym for the French Conseil Européen pour la Recherche Nucléaire, or European Council for Nuclear Research, a provisional body founded in 1952 with the mandate of establishing a world-class fundamental physics research organization in Europe. At that time, pure physics research concentrated on understanding the inside of the atom, hence the word nuclear.
>
> When the organization officially came into being in 1954, the council was dissolved, and the new organization was given the title European Organization for Nuclear Research, although the name CERN was retained.
>
> Today, our understanding of matter goes much deeper than the nucleus, and CERN's main area of research is particle physics—the study of the fundamental constituents of matter and the forces acting between them. Because of this, the laboratory operated by CERN is commonly referred to as the European Laboratory for Particle Physics (CERN 2008).

Since its inception, the organization has made significant advances in our understanding of matter and energy (see Figure 7.2):

As an organization, CERN is equivalent to a mid-sized corporation. CERN employs about 2,400 people, 1,500 part-time people, and hosts over 10,000 visiting scholars. "The Laboratory's scientific and technical staff designs and builds the particle accelerators and ensures their smooth operation. They also help prepare, run, analyze, and interpret the data from complex scientific experiments" (CERN 2008). CERN is organized into three major functional areas: administration, research and computing, and accelerators. See Figure 7.3.



Early

- 1954: foundations for European science
- 1957: the first accelerator begins operation
- 1959: the PS starts up
- 1968: Georges Charpak revolutionizes detection

1970s

- 1971: the world's first proton-proton collider
- 1973: neutral currents are revealed
- 1976: the SPS is commissioned

1980s

- 1983: discovery of the W and Z particles
- 1986: heavy-ion collisions begin
- 1989: giant LEP takes its first steps

1990s

- 1990: Tim Berners-Lee invents the World Wide Web
- 1993: precise results on matter-antimatter asymmetry
- 1995: first observation of anti-hydrogen

2000s

- 2002: capturing anti-hydrogen atoms
- 2004: CERN celebrates its 50th anniversary
- 2008: the LHC starts up

2010's

- 2011 ALPHA traps antimatter atoms for 1000 seconds
- 2011 Tantalizing hints of the Higgs
- 2012 ATLAS and CMS observe particle consistent with the Higgs boson

Figure 7.2 Major milestones in the history of CERN

CERN's clients include scientists from all over the world. "Some 10,000 visiting scientists, *half of the world's particle physicists*, come to CERN for their research. They represent 608 universities and 113 nationalities" (CERN 2008). Hundreds of research teams design experiments to test various hypotheses on the cutting edge of physics. At any given time, scores of teams are working independently on projects. A typical project at CERN includes anywhere from two to dozens of participants.

CERN's human resources department takes an active role in training and developing researchers in the management and leadership skills

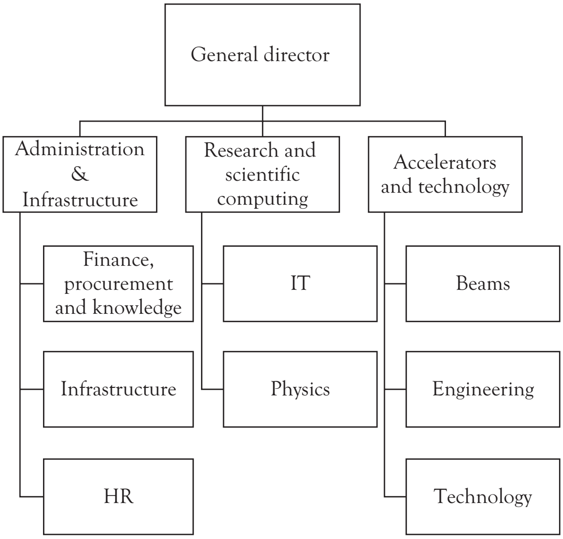

General director
Administration & Infrastructure
Research and scientific computing
Accelerators and technology
Finance, procurement and knowledge
Infrastructure
HR
IT
Physics
Beams
Engineering
Technology

Figure 7.3 CERN organization chart*

*CERN (2014).

Table 7.2 Core development training for group leaders at CERN*

Day 1	Day 2	Day 3
Introduction	Connecting with others	Authentic leadership
Group leadership and accountability	Change	Group leadership
Your leadership story	Connecting with others	Connecting with others
Leadership competencies	Authentic leadership	Leadership legacy

*CERN (2011).

Objectives:
- To create a common management culture for CERN group leaders.
- To provide CERN group leaders with a basic overview of the various aspects of their role and responsibilities, and develop awareness of the core management competencies concerned.
- To offer a forum for CERN Group Leaders to discuss management issues and share management experience across the organization.

required to run projects effectively and efficiently. For instance, one of its leadership development classes looks like what is shown in Table 7.2.

CERN, like so many organizations, realizes the importance of the leadership and management roles discussed earlier in the book and has invested the resources necessary to manage these highly capital-intensive, multinational projects on the cutting edge of science. All organizations whose output is knowledge can take a lesson from CERN in this regard.

Research team lesson learned

- Highly technical organizations populated by employees coming from the technical fields need to train team members in leadership, management and other essential *soft* skills in order to create high performing teams.

Chapter Summary

Modern science is a multinational, multi-institution enterprise. Budgets run into hundreds of millions and billions of dollars. Despite the size of the budgets, the work is accomplished by teams of various sizes, ranging from 2 to 50 people. At institutions like CERN, scientists apply scientific principles and experimental methods to probe deep into the nature of matter and energy or the structure of our genes. In the process, the new knowledge generated becomes critical input for development efforts that can yield new healthcare treatments, consumer electronics, communications, information technologies, and methods. By their nature, research teams are populated with creators and knowledge workers. The roles of leader and manager on the other hand are not as well represented. Consequently, organizations like CERN need to train researchers in the skills required to lead and manage the teams in order to be effective.

CHAPTER 8

Models of Organizations

> *Your most precious possession is not your financial assets. Your most precious possession is the people you have working there, and what they carry around in their heads, and their ability to work together.*
>
> —Robert Reich, Political Economist

Overview

Having discussed teams, we will now focus on the organization itself from a strategic and organizational design perspective. The way you, or your manager, view the organization has a huge impact on the type of work environment your operate in. All organizations are built on an image or metaphor. For example, many organizations are built on models from science and engineering. The model may be simply a metaphor or the organization can actually be constructed like the model. Three primary organizational models that have shaped the design of modern day organizations are:

- Machine
- Organism
- Social system

Following a discussion of the major models that underlie most organizational designs, I introduce a new model of the organization that will thrive in the 21st century. In subsequent chapters, we examine various means to transform an organization into a more competitive creative enterprise.

Organization as Machine

> *Machines are worshipped because they are beautiful, and valued because they confer power; they are hated because they are hideous, and loathed because they impose slavery.*
>
> —Bertrand Russell, English Logician/Philosopher 1872–1970

The image of the organization as machine is deeply rooted in social history. From Fritz Lange's image of metropolis to the Nazi "war machine" of World War II, there are numerous examples of how organizations have been designed to machinelike specifications. Machine-like organizations are built on the premise that the overriding purpose of the organization is to *maximize production* (or output) and in this sense they can be highly effective and efficient. For the ancient Romans, output was measured in the number of towns and villages brought under the control of the empire. The Nazis, which began as a movement that produced roads and public works for Germany, developed an organizational machine whose efficiency was unparalleled, and nearly succeeded in exterminating entire races and groups of people not considered of "value."

With the arrival of the Industrial Age, the development of new technologies and means of production, and the emergence of large organizational structures in the form of corporations, the business world was quick to embrace the machine model for its ability to produce products efficiently in vast numbers. Ford Motors and other car manufacturers were among the earliest organizations to take advantage of the power of the machine. Auto manufacturers featured assembly lines and industrial working conditions. The goal was to produce as many cars as possible within a certain period of time and to make a profit.

The fundamental characteristics of machine-like organizations are the following according to Ackoff (1981), a well-known academic and strategist:

- People are cogs in the machine.
- Managers have total control over means of production.
- Workers have low aspirations.
- Workers fear unemployment.
- Most tasks and jobs are decomposed into ones with low skill and variety.

> In corporations so conceived, employees were treated as replaceable machines or machine parts even though they were known to be human beings. Their personal objectives, however, were considered irrelevant by employers. Employment involved an implicit acceptance by employees of the employer's right to treat them as though they were machines. Furthermore, the very simple repetitive tasks they were given to do were designed as though they were to be performed by machines (Ackoff 1981, 26).

The machine-like organization was the mainstay in the United States from the mid-1800s until the early part of the 20th century until changes in several areas forced the transformation of many organizations to alternative forms.

Interestingly, remnants of the organization as machine exist in certain industries even today in the United States and in many other parts of the world. For example, fast food restaurants like McDonalds, Burger King, and Wendy's employ technology and procedures to enable anyone with minimal education and skills to work in one of its restaurants. Freed of the burden of knowing what to charge or how to make change, all the user has to do is press the Big Mac icon on the cash register to record a sale. I am not suggesting that McDonalds or the others mistreat their employees in any way but they have found a way to manage human capital as simple, task-driven entities.

Call centers and customer service centers are also places that have become so mechanized that some have questioned their humanity. For example, all key-strokes are monitored as are all calls and events for each workstation. Workers sometimes go hours without a break to the bathroom or to get a snack. So while many organizations have changed to other forms, the influence of the machine-like organization is alive and well in certain industries and parts of the world.

On the other hand, while ruthlessly efficient, the influence of the machine-like organization has diminished largely due to changes in the environment, especially in the United States. During the early part of the 20th century,[1] U.S. federal laws were enacted that restricted the use of child labor and protected the rights of workers to organize and unionize (Ackoff 1981). The increasing complexity of the business environment required workers with greater skills and more degrees of freedom.

Professional managers that had no part of ownership also emerged in this period, thus creating a new class of worker. These and many other socioeconomic changes lead to the development of new organizational forms based on entirely different assumptions.

Organization as Organism

> *It is clear to all that the animal organism is a highly complex system consisting of an almost infinite series of parts connected both with one another and, as a total complex, with the surrounding world, with which it is in a state of equilibrium.*
>
> —Ivan Pavlov, Scientist

In the period from the late 1800s until the end of World War I, the U.S. economy grew dramatically. Competition increased, regulations increased, and corporations grew in size, complexity, and numbers. A report filed by the *New York Times* observed the following:

> ... Modern large scale production, which the world must borrow from us, dates from the 1870's. The great era of industrial consolidations dates from the 1880's. The distinguishing characteristic... is the dispersion of capital, not the aggregation in the hands of the wealthy... Within a single generation the few hundred corporations have expanded into 317,579 now reporting $8,361,000,000 taxable profits distributed among an unknown number of small capitalists. There were besides 115,518 corporations making gross earnings of $6,757,622, 164, but no taxable income (New York Times 1921).

This report was filed in 1921. Growing from only a hundred or so corporations to hundreds of thousands in a period of about 20 years was a remarkable shift. Corporations grew large and soon began to be perceived as having their own *purposes*. Ackoff writes:

> ... a new concept of the corporation gradually emerged: the corporation as an organism ... the corporation was taken to have

> a life and purposes of its own. Its principal purposes, like those of any organism, were believed to be survival and growth (Ackoff 1981, 27).

Growth led to the continual expansion of markets and the acquisition of resources to attain those ends. As they grew, organizations hired more people and structured themselves in more intricate ways. A greater variety of functions emerged just as more complex organisms differentiate their parts into functional subsystems such as the endocrine system, the cardiac system, the pulmonary system, and so forth. Corporations established divisions, departments, and other structures such as accounting, production, and reporting systems. Managers were groomed for specific functions such as finance, engineering, marketing, and so forth, as well as for tactical, operational, and strategic roles within the organization.

> Management was characterized as the brain or head of the firm and employees as its organs. Because organs are less easily replaced than machines or machine parts, their health and safety became corporate concerns (Ackoff 1981, 27).

This transformation of the organization "into" an organism is also described by Stafford Beer in his seminal works.[2] Beer saw organizations as management systems that were self-regulating and controlled by cybernetic loops. In order to survive and to grow, they had to adapt to their environments.

The characteristics of the organization as a biological system are:

- parts function relative to the whole;
- adaptation to changing environments and ecosystems;
- focus on growth and survival;
- more complex tasks and jobs;
- less machine-like and more like a living system.

A modern day example of a firm built on this model is Walmart. Walmart began as a small firm started in 1962 by Sam Walton but by 1970, was operating 38 stores, had 1,500 employees, and sales of $44.2 million.

By 1987, there were 1,198 stores with sales of $15.9 billion and over 200,000 associates. As of the last quarter of 2013, Walmart's revenues were $466 Billion and it employed more than 2 million people working in over 27 different countries around the world. It operates over 10,700 stores worldwide and serves over 245 million customers (Walmart 2013).

This astounding growth can be attributed to an organization that models itself as an organism. However, like a predatory organism, it has put so many smaller firms out of business and consumed so many resources that some critics argue that its success has come at too high a price and is actually bad for the U.S. economy (Young 2005). It can also limit the growth and development of people who work for the organization. Although considered of value, employees are still "organs" under the supervision of the "brain" (e.g., management). Just as the heart cannot decide to stop pumping blood, many functions performed by individuals within the organization are required to go on regardless of personal needs. The organization structured as a biological organism nourishes its employees but does not necessarily encourage the pursuit of individual goals and self-expression. Human beings are still parts, albeit complex parts. So what is the alternative?

Organization as Social System

> *We should no longer treat a corporation as a biological system. We should treat it as a social system. A social system has purposes of its own, so do its parts, and so do the systems that contain it and the other systems they contain. A social system floats in a sea of purposes at multiple levels with some purposes incompatible within and between levels.... There is a growing need to think of the corporation as a community, not as an organism.*
>
> —Russell Ackoff, Management Expert (Allio 2003)

While the model of the organization as an organism or biological system is alive and well and many corporations behave in such ways, it has certain inherent flaws. First, many biological systems simply grow without end, like bacteria or mold. Unfettered growth resulting in either an increase in size or number is neither desirable nor sustainable for many systems or environments, including economic environments. From a global perspective, we know there are simply not enough resources for all social, biological, and physical systems to grow exponentially without end.[3] Furthermore, antitrust regulations are designed to control such growth and limit the formation of monopolies so as to maintain the overall health of the economic system.

Secondly, since the parts of the organization are considered to be parts or sub-systems ("organs"), logically the analogy with human beings breaks down for the simple reason that *people have their own purposes*; that is, they have their own *aspirations, motivations,* and *goals*. Collecting a paycheck is partly a means to an end, whether it is to buy cars and motorcycles, flat screen TVs, Superbowl tickets, take vacations, or start a business on the side. Of course, quality of work-life (QWL) is important too but working in a company is a negotiation between the individuals that populate them and the overall objectives of the company. Ackoff writes:

> An organization is (1) a purposeful system that is (2) part of one or more purposeful systems, and (3) parts of which, people, have purposes of their own (Ackoff 1981, 29).

Corporations pursue the attainment of profits. They are a part of other systems and environments (e.g., the local economy, community, industry, etc.). They hire people to carry out the aims of the firm with the full knowledge that people can leave at will to pursue other opportunities. For example, the median number of years of tenure for workers in 2010 in the United States was 4.4 years,[4] which has remained stable for the past 25 years. So it is an organizational reality that over 20 percent of a firm's workforce turns over each year and is much higher in certain industries.

So if an organization is not an organism, then what is it? Fundamentally it is a *social system*. It is composed of people who interact in ways that enable them to jointly pursue their own and shared ends. The characteristics of the organization as a social system are noted below:

- it is a purposeful system composed of purposeful parts (i.e., people);
- it is embedded in context of other social systems;
- the system adapts and learns over time;

- it has some self-organizing components;
- the organization is recognized and serves both internal and external stakeholders

The purpose of a social system may be to grow but organizations can choose to *develop* as well. What is the difference? Growth is to increase in size or number and for many systems there is no choice involved. Development is another story. Personal development is, "... a process in which an individual increases his ability and desire to satisfy his own desires and those of others. It is an increase in capacity and potential, not attainment" (Ackoff 1981, 35). The same may be said of organizations:

Organizational development

- Organizational development is a process by which an organization increases its ability and desire to satisfy its own objectives and those of others. It is an increase in capacity and potential.

Interestingly, the more developed a person or organization is, the less it is limited by resources imposed by the environment (Ackoff 1981, 37). So organizations conceived as social systems invest in the means to enable them to perform more effectively and efficiently over time. This approach is *sustainable* and consistent with an evolving business ecosystem. It is a model that is consistent with the purpose of this book: building high power teams and organizations that are sustainable.

Impact of Organizational Models on the View of Employees

What impact do the dominant models of organization discussed have on our view of employees? Well, it can be significant. McGregor defined two alternative views of employees: Theory X and Theory Y (Accel Team Development n.d.). Theory X assumes that people have low aspirations; that is, they are lazy and need structure. In Theory X organizations, managers exert near total control over the behavior of employees. Many older companies operate on a variant of Theory X thinking (McGregor 1960). Machine-like organizations are most likely to embrace Theory X thinking. Organizations modeled as organisms view employees as components of functional subdivisions. As parts of the whole, employees may be treated under a Theory X set of assumptions, but that will vary according to the culture.

Theory Y management is based on a completely different set of assumptions about employees. The tenets of Theory Y are:

- people have high aspirations if challenged;
- people are committed to work if they find it satisfying;
- people can be inventive and creative if encouraged to be so;
- employees will seek responsibility if allowed.

Organizations conceived of as social systems, and by extension, poietic systems, are most likely to embrace the tenets of Theory Y.

Impact of Organizational Models on Strategy and Stakeholders

In an ideal world, organizational design begins with business strategy. Strategy defines the goals and objectives that a firm wants to pursue. Strategy also influences structure and leads to functional differentiation; that is, how the organization is modeled in terms of its reporting, chain of command, and other characteristics. In other words, *structure follows strategy* (Chandler 1962).

However, in practice it is not unusual for management to invert this relationship; that is, management will tinker with structure to achieve strategy, which is a bad idea. I would also argue that the underlying assumptions embedded in the dominant organizational model in use (e.g., machine, organism, social system) will exert a powerful influence on the choice of strategy or worse, run counter to the strategic goals themselves.

Strategy must be consistent with the business model; that is, the interpretation of the fundamental equation for business: Profits = Revenues – Costs, which also can be written as $\text{Profits} = q\ (p - c) - C_{\text{overhead}}$. That profits is a function of the difference between revenues and costs is a simple enough equation but one that harbors incredible challenge in

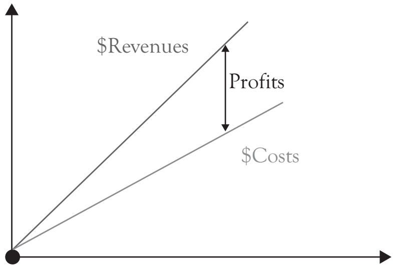


Figure 8.1 Relationship between revenues, costs, and profits

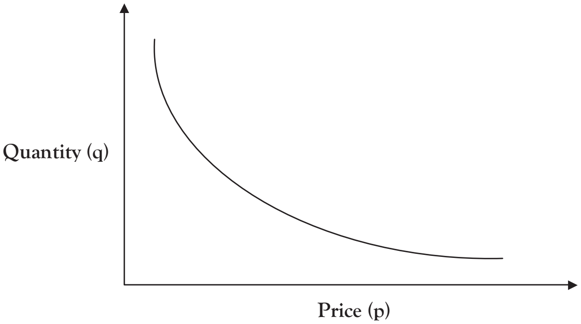


Figure 8.2 Relationship between price (p) and quantity (q)

practice. Revenues are a function of the market *price* at which we sell the product and costs are a function of the amount it *costs* to produce and distribute the product (see Figure 8.1).

What complicates this picture is that price (p) and demand (q) are in most cases inversely related. As you lower prices, you gain market share, and vice-versa. The function typically looks like what is depicted in Figure 8.2.

The two primary competitive strategies that firms pursue (Porter 1980) are (1) compete as the low-cost producer and (2) compete on the basis of value or differentiation. In other words, to maximize profits you increase the difference between prices (p) and costs (c) by lowering costs or by adding enough value to the product or service to raise prices (but still retain demand). Exceptional organizations learn how to do both (Kim and Mauborgne 2005).

Machine-like organizations tend to favor low-cost, high profit margin strategies to gain competitive advantage. They tend to operate best in relatively stable or placid environments (Emery and Trist 1965). It is difficult for a machine-like organization to pursue a strategy of differentiation.

Organism-like organizations tend to favor competitive advantage through cost cutting as well. Although they can operate in dynamic environments, they will be hard-pressed to radically alter their primary strategy. Walmart is an excellent example of this organization type. It is the world's largest firm devoted to being the low-cost producer in just about everything. As an organism, it is gobbling up smaller companies at an alarming rate.[5] Its strategy thus poses a hazard to various *stakeholders*. A stakeholder is any individual or group that has a stake in the outcome of the system (Ackoff 1981). In corporate settings, these include:

- *Internal and transactional stakeholders*: investors, employees, suppliers, distributors, and customers
- *Peripheral stakeholders*: government bodies, political groups, trade associations, trade unions, communities, and the public competitors

In the case of Walmart, its policies and strategies can have a negative effect on employees, suppliers, competitors, and even communities. Investors and customers reap the major benefits of Walmart's strategy.

Social systems type organizations pursue more balanced strategies because they tend to value both the people who work for them and other stakeholders. As such, they are hard pressed to be low-cost producers across all product lines and may pursue strategies that favor differentiation. Furthermore, because social systems (and *poietic organizations* in particular) value employee development and quality of working life (QWL), they are more likely to harness the creativity of their employees and thus are better equipped to operate in a variety of environments from stable to dynamic. Table 8.1 provides a summary of the impact of the various organization models on strategy and stakeholders.

Table 8.1 Influence of organization models on strategy and stakeholders

Model	Dominant strategy in use	Dominant business model in use	Environment	Stakeholders helped most	Shareholders helped least
Machine	Low cost	Low cost-high price High profits	Static	Investors, Suppliers, Customers, Public	Employees
Organism	Low cost	Low cost-low price Volume driven	Dynamic	Investors, Customers	Employees, Suppliers, Public
Social system	Value	Moderate cost-variable price Profit or volume	Either	Investors, Suppliers, Customers, Employees	

Chapter Summary

In summary, models of organizations exert a powerful effect on strategy, structure, and the quality of working life of employees. Machine and biological organizations tend to pursue low-cost strategies, which can be achieved by targeting lower labor and material costs. Organizations modeled as organisms can operate in a host of environments and tend to pursue sheer growth, oftentimes at the expense of other stakeholders. Social systems tend to pursue more balanced approaches that retain flexibility. Organizations that are conceived as social systems will pay higher wages typically and pursue strategic differentiation. They tend to compete on the basic of value and will seek development as well as growth for their ends.

The good news is that these models, while powerful, can be changed. Organizations are products of design no different from any other "artifact." An organization modeled like a machine does not have to remain so. At any time, it can choose an alternative set of functions, structures, processes, and ends. In the next chapter, we look at emergence of the most successful organizations; that is, the emergence of *poietic organizations*.

CHAPTER 9

Rise of the Poietic Organization

To have great poets, there must be great audiences.
—Walt Whitman, Poet and Writer

Poetry is all that is worth remembering in life.
—William Hazlitt, English Writer (1778–1830)

Each year, *Fast Company*, a publication devoted to business innovation, puts out its list of the world's most innovative companies. Topping the list in 2014 was Google, once again. They write: "For becoming a $350 billion giant that lets loose almost too many innovations and milestones to count" (*Fast Company* 2014). The list also includes well-known players like Nike (7), Twitter (13), Apple (14), and Amazon (18), as well as lesser known ones like Xiaomi (3), Dropbox (4), AirBnB (6), Yelp (10), and Tesla (20). All have dramatically changed the basis for competition by unveiling game-changing products and services, new methods of bringing goods to market or serving clients, and great design. They represent a new breed of organization in my opinion because they are designed from the bottom up to maximize *poiesis*; that is, creativity and production. Like great poets, the fierce loyalty of their audiences helps to drive them to increasing success in the marketplace. You might say they are the new bards of innovation.

Factors Motivating the Need for New Organizational Forms

Several environmental conditions have motivated the introduction of these new organizations into the marketplace because they are optimized for learning, innovation, design, and production (see Table 9.1).

Table 9.1 Changes demanding a new model for organizations

Attribute	Description
Environmental texture[*]	• Increasing complexity • Transactions with increasing number of actors • Rapid rate of change
Knowledge management	• Task environments are only partly structured, if at all • Interpretation and sense-making are key skills • Ambiguity and contradictions abound
Networks and teams	• Teams are ubiquitous • Meaning is negotiated
Leadership	• Leaders facilitate the learning and growth of employees • Leaders empower employees to make decisions and to actively construct solutions to problems
Globalization	• There is a new world system of organizations • The boundaries between systems have largely disappeared • The world is "flat"[†] • The global supply chain is real • Global networks for communication, pools of labor, and financial transactions are extensive

[*] Emery and Trist (1965).

[†] See Tom Friedman's *The World is Flat* (2007).

The rate of change has always been a challenge for leaders and managers. More importantly, the *complexity* of the transactional environment has grown exponentially. The advent of smartphones, text messaging, email, high speed networks, and social networking has allowed individuals to maintain relationships with an increasing number of actors. Employees are faced with increasingly complex and ambiguous task environments. As a result, the ability to interpret and make sense of incoming data is an important skill. Most work now gets done in teams, which requires trust, open communication, and ongoing negotiation between the members. Leaders are tasked with developing employees to make decisions on their own with less supervision. Firms are now bound globally through sophisticated supply chains and networks for communications, financial transactions, and pools of labor. Given these changes, organizations must embrace different core values and operate with different functions, processes, structures, and goals.

Characteristics of the Poietic Organization

In the last chapter, we looked at three models of organizations: machine, organism, and social system. The innovative companies of today are based on a new model: the model of a *creative design system* (CDS). A CDS shares all of the characteristics of a social system but includes ones that are not part of the original concept of a social system.

A CDS is a *community of practice* that explicitly recognizes the centrality of *creation and production* in the goals as well as the function and structure of the organization. Organizations built on this model are therefore *poietic organizations.*

Definition of the poietic organization

- A poietic organization is a community of practice that optimizes creation, design and production; that is, it is built on the model of the organization as a creative design system.

There are several defining characteristics of poietic organizations as noted in Table 9.2.

Table 9.2 Characteristics of creative design systems (Poietic organizations)

Category	Characteristic[*]	Value
Output	Production	• A consistent flow of new designs in the form of innovative products and services
Theory in use	Concept of the organization	• Social system • Community of practice[†]
(Models and world view)	Concept of organizational life cycle	• Balance of growth in size and development of capacity and potential
	Concept of the employee	• Theory Y • Human purpose (teleology) is acknowledged[‡]
	Concept of learning	• Constructivist • Learning by doing • Scientific method and "tinkering"
	Concept of intelligence	• Multiple intelligences[**]

(Continued)

Table 9.2 (Continued)

Category	Characteristic*	Value
	Concept of reality	• Input-sensitivity (Chaos theory††) • Relativity • Quantum theoretical
	Concept of organizational life	• View of organization as changing and in continuous process of re-creation • Multiple world views, duality • Creative expression and play encouraged • Holistic orientation • Sense of community
Practice and craft	Core competencies	• Improvisational capacity • Design proficiency • Experimentation • Aesthetic awareness • Strengths-based development
Effectiveness criteria	Adaptation to the environment	• Improvise and experiment when necessary • Manage through global networks
	Goal attainment	• Competitive strategy based on value orientation with cost awareness
	Integration and coordination	• Based on trust and strong social network • Communities of practice
	Human resources	• Theory Y‡‡ • Emphasis on quality of working life (QWL)

*Please see *Fostering Creativity in Self and the Organization: Your Professional Edge*, also published by Business Expert Press for more extensive treatment of IDEAS: improvisation, design, experimentation, aesthetic awareness, and multiple intelligence strengths.
†See for example, Stein (2005).
‡See for example the works of Russell Ackoff.
**See for example, the works by Howard Gardner.
††See for example, Gleick (1987).
‡‡McGregor (1960).

An organization modeled as a CDS is fast and innovative. Like creative people, it *produces creative works on a continuous basis*. Howard Gardner (1998) defined a creator as someone who creates on a regular basis, fashions ideas, concepts, and objects in a given domain in new and novel ways that are ultimately accepted by the community. By extension, creative and innovative organizations do the same:

Creative aspects of poietic organizations

- Poietic organization, based on the model of creative design systems, create on regular basis, fashioning ideas, concepts, and objects in a given domain or industry in new and novel ways that are embraced by customers and other stakeholders.

Put more simply: “Innovation boils down to two elements: creating something and making people want it. These companies make both look simple” (*Newsweek* 2010).

A second defining characteristic of poietic organizations is that they take the concept of development seriously. Earlier in the book, I defined development as *a process by which an organization increases its ability to satisfy its own objectives and those of others, as well as an increase in capacity and potential.* Poietic organizations do this at many levels, from developing their people to investing in good design.

Developmental aspects of poietic organizations

- Poietic organizations engage in a variety of developmental processes to increase their ability to satisfy objectives and to expand creative capacity and potential.

Poietic organizations focus on the development of their strengths. They increase their improvisational capacity, design proficiency, experimental abilities, aesthetic awareness, and they leverage natural strengths embodied in their core competencies (Prahalad and Hamel 1982); that is, they invest in IDEAS as defined earlier in this book.[1]

Internally they are built on extensive social networks of trust and they encourage the growth and development of *communities of practice* (Stein 2007). In short, they are strong in all of the four primary areas of organizational effectiveness (Lewin and Minton 1986) as illustrated in Figure 9.1.

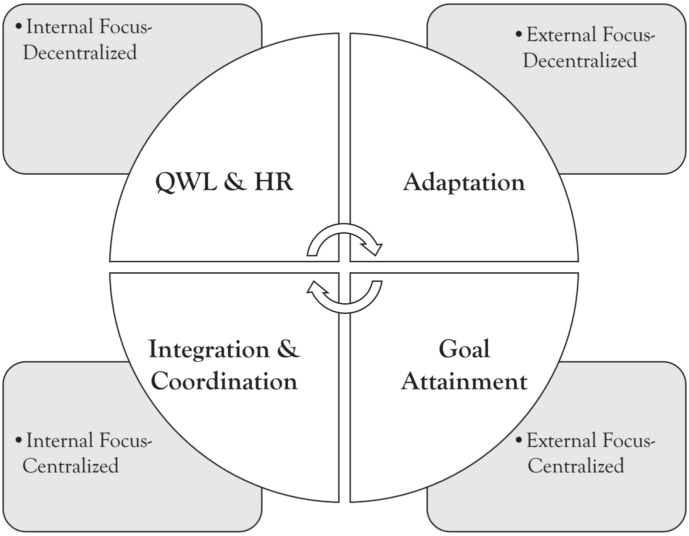

• Internal Focus-Decentralized
• External Focus-Decentralized
QWL & HR
Adaptation
Integration & Coordination
Goal Attainment
• Internal Focus-Centralized
• External Focus-Centralized

Figure 9.1 Four primary measures of organizational effectiveness

Note: Figure based on the work of Lewin and Minton (1986).

Chapter Summary

Several environmental conditions have put pressure on organizations to adapt and morph into new forms: the increasing complexity of the environment, the ambiguity of the task environment that requires better knowledge management, the dominance of teams, the growth of supply and distribution networks, changing demographics requiring new forms of leadership, and globalization. All of these conditions have motivated organizations to become more flexible, agile, and to learn. The model of the organization as a machine or organism is outdated. Instead, successful organizations are conceived of as communities of practice devoted to creation, design, performance, and production; that is, they are poietic organizations.

Although few organizations exhibit all of the characteristics previously outlined, modern organizations such as Google, Apple, Tesla, Nike, and many other innovative, companies[2] are indeed poietic organizations. These are companies that are *consistently* creative, innovative, and productive. They learn from their mistakes and recover quickly. They are in tune with their audiences and reach out to latent customers by pioneering new products and services in blue oceans.

While these companies may not be structured *exactly* the same, we do know that they produce new products and services *on a regular basis*. Organizations that wish to thrive in the coming decade need to remodel themselves to compete. In the next chapter, we look at various methods of organizational transformation.

CHAPTER 10

Organizational Transformation

When we quit thinking primarily about ourselves and our own self-preservation, we undergo a truly heroic transformation of consciousness.

—Joseph Campbell, Writer and Mythologist

Transformation literally means going beyond your form.

—Wayne Dyer, Author and Motivational Speaker

Overview of Methods of Transformation

There are four primary ways to transform an organization. These can be categorized according to (1) what is being maximized (or minimized) and (2) the frequency of the change process (see Table 10.1).

The first (and most common) approach is to redesign the organization to *solve problems*. It can be argued that organizations are filled with numerous problems that need to be *fixed*. Sometimes it is the people that need to be fixed. Other times it might be the accounting or information system. Typically we change structures, regroup functions, install new computer systems, redesign business processes, and employ other means to solve problems. In many cases, change is initiated as a *planning or problem-solving intervention*. However, this is not the only option. Organizations can be designed so that change can be effected over time in an evolutionary way. So instead of initiating a *planning cycle*, the organization can be designed to operate using processes that are *self-regulating*. One approach is to enable the organization to *learn* over time. Argyris and Schon (1978) were among the first researchers to articulate this approach to organizational transformation. We will explore this too in a later section.

Table 10.1 Typology of transformation methods

Strengths	**Appreciative inquiry**	**Poietic transformation**
Problems	**Planning methods**	**Organizational learning**
	Episodic (interventionist)	Evolutionary (self-regulating)

Some argue, however, that problems are not real but simply abstractions from reality (Ackoff 1981). We, as observers, frame problems as well as opportunities. So one could argue that problem framing is a tricky and highly subjective business. What if we frame the wrong problem and solve it? For example, what if we identify a human resource problem but it is really a quality control problem? It happens all the time. Let me illustrate.

I was working with a company that designed a decision-support system to educate, train, and assist assembly line workers in identifying substandard parts (Stein and Evans 1995). The *problem* that was identified was that due to the high turn-over, inspection employees were not good at spotting the parts that had defects such as fractures. An information system was built to ameliorate the problem, and the business processes for inspection were redesigned. After being installed, the decision support system was a success by all accounts. There was significant improvement in the ability to identify failed parts, and the workers liked using the system. Problem solved, right? Yes and no.

While the defects were being detected at higher rate, the *root cause* of the problem was still left untreated. Interestingly, a feature of the decision support system was to collect and classify the types of defects observed. The project engineer[1] was curious enough to analyze the record of defects. Through his analysis, he discovered the root cause of the problem and it had nothing to do with human resource issues. When the parts were being fabricated, it was discovered that the manufacturing design process was flawed leading to errors during fabrication. Armed with the information from the system, effort was put into redesigning the manufacturing process. With the new process in place, the problem went away. The new process reduced defects by *an order of magnitude of one hundred*. The need for inspection workers was eliminated on this line and random sampling was later used for quality control (QC).

I think this story illustrates the limitations of problem framing and making problems the focus for change, redesign, and transformation. So if not problems, then what else? The answer provided by David Cooperrider (2005) is to focus on *strengths* or opportunities instead of problems. His method, known as *Appreciative Inquiry*, begins with the notion that it is better to capitalize on strengths than to focus on problems. *Maximizing strengths* rather than minimizing problems is a *design choice*. We will discuss this method in more depth later in the chapter. Finally, the fourth option is Poietic Transformation. More on that in the next chapter.

So to summarize, there are four primary approaches to organizational change: planning methods, organizational learning, Appreciative Inquiry, and Poietic Transformation. The process we select to transform an organization to a higher state of functioning is as important as the outcome. Each method has certain strengths and characteristics. I have grouped these methods according to the two dimensions: (1) whether the method focuses on problems or opportunities and (2) whether the method is *evolutionary* or whether it is *episodic* (that is, there is a definite start, middle, and end to the process or intervention). Based on these distinctions, we have the typology illustrated in Table 10.1.

We will discuss the characteristics of the various methods in the next sections.

Problem-based Planning Methods

Planning is based on solving problems. It has a beginning, middle, and an end, hence it is episodic (see Figure 10.1). Although there are many variations on planning, there are three primary approaches that I will discuss:

- Top-down planned change
- Bottom-up planned change
- Participatory planning

Let's look at the values and assumptions of these methods.

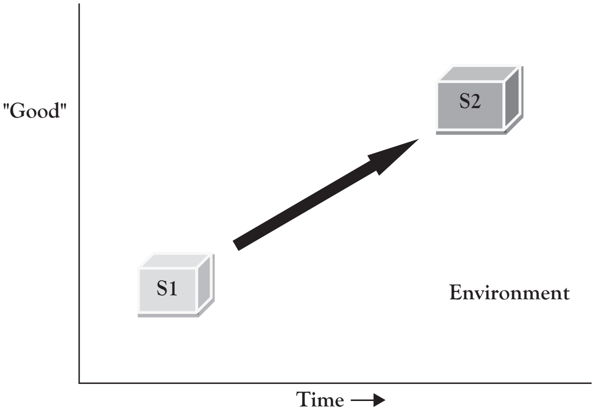


Figure 10.1 Planning depicted as an increase of the state of "good"

Open any management textbook and there will be a chapter on planning and problem-solving. Standard (or rationalistic) planning follows a logical flow and includes several common steps:

- Frame the problem
- Identify goals
- Evaluate alternatives and select
- Implement the solution

Every plan of action has a *time horizon*, which defines an episode or period of time during which the planning process is active.

In most cases, planning is in response to a problem or impending crisis, although it can be for other reasons (especially start-up firms) such as to raise capital, inform potential employees, respond to the press, guide business operations, verify the company's strengths and weakness, or to assess the market.

There are two primary ways conventional planning methods are implemented: Top-down or bottom up. The top-down method assumes that top management frames the problem, establishes goals, evaluates the alternatives, and then "sells" the solution to the rest of the organization (see Table 10.2). The underlying assumption is that the organization is a machine that needs to be fixed and because it is a machine, it is composed of machine-like parts. It tends to ignore individual (and even team) level

Table 10.2 Standard planning methods

Method	Values and assumptions	In practice
Top-down planned change	• View of organization as a machine • Rationalistic definition of goals and goal states • Focus on solving problems and fixing the organization • Focuses on organizational level objectives; ignores individual needs • Top management is the source of control and regulation of the firm • Employees implement goals of management	• Top management frames the problem, establishes goals, evaluates alternatives • Solution is sold to employees • Employees implement the solution
Bottom-up planned change	• View of organization as a machine or organism • Rationalistic definition of goals and goal states • Focus on solving problems and fixing the organization • Focuses on organizational level objectives; ignores individual needs • Employees and top management share information • Employees are eyes and ears of the organization; top management is the brain	• Employees surface information about goals, problems, and so on for top management • Top management frames the problem, establishes goals, evaluates alternatives • Solution is sold to employees • Employees implement the solution

needs and objectives. Management is the source of control and regulation of the firm.

There are several problems with top-down planning, the chief one being that if management frames the wrong problem, it can be a disaster. Also, as firms increase in size, it becomes more and more difficult for senior management to know what is going on at the ground level. As an alternative to top-down planning, IBM invented bottom-up planning, which is sometimes referred to as *management by objectives* (MBO). The main advantage of this method is that employees help surface problems and establish goals unit by unit with the idea that information from the field is useful in the overall formulation. While this corrects some weaknesses of top-down planning, it generates others.

For example, in a large firm like IBM, it becomes a herculean task to integrate the objectives of the various units. Some critics argue that the integration process works against long-term strategic planning because it is so deeply rooted in current operations. Furthermore, although it has the appearance of participation, senior management is still the one in the position of making all the decisions; employees serve as the eyes and ears of the firm, but not the brain. In this sense, it is aligned with the view of the organization as a machine or an organism. Individuals are not perceived as fully functioning and autonomous decision makers.

An alternative to the standard planning models was formulated by Ackoff (1981) to address some, but not all of the concerns, of the conventional planning methods. Although he still viewed planning as primarily as problem-focused and as a discrete and episodic process, his approach does add two important elements. First, he introduced *participation* as a key element. He viewed participation by employees at all levels of the organization, as well as external stakeholders (e.g., customers) to be essential to the process. All participants, in theory, have decision-making powers and are not simply providing information for senior management as in MBO. He envisioned the creation of several planning groups each spanning 3 to 4 levels (above and below) within the existing organizational structure. These groups would have the power to set goals and frame problems for the entire organization. He sometimes referred to his planning method as *Interactive Planning* because of its focus on participation. The underlying assumption is that the organization is a human social system composed of purposeful parts (Ackoff 1981).

Another notable feature of the process is the creation of a shared vision of the *ideal state* of the organization. He called this phase *Idealized Design*. I especially like this addition because it *gets away from problems and embraces design thinking as a solution*. He argues that if the organization articulates its ideal state then it will be "ideal-seeking." He reminds us of the contributions made by the ancient Greeks. The Greeks formulated four ideals for human beings: truth, plenty, good, and beauty (Ackoff 1981, 38). Although we may not attain these things we can be inspired to try. Similarly, if organizations frame their own unique ideals, they will be inspired to make progress toward those ideals over time (see Table 10.3).

So to recap, most planning methods focus on finding solutions to problems. They do so with varying degrees of participation and involvement by employees. Planning is rationalistic, controlled, episodic, and

Table 10.3 Interactive/participatory planning[*]

Values and assumptions	In practice
• View of organization as social system • Planning is a joint between management and employees • Rationalistic and structured • Looks for measurable outcomes • Primary strength is focus on creating a shared vision of the ideal organization that can be realized • Participation is encouraged although the analytical aspects of the methods devolve in practice to management and analysts	• Management engages organization in process • Analysis of existing organization, strengths, and weaknesses is done by management (Mess Formulation) • Management and employees together visualize an "idealized" system. This is captured as an image (Idealized Design) • Gap Analysis is performed between what currently exists and ideal system. Management and employees brainstorm ways to fill the gap (Means Planning) • Management analyses resources needs (Resources Planning) • A plan is constructed and implemented. Effects of plan are monitored (Implementation and Control)

*Summary of Ackoff (1981).

somewhat linear. Typically, the model of the organization is one of machine or organism, except Interactive Planning which views the organization as a social system.

Strengths-based Intervention

Sometimes solving problems is not the solution but the problem. Argyris and Schon write:

> We are beginning to notice that there is nothing more problematic than solutions. Some of the most agonizing problems have been triggered by solutions to slum eradication and urban renewal... We begin to suspect that there is no stable state awaiting us over the horizon. On the contrary, our very power to solve problems seems to multiply problems (Argyris and Schon 1978, 9).

To overcome the limitations of conventional problem-based planning methods, David Cooperrider developed another approach, which he termed *Appreciative Inquiry* (AI). The method was an outgrowth of his dissertation published in 1986. The fundamental premise of the method is that the best way to produce lasting change is to *build on strengths and exploit opportunities* rather than focus on problems. Although problems exist, it is our choice as designers as to what to focus on. The assumption is that if we focus on problems they become our reality, with all the baggage that entails. Problems suggest blame, which can be counter-productive. Cooperrider suggested that people can agree much more readily on what *worked* as opposed to what broke. He also argues that people find it reassuring to build on a foundation from the past rather than starting with a blank sheet such as is the case with Business Process Re-Engineering (BPR). While BPR avoids the pitfalls and squabbles of past problems, it also suffers from a lack of continuity by throwing out the proverbial baby with the bath-water. Appreciative Inquiry in contrast, brings a balance of good from the past as well as encouraging the change agents to introduce new patterns of thought.

Appreciative Inquiry is as much a matter of philosophy as a methodology. It begins with the premise that our viewpoints and reality are constructed. The phrase "You make your own reality" captures the meaning of constructivism.[2] The core beliefs of AI are the following according to Phillips (2004, 33):

- There are always elements of every organization or team that work well.
- We get more of the things to which we pay attention.
- There is little, if any, objective reality; we create it individually and collectively.
- Asking questions draws people's attention to the subject of the questions, and so we influence what people pay attention to.
- People move forward into the unpredictable future with more confidence and faith when they can take part of the past with them.
- The parts of the past we take forward should be the best parts.

In practice, the method includes five distinct phases: *define, discover, dream, design*, and *deliver*. The first phase (Define) explores questions of why the group is engaged in AI and what the overall purpose of the intervention is. It is also an opportunity to identify and to build the team conducting the intervention, as well as to develop a series of interview questions regarding the team or organization.

The purpose of the second phase (Discover) is to reveal (or discover) evidence of the positive experiences of the individuals in the organization. This phase may result in identifying tens or even hundreds of stories pertaining to what worked in the past. The intervention team will then perform a content analysis of the narratives to discover dominant themes.

The third phase of the process (Dream) challenges the team to envision new ways of making the organization better, and as such shares a critical element with Ackoff's Interactive Planning (e.g., Idealized Design). Imagination is the cornerstone of AI as suggested by Watkins and Mohr (2001). The dream phase is an opportunity to exercise that imagination. The team imagines ways the organization can be in the future. That imagination is expressed in images, pictures, sketches, music, or even drama. They may also include bold statements or propositions about the desired future (Phillips 2004).

In the fourth phase (Design), the team crafts the *functions, structure*, and *processes* that will define the new state of the organization based on the evidence and underlying themes discovered earlier. Function is the utility of a particular unit relative to the whole; for example, the role of the QC department is defined with respect to the manufacturing function. Function is always defined relative to the containing whole. Structure is defined as the identification of the parts and their relationships; for example, the structure of a division is defined by the parts (i.e., people) and their relationships (i.e., who reports to whom; who serves as leader; who allocates funds, etc.). Processes are temporally bound flows of information or resources. For example, Six Sigma is a process that identifies the quality of a product at various check-points.

To get the ball rolling, participants in AI are asked to state very specific actions that can be taken in the form of *commitments, requests*, and *offers* (Phillips 2004). Commitments are actions that can be taken immediately to make progress such as preparing a presentation or crafting a memo. Requests are made from one group or individual to another in order to make progress. This could mean a request for resources or access to data. Offers are made by groups or individuals to provide resources to other groups to help them accomplish their ends. Examples include money, data, time, expertise, and so forth.

Table 10.4 Appreciative Inquiry

Values and assumptions	In practice
• View of organization as social system • In every society, organization, or group, something works • What we focus on becomes our reality • Reality is created in the moment, and there are multiple realities • The act of asking questions of an organization or group influences the group in some way • People have more confidence and comfort to journey to the future (unknown) when they carry forward parts of the past (the known) • If we carry parts of the past forward, they should be what is best about the past • It is important to value differences • The language we use creates our reality	In practice, the method assumes five steps: 1. *Define* the scope and purpose of the intervention 2. *Discover* what worked in the past 3. *Dream* about what could be made even better 4. *Design* a new system based on its strengths 5. *Deliver* the results of the design and shape and sustain the changes; i.e., promote the system's destiny Very specific actions can be taken in the form of *commitments*, *requests*, and *offers*.

In summary, the AI method tasks the teams with designing a new form of organization based on both an appreciation of what worked in the past and the new *dreams* of the organization. By intervening, the designers ultimately change the future direction of the company, or its destiny, which is why the last phase is called "Destiny" or "Delivery." The AI teams deliver the redesign to the organization. The complete method is summarized in Table 10.4.

AI has been successfully applied in a range of applications: Strategic planning, mission design, system redesign, and process and service enhancement. Organizations that have used AI include British Airways (Lewis and Van Tiem 2004), PepsiCo UK (Phillips 2004), Retail Direct (Phillips 2004), Children's Hospital of Philadelphia, and many others.[3] Organizations as diverse at the UN and for-profit companies have used the method. Here are some examples:

> On June 24, 2004, Secretary-General Kofi Annan convened the Global Compact Leaders' Summit at the UN Headquarters in New York. The design of the Summit was unique in that it employed a methodology known as Appreciative Inquiry, created by David Cooperrider and colleagues at Case Western Reserve University. Over 500 leaders from around the world gathered to

> explore the global struggle for corporate responsibility (Appreciative Inquiry Commons 2004).
>
> Discovering and Leveraging our Rich Heritage: This interview guide was developed for the information systems departments of a large insurance company. It is a wonderful example of an Appreciative Inquiry interview guide including setting up the inquiry, guiding participants through the key steps of the interview, identifying topics, the summary sheets, and how to complete the entire interview and summary process (Appreciative Inquiry Commons 2001).

Appreciative Inquiry is thus a useful and welcome alternative to traditional planning methods that focus on problem solving rather than strength building.

Self-Regulating Methods of Transformation

Another way to get away from an episodic problem-solving approach is to employ mechanisms that regulate the system, and do so continuously. While planning methods have their merits, another over-riding disadvantage is that they are episodic and must be initiated. Some would argue that it is much better if the system *corrected itself* over time rather than wait for intervention. We see examples of such systems in many fields from mechanics to biology. In all of these systems, there are feedback and feed-forward loops that help to regulate behaviors. A simple example of such a system is a thermostat. Thermostats work by detecting the ambient temperature, comparing that to the set point and taking appropriate action. If the temperature is below set point (in a heating context) then the furnace is turned on until the temperature is raised sufficiently. If it is above set point, the furnace remains off.[4] Thermostats and similar devices regulate the system by sending information about the state of the system back to the controller where the comparison is made. You can think of it as a simple decision support system.

The technical term for these systems is that they are *cybernetic systems*. If this sounds like something from a Terminator movie, you are partially right. The field of cybernetics was fully articulated as a discipline of study by Norbert Wiener, Warren McCulloch, and others in the 1940s, although the ideas go back as far as Plato. The word cybernetics comes from the Greek word kybernētēs, which means steersman, governor, pilot, or rudder. Cybernetics has made contributions from fields as diverse as engineering to organizational theory.

For example, the governor on an engine serves to regulate the flow of fuel and thereby control the system. Watt's steam engine built in the 1700s utilized such a mechanism. With the advent of the electronic devices in the early part of the 20th century, there was considerable interest in developing self-regulating systems for use in amplifiers, servo-mechanisms, radar antenna, gun mounts, and all forms of electronic devices. Many of these devices were developed by the military during World War II and are in use in some form in most consumer goods purchased today.

Broadly speaking, cybernetics deal with systems that are *goal seeking*; that is, they have a purpose or a goal they are trying to pursue and self-regulate to achieve those ends. The area of research regarding goals is known as *teleology*, which comes from the Greek word *telos*, meaning ends, goals, or purpose. It was not long before it was recognized that the principles of cybernetics and teleology could (and should) be applied to organizations and other social systems. Several organizational movements owe their roots to cybernetics.

For example, Deming's work on Total Quality Management is firmly rooted in the cybernetic concepts of measurement, evaluation, and correction. Six Sigma, TQM's successor, also makes use of similar principles. In these cases, the goal is either the reduction in defects or the attainment of a particular design specification. The information gathered includes outcome measurements of the product or service itself, but also soft information garnered from customers, employees, and other stakeholders. Correction comes in the form of changes in the manufacturing processes, but also in how the work is organized, the deployment of new tools and techniques to assist decision makers, training, as well as changes to reward systems and other human work-force related activities. Changes in leadership, incentive systems, and managerial processes may accompany changes to the technical process and processes of production.

In addition to influencing the quality movement, cybernetics has worked its way into mainstream organization theory, partially initiated by another work by Weiner (1950) that drew analogies between self-regulating mechanical systems such as clocks and thermostats, and human systems. These ideas made their way into the social sciences by other luminaries such as Gregory Bateson and Stafford Beer. Most recently, the ideas have produced a school of thought that focuses on how organizations learn. Hundreds of papers have appeared in the management literature on this subject much of which derives from the work of Chris Argyris and Don Schon. They coauthored a seminal work on organization learning (Argyris and Schon 1978) that extended cybernetic thinking into the organizational realm. They argue that:

> …our organizations live in economic, political, and technological environments that are predictably unstable. The requirement for organizational learning is not an occasional, sporadic phenomenon, but is continuous and endemic to our society (Argyris and Schon 1978, 9).

Organizational learning "involves the detection and correction of error" (Argyris and Schon 1978, 2) as discovered by people who work in the organization. They identify two types of learning following the work of Bateson (1972): single-loop and double-loop learning.

Single-loop learning takes place when, "…the error detected and corrected permits the organization to carry on its present policies or achieve present objectives" (Argyris and Schon 1978, 2). A thermostat is a good example of single-loop learning because it maintains the set point. In an organizational context, overestimating inventory requirements resulting in downward revisions on the next cycle would be an example of single-loop learning.

On the other hand, "Double-loop learning occurs when error is detected and corrected in ways that involve the modification of an organization's underlying norms, policies and objectives" (Argyris and Schon 1978, 3). This is a completely different proposition for an organization, and much more difficult to enact. In this context, the organization must initiate processes that take a deep look at the ways it does business. In the prior example, imagine a thermostat that could reprogram its set points. In the case of our inventory problem, the organization might review all policies that result in fluctuating inventories, from marketing to manufacturing. What appeared as an estimation problem may have much deeper roots and be the result of underlying causes that have nothing to do with estimation. In these cases, the organization is said to engage in double-loop learning.

To become a learning organization requires a revision in many underlying assumptions and values (see Table 10.5). First, it must develop a culture that does not punish employees that surface problems and detect errors. Most organizations do just the opposite; they punish those who detect errors, thereby missing opportunities to learn. Second, management must make a commitment to learning as an objective at all levels of the organization. Third, the organization must create a balance between single and double-loop learning since both are essential.

In practice, one of the things the organization must do is work to modify the mental models of employees. They argue that people store maps of the world and hypotheses about how the world works in their minds, thus forming a component of organizational memory. This memory can be both a source of strength as well as weakness (Stein 1995; Stein and Zwass 1995). The models can be used to learn from the past. On the other hand, if the models are outdated, they can defeat attempts to learn. Substituting new, shared models of the world can be the work of

Table 10.5 Organizational learning

Values and assumptions	In practice
• View of organization as living system or social system • Based on notions of cybernetics and teleology • A culture amenable to learning • A degree of goal divergence, tolerance of dissent, openness to outside ideas, and desire to do better • Freedom to experiment, tolerance of errors • Commitment by management to learning as an objective • Individuals are agents for organizational learning • Incremental change	• Creation of shared mental models • Planning and action organizationally close • Capture of lessons learned • Trust in the judgment of colleagues • Co-ordination through effective organizational conversation • Balance of single and double-loop learning • The effects of defensive routines can be mitigated

targeted intervention. Finally, when the organization does learn, the new models need to be stored in organizational memory for later use.[5]

In summary, organizational learning theory is a powerful example of applied cybernetics. It is a continuous and evolutionary approach to organizational transformation that can be used in conjunction with episodic methods of change (see Table 10.5).

Pros and Cons of Common Methods of Transformation

In order to survive, all organizations must undergo transformation, either by choice or necessity. All of the methods of transformation discussed in this chapter are effective at producing change and each has its pros and cons (see Table 10.6).

Top-down planning is rationalistic and structured and can be accomplished in a relatively short time frame. It suffers however on the back-end during implementation. Since participation is relatively low, members typically do not have the kind of buy-in found in other methods and they may not get onboard with change. Management sometimes resorts to “selling” its solutions to the rest of the organization. It is interesting how seemingly sophisticated organizations can make this mistake, and the negative impacts this can have. Bottom up planning provides an opportunity for more input from employees but also suffers from some of the same weaknesses. Participatory planning addresses many of the issues through participation. It also includes the very important visualization step. All conventional planning methods, however, still remain rooted in *problem-solving*.

Appreciative Inquiry focuses on strengths and opportunities rather than problems. Like planning, it is episodic and has a definite beginning, middle, and end. Organizational learning on the other hand is based on self-correcting and self-regulating mechanisms. Organizations learn by minimizing error (single-loop learning) and by questioning core assumptions and values (double-loop learning). Fundamentally it is problem-based. Organizational learning interventions attempt to increase an organization’s ability to promote learning cycles at all levels. The choice of method will depend on the goals of the organization, if overall fit with

Table 10.6 Summary of conventional transformation types

Type	Frequency	Org. view	System view	Instances	Pros/cons
Planned-top down	Episodic	M	Deterministic	Operational planning	Pros-speed Cons-implementation
Planned-bottom up	Episodic	M/O	Deterministic Adaptive	MBO	Pros-information Cons-integration
Participatory planning	Episodic	SS	Teleological (purposive)	Interactive planning	Pros-implementation Cons-slower
Appreciative Inquiry	Episodic	SS	Interpreted and constructed	Appreciative Inquiry	Pros-strengths Cons-requires skillful facilitation
Organizational learning	Evolutionary and self-regulating	O/SS	Adaptive-learning	Organizational learning	Pros-self-correcting Cons-more complex and subtle

organizational values and assumptions, the time frame, and the quality of the facilitators. In the next chapter, we articulate a hybrid method identified as *Poietic Transformation* specifically designed to transform your organization into a high powered creative design system.

Chapter Summary

All systems transform by choice or chance and organizations are no different in this respect. There are four major ways to transform an organization: Planning methods, Organizational Learning, Appreciative Inquiry, and Poietic Transformation. Both planning and organizational learning are based on the reduction of errors or the solution of problems. Appreciative Inquiry and Poietic Transformation are based on augmenting strengths and exploiting opportunities.

Another distinguishing characteristic of the method of transformation is whether it is done in discrete phases (i.e., episodic) or is evolutionary and self-regulating. Planning methods are both episodic and problem-based. In contrast, Appreciative Inquiry is a phased intervention method for strength development. Organizational learning is based on the idea of cybernetic, self-regulating system, while still focused on the reduction of errors. All approaches can produce effective changes for an organization, while the duration, magnitude, and velocity of change may vary between methods. Furthermore, there are real pros and cons to the methods based on whether a particular method is consistent with an organization's values, world views, and mental models; that is, culture. Poietic Transformation on the other hand is based on nurturing poiesis (i.e., creation and production) over time.

CHAPTER 11

Transforming Your Organization into a High Power Creative Design System

> *All the forces in the world are not so powerful as an idea whose time has come.*
>
> —Victor Hugo, Writer

> *Man's greatness lies in his power of thought.*
>
> —Blaise Pascal, Scientist

Method Overview

Most organizations are far from the ideal of a creative design system. In the previous chapter, I indicated four primary methods of change: *planning, organizational learning, Appreciative Inquiry,* and *Poietic Transformation (PT).* The purpose of this final chapter is to flesh out this latter approach and to tie together the lessons learned from the previous chapters.

Poietic Transformation is an evolutionary, strengths based approach to change management. It is based on the idea that organizational development occurs best when (1) it is self-regulating and (2) it is based on strengths. The general philosophy of PT is to encourage members of the organization to (1) *create* and (2) *to continuously enhance their creations.* Unlike planning methods it is not problem-based. Unlike appreciative inquiry, it is meant to be evolutionary and ongoing, not episodic. It is based on the assumption that creators produce artifacts and engage in performance. It can be applied at the individual, team, and organizational levels.

Table 11.1 Phases to a poietic transformation intervention

Phase	Description
Prepare	Prepare for performance or execution through review and practice
Visualize	Imagine the structure and functions of new designs and performances
Organize	Edit, refine, and organize visualizations
Perform/Execute	Execute the design or engage in performance

To engage in PT requires an initial intervention to orient the participants in the new way of thinking. After this initialization phase, it is self-regulating. A poietic transformation intervention contains four main phases as indicated in Table 11.1.

Let me illustrate these four key aspects of the method.

Preparation Phase

The first step is to perform an organizational assessment that includes (1) preparing answers to key questions; (2) developing an IDEAS scorecard; and (3) writing a story about the organization and its history (see Figure 11.1). Details of these activities are provided in Table 11.2.

One of the most important parts of the analysis is to develop an IDEAS scorecard for the organization. The scorecard includes examples of improvisation capacity, design proficiency, experimental and scientific knowledge, aesthetic awareness, and strengths. It also includes a critical review of the depth and breadth of these qualities. Each objective is aligned with appropriate metrics, targets, and tasks required to achieve them. An example of an IDEAS scorecard is illustrated in the next section.

The final outcome of the preparation phase is a *story* of the essential aspects of the organization with regard to *creation* and *production*. Storytelling is a very powerful means to capture and transmit information about a person, a tribe, or an organization. Joseph Campbell's work on myth construction (Campbell 1972) argues that there are three essential elements to a great story: *departure, initiation,* and *return*. This is the heart of the hero's journey and every compelling

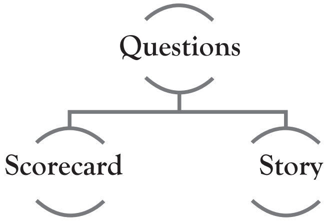


Figure 11.1 Organizational assessment phase of poietic transformation

story must have these elements to capture the listener or reader's attention. The organization must write a story of its journey up to the present using these elements. For more information on the power of stories, see also David Snowden's work on storytelling[1] or Dan Pink's work (Pink 2005).

Table 11.2 Organizational assessment phase of poietic transformation

Description	Tasks
Questions	**World views** • What is the organization's view of employees? • What is the view of human systems? • What is the view of science and experimentation? • What is the view of organizations? What is the model upon which it is based? • What is the view of change and transformation?
	Beliefs • Does your organization engender the belief that individuals can change the system? • Are the concepts of improvisation, design, experimentation, aesthetics, and strengths (IDEAS) part of the vernacular? • Does the organization reinforce the belief that everyone has creative design or improvisational abilities? • Does the organization help people reach their creative potential through training or other means? Why? Why not? How?
	Opportunities • What emerging trends can the organization capitalize on? E.g., global supply chains*, value networks†, Blue Ocean strategies‡
Scorecard	• Prepare an IDEAS *scorecard*: Improvisation capacity, design proficiency, experimental and scientific knowledge, aesthetic awareness, and strengths
Story	• Synthesize the findings into a *story* about the organization.

Notes: *See for example, Friedman (2005); †Christiansen (2003); ‡Kim and Marborgne (2005)

Example of an IDEAS Scorecard: Space Travel

While it is outside the scope of this work to elaborate a full poietic transformation plan for a particular organization, here is an example of what an IDEAS scorecard might look like for a company in the value network of the emerging field of commercial space travel. The reader is also referred to the ideasmethod.com website for additional resources and examples.

With the changing role of NASA, the commercialization and privatization of space travel has accelerated. SpaceX and several private (Space Settlement Institute 2014a) and public (Space Settlement Institute 2014b) aerospace companies such as Boeing, Virgin Galactic, and Blue Origin are racing to develop systems to take humans beyond earth. The context for design and improvisation for these companies ranges from *high structure and high risk* to *low structure and high risk* (see Figure 11.2).

Since NASA and its partners have documented this knowledge base over decades of space flight, there is a high degree of structure to the problem, space, in the form of SOPs, routines, and protocols, despite the inherent risks. However, the new and challenging goals of current companies continues to push the envelope of what is known. For example, the mission for SpaceX is ambitious to say the least:

> SpaceX designs, manufactures and launches advanced rockets and spacecraft. The company was founded in 2002 to revolutionize space technology, with the ultimate goal of enabling people to live on other planets (SpaceX 2014).

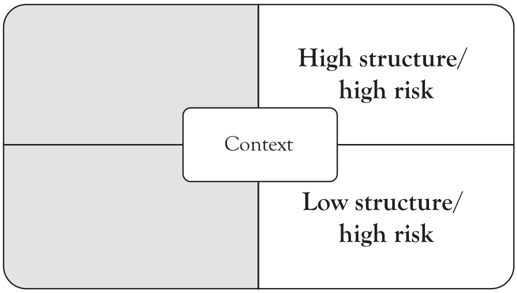


Figure 11.2 Design and improvisation context for space travel industry

Improvise

- Objective: Successful rocket launches
- Measure: Flight delays
- Target: Zero flight delays
- Actions: Rehearse routines

Design

- Objective: Design of rockets and control systems
- Measure: Speed of design
- Target: Reduce time to protype by 50%
- Actions: Apply various methods of team development

Experiment

- Objective: Select best of competing designs
- Measure: Set up experiments on competing designs
- Target: Double number of experiments
- Actions: Train teams in experimental design

Aesthetics

- Objective: Raise awareness among space enthusiasts
- Measure: Number of followers via social media
- Target: Double number of followers
- Actions: Personalize space travel though images, artifacts

Strengths

- Objective: Leverage core competencies in aeronautics
- Measure: Number of spin-off products and services
- Target: Double number of new products each year
- Actions: Plan brainstorming sessions for new products

Figure 11.3 An IDEAS scorecard for commercial space travel companies

Consequently, many problems associated with space travel are being solved in real-time. As such, there is very little structure to what we know about space travel, resulting in a low structure-high risk context.

These companies must exercise their creative muscles in order to solve the myriad of problems required of such goals. A strong grounding in improvisation, design proficiency, experimentation, aesthetic awareness, and core strengths (i.e., IDEAS) will be necessary to overcome both technical and financial hurdles. Companies such as SpaceX will want to develop a balanced array of skills in all five areas to be effective using an approach similar to the balanced scorecard (Kaplan and Norton 1992). A portion of an IDEAS scorecard[2] for SpaceX or one of its competitors might look like what is shown in Figure 11.3.

Visualization Phase

The next phase is to write a *new story* based on the stakeholder's imagination of what the organization might become in the future. This phase can be done before the assessment or in parallel with it; for example, one team can be assigned to do the assessment while the other can do the visualization. This is the same step as Ackoff's *idealization* phase or Cooperrider's *dream* phase. The story should contain as much detail as possible and include identification of structures, functions, processes, and goals. It should describe the core assumptions of the organization and dominant models in use that contribute to an overall world view. It should also contain descriptions about new behaviors, attitudes, and skills.

For an example of how this can be implemented, we can look to General Electric. In an interview appearing in *Harvard Business Review* (HBR 2006), CEO Jeff Immelt identified elements of General Electric's "Growth Tool Kit," which includes a form of visualization that he calls "Customer Dreaming Sessions." In his words, "Assemble a group of the most influential and creative people in an industry to envision its future and provide the kind of interchange that can inspire new plans" (HBR 2006, 7).

This is similar to what Bell Systems (AT&T) did in the 1960s to modernize the phone system. According to Ackoff (personal communication n.d.), the CEO at the time rushed into a stakeholder's meeting sweating and out of breath and exclaimed, "The phone system is completely destroyed!" The room exploded into an uproar. Once the room settled down, the CEO explained that the phone system was OK but would implode if they did not make needed changes soon. He tasked management with the job of reimagining the phone system. One of the innovations that came from that meeting was the push-button, touch-tone telephone.

An Example of a Visualization Story: Space Travel and Colonization

Here is a modern day example of story-based visualization to generate interest in the Mars One project. The mission of Mars One is to establish a human colony on the planet Mars by 2023. What follows is the story (Mars One 2014) written by the Mars One organization to inspire volunteers to take a *one-way trip* to the planet Mars. As you will see, it incorporates several key elements of the hero's story such as *departure, initiation*, and other elements of the hero's journey.[3]

The Quest

You could say that most people would rather lose a leg than live the rest of their life on a cold, hostile planet, having said goodbye to friends and family forever, the best possible video call suffering from a 7 minute delay—one way. However, there are individuals for whom traveling to Mars has been a dream for their entire life. They relish the challenge. Not unlike the ancient Chinese, Micronesians, and untold Africans, the Vikings and famed explorers of Old World Europe, who left everything behind to spend the majority of their lives at sea, a one-way mission to Mars is about exploring a new world and the opportunity to conduct the most revolutionary research ever conceived, to build a new home for humans on another planet. Mars One will offer everyone who dreams the way the ancient explorers dreamed the opportunity to apply for a position in a Mars One Mission. Are you one for whom this is a dream?

Preparation

Before they leave the Earth's atmosphere to travel to Mars, each astronaut will be put through the required 8 years of training. They will be isolated from the world for a few months every 2 years in groups of four in simulation facilities, to learn how they respond to living in close quarters while isolated from all humans except for the three crew members. In addition to the expertise and work experience they must already possess, they have to learn quite a few new skills: physical and electrical repairs to the settlement structures, cultivating crops in confined spaces, and addressing both routine and serious medical issues such as dental upkeep, muscle tears, and bone fractures.

Departure and Journey

The flight will take between 7–8 months (depending upon the relative positions of the Earth and Mars). The astronauts will spend those 7 months together in a very small space—much smaller than the home base at the settlement on Mars—devoid of luxury or frills. This will not be easy. Showering with water will not be an option. Instead the astronauts make do with wet wipes as used by astronauts on the International Space Station. Freeze dried and canned food is the only option. There will be constant noise from the ventilators, computer and life support systems, and a regimented routine of 3 hours daily exercise in order to maintain muscle mass. If the astronauts are hit by a solar storm, they must take refuge in the even smaller, sheltered area of the rocket which provides the best protection, for up to several days. The journey will be arduous, pressing each of them to the very limits of their training and personal capacity. But the astronauts will endure because this will be the flight carrying them to their dream.

Initiation

Once they arrive on Mars, the astronauts will begin making use of their relatively spacious living units; over 50 m^2 per person, and a total of more than 200 m^2 combined interior space. Within the settlement are inflatable components which contain bedrooms, working areas, a living room, and a "plant production unit", where they will grow greenery. They will also be able to shower as normal, prepare fresh food (that they themselves grew and harvested) in the kitchen, wear regular clothes, and, in essence, lead typical day-to-day lives. If the astronauts leave the settlement, they have to wear a Mars Suit. However, all living spaces are connected by passageways, in order for the astronauts to move freely from one end of the settlement to the other. As the rovers have done much of the heavy construction prior to their arrival, it will not take the astronauts a long time to find routine in their new life, moving into carrying out valuable construction works and research.

Reports from Mars

The astronauts will not only submit routine reports, but will also share all that they enjoy and find challenging. It will give the

> people on Earth a unique and personal insight view of life on Mars. They could answer intriguing questions like: What is it like to walk on Mars? How do you feel about your fellow astronauts after a year? What is it like living in the reduced Mars' gravity? What is your favorite food? Do you enjoy the sunsets on Mars?

Future Expansion

> A new group of four astronauts will land on Mars every 2 years, steadily increasing the settlement's size. Eventually, a living unit will be built from local materials, large enough to grow trees. As more astronauts arrive, the creativity applied to settlement expansion will certainly give way to ideas and innovation that we cannot conceive now. But we can expect the human spirit to continue to persevere, to even thrive in this challenging environment.

Although the final element to the hero's journey, the triumphant "return" is not fully explored in this narrative (since it is meant to be a one-way trip), one would imagine that the settlers would be given a hero's welcome upon their return to earth.[4] For proof that this story was a powerful motivator, consider the outcome. During the first round of open applications between May 2013 and August 2013, over 200,000 volunteers submitted applications to take this one-way journey (*Nature World News* 2013).

Organization Phase

The next phase of poietic transformation is to organize the elements of the story into a plan of action for change and development. Table 11.3 shows some of the key parameters that need to be changed to transform in the direction of a poietic organization (the third column is intentionally left blank so it can be customized to the context). In practice, the transformation team would brainstorm ways to implement the ideal given the boundaries and constraints of the organization and its context.

Table 11.3 Example of plan of action for poietic transformation

Characteristic	Ideal	Developmental tasks
Attitudes	• Pro-active • Positive • Idealistic • Open-minded • Courageous (courage of convictions)	
Behavior	• Speaking to others • Listening and seeing	
Culture	• Make them part of a new culture • Create trust • Reward risk-taking	
Skills	• Creative Skills – Improvisational skills – Design skills – Experimental skills – Aesthetic awareness • Perceptual Skills – Visioning and imagination – Perceptual skills • Reflective skills – Self-awareness • Functional skills – Communication skills – Teamwork skills – Research skills – Technical skills – Evaluation skills – Sales skills (selling your ideas) – Negotiation skills	

Performance and Execution Phase

The payoff stage of the process is the last one. In this stage, participants introduce new designs in the form of artifacts (e.g., tangible products) or incorporate new performances (e.g., routines, improvisational sequences, service scripts, businesses processes) into their organizations.

When these changes are introduced, adjustments may be needed. New artifacts are subject to the design processes noted earlier in the book. Here are four guidelines (R4) for modifying and reinforcing new performances and behaviors (see Figure 11.4).

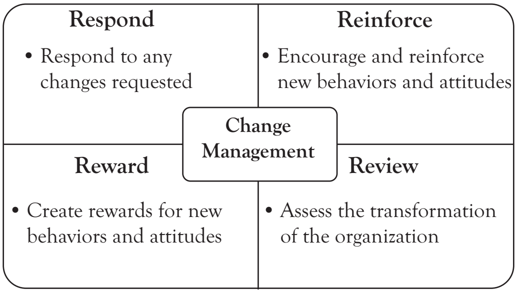

Respond
• Respond to any changes requested
Reinforce
• Encourage and reinforce new behaviors and attitudes
Change Management
Reward
• Create rewards for new behaviors and attitudes
Review
• Assess the transformation of the organization

Figure 11.4 The four Rs guidelines of change management

Neutralizing Barriers to Change

Whenever change is introduced into an organization, resistance to that change is inevitable. Typical barriers include fear, power, unclear goals, and other factors (see Figure 11.5).

While it is outside the scope of this work to address change management strategies in depth since whole books have been written on the subject, a few observations are worth making. First, your **choice of transformation method** and **core assumptions** will play a significant role in how the process unfolds. More participation usually means more buy-in at the back-end. Furthermore, focusing on creation output and strengths tends to generate energy and enthusiasm; focusing on problems can have the opposite effect. The poietic transformation method is designed to liberate energy and minimize barriers. People tend to feel good about expressing and sharing their creative works.

Second, your **social network** can have a significant impact on the success of a project if you are the one initiating change. For example, you can work around a difficult boss by strengthening the ties you have within and outside your organization.

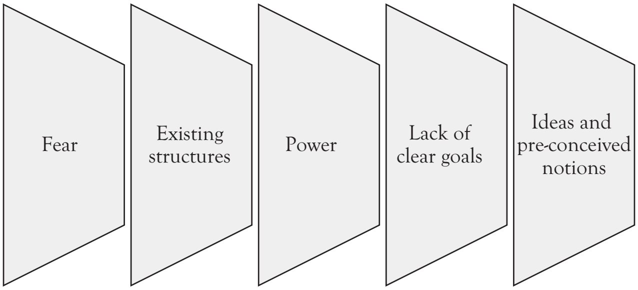

Fear
Existing structures
Power
Lack of clear goals
Ideas and pre-conceived notions

Figure 11.5 Barriers to change

Third, don't forget that you, as a creator, can **influence others indirectly through your works and performances**. This is the definition of a creator.

Fourth, you can begin the process of change at any time **by leveraging the principles of chaos theory**. Chaos theory is the study of *input-sensitive systems*. Small changes in input can produce dramatic changes in output through complex causal chains. Make small changes in your own behavior and see how this impacts the network of people you interact with and beyond.

Fifth, bring an **experimental attitude** to your workplace. Engage in *action learning* to better understand the relationships between actions and outcomes. Capture and use this knowledge to produce change. In short, become a reflective practitioner (Schon 1983).

Chapter Summary

Poietic transformation includes four steps:

1. *Preparation*: Prepare for performance or execution through review and practice
2. *Visualization*: Imagine the structure and functions of new designs and performances
3. *Organization*: Edit, refine, and organize visualizations
4. *Performance and Execution*: Execute the design or engage in performance

The beginning of the preparation phase includes finding answers to several questions regarding the models in use, assumptions, values, and poietic strengths (e.g., IDEAS) of the organization. The output of this phase is the development of an IDEAS scorecard and a story about the current state of the system.

The heart of the visualization phase is also a story; however, in this phase the story is *prescriptive* rather than *descriptive*. The story is meant to inspire and motivate the organization's current and potential stakeholders including employees, partners, investors, clients, suppliers, volunteers, and so forth. To be compelling, the story must contain key elements common in mythology: *preparation, initiation,* and *the return*. In short, it must inspire the hero in each person touched by the enterprise. A modern day example of this type of story is evidenced in the messages crafted by the organizers of Mars One, which includes a one-way trip to Mars for the purposes of colonization.

The third phase is about transforming the story into concrete goals and tasks, which will require an investment in developing new attitudes, behaviors, values, and skill sets. The final phase of the process is turning these changes into actual *performances*. A performance results in the development of an artifact such as a new product or service. In the alternative, the performance itself may be a desired outcome, such as managing a crisis, executing a military mission, or running a sales and marketing event effectively. To get to the desired level of proficiency, the organization can employ the Four Rs approach. The Four Rs actions of change management include review, respond, reinforce, and reward. The inevitable resistance that will occur can be minimized by making several key choices when designing the process.

CHAPTER 12

Summary and Conclusions

> *I tell people in their careers, "Look for growth. Look for the teams that are growing quickly. Look for the companies that are doing well. Look for a place where you feel that you can have a lot of impact."*
>
> —Sheryl Sandberg, Business Executive, Facebook

Recap of Teams

Analogous to atoms, teams are the fundamental units of organizations. Nothing of consequence gets done without teams. Raising the level of performance of teams is therefore an imperative for organizations. There are four major types of teams: design, improvisational, research, and management teams. High power teams are characterized by trust, commitment, creativity, and leadership.

Team development is critical to achieving high performance. Two factors that can be used to help the members of the team understand one another are personality and multiple intelligence profiles. There are numerous ways to assess personality. Given its widespread use in industry, the MBTI is one instrument among many that can be used for team development. The MBTI loosely parallels Jung's assessment of people's preference for certain cognitive functions. Although it may be advantageous to skew the distribution to certain personality types to meet specific project needs or to ensure that certain types are present on the team such as ISFJ, ESFJ, ENFJ, or ENTJ, the best use of the MBTI is to help the members of the team to learn about each in order to develop trust, better communication, and commitment.

Multiple intelligence (MI) profiles may be used for similar ends. In *Fostering Creativity in Self and the Organization: Your Professional Edge*, I examined ways that individuals can build on their inherent strengths and abilities using MI, and the reader is referred to that book for more extensive treatment of the use of MI for personal and professional development. In this book, we looked at how the distribution of MI areas of strength can impact a team. After each person has done an assessment, the composite scores of the team can be represented visually in tabular form as well as using radial and scaled sphere diagrams. These representations facilitate sharing among the team members in the context of team development. Again, great teams are the result of trust, communication, and commitment, and these assessments help to build those qualities through mutual sharing.

While personality and intelligence are relatively enduring factors, people can take on different team roles by choice. Roles are critical to creative high power teams. Roles serve three primary functions: (1) to aid in the creation and building of new products, services, and processes; (2) to help organize the various tasks required of the team; and (3) to keep the members informed by supplying data, information, and knowledge in support of team objectives. Consequently, each team needs its members to fulfill the roles of creator-builder, leader-manager, and knowledge worker. The assignment of roles can be based on past experience, inclination, strengths, or even by random selection. Roles also can be rotated among the members.

Although much has been written about management teams, less has been written about *improvisational, design,* and *research teams*. It is important to examine the characteristics of the organizations that utilize these unique teams to maximum effect. These teams perform at high levels by effectively using roles to maximum effect, encouraging cross-training, and structuring the processes of discovery, creation, and production. Some great companies to learn about teams include Lego, Virgin Air, and OXO, among others. For more lessons learned from the ultimate creative high power team, read on.

The Ultimate Creative High Power Team

What if you got a call from the White House to put together a team to fix a several hundred million dollar information system that was failing miserably. You had only 60 days to execute a turn-around that would affect tens of millions of citizens. And, by the way, a U.S. president's legacy hung in the balance on its successful execution. What would you say? What would you do? Well, this is exactly what happened when a team of IT professionals were called in to save HealthCare.gov. The latter is the website designed to implement President Obama's landmark healthcare reform legislation by offering new insurance plans to as many as 40 million Americans. This amazing incident illustrates the power of teams and how a group that sets its goals, assigns roles, implements structure, benefits from great leadership, and leverages IDEAS can do nearly the impossible. Put another way:

> This is the story of a team of unknowns—except in elite technology circles—coders and troubleshooters who dropped what they were doing in various enterprises across the country and came together in mid-October to save the website. In about a tenth of the time that a crew of usual-suspects, Washington contractors who had spent over $300 million building a site that didn't work, this ad hoc team rescued it and, arguably, Obama's chance at a health-reform legacy (Brill 2014).

There are several powerful lessons learned from this story.[1]

The Decision Problem and Context

Given the abysmal launch of the website, the big decision in October 2013 for President Obama was to either (a) scrap the HealthCare.gov website that cost over $300 million or (b) to salvage it. The advisors tasked with finding an answer to this question included White House Chief of Staff **Denis McDonough**, White House Chief Technology Officer **Todd Park**, and soon to be director of the president's National Economic Council, **Jeff Zients**. This was clearly a high risk context with varying degrees of structure and existing knowledge. Commercial websites like Amazon and Twitter had been built before and scaled to accommodate millions of visitors. The problem was the original contractors did not seem to be using that knowledge. Put another way, "It's just a website. We're not

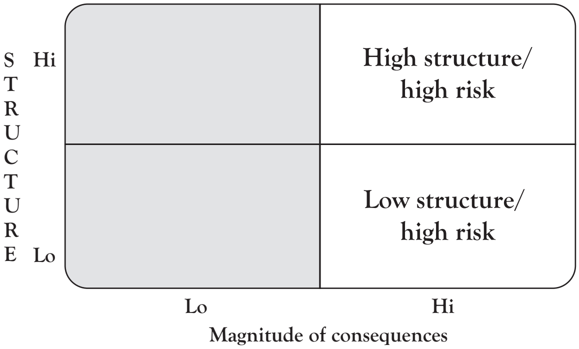


Figure 12.1 Context faced by HealthCare.gov rescue team

going to the moon" (Brill 2014, Section 4). Because of the compressed timeframe of only 8 weeks (i.e., to realize coverage by January 1st, new members needed to sign up by mid-December, 2013), this was clearly a high pressure improvisational and design context (see Figure 12.1).

Team Composition

The team that was put together was culled from a variety of professional networks. Park contacted **Gabriel Burt**, the chief technology officer at a Chicago company named Civis Analytics, which was the firm in charge of Obama's information technology and data management campaign strategy. Burt then brought in his mentor, **Mikey Dickerson**, who was the site-reliability engineer for Google. The rest of the core team assembled by Burt included **Paul Smith**, who had been deputy director of the Democratic National Committee's tech operation, **Ryan Panchadsaram**, a high-tech professional who was a Presidential Innovation Fellow at the White House, and a handful of the best engineers at QSSI and CGI, the contractors who earned the original bid for the website. John Doerr, one of most influential venture capitalists of all time,[2] also recommended **Mike Abbott**, the guy who, "…saved Twitter's technology when it was failing" (Brill 2014, Section 3). The final addition to the initial rescue team was **Marty Abbott**, who had been the CTO of eBay and ran a high-tech crisis management consulting business. Once into the process, the team added **Jini Kim**, a former employee of Google, to keep track of and respond to errors, earning her the title of "queen of errors" (Brill 2014, Section 4).

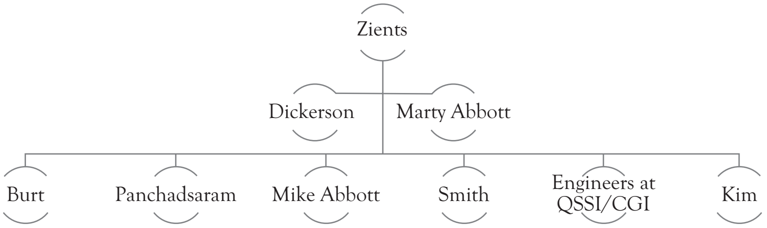


Figure 12.2 Rescue team structure

Team Roles

The biggest problem for the organizations and their teams that originally built the site was leadership according to Brill:

> What Abbott could not find, however, was leadership. He says that to this day he cannot figure out who was supposed to have been in charge of the HealthCare.gov launch. Instead he saw multiple contractors bickering with one another and no one taking ownership for anything (Brill 2014, Section 3).

Based on each person's qualifications, style and background, Dickerson was assigned as the technical leader and manager of the team. Zients was the overall leader and manager. Burt, Mike Abbott, Marty Abbott, Panchadsaram, and Smith all worked together to revamp the design; that is, they all contributed to the creator (designer) role. The role of informer was shared among the members (see Figure 12.2).

Team Structures to Maximize IDEAS

One of the most important critical success factors for the group were the process structures such as "stand-ups" that were put in place by Dickerson and Mike Abbott to help the team achieve its goals.

> Stand-ups… are Silicon Valley–style meetings where everyone usually stands rather than sits and works through a problem or a set of problems, fast. Then everyone disperses, acts and reports back at the end of the day at a second stand-up (Brill 2014, Section 4).

Dickerson also included three key rules for the team:

- Rule 1: The war room and the meetings are for solving problems. There are plenty of other venues where people devote their creative energies to shifting blame.
- Rule 2: The ones who should be doing the talking are the people who know the most about an issue, not the ones with the highest rank. If anyone finds themselves sitting passively while managers and executives talk over them with less accurate information, we have gone off the rails, and I would like to know about it. (Explained Dickerson later: If you can get the managers out of the way, the engineers will want to solve things.)
- Rule 3: We need to stay focused on the most urgent issues, like things that will hurt us in the next 24–48 hours (Brill 2014, Section 4).

Just as firms like Lego and OXO turn average teams into high performers by structuring product development, so did Dickerson, Abbott, and Zients who went about structuring the design and patch process to accelerate team outcomes. Zients also used lists, schedules, deadlines, objectives, and targets (Brill 2014, Section 4) in a way not unlike the balanced scorecard approach described earlier in the book.

Rolling with IDEAS

This team was truly defined by its strengths in IDEAS: improvisational capacity, design proficiency, its ability to experiment and tinker to get the site right, aesthetic awareness, and leveraging strengths. Regarding aesthetics, the site had to be easy to use and benefit from a clean, clear design without clutter, and redundancy. Those who saw the site before and after noted how much more streamlined and slick it looked after the repair process began. Fewer keystrokes were required to accomplish the same tasks. All of these outcomes were the result of a heightened sense of aesthetics, which is much more common in private industry than in the public realm. The primary expertise required of the team was design, and everyone on the team (with the exception of Zients) was a designer in one capacity or another. A key insight was the separation between the functions of browsing, registration, and payment. They understood the process of converting high level requirements into design outcomes. Most importantly, they knew how to improvise.

Improvisation is the ability to make effective real-time decisions in new and complex situations using current information and appropriately chosen (or modified) routines, scripts, and patterns. This situation required improvisation on a massive scale. Realize that this was a *live* website that tens of thousands of people were trying to access at a given time in order to sign up for health insurance. Every time the site went down, it affected scores of people and the press were reporting on its status in real-time. The team did not have the luxury of sitting back and planning its every move. It had to react in real-time to keep the site up and running as it was being fixed.

Fortunately, each of these team members were experts in their respective areas of data analytics, databases, user interfaces, testing, scalability, and so forth. They had seen numerous similar cases before and had the ability to adapt what they knew to the contingencies imposed by the site. In short, they understood the language of the domain of software architecture and could "speak" it in the ways necessary to fix the site. They were not afraid to take risks:

> Paul Smith… had been working on a problem that had stumped everyone so far: The unique identifier that the website had to issue to anyone who was trying to enroll was taking too long to generate…. Smith and the team quickly designed a new patch, this time with the right number of digits, and executed what's called a "hot fix," meaning they put it onto the site almost instantaneously without testing. It worked (Brill 2014, Section 4).

Coupled with its ability to improvise was an experimental attitude that sparked learning. To be a true learning organization, there can be no finger pointing and blaming. In fact, it is the early discovery of errors that creates the opportunity to learn. This team created a learning environment on steroids.

> “The team,” says Zients, “ran two-minute drills to perfection. We had the best players on the field. Some plays didn’t work. We talked about some of those. But there was never any finger pointing. People just hustled right back to the line, and we ran the next play.”
>
> Dickerson was so adamant about the need to forgo finger pointing and move on to the next play that during one stand-up in mid-November he demanded a round of applause for an engineer who called out from the back of the room that a brief outage had probably been the result of a mistake he had made (Brill 2014, Section 4).

Through effective leadership and by reinforcing certain rules of engagement, the team developed a culture that supported tinkering, experimentation, and learning rapidly from mistakes, thus contributing to its success.

The Bottom Line

How successful was this group? Here were the results 43 days after the first call was made:

> On Sunday, Dec. 1, Zients issued a public report card showing the website’s turnaround. A series of hardware upgrades had dramatically increased capacity; the system was now able to handle at least 50,000 simultaneous users and probably more. There had been more than 400 bug fixes. Uptimes had gone from an abysmal 43 percent at the beginning of November to 95 percent. And Kim and her team had knocked the error rate from 6 percent down to 0.5 percent (Brill 2014, Section 4).

The real test came 3 weeks later when the site was readied for the final push to get people to sign up for insurance. In the words of one of the team members:

> “I’ll never forget that day for the rest of my life,” says Park. We’d been experiencing extraordinary traffic in December, but this was a whole new level of extraordinary... By 9 o’clock traffic was

> the same as the peak traffic we'd seen in the middle of a busy December day. Then from 9 to 11, the traffic astoundingly doubled. If you looked at the graphs, it looked like a rocket ship (Brill 2014, Section 4).

According to statistics released later, traffic rose to a high of 83,000 simultaneous users. Over 129,000 enrollments were effected on Dec. 23, which was nearly five times as the site had handled in all of October (Brill 2014, Section 4). The site continued to improve into 2014 and was expected to hit its targets of 5 to 6 million people by the end of March (Baker 2014). In the end, the number of those enrolled by the deadline reached nearly 7.1 million (Acosta, Watkins, and Liptak April 1, 2014) and by mid-2014, the total number of enrollments was at over 9 million people.

There is no question that without the help of this rescue team, the HealthCare.gov website would never have been ready in time for the mandated signup date. This story illustrates what is indeed possible when a group of people transform into a creative high power team.

Recap of Organizations

The three primary models that form the basis for organizational design include the machine, the organism, and the social system. These models exert a powerful influence on the structure, function, and processes of the organization, as well as the way people are treated and the thrust of corporate strategy.

The early auto companies exemplified the first machine-like organizations. These organizations were ruthlessly efficient at mass production. They excelled at taking ideas and transforming them into uniform products by implementing systems of production based on standardization, procedures, and task decomposition. Unfortunately, this efficiency came at the expense of the parts; that is, the people. They too were reduced to standardized job descriptions like parts of a machine. Another downside to the machine-like organization is that while it may be good at doing one thing well for a given set of conditions, it may not succeed if the environment changes. In other words, it is not easy for the machine-like organization to modify its goals, structures, and processes because of its ruthless pursuit of efficiency and standardization.

In contrast, organizations conceived as living systems are much more adaptable and flexible in modifying their structures, functions, and processes in order to adapt to changes in the environment. Organizations such as Walmart operate like organisms surviving, or dominating, business ecological niches. Unlike machines, the components of these organizations are much more highly differentiated and integrated. Although they are adept at changing their overall strategies and reconfiguring themselves accordingly, people are still components of the larger system and not encouraged to pursue activities outside of the functions to which they are assigned. Just as the lungs cannot redesign themselves to pump blood like the heart, by analogy, employees and teams are not encouraged to pursue their own ends. Individual goals are thus subordinated to the overall needs of the organization. Human potential and creativity is still very limited in an organization based on the model of the organism.

A fundamental shift in organizational design occurred with the insight[3] that organizations are social systems composed of purposeful parts; that is, people. The idea of personal development is also a cornerstone of this view. Employment is thus a negotiated agreement between individuals and their firms. Individuals agree to work for firms so as to facilitate the ends of the organization *as well as their own ends*. Personal and professional development is one of those ends; that is, "... a process in which an individual increases his ability and desire to satisfy his own desires and those of others. It is an increase in capacity and potential, not attainment" (Ackoff 1981, 35).

The poietic organization takes these ideas one step further. A poietic organization *is a social system that explicitly encourages creation and production.* Its concept of people, teams, and the organization are aligned to do one thing really well: build new products and services on a frequent basis. They understand that you can't treat people like machine parts and expect them to innovate. That is why companies like Google and 3M devote so much time and so many resources to quality of work life issues in order to attract the most creative and motivated workforce. Google, for example, puts its money where its mouth is by paying employees to "daydream" at about 20 percent of the time while on salary (Atwood 2012). The companies of 3M (Goetz 2011) and Hewlett Packard (Cringely 2011) were also doing it decades before. Creativity and design are not optional but are central elements of strategy and practice at poietic organizations.

Poietic organizations are also self-regulating. They focus on how to design better processes (internal and external), products, and services. Although they learn, unlike simple learning organizations that regulate through error (problem) detection, they regulate based on both problem-solving and the *quality of the designs and user satisfaction*. The poietic organization considers itself to be a product of design too and it is also subjected to design review and adjustment. At heart, a poietic organization is a creative design system. *Creative design system organizations create on a regular basis, fashioning ideas, concepts, and objects in a given domain or industry in new and novel ways that are embraced by customers and other stakeholders.*

Since most organizations are not poietic by nature, they must transform themselves. Transformational methods are either problem-based or strengths-based. For example, planning methods are all problem-based. Ackoff's participatory planning method distinguishes itself by the levels of *participation* and its focus on *idealized design*, but still focuses on the solution of problems. Appreciative Inquiry on the other hand focuses on strengths development not problem solving.

Another factor that distinguishes one method from another is whether it is *episodic* or *self-regulating*. Episodic methods have a beginning, middle, and end, and this time period is sometimes referred to as the "planning horizon." In the alternative, organizational learning is a method that is self-regulating but is based on the detection and correction of error (i.e., problems). Poietic Transformation is self-regulating and based on the development of strengths, although it can be jump-started with a phased approach.

The goal of Poietic Transformation is to help organizations achieve the full potential of the poietic organization. Poietic Transformation is thus a self-regulating, strengths-based approach to change. It includes four primary activities: *preparation, visualization, organization*, and *performance*. *Preparation* is the self-assessment phase in which the organization takes a hard look at its strengths and areas for development. It culminates in an IDEAS scorecard and a story about the organization.

The second phase, *visualization*, provides an opportunity to imagine and write a new story for the organization. The next activity, *organization*, is to organize the changes that must occur to close the gap between the current state and the imagined state. The final phase, *performance*, is a chance to put into practice new behaviors, skills, and values consistent with the value and ends of the poietic organization.

Remaining Paranoid and Other Final Thoughts

The organizations that appear on *Fast Company's* latest list of innovative companies represent the newest and most formidable competitors and it would be a mistake to ignore the lessons they offer regardless of your industry. For example, I'm sure supermarkets never thought an Internet firm named Amazon would someday compete for their business.

No longer content to seek competitive advantage through simple strategies that focus on low-cost production or niche marketing, poietic organizations have learned to boost competitive advantage by mastering three types of knowledge: *theoria* (theory), *praxis* (practice), and *techne* (craft). Craft includes improvisational capacity, design proficiency, experimentation, aesthetic awareness, and other strengths in the form of core competencies; that is, they have mastered IDEAS. Practice includes effective management, leadership, and decision-making skills. Theory includes a deep understanding of scientific methods, systems thinking, organization theory, and theories of human potential. These skills and areas of knowledge enable them to craft unique value propositions for their customers while simultaneously cutting costs. Great design, aesthetics, quality, functionality, flexibility, and community are hallmarks of these innovators.

By their very nature, poietic organizations are communities of practice that can attract vast audiences, just as the great poets did in their time. The poietic company's image of "organization" is rooted in the concept of a community centered on creativity, design, and production. These organizations also know that creative thinking does not come cheap; they pay higher than average wages and invest in the quality of working life of their employees in order to unleash the creative potential of their employees. They understand that employees have a vast potential to create if given the opportunity to do so.

The bottom line is the poietic organization is your new competitor regardless of your industry. Just as creativity knows no boundaries, so it is with the creations produced by poietic firms. They break industry boundaries and crack once considered impenetrable value networks (Christiansen 2003). For example, Airbnb is challenging major hotel chains with its customer-centric concept of short-term house sharing. Hard to imagine? Consider this fact: "Airbnb will usurp the InterContinental Hotels Group and Hilton Worldwide as the world's largest hotel chain—without owning a single hotel" (Carr 2014). Another company, Uber, is threatening the hegemony of taxi services in major cities by circumventing regulatory frameworks that protect them and breaking barriers to entry without owning a single cab. How? Through a smartphone app. Finally, who would have thought that a broadcast messaging service that only allows the user 140 characters (less than the number of words in this sentence!) would become a major marketing tool for the Fortune 500.

So it is with Twitter and any number of poietic firms. They take a simple concept, build the most creative organizational context they can, nurture the creativity of their employees, develop myriad high power teams, and pump out game-changing products and services at an alarming rate.

Does your organization have the will to invest the time and resources necessary to transform into a poietic organization to stay ahead of the competitors you don't know are coming?

Appendix

I have put together lists of several resources classified by topic including books, articles, links, and multi-media (e.g., videos, audio, images, etc.). Additional resources are available at ideasmethod.com and the author's web site (ericwstein.com).

Team Transformation

	Team Transformation
Books and Papers	**Roles** Chong, E. (2007). Role balance and team development: A study of team role characteristics underlying high and low performing teams. *Journal of Behavioral and Applied Management,* 8(3), pp. 202–217. Kreitner, R., & Kinicki, A. (2008). *Organizational behavior* (8th ed.). New York: McGraw-Hill/Irwin. Mumford, T., Van Iddekinge, C., Morgeson, F., & Campion, M. (2008). The Team Role Test: Development and validation of a team role knowledge situational judgment test. *Journal of Applied Psychology,* 93(2), 250. Rodrigues, C. (1984). Adapting the innovator, the implementer and the pacifier leadership styles to changing environmental demands: a conceptual model. *Central State Business Review,* 3(1), pp. 41–46. Rodrigues, C. (1993). Developing three-dimensional leaders. *Journal of Management Development,* 12(3), 4 11.
Links	**Myers-Briggs Assessments and Tools** • http://www.myersbriggs.org/ • http://www.personalitypathways.com/type_inventory.html
Multi-media	Karr, R. [narrator]. (2000). June 1st, 2000: • Orpheus chamber orchestra a model for business. *NPR's Morning Edition.* [audio recording]. Story and recording retrieved at: http://www.npr.org/templates/story/story.php?storyId=1074891. Derek Sivers | Profile on TED.com (http://www.ted.com/speakers/derek_sivers.html)

	• Through his new project, MuckWork, Derek Sivers wants to lessen the burdens (and boredom) of creative people. Jacek Utko | Profile on TED.com (http://www.ted.com/speakers/jacek_utko.html) • Could good design save the newspaper—at least for now? Jacek Utko thinks so—and his lively, engaging designs for European papers prove that it works. Matt Weinstein | Profile on TED.com (http://www.ted.com/speakers/matt_weinstein.html) • A sought-after pro speaker and the founder of Playfair, Matt Weinstein wants to bring teamwork into work, and fun and humor into team building. Tom Wujec | Profile on TED.com (http://www.ted.com/speakers/tom_wujec.html) • Tom Wujec studies how we share and absorb information. He's an innovative practitioner of business visualization—using design and technology to help groups solve problems and understand ideas. Joachim de Posada | Profile on TED.com (http://www.ted.com/speakers/joachim_de_posada.html) • Joachim de Posada is a speaker and motivational coach. He's the author of "How to Survive Among the Piranhas" and "Don't Eat the Marshmallow ... Yet." Markus Fischer | Profile on TED.com (http://www.ted.com/speakers/markus_fischer.html) • Markus Fischer led the team at Festo that developed the first ultralight artificial bird capable of flying like a real bird. Ken Kamler | Profile on TED.com (http://www.ted.com/speakers/ken_kamler.html) • Ken Kamler has served as doctor on some of the world's most daring expeditions, but also performs delicate microsurgery when at home in New York.

(*Continued*)

Organizational Transformation

	Organizations
Books and Papers	**Planning** Ackoff, R. (1981). *Creating the corporate future: plan or be planned for*. New York: Wiley. Ackoff, R. (1981). On the use of models in corporate planning. *Strategic Management Journal (pre-1986)*, 2(4), pp. 353–359. **General** Edwards, Douglas (2011), I'm Feeling Lucky: The Confessions of Google Employee Number 59, Houghton Mifflin Harcourt **Organizational Design** Banner, D. & Gagné, T. (1995). *Designing effective organizations: traditional & transformational views*. Thousand Oaks, California: Sage Publications, Inc. Mintzberg, H. (1991). The Effective Organization: forces and forms. *Sloan Management Review*, 32(2), p. 54. Wheatley, M., & Kellner-Rogers, M. (1996). Self-organization: the irresistible future of organizing. *Strategy & Leadership*, 24(4), p. 18. **Learning Organizations** Darling, J. & Shelton, C. (2003). From theory to practice: using new science concepts to create learning organizations. *The Learning Organization*, 10(6), p. 353-360. Ayas, K. & Zeniuk, N. (2001). Project-case learning: building communities of reflective practitioners. *Management Learning*, 32(1), pp. 61–76. Forman, D. (2004). Changing perspectives from individual or organizational learning. *Performance Improvement*, 43(7), pp.16–21.

	Galer, G. & van der Heijden, K. (1992). The learning organization: how planners create organizational learning. *Marketing Intelligence & Planning*, 10(6), pp.5–13. Lewis, J. & Van Tiem, D. (2004). Appreciative inquiry: a view of a glass half full. Performance Improvement, 43(8), pp.19–24. Stata, R. (1989). Organizational learning – the key to management innovation. *Sloan Management Review*, 30(3), pp. 63–74. **Quantum Organizations** Darling, J., McKenna, M. & Shelton, C. (2002). Leading in the age of paradox: Optimizing behavioral style, job fit and cultural cohesion. *Leadership & Organization Development Journal*, 23(7), pp. 372–380. Darling, J., McKenna, M. & Shelton, C. (2001). The quantum skills model in management: A new paradigm to enhance effective leadership. *Leadership & Organization Development Journal*, 22(5/6), pp. 264–273. Fabian, N. (2008). From quantum physics to organizational change-even at NEHA! *Journal of Environmental Health*, 70(9), Health module p. 86. Johnson, D. (2002). Quantum learning: Leadership for learning organizations. *Futurics*, 26(3/4), pp. 89–92. Miller, J. (2005). Systems theory and quantum learning: a new hope for organizations of the future. *Futurics*, 29(1/2), pp. 74–77. Overman, E. (1996). "The new sciences of administration: Chaos and quantum theory." *Public Administration Review*, 56(5), pp. 487–491. Werman, V. (2000). Business measures in a quantum world. *IIE Solutions*, 32(10), pp. 39–44.

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	Wheatley, M. (2006). *Leadership and the new science: discovering order in a chaotic world (3rd ed.)*. San Fransisco: Berrett-Koehler Publishers.
	Youngblood, M. (1997). Leadership at the edge of chaos: From control to creativity. *Strategy & Leadership*, 25(5), pp. 8–14.
	Zohar, D. (1998). What would a quantum organization look like? *Management Review*, 87(3), pp. 56–58.
	Chaotic Organizations
	Bechtold, B. (1997). Chaos theory as a model for strategy development. *Empowerment in Organizations*, 5(4), p. 193.
	Crossan, M., Klus, L., Lane, H., & White, R. (1996). The improvising organization: where planning meets opportunity. *Organizational Dynamics*, 24(4), pp. 20–35.
	Forgues, B. & Thietart, A. (1995). Chaos theory and organization. *Organizational Science*, 6(1), pp. 19–31.
	Gleick, J. (1988). *Chaos: making a new science*. New York: Penguin.
	Maguire, M. (1999). Chaos theory offers insights into how teams function. *Quality Progress*, 32(6), pp. 41–45.
	Samoilenko, S. (2008). Fitness landscapes of complex systems: insights and implications on managing a conflict environment of organizations. *Emergence: Complexity and Organization*, 10(4), pp. 38–45.
	Wilding, R. (1998). Chaos theory: implications for supply chain management. *International Journal of Logistics Management*, 9(1), pp. 43–56.

	Organizational Change Albrecht, K. (1994). The power of bifocal vision. *Management Review*, 83(4), pp. 42–46. Albrecht, K. (2004). Better decision making: from who's right to what's right. *The Futurist*, 38(3), pp. 20–24. Albrecht, K. (2008). The triune intelligence model: an optimistic view of human capability. *Karl Albrecht International*, retrieved from https://www.karlalbrecht.com/downloads/Albrecht-TriuneIntelligence.pdf. Albrecht, K. (2006). Social Intelligence. *Leadership Excellence*, 23(11), pp. 17–18. Albrecht, K. (2010). The Journey to Excellence. *Karl Albrecht International*, retrieved from https://www.karlalbrecht.com/downloads/Albrecht-Missioneering.pdf.

Links	• **Planning**
	  • Boston's Big Dig: http://www.massdot.state.ma.us/highway/TheBigDig/FactsFigures.aspx
	• **Appreciative Inquiry**
	  • http://appreciativeinquiry.case.edu/
	  • http://www.new-paradigm.co.uk/Appreciative.htm
	• **Organizational learning**
	  • http://www.brint.com/OrgLrng.htm
	  • http://carbon.ucdenver.edu/~mryder/itc_data/org_learning.html

Multi-media	Dawson-Pick, D. (Producer) (1997). Learning to survive. *Creating the learning organization*, v.1 (VHS). BBC Worldwide Americas, Inc.. Dawson-Pick, D. (Producer) (1997). The learning experience. *Creating the learning organization*, v.2 (VHS). BBC Worldwide Americas, Inc..

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	Dawson-Pick, D. (Producer) (1997). Making it happen. *Creating the learning organization*, v.3 (VHS). BBC Worldwide Americas, Inc. Pascale, R. (Producer) (1997). *The hidden dimension*. (VHS). New York: Films for the Humanities & Science. Rose, C. P. (Host), & Ortiz Jr., E. L. (Director). (May 28th, 1993). Episode #3105: Sperling/ Wiseman/ Marshall/ Gardner [Television series episode]. In C. Rose (Producer), *Charlie Rose*. New York: WNET. Rose, C. P. (Writer), & Jay, M. (Director). (April 5th, 2005). An Hour with political writer Thomas L. Friedman [Television series episode]. In C. Rose & Y. Vega (Producers), *Charlie Rose*. New York: WNET. Smith, H. (Writer), & Young, R. (Writer & Director). (November 16th, 2004). Is Wal-mart good for America? [Television series episode]. In H. Smith and R. Young (Producers), *Frontline*. Boston: WGBH. David Logan | Profile on TED.com (http://www.ted.com/speakers/david_logan.html) • David Logan is a USC faculty member, best-selling author, and management consultant. Ben Cameron | Profile on TED.com (http://www.ted.com/speakers/ben_cameron.html) • Ben Cameron runs the arts granting program at the Doris Duke Foundation, focusing on live theater, dance and jazz. Fellows Friday with Rose Shuman | TED Blog (http://blog.ted.com/2011/06/03/fellows-friday-with-rose-shuman/) • Rose Shuman designed Question Box to spread the benefits of the Internet in the developing world. At the push of a button, villagers could get answers to any query.

	About TED | TEDTalks Sponsors | Steelcase (http://www.ted.com/pages/285) • "At Steelcase we bring human insight to business by studying how people work, wherever they work. Those insights can help organizations achieve a higher level of performance, by creating places that unlock the promise of their people. Our goal is to help them create spaces that support how they work. Our passion is to help them love how they work." About TED | TEDTalks Sponsors | Autodesk (http://www.ted.com/pages/182) • "Our products are specifically designed to assist and support the kind of inspired and innovative thinking displayed and celebrated at (TED). Put simply, Autodesk software helps architects, designers, engineers, manufacturers, and digital artists design, visualize, and simulate their projects digitally; experience their ideas virtually; and empower them to design in better ways. TED Prize | Nominate (http://www.ted.com/pages/77) • "Each year, we award the TED Prize to a leader with a bold, innovative vision for sparking global change. The TED Prize winner receives $1,000,000 — and support from the TED community's wide range of resources and expertise — to make their dream become a reality."

Learning and Constructivism

	Learning
Books and Papers	All, A., & Brandon, A. (2010). Constructivism theory analysis and application to curricula. *Nursing Education Perspectives*, 31(2), pp. 89–92. Altman, B. (2009). Determining US worker's training: history and constructivist paradigm. *Journal of European Industrial Training*, 33(6), pp. 480–491. Chen, I., & Liu, C. (2010). Evolution of Constructivism. *Contemporary Issues in Education Research*, 3(4), pp. 63–66. Cottone, R. (2001). A social constructivism model of ethical decision making in counseling. *Journal of Counseling and Development*, 79(1), pp. 39–45. Kalina, C. & Powell, K. (2009). Cognitive and social constructivism: developing tools for an effective classroom. *Education*, 130(2), pp. 241–249. Prakash, E. (2010). Explicit constructivism: a missing link in ineffective lectures? *Advances in Physiology Education*, 34(1), pp. 93–96. Sakulbumrungsil, R., Sthapornnanon, N., Theeraroungchaisiri, A., & Watcharadamrongkun, S. (2009). Social constructivist learning environment in an online professional practice course. *American Journal of Pharmaceutical Education*, 73(1), pp. 1–8.
Links	
Multi-media	Sir Ken Robinson: Bring on the learning revolution! | Video on TED.com (http://www.ted.com/talks/lang/eng/sir_ken_robinson_bring_on_the_revolution.html) Sir Ken Robinson makes the case for a radical shift from standardized schools to personalized learning—creating conditions where kids' natural talents can flourish.

	David Merrill demos Siftables | Video on TED.com (http://www.ted.com/talks/lang/eng/david_merrill_demos_siftables_the_smart_blocks.html) Is this the next thing in hands-on learning? Chris Anderson: How web video powers global innovation | Video on TED.com (http://www.ted.com/talks/lang/eng/chris_anderson_how_web_video_powers_global_innovation.html) Video is driving a worldwide phenomenon he calls Crowd Accelerated Innovation—a self-fueling cycle of learning that could be as significant as the invention of print. Ali Carr-Chellman: Gaming to re-engage boys in learning | Video on TED.com (http://www.ted.com/talks/lang/eng/ali_carr_chellman_gaming_to_re_engage_boys_in_learning.html) At TEDxPSU, Ali Carr-Chellman pinpoints three reasons boys are tuning out of school in droves, and lays out her bold plan to re-engage them: bringing their culture into the classroom. Aditi Shankardass: A second opinion on learning disorders | Video on TED.com (http://www.ted.com/talks/lang/eng/aditi_shankardass_a_second_opinion_on_learning_disorders.html) Developmental disorders in children are typically diagnosed by observing behavior, but Aditi Shankardass knew that we should be looking directly at their brains. Ben Dunlap talks about a passionate life | Video on TED.com (http://www.ted.com/talks/lang/eng/ben_dunlap_talks_about_a_passionate_life.html) Sandor Teszler is a Hungarian Holocaust survivor who taught Dunlop about passionate living and lifelong learning.

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	Srikumar Rao: Plug into your hard-wired happiness | Video on TED.com (http://www.ted.com/talks/lang/eng/srikumar_rao_plug_into_your_hard_wired_happiness.html) Srikumar Rao says we spend most of our lives learning to be unhappy, even as we strive for happiness. Arvind Gupta: Turning trash into toys for learning | Video on TED.com (http://www.ted.com/talks/lang/eng/arvind_gupta_turning_trash_into_toys_for_learning.html) About how to turn trash into seriously entertaining, well-designed toys that kids can build themselves—while learning basic principles of science and design. Caleb Chung plays with Pleo | Video on TED.com (http://www.ted.com/talks/lang/eng/caleb_chung_plays_with_pleo.html) Pleo the robot dinosaur acts like a living pet—exploring, cuddling, playing, reacting and learning. Inventor Caleb Chung talks about Pleo and his wild toy career.

World Views and Behavioral Change

	World Views
Books and Papers	**Mental Models** A good book on world views, mental models and wisdom is: *Seeking Wisdom: From Darwin to Munger* by Peter Bevelin **Time Management** *The 4-Hour Workweek* by Tim Ferriss. A must read for anyone living in the 21st century **Creativity** Ray, M. & Myers, R. (2000). *Creativity in business*. New York: Broadway Books Chaos Theory Gleick, J. (1988). *Chaos: making a new science*. New York: Penguin
Links	
Multi-media	Ken Robinson says schools kill creativity | Video on TED.com (http://www.ted.com/talks/lang/eng/ken_robinson_says_schools_kill_creativity.html) A profoundly moving case for creating an education system that nurtures (rather than undermines) creativity. Adora Svitak: What adults can learn from kids | Video on TED.com (http://www.ted.com/talks/lang/eng/adora_svitak.html) Child prodigy Adora Svitak says the world needs "childish" thinking: bold ideas, wild creativity and especially optimism. Shekhar Kapur: We are the stories we tell ourselves | Video on TED.com (http://www.ted.com/talks/lang/eng/shekhar_kapur_we_are_the_stories_we_tell_ourselves.html)

(*Continued*)

	Hollywood/Bollywood director Shekhar Kapur ("Elizabeth," "Mr. India") pinpoints his source of creativity: sheer, utter panic. He shares a powerful way to unleash your inner storyteller. Jennifer Lin improvs piano magic | Video on TED.com (http://www.ted.com/talks/lang/eng/jennifer_lin_improvs_piano_magic.html) Pianist and composer Jennifer Lin gives a magical performance, talks about the process of creativity and improvises a moving solo piece based on a random sequence of notes. Malcolm McLaren: Authentic creativity vs. karaoke culture | Video on TED.com (http://www.ted.com/talks/lang/eng/malcolm_mclaren_authentic_creativity_vs_karaoke_culture.html) How does one find authentic creativity? In his last talk before passing away, Malcolm McLaren tells remarkable stories from his own life. Isaac Mizrahi on fashion and creativity | Video on TED.com (http://www.ted.com/talks/lang/eng/isaac_mizrahi_on_fashion_and_creativity.html) Fashion designer Isaac Mizrahi spins through a dizzying array of inspirations—from '50s pinups to a fleeting glimpse of a woman on the street who makes him shout "Stop the cab!" Elizabeth Gilbert on nurturing creativity | Video on TED.com (http://www.ted.com/talks/lang/eng/elizabeth_gilbert_on_genius.html) Elizabeth Gilbert muses on the impossible things we expect from artists and geniuses—and shares the radical idea that, instead of the rare person "being" a genius, all of us "have" a genius.

	Larry Lessig on laws that choke creativity | Video on TED.com (http://www.ted.com/talks/lang/eng/larry_lessig_says_the_law_is_strangling_creativity.html) Larry Lessig, the Net's most celebrated lawyer, cites John Philip Sousa, celestial copyrights and the "ASCAP cartel" in his argument for reviving our creative culture. Henry Markram builds a brain in a supercomputer | Video on TED.com (http://www.ted.com/talks/lang/eng/henry_markram_supercomputing_the_brain_s_secrets.html) Henry Markram says the mysteries of the mind can be solved—soon. Mental illness, memory, perception: they're made of neurons and electric signals, and he plans to find them with a supercomputer. 10 ways the world could end: Stephen Petranek on TED.com | TED Blog (http://blog.ted.com/2007/09/25/stephen_petrane/) Stephen Petranek reveals the question that occupies scientists at the end of the day (and the beginning of happy hour): How might the world end? He lays out the challenges that face us. Struggling with quantum logic: Q&A with Aaron O'Connell | TED Blog (http://blog.ted.com/2011/06/02/struggling-with-quantum-logic-qa-with-aaron-oconnell/) On stage at TED2011, Aaron O'Connell talked about building the largest object ever put into a quantum mechanical state, a vibrating piece of metal (called a mechanical resonator).

Gaming and Innovation

	Gaming
Books and Papers	Cohendet, P., Grandadam, D., & Simon, L. (2010). The Anatomy of the Creative City. *Industry and Innovation*, 17(1), pp. 91–111. Cohendet, P. & Simon, L. (2007). Playing across the playground: paradoxes of knowledge creation in the videogame firm. *Journal of Organizational Behavior*, 28(5), pp. 587–605. Larach, U., & Cabra, J. (2010). Creative problem solving in Second Life: an action research study. *Creativity and Innovation Management*, 19(2), pp. 167–179. Lopez-Paceco, A. (2010). Creativity is key to profitability. *Financial Post*. Retrieved from http://www.financialpost.com/executive/Creativity+profitability/3656072/story.html Salmon, G. (2009). The future for (second) life and learning. *British Journal of Educational Technology*, 40(3), pp. 526–538. Tschang, F. (2007). Balancing the tensions between rationalization and creativity in the video games industry. *Organization Science*, 18(6), pp. 989–1005,1023.
Links	
Multi-media	Jesse Schell: When games invade real life | Video on TED.com (http://www.ted.com/talks/lang/eng/jesse_schell_when_games_invade_real_life.html) Games are invading the real world—and the runaway popularity of Farmville and Guitar Hero is just the beginning.

	Tom Chatfield: 7 ways games reward the brain | Video on TED.com (http://www.ted.com/talks/lang/eng/tom_chatfield_7_ways_games_reward_the_brain.html) Tom Chatfield shows that games are perfectly tuned to dole out rewards that engage the brain and keep us questing for more. Tod Machover and Dan Ellsey play new music | Video on TED.com (http://www.ted.com/talks/lang/eng/tod_machover_and_dan_ellsey_play_new_music.html) Brenda Laurel on games for girls | Video on TED.com (http://www.ted.com/talks/lang/eng/brenda_laurel_on_making_games_for_girls.html) A TED archive gem. At TED in 1998, Brenda Laurel asks: Why are all the top-selling video games aimed at little boys? She spent two years researching the world of girls. David Perry: Are games better than life? | Video on TED.com (http://www.ted.com/talks/lang/eng/david_perry_on_videogames.html) Game designer David Perry says tomorrow's videogames will be more than mere fun to the next generation of gamers. They'll be lush, complex, emotional. Stuart Brown says play is more than fun | Video on TED.com (http://www.ted.com/talks/lang/eng/stuart_brown_says_play_is_more_than_fun_it_s_vital.html) A pioneer in research on play, Dr. Stuart Brown says humor, games, roughhousing, flirtation and fantasy are more than just fun.

(*Continued*)

	Jane McGonigal: Gaming can make a better world | Video on TED.com (http://www.ted.com/talks/lang/eng/jane_mcgonigal_gaming_can_make_a_better_world.html) Games like World of Warcraft give players the means to save worlds, and incentive to learn the habits of heros. Beau Lotto: Optical illusions show how we see | Video on TED.com (http://www.ted.com/talks/lang/eng/beau_lotto_optical_illusions_show_how_we_see.html) Beau Lotto's color games puzzle your vision, but they also spotlight what you can't normally see: how your brain works. John Hunter on the World Peace Game | Video on TED.com (http://www.ted.com/talks/lang/eng/john_hunter_on_the_world_peace_game.html) John Hunter puts all the problems of the world on a 4'x5' plywood board—and lets his 4th-graders solve them. At TED2011, he explains how his World Peace Game engages school kids.

Notes

Chapter 1

1. IDEAS is treated extensively in the companion book *Fostering Creativity in Self and the Organization: Your Professional Edge* by Eric W. Stein, which is also available from Business Expert Press.
2. These concepts come from the ancient Greeks including Aristotle, Socrates, and Plato.
3. The original conception of theoria pertains only to knowledge about the natural world. I have included organizational theory in this category for the sake of logical grouping, although strictly speaking it would not be included in theoria. According to Simon (1969), theories pertaining to human activity and design belong to The Sciences of the Artificial (Simon 1969).
4. One of the benefits of a high-value, high-profit margin competitive strategy is the availability of cash. Apple has been able to invest in its means of production because it had accumulated hundreds of billions of dollars in retained earnings.
5. Companies such as Target, Home Depot, and even Walmart have invested heavily in their online distribution systems to compete with Amazon.
6. Also available from Business Expert Press.
7. The Ideas Method™ is trademarked by Barisoft LLC. All rights reserved.

Chapter 2

1. In my opinion, this is the most confusing of the personality dimensions and it is unfortunate that the designations of *P* and *J* were used. It would have been preferred to use "Planner-types" vs. "Adapter-types."
2. Several assessment tools must be purchased. It is up to the reader to decide the efficacy of these tools and the author makes no claims regarding the use of these tools.
3. Links to these sites change frequently. Here are a few MBTI links to get you started. The author does not make any claims or endorse any of the websites or products indicated. For personal use only.
   - For a quick assessment: http://www.personalitypathways.com/type_inventory.html

– For reference: http://www.myersbriggs.org/

4. See for example, the early work by Brown (1983) on this topic. There has also been considerable research on the relationship between group personality composition and team effectiveness. For an overview of some of this research see for example Halfhill et al. (2005).
5. The Big Five personality traits are five dimensions of personality based on the Five Factor Model (FFM) proposed by Digman (1990). The Big Five factors are openness, conscientiousness, extraversion, agreeableness, and neuroticism (e.g., the acronym OCEAN).

Chapter 3

1. For a more extensive look at multiple intelligences theory and high performance people, please refer to *Fostering Creativity in Self and the Organization: Your Professional Edge* by Eric Stein published by Business Expert Press.
2. Gardner notes that although some of the people above such as Mozart were prodigies as children, many did not attain greatness until much later in life.
3. Links to these sites change frequently. Here are a few MI assessment links to get started with: http://www.literacyworks.org/mi/assessment/findyourstrengths.html and http://www.bgfl.org/custom/resources_ftp/client_ftp/ks3/ict/multiple_int/questions/questions.cfm
4. Top areas of MI represent two things: (1) areas of natural skills and abilities; (2) those that have been developed; and (3) areas of potential. A person may develop his or her areas of MI over time. However, for the purposes of the team, the current 2-D profiles are most salient.
5. Tools to represent MI profiles are available at the ideasmethod.com website.
6. While the research is on-going and still the subject of academic debate, some studies have shown EQ to be correlated with success in a variety of areas of life. See for example Brackett, Rivers, and Salovey (2011).
7. The interested reader is referred to ideasmethod.com for useful Excel templates for displaying MI individual and team profiles.

Chapter 4

1. The work of Belbin (1993) appears in Chong (2007), p. 204.
2. Gardner is a noted psychologist from Harvard who proposed a theory of multiple intelligences.
3. For an excellent book on modern leadership, see Sosik and Jung (2010).

4. In other words, there is some confusion between roles and functions in the literature. Let's use the terms leader and manager to designate the roles that contain the functions required for high performance teams rather than invent a new set of roles. The advantage is that there is considerable research about leaders and managers, which can be built on. Conversely there is little research on roles such as completer or calibrator; these are functions not roles.
5. See Stein (2014) for more extensive treatment of the role and importance of scientific method to individuals.

Chapter 5

1. This case is discussed in more depth in *Fostering Creativity in Self and Organization: Your Professional Edge* by Eric Stein published by Business Expert Press.
2. These ideas are developed in greater depth in *Fostering Creativity in Self and Organization: Your Professional Edge* by Eric Stein published by Business Expert Press.
3. Available from Business Expert Press.
4. It is unclear that other countries would have fared any better.
5. See for example, http://www.thefreedictionary.com/improvise

Chapter 6

1. For a more extensive discussion of the characteristics of designers, please refer to the companion book to this one: *Fostering Creativity in Self and Organization: Your Professional Edge* by Eric W. Stein, also available from Business Expert Press.
2. Started by Sam Farber in 1990, OXO was acquired by Helen of Troy Ltd for $275 million in 2004. The housewares division of HoT (i.e., OXO) generated 259 million in revenues in 2013 according to its 2013 Annual Report, which was a 9% increase over the previous year.
3. http://www.oxo.com/Ourawards.aspx

Chapter 7

1. See for example, Academic Press Dictionary of Science and Technology (1992).
2. For a more extensive discussion of the characteristics of scientists and the dominant school of thought, please refer to the companion book to this

one: *Fostering Creativity in Self and Organization: Your Professional Edge* by Eric W. Stein, also available from Business Expert Press.

3. One of the most important quantum mechanical experiments is the *double-slit* experiment.

Chapter 8

1. For example, Congress passed the Fair Labor Standards Act in 1938, which set the minimum age of employment and hours of work for children under federal law. However, it took almost 100 years for these standards to be enacted into law at the federal level.
2. *The Brain of the Firm* (1972) and *the Heart of Enterprise* (1979) by Stafford Beer.
3. See for example, *Limits to Growth* by Meadows, Meadows, Randers, & Behrens, 1972.
4. "Employee Tenure in 2010", U.S. Bureau of Labor Statistics (2010)
5. See for example, Young (2005).

Chapter 9

1. Please see *Fostering Creativity in Self and the Organization: Your Professional Edge,* also published by Business Expert Press for more extensive treatment of IDEAS.
2. Microsoft was one of these organizations but seems to have lost its edge.

Chapter 10

1. My co-author and former student, Doug Evans, who later became COO of the company.
2. See Stein (2014) for more on constructivism.
3. See The Appreciative Inquiry commons at http://appreciativeinquiry.case.edu for an extensive updated list of cases and AI stories.
4. This is a simple on-off system. The thermostat does nothing more than turn the furnace on or off and detect ambient temperature.
5. See Stein (1995) and Stein and Zwass (1995) for a complete discussion of these issues regarding organizational memory and learning.

Chapter 11

1. For example, Snowden (1996).
2. More examples and templates available at http://www.ideasmethod.com
3. I have taken the liberty of editing the original by abbreviating some sections and modifying the headers to illustrate the points discussed in the text.
4. This would be problematic for several reasons. Since the gravity of Mars is only 38 percent as great as the gravity on Earth, the Mars settlers would not have the muscular strength to even walk on Earth upon their return. The long-term effects of the changes in bone density and muscular development are still not completely understood nor do we know if this outcome is reversible. Our heroes would be severely handicapped back on Earth as a consequence.

Chapter 12

1. The complete story can be found in Brill (2014), who is a writer for Time.com.
2. John Doerr is a senior partner at Kleiner Perkins Caufield and Byers and helped bring Google, Amazon, and Twitter to market.
3. See for example, Ackoff (1981).

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Designing Creative High Power Teams and Organizations

Beyond Leadership

Eric W. Stein

The very best firms today are poietic organizations; that is, they are exceptional at streamlining the processes of ideation, creation, and production. These poietic organizations do two things well: They design and develop high power teams, and they create an organizational culture and context that supports improvisation, design, experimentation, aesthetic awareness, and strengths development. Great teams exhibit the same characteristics—trust, commitment, and energy.

Inside you'll learn how to design and develop creative high power teams and organizations by first assessing team member strengths using personality factors and multiple intelligences theory. Following these assessments, how to best represent and share this information to promote team development is illustrated, while examining three types of high performance teams—improvisational, design, and research teams. The second half of this book focuses on the major models upon which organizations are built, the pros and cons of these choices, and strategy. Using current research, examples and cases, the author articulates ways to transform your organization into a high power and poietic organization.

Eric W. Stein earned a PhD in Managerial Science from the Wharton School of the University of Pennsylvania and a BA in Physics from Amherst College. He is an Associate Professor of Management Science and Information Systems at The Pennsylvania State University where he focuses on creativity, innovation, leadership, and sustainability. He served as director of the Entrepreneurship program in the MBA program, ran his own firm designing KM software, and has published in numerous journals. Dr. Stein has served as a consultant to several organizations including Xerox and the World Bank. A community leader, he was elected and served as Councilman in Media, PA.

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