



**Unit**

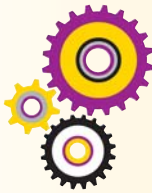


**Equifinality**



## Introduction to Equifinality

The second principle of systems theory is the concept of equifinality.



**Organizations are open systems.**

**Equifinality proposes that, in an open system, multiple paths are available to reach the same end.**

**An organization should first design its system, then build the structure to support it.**

### Understanding the Definition of a Closed System

In a closed system, as Bertalanffy (1968) notes, "the final state is unequivocally determined by the initial conditions: e.g., the motion in a planetary system where the positions of the planets at a time  $t$  are unequivocally determined by their positions at time  $t_0$ ." (p.40). In other words, closed systems are basically mere formulas and do not truly exist.

**In a closed system, once relationships are defined and identified, future responses can be exactly predicted. This is because closed systems are made distinct by their inaccessibility to external influences.** Truly closed systems do not occur naturally. Intervention is necessary in order to exclude or prevent the external influences or forces from affecting internal structures. Whoever controls the system is able to exclude external forces and therefore artificially limit the options available. In closed systems, there are no real choices or decisions; the limitation of alternatives is part of the definition of the closed system. The inputs are controlled and the relationships are defined by the limited range of inputs. Therefore, the outputs of the system are determined as well. The sidebar on this page gives an example of mathematics as a closed system.

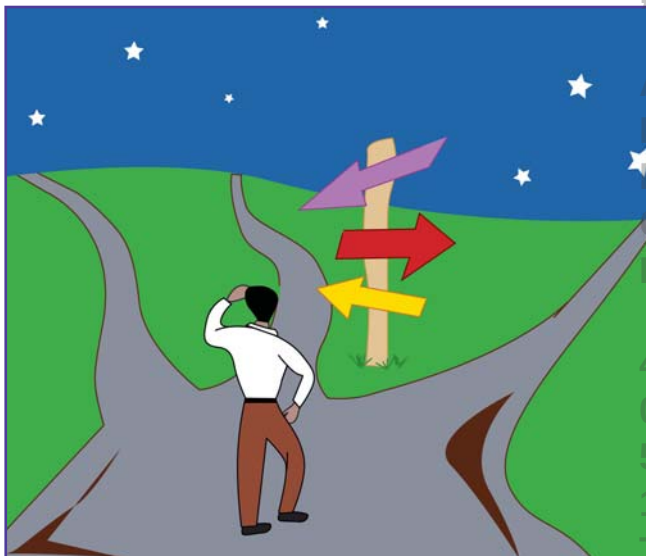


### Modern Organizations as Open Systems

Realistically, modern organizations are open systems that influence, and are influenced by, their environments. In open systems, Bertalanffy states that "the same final state may be reached from different initial conditions and in different ways" (p. 40). From an organizational standpoint, in order to be effective, the organization must have the ability to evaluate the relative opportunities available to reach organizational goals (Drazin & Gresov, 1997).

**Efficiency presupposes effectiveness; efficiency is the accomplishment of objectives using the minimum number of resources.**

Alternatives exist in open systems. **Because the range of influences is not controlled, the actors within the system have the opportunity to make choices.** The choices the actors (managers) within the system have the opportunity to make vary depending upon the ability of the actors to manipulate the inputs to the system and the external forces acting upon the transformation process.



*A key element in the determination of the alternatives available is the ability of managers to identify a range of possible options **within the context of the mission.***

The ability of managers to manipulate the outputs of the system is a function of the inputs available, the extent to which the managers have control over the inputs, and the knowledge, skills and abilities of the managers.

Managers are usually able to identify one or two possible courses of action. In many cases, that is as far as they progress. There may be many other options available and some of those options may well be superior to the option first identified. **Managers must use creative thinking to identify as many possible options in the time available.** In most cases, it is

## Unit Five

### Equifinality



impossible to identify all of the possible alternatives. Further, it is not necessary to develop a list of alternatives so lengthy as to be impossible to evaluate. The manager must be *efficient* and *effective* in the evaluation of how resources are used in order to achieve the organization's objectives.

#### Effectiveness and Efficiency

To be  
**effective** is  
to simply get  
the job done.



To be **efficient** is to  
be effective with the  
utilization of fewer  
resources.

A useful example of the difference between effectiveness and efficiency can be found in the game of golf. The objective of the game is to move the golf ball from the tee to the hole using as few swings as possible. An effective golfer gets from the tee to the hole. However, the effective golfer is not concerned about the number of strokes necessary. The effective golfer's concern is only to reach the hole. It could take two swings or ten swings; the number does not matter.

However, in scoring golf, the number of contacts between the ball and the player's club does count. This introduces the concept of efficiency. An efficient golfer uses the minimum number of strokes necessary to move from the tee to the hole.

The significance of this concept is directly related to the overall organizational performance. Nothing less than the survival of the organization is at stake here. Simply stated, the long term survival of any organization depends on its continuous ability to become more efficient.





### Opportunity Cost

A common definition of economics describes it as a study of scarcity. This view is built around the fact that human wants and needs are unlimited while various resources are limited. Hence, economics is the study of how to best allocate the scarce resources to best satisfy the unlimited wants and needs. One of the foundational concepts in economics is the concept of opportunity cost.

**All effective alternatives should be evaluated and the most efficient one implemented.**

Selection of the best alternative means that other alternatives are not selected. Economists call this the opportunity cost of the alternative selected. **The opportunity cost is the value that would have been received if the next best alternative were chosen.** To select one alternative, and miss other alternatives, actually does cost the organization money. **The efficiency of the organization can be measured in terms of the opportunity costs it incurs.**

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### Defining Closed Systems:

#### What is half of eight?

*The most obvious answer is four. This is the answer one would expect within the laws of mathematics.*

*Mathematics is the ultimate closed system where relationships are defined and outcomes are exactly predicted. External influences artificially limit the options and restrict the chosen path. To follow the applied rules of mathematics means that predictably:*

**half of eight is four.**

*Now remove the restrictions of mathematics and consider the question. Look through the lense of spatial relationships. Half of eight can now be*

**three**

or even

**zero....**



## Profiles of Great Organizers of Productivity



### Frederick Winslow Taylor

#### The Search for the Ultimate Efficient Solution

Frederick Winslow Taylor combined several innovative ideas about the creation of efficient work systems into a unique and ultimately revolutionary theory about the mechanism necessary for the identification of the "one best way" to perform a particular task. Taylor termed his revolution "scientific management" and became the leading management consultant of his time.

Taylor, trained as an engineer, began his career as a common laborer at the Midvale Steel Company. He progressed to a management position and began to experiment with different methods of increasing productivity. Taylor concluded, after considerable observation and analysis, that the secret of increasing productivity lay in finding the right challenge for each person, then paying well for increased output. Pay the person, not the job. His most famous experiment involved a worker named "Schmidt" who loaded bars of pig iron onto a car to be transported into the mill. Taylor observed Schmidt as he worked, picking up a bar of iron from a pile, carrying it to the car, and walking back to the pile. He further broke the process into small-

er steps: bending to pick up the bar, picking up the bar, walking on level ground to the ramp, walking up the ramp, and dropping the iron into the car. As Taylor analyzed Schmidt, he

realized that the process could be refined to move more iron with less effort. Initially, Schmidt was reluctant to cooperate with Taylor's suggestions. Then Taylor hit upon the second component of his revolutionary theory: workers must be motivated to improve productivity through a paradigm shift in their perception of management's role in the work process from adversary to fellow collaborator. In order to accomplish this shift, he used an existing idea, piecework (payment per unit produced) to motivate workers. Schmidt's initial resistance faded when he realized that he could make more money with less effort using Taylor's improvements in the work process.

Taylor's emphasis on observation, analysis, and redesign of the work process became an essential part of modern quality improvement processes. Taylor was the first to present a systematic study of interactions among job requirement, tool, methods, and human skill, to match people and jobs both psychologically and physically. In so doing, he let data and facts do the talking. The basic ideas incorporated in total quality management and Six Sigma programs trace back to Taylor's work in scientific management.

## Profiles of Great Organizers of Productivity

### HEWLETT PACKARD

*In 1939, Hewlett-Packard was a tiny California company operating out of its owners' garage. As the U.S. government geared up to fight World War II, the demand for electronic equipment to support the war effort expanded what had been a very small market into a larger and larger part of the national economy. Hewlett-Packard, operating in Palo Alto, grew its business as a War Department contractor.*



**Hewlett-Packard's first product:  
an audio oscillator**

*In the 1950s, Hewlett-Packard expanded into the post-war economy through the introduction of non-defense products. In 1958, Hewlett-Packard opened its first global office in Geneva, Switzerland and a plant in Germany. This was followed in 1963 by a joint venture in Japan and further expansion in the U.S.*



**Dave Packard and Bill Hewlett in 1981**

*with manufacturing plants in Colorado and Pennsylvania.*

*Hewlett-Packard continued to grow as a global organization during the 1970s. As one of the first firms to explore a joint venture in China, Hewlett-Packard's vision was rewarded in 1985 with the establishment of China Hewlett-Packard, a pioneering effort in China's gradual opening to external firms and economic reform. Hewlett-Packard's leadership in*



**Introduced in 1968, the world's  
first Desktop scientific calculator**

## Profiles of Great Organizers of Productivity

### Hewlett Packard (continued)

research and development in the U.S. was matched by efforts in Germany (a breakthrough, non-invasive fetal heart monitor), the United Kingdom (the first e-mail system) and Japan (the first Japanese character calculator). Hewlett-Packard became a \$1 billion company in 1977.

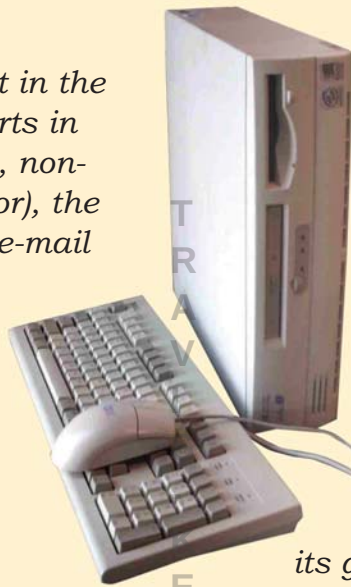
As the personal computer market exploded in the 1980s, Hewlett-Packard kept pace. By the end of the decade, Hewlett-Packard stock traded not only in the U.S., but on the Tokyo stock exchange as well. Sales topped \$11 billion and Hewlett-Packard's labor force globally reached toward 100,000 employees.

By the end of the next decade, Hewlett-Packard spun off Agilent Technologies, keeping the computing and computing related busi-

ness units. Agilent Technologies, a multi-billion dollar company, continued the Hewlett-Packard tradition by establishing two Chinese ventures within the first five years of its existence.

Hewlett itself continued to expand its global presence

by opening a high-technology center in Moscow, establishing and maintaining a contract with the Bank of India, and operations in over 170 countries.



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## Profiles of Great Organizers of Productivity

Nothing but blue skies...jetBlue, that is

JetBlue Airways initiated its service with an inaugural flight between JFK International Airport and Fort Lauderdale, Florida on February 11, 2000. The airline now serves 30 cities in the U.S. and the Caribbean with a fleet of 68 new Airbus A320 planes. It is the only airline with all-leather seats and each seat is equipped with 24 channels of free, live satellite television.

JetBlue's true origin dates back to 1993, when CEO David Neeleman sold his first airline, Salt Lake City Air, to Southwest Airlines. Later, as founder and president of Morris Air, another airline originating in Salt Lake City, Neeleman proved that high quality service and low fares attract a loyal market.

After selling Morris Air to Southwest in 1993 for \$130 million, Neeleman launched a successful Canadian carrier, WestJet, and developed an e-ticketing system into Open Skies, the simplest airline reservation system. Neeleman sold Open Skies to Hewlett Packard in 1999. In July, Neeleman formed a management team and with \$130 million in capital funding from investors such as Chase Capital, he announced his next venture, an airline that would bring "humanity back to our travel."



JetBlue not only values its passengers, it rewards its crews as well. At Morris Air, Neeleman created



"**homesourcing.**" In the homesourcing model, 400 of JetBlue's ticketing reservation agents work 25 hours per week from their homes. The vast majority of JetBlue's reservation agents are stay-at-home mothers and Mormons (as is Neeleman). As a personal value, Neeleman believes that society will be better off if more mothers are able to stay at home with their young children but still have a chance to be wage earners. At Morris Air, employees took 30% more bookings.

All employees of JetBlue participate in the Paid Time Off (PTO) plan that combines vacation, sick leave, and holidays in a single bank of time. Medical, life, and disability insurance benefits, a 401(k) plan and a profit sharing plan round out the employee benefit package. JetBlue received the award for Best Domestic Airline and Best Value for Cost for each of the four years of its operation. The keys to JetBlue's success: start with the best capital in order to be able to invest in the best product, fly new planes that are reliable and fuel-efficient, screen to hire only the best people, train them well with the best tools, and focus on service thus offering customers the best possible experience.

## Decisions for Discussion

### Alexander the Great and Darius: the Battle of Gaugamela

#### *An Efficient Use of Resources to Accomplish Organizational Objectives*



The Alexander Mosaic

In October of 331 B.C.E., Darius of Persia appeared to have all the advantages in his coming battle with Alexander of Macedon: superior information about his opponent, choice of the field of battle, even the opportunity to prepare the field of battle in such a way as to maximize the capabilities of his war machines, not to mention at least a 4-to-1 advantage in the number of troops. Yet, at the end of the day, Darius had abandoned his army and fled the field of battle. Within two weeks, he was dead, assassinated by his own cousin. How did Alexander use the available resources to achieve this surprising outcome?

First, Alexander previously developed an excellent communication network with his commanders. Second, Alexander used the smaller size of his army as an asset, leveraging the communications advantage of a smaller, more closely associated group. Beyond the senior commanders, Alexander's army, although smaller than Darius' (estimates place Alexander's forces at approximately 40,000 and Darius' at 200,000 to 250,000), was organized into highly trained and well-disciplined units. The phalanxes, or rows of troops armed with 18-foot spears, prevented opposing troops from attacking with their much shorter swords. The phalanxes were the core of Alexander's battle line and because of them, a direct assault on the center of Alexander's army presented an extremely difficult challenge. Darius' infantry was organized along conventional lines and therefore, spread out and did not have successive rows of troops to move forward while engaged.



Alexander

Alexander lined his troops up on Darius' left flank, and as the battle began, Darius was forced to move his forces further to the left, thus diluting the advance of his superior numbers. Alexander arranged his troops so that the full capability of his phalanx units was screened by his infantry. After a brief initial engagement, Alexander's troops broke off the attack deliberately and fell back. When Darius' forces pursued, they faced the strongest units of Alexander's army. Alexander's other infantry units still waited, not engaged in the battle, as Darius committed more of his forces against the enemy immediately in front. As Alexander committed more of his cavalry on Darius' left, Darius was forced to continue to move to the left in order to avoid being flanked.



Darius

After Darius fully committed his forces, Alexander still retained a significant proportion of his best men. As Darius' army stretched further to the left, Alexander formed his available, and still fresh troops into a wedge and drove toward the weakest section of Darius' line: the center. As Darius' army began to withdraw in disorder, Alexander's forces pressed forward. Darius fled the battle and left his troops in disarray, open to the advances of Alexander's army.

At the conclusion of the battle, Darius' army suffered losses of at least 40,000 dead and many more wounded. Alexander's losses were placed at approximately 500 dead. Alexander's ability to deploy the available resources in an effective manner against a significantly stronger (at least in numerical terms) opponent provides a demonstration of the principle of equifinality. Many means exist to achieve the same the end; the manager who is able to use the minimum amount of resources to achieve the organizational objective produces the most value to the organization.

### Discussion Questions:

1. Would you say that Alexander was effective, efficient, or both? Why?
2. How did Alexander's strategy prevent Darius from using his resources in a more efficient manner?
3. Put yourself in Darius' position. Based on the description above, how could you make your army more efficient?

### Summary



- ▶ There are alternate routes to reaching any desired outcome.
- ▶ Managers should explore such routes and adopt the most efficient alternative to accomplish the desired outcome.
- ▶ Equifinality is the foundational concept for
  - Process of continuous improvement (Kaizen)
  - Practice of benchmarking
- ▶ Long term survival of any organization depends on its continuous improvement efforts.

*This is a copy of the online form you will fill out in the COMPLETE section of this unit's coursework.*

## THE MISSION IS DIVIDED INTO MAJOR GOALS

### MAJOR GOALS ARE DIVIDED INTO OBJECTIVES

### OBJECTIVES ARE ACCOMPLISHED BY PROCESSES

#### PROCESSES ARE SEQUENTIAL STEPS OF WORK ACTIVITIES, DESIGNED TO ACCOMPLISH OBJECTIVES

Identify a process that you perform regularly to fulfill the objectives of your position. Trace and list the specific steps that make up the process below:

Name of Process: \_\_\_\_\_

Now List the Steps:

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## Work Process Analysis

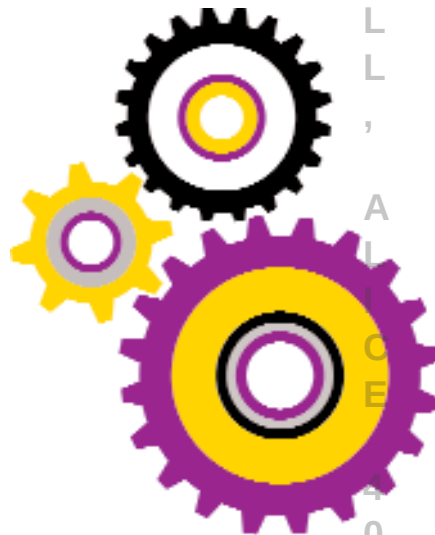
**Step 1**  
Identify the major function of your division in the **red block**

**Step 2**  
Identify the closest partner divisions and their major function in the **blue blocks**



**Step 3:** Review the steps you listed on the **Process Sequence** form and evaluate each step for any of the following actions.

|                                                                                                                                                                  |                                                                          |
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| <b>ELIMINATE:</b> Here, identify and list all steps that can be eliminated without reducing the overall effectiveness of the process.                            | <div style="border: 1px solid black; height: 100px; width: 100%;"></div> |
| <b>COMBINE:</b> In this space, identify and list any step(s) that can be combined to improve efficiency.                                                         | <div style="border: 1px solid black; height: 100px; width: 100%;"></div> |
| <b>MODIFY:</b> In this box, identify and list any step(s) the modification of which can improve overall efficiency.                                              | <div style="border: 1px solid black; height: 100px; width: 100%;"></div> |
| <b>ADD:</b> Finally, list and briefly describe any step the addition of which can add value to the process (i.e. enhance product quality, reduce reworks, etc.). | <div style="border: 1px solid black; height: 100px; width: 100%;"></div> |



**Unit**

**VI**

**Modern Organization as a T-Box**

## Unit Six

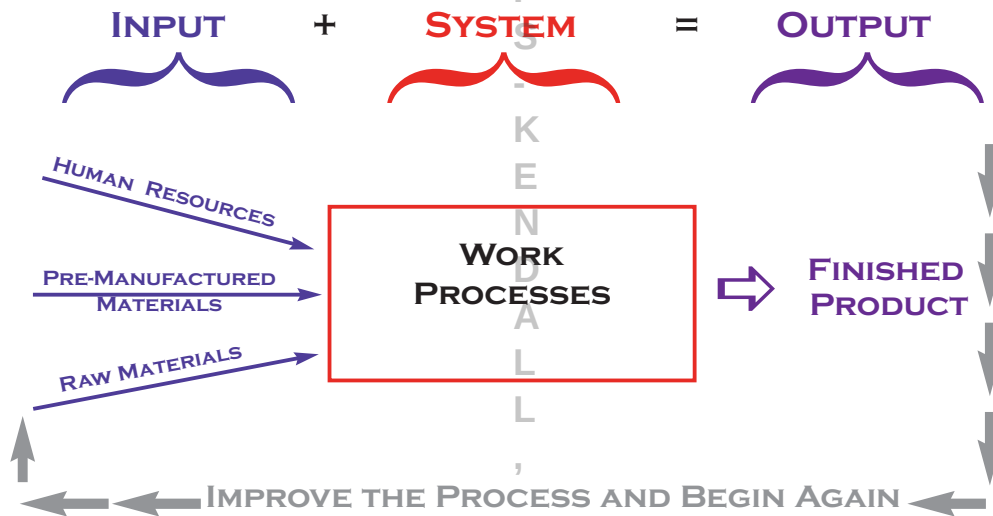
### Modern Organization as a T-Box



## Introduction to Modern Organization as a T-Box

The third core principle of systems theory is the view of an organization as a transformational box.

Figure 6.1



**The transformational box represents actual conversion of various 'inputs' such as raw materials or human labor to a finished product or a service.**

The inputs to the transformational box are the raw materials or energy entering the system. The transformation process converts these raw materials or energy into another state, the output of the system. Once the output of the system is released into the environment, the feedback process begins. (Figure 6.1) As open systems, organizations allow inputs to enter readily from the environment. Those inputs provide a constant infusion of energy into the system. Since organizations are open systems, they also lose or dissipate energy into the environment.

Katz and Kahn (1966) refer to this as "through-put" or the organization's transformation of the energy available to create some modified form (output).

## Unit Six

### Modern Organization as a T-Box



Bertalanffy (1968) suggests that all living organisms take energy (input) from their environment, change or transform the energy, release the results of the change (output), and then receive some form of feedback or communication from the environment. This feedback then affects the future inputs to the system.

French and Bell (1995) place this in the organizational context in that the commonly shared purpose of all organizations is to import input from the environment in the form of natural or human resources, transform the inputs through work processes, and export the finished products back to the environment in the form of products, energy, or service providers.

A second implication of this is that systems are actually cycles of events (Katz and Kahn, 1966). An event system can occur a single time or may reoccur. Event cycles can also combine with other event cycles to create complex systems.

#### 5 Phases of Historical Transformation

The process of transforming resources into finished products has always been a human pursuit. As far back in time as the age of the caveman, transformation has been part of our daily lives. Historical transformation can be divided into five phases, but the constant in each of these phases is the human being. The purpose to considering these five phases is that raw resources have also always existed, just not in the state we would normally consider 'raw'. These resources are converted and hence transformed into a finished product.

Another constant factor through the transformation process is the human being. Humans have had a profound effect on how resources are transformed and the results that are produced from the transformation. Each phase of historical transformation has brought us one step closer to today's modern organization as a T-Box, and is identified and explained in order to understand and demonstrate the modern organization of today.

## Unit Six

### Modern Organization as a T-Box



#### Phase I:

#### Utilization of Raw Materials to Transform Earth's Environment

The raw resource, the tool, forms the first stage of the human transformation quest. The Clovis spear was one of the first tools that enhanced the human ability to transform and dominate their environment.



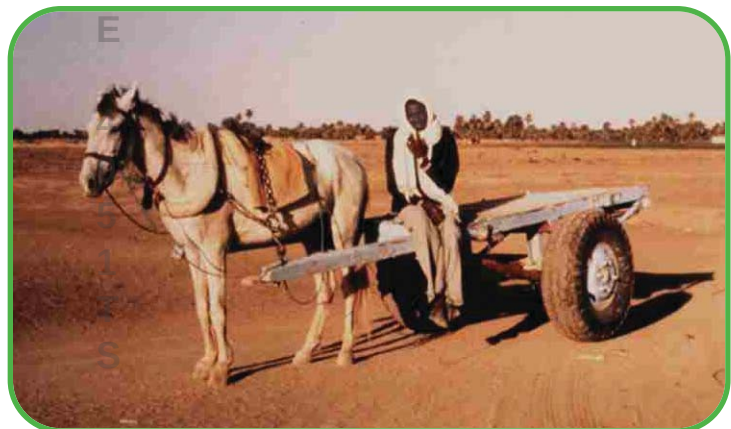
Humans possess no natural, built-in weapons that can compare to those of the predatory animal. They lack long, sharp teeth and claws, powerful hooves, or deadly horns and antlers. Humans' biological weapons are no match for those of the large and dangerous animal that humans have hunted and killed since prehistory. Ancient peoples learned to use sticks, stones and bones, shaping these objects into weapons that were both effective in killing animals for food and for serving as protection. Dating back to the Stone and Ice Age, the tools supplemented human speed and strengthened the power of the human punch.



#### Phase II:

#### Utilization of Animals to Advance the Transformation Quest

Humanity's ascent from Stone Age hunters and gatherers to modern day protectors of animal rights and animal owners is inextricably woven with animals. As beasts of burden, means of transport, and a protein source, animals have made possible agricultural surpluses, triggered cultural cross-pollination, and facilitated the need and invention of wheeled vehicles, roads, and languages. In addition to hunting, the domestication of animals offered promise of more and better utilization. Animals such as the cow and the horse were the historical willing participants in such process. Some may argue the use of the term 'willing participants', but the continued existence of the buffalo and the zebra present a formidable answer.



## Unit Six

### Modern Organization as a T-Box



#### Phase III: Utilization of Other Human Beings

Human beings, both past and present, have found that living together is often easier than living alone; hence, the development of what we now call communities, towns, and cities. Contrary to common belief, Christopher Columbus did not discover America. The first settlers of the Americas crossed the seas at least 20,000 years ago from Asia and Europe. These settlers used the raw resources available to establish shelters as a means to survive.

Often, these settlements or communities were located near a natural water source and in an area conducive to farming. Settlers would often work together to erect their homes, plant their crops, and cultivate and harvest the produce.

Even before the early settlers understood the benefits of team work, the great Egyptians demonstrated their understanding of it by producing one of the world's greatest architectural wonders,

the pyramids. It is estimated that approximately 100,000 people helped erect the Great Pyramid. The remains of ramps have been found that were used to carry the stones to the upper levels of the pyramid. A wooden sledge was used in conjunction with four rows of laborers, 172 in all, to move this stone. The result of their labors still stands today.

Human beings were utilized in the construction of the Great Wall of China. The Great Wall is the most enormous building project ever carried out by human beings past or present, especially with the technology available at the time of its creation. The wall extends over 1500 miles in length. It has been built and repaired over a time span of several dynasties, using approximately 2,100,000 men.

Humans have been the key resource in all three of these examples, and with the use of humans, the transformation process created unique and wondrous products that still exist.



## Unit Six

### Modern Organization as a T-Box



#### Phase IV: Utilization of Machines

**- an extension of the resources phase but uniquely qualified due to the capability of massive scale transformation.**

An M-16 rifle is essentially a machine that throws spears (bullets) on a massive scale and with a high degree of accuracy. Tanks are designed to perform similar tasks as the ancient catapults.

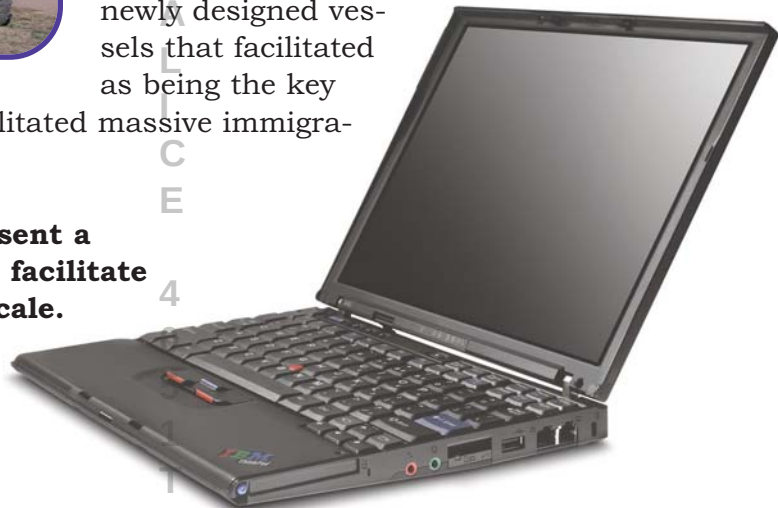
The simple horse and plow is now a massive tractor, early log cabins have now become elaborate homes, and colonial settlements are now urban dwellings surrounded by cities of skyscrapers. The machine, an entity humans design and create, does other things that at times are not fully recognized. Machines have the ability to create new environments. One of the most complex environments in which we live, the city, has been made possible by the machine.



Advancements in modern technology facilitated massive immigration in the past 500 years. Only with technology did we produce vessels capable of crossing the Atlantic Ocean, which in turn, facilitated massive immigration to this land. In short, breakthroughs in technology may have been the key element leading to newly designed vessels that facilitated as being the key

ingredient that changed and facilitated massive immigration to the Americas.

**Simply stated, machines represent a significant phase because they facilitate transformation on a massive scale.**



## Unit Six

### Modern Organization as a T-Box



#### Phase V: Organization

- **effective utilization of previous elements to form the basis for the modern pace of advancement**

The formation of an organization usually consists of the effective alignment of the critical elements, raw materials, human resources, and machinery, to facilitate a greater level of transformation more efficiently. For instance, the personal computer, which is an individual machine, has given us more freedom and power than any other machine. In the meantime, we are more dependent than ever on their production, maintenance, and operation in very large organizations.



Another example of the connection between machine and modern technology would focus on the connection between technology and energy. Oil consumption was established thousands of years ago,

but not on the same scale as today. Machines and modern technology have facilitated oil explorations on a massive scale. From the energy we use, to the automobiles we drive, our demand for this natural resource has reached new heights. There is no way that our world of six billion people could survive without it or the machines and

the technology used to transform it. Each phase of historical transformation has brought us to today's examples of the modern organization as a T-Box.



# Unit Six

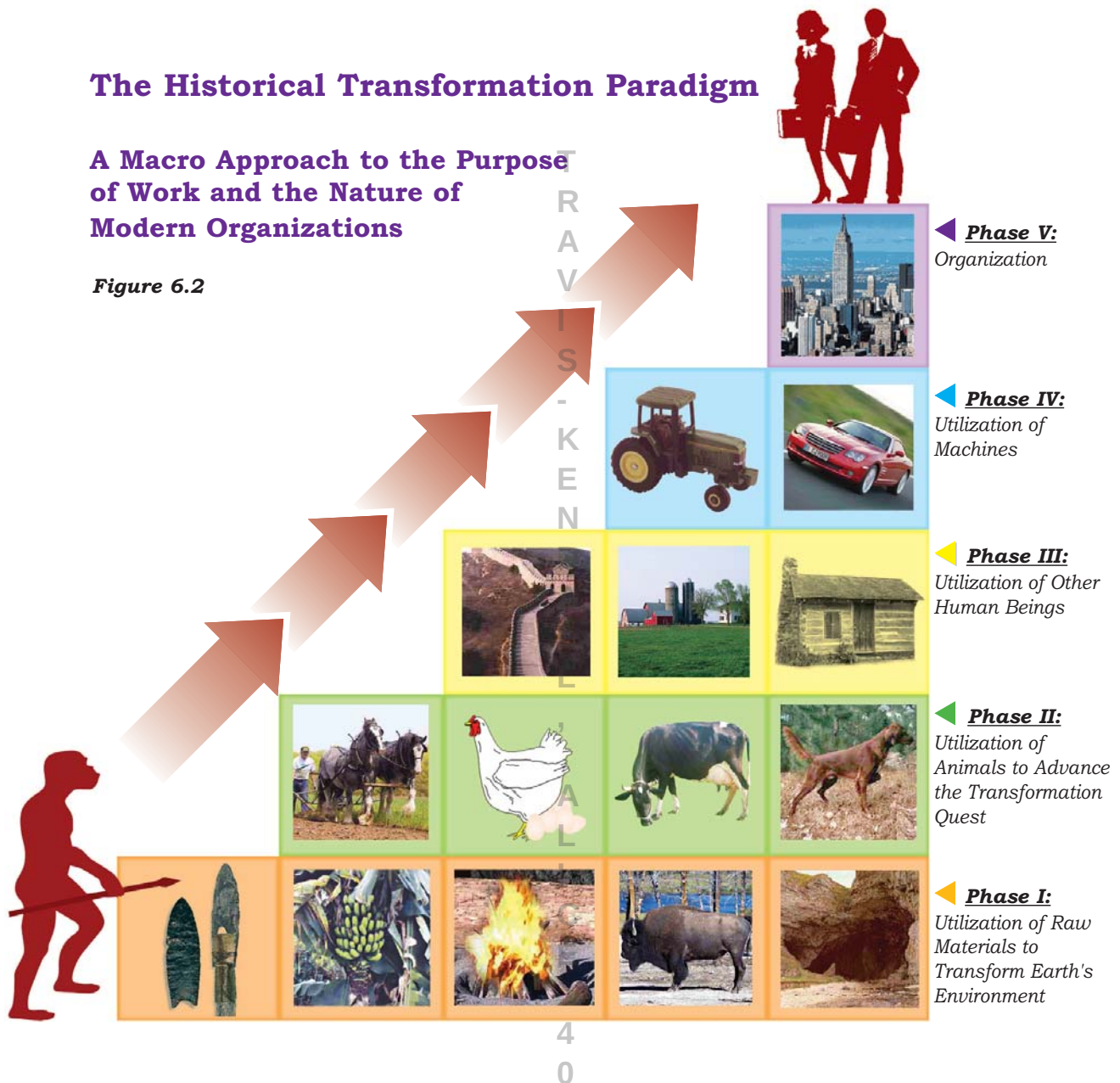
## Modern Organization as a T-Box



### The Historical Transformation Paradigm

#### A Macro Approach to the Purpose of Work and the Nature of Modern Organizations

Figure 6.2



**Taking the T out of the Box:** The basis for the Historical Transformation Paradigm is that Earth's environment is too hostile for convenient human living conditions on a regular basis. It requires constant transformation. Throughout history, humans have transformed earth's resources into products that remedy these natural hostilities. These transformations have become more effective and efficient. The five phases of historical transformation discussed in this chapter are illustrated above in Figure 6.2.

## Profiles of Great Organizers of Productivity

### Archer Daniels Midland Company

ADM is one of the largest agricultural processors in the world, produces everything from corn to paint solvent.

Founded in 1902, ADM employs over 26,000 and operates in over 60 countries on every continent except Antarctica. ADM participates in every aspect of the agricultural process, from the actual operation of farms, to the production of feed for livestock, to the milling of corn into corn starch, to the conversion of corn starch into corn syrup. ADM operates one of the largest transportation systems in the world to move its raw materials (crop products) to its processing facilities and then on to its customers. ADM processes corn and other crops into components of fuels and industrial products used in industries from mining to petroleum.



ADM represents the revolution in agriculture during the 20th century. In 1900, the population of the United States was 76 million. Of that 76 million, 29 million people were part of the labor force. 10 million people were directly employed in agriculture. That represents 34% of the labor force of the United States. In 2000, the population of the United States was 275 million (135 million people participated in the labor force) but 3.3 million people worked in agriculture. This represents 2% of the workforce and approximately 1% of the population as a whole. But the true nature of the revolution becomes apparent when the productivity of the agricultural industry is compared. In 1900, the United States produced 2.6 billion bushels of corn and 600 million bushels of wheat. In 2000, we produced almost a trillion bushels of corn and 2.2 billion bushels of wheat with the work of 6.7 million fewer people.

### Examples of Transformational Boxes

**The transformational box is easiest to understand in the manufacturing environment.**

In the manufacturing environment, raw materials are transformed into a finished product at each stage of the supply and distribution chain. The automobile industry presents an opportunity to examine the T-Box.

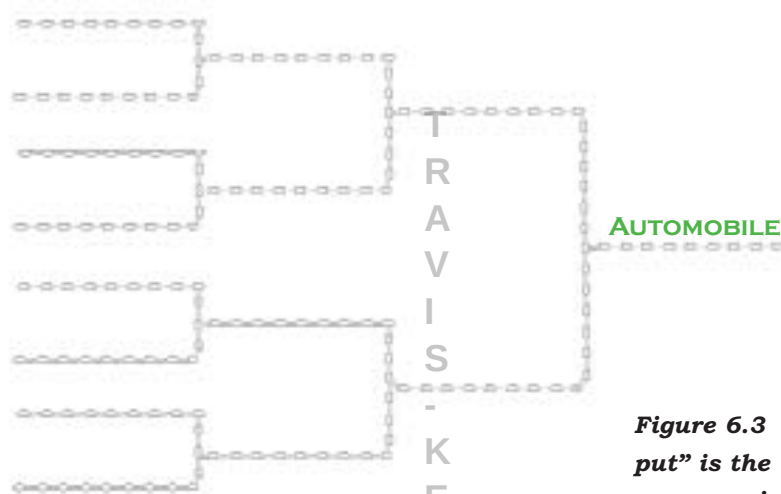
Automobiles are comprised of thousands of individual components. Each component is a physical representation of a transformation process (Figure 6.3).

Consider the metal components such as steel. Steel is the end result of several transformation processes beginning with exploration for iron ore. Deposits of ore, once located through the exploration process, are extracted from the ground, thus making ore an output of the mining process.



## Unit Six

### Modern Organization as a T-Box



**Figure 6.3** Each supplier's "output" is the "input" for the next company in the process.

**From the view of the mining company, ore is the output of its T-Box.**

Once the ore is received by the steel producer, it is an input, raw material into the steel mill's T-Box. The steel mill converts the ore through the smelting process, to steel, which is then further refined into units based on customer requirements. **In the context of the steel mill, the finished steel now is output of the milling process.**

Steel becomes an input into the next step in the automobile production process: transformation into one of the metallic parts of a vehicle, the frame of a car, for example. The producer of the frame treats steel as an input to

the production process. The steel is cut and welded into the shape required by the automobile producer. **The completed frame, as output, is then passed to the next step in the process:** the actual automobile 'producer' actually is an assembler of the thousands of components needed to create a finished vehicle.



The automobile producer complies thousands of individual parts, inputs into its T-Box, and assembles them according to a complex set of individual tasks. In order to assemble a vehicle, the automobile manufacturer begins the transformation process by designing the specific parts necessary to create a functioning vehicle.

**This provides an example of the inter-**

## Unit Six

### Modern Organization as a T-Box



#### connectedness of the entire system.

The frame producer is typically working from specifications provided by the automobile manufacturer.

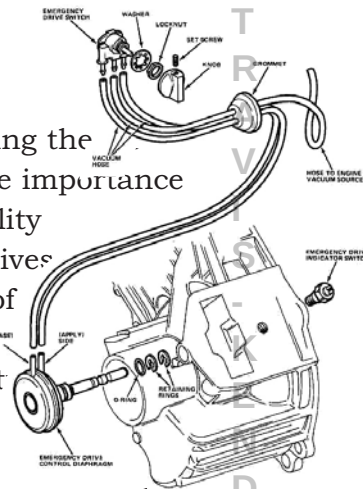
The suppliers to the manufacturer devote tremendous energy to meeting the manufacturer's specifications. The importance of ISO certification and quality control/improvement initiatives proof of the critical nature of suppliers do not meet the specifications, the manufacturer drop the supplier.

The automobile manufacturer must also identify the exact series of steps necessary to actually assemble the specific parts into the completed vehicle.

Typically, this process occurs on an assembly line, using a

process basically unchanged since Henry Ford established the first automotive assembly line in the United States using conveyor belts. The assembly line is a transformation process itself as the thousands of component parts are placed on the frame, the first of the major components in the process. In addition, prior to actually attaching parts to the frame, many parts are "pre-assembled" from

sub-components. **These preparatory steps are sub-systems of the overall system.**



Beyond the physical components of the car, there are other elements, sub-systems, of the transformation process. For example, robotics may be used to perform many tasks in the assembly process, but they do not perform all of the labor. Actual employees are required to perform the millions of individual tasks. The human resource function of the organization identifies

A potential employees, selects them based on criteria developed based on the actual tasks to be performed in the assembly process. Employees typically do not have

all of the skills necessary to

perform all of the tasks required. Employees also need to be oriented to the specific procedures used by the employer (when's payday?).

**Training becomes part of the transformation process.**



## Profiles of Great Organizers of Productivity

### Southwest Airlines

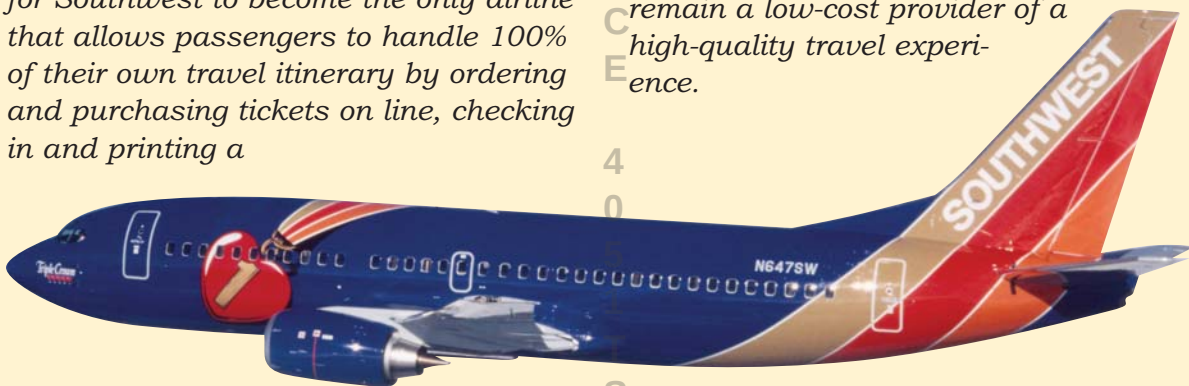


*Southwest Airlines enjoys a reputation as a people-oriented company: a good place to work and a good airline to fly because of its easy-going employees who have even been known to participate in practical jokes between passengers. Nevertheless, behind the very human face of Southwest, technology, specifically computers, plays a huge role in job duties, customer service delivery, and safety. Every aspect of Southwest relies in some way on computer. Ticket sales, paychecks, tracking correspondence, and scheduling planes, crews, and maintenance all rely upon computers.*

*During the past four years, technological advances helped Southwest develop the RAPID CHECK-IN kiosks at airports, upgrade the baggage service tracking system, and create the Ticket-less Award Travel for Rapid Rewards (Southwest's frequent flyer program) members. Technology made it possible for Southwest to become the only airline that allows passengers to handle 100% of their own travel itinerary by ordering and purchasing tickets on line, checking in and printing a*



*boarding pass before even leaving for the airport, and checking their own bags at the airport. Although people are still a huge part of Southwest's success, technology allows Southwest to remain a low-cost provider of a high-quality travel experience.*



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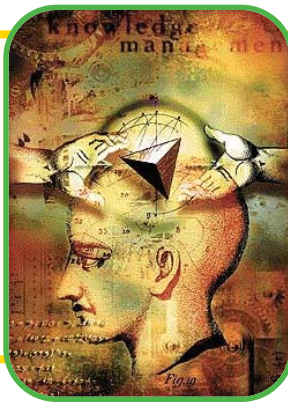
## Unit Six

### Modern Organization as a T-Box



#### Knowledge Management

Identification of the precise mix on materials, people, and skills necessary to create a vehicle represents another element of the transformation process: knowledge management.



**In order to transform the raw materials into a finished product, the organization must develop intangible assets:**

- the capability to identify
- the resources necessary
- and the skills to organize
- them once they are identified.

Knowledge management includes determining what employee skills are needed (human capital), the systems and structures required to complete the tasks in the transformation process, and the relationships between the elements of the sub-systems and the external environment. This last aspect of knowledge management demonstrates the interconnectedness of the system. As discussed in the previous reading, interconnectedness is a critical element in this ability. The organization, through its management, must connect each step in the process and comprehend the interdependence of all of the component parts within the organization as well as the dependent relationships between the organization and the external environment.

#### A Service Example of a Transformation Box

The T-Box is relatively easy to understand in the manufacturing context. **In the service sector, the "transformation" process is intangible.** The outputs of the system may be difficult to observe directly. In the service sector, *knowledge management* becomes even more important in the transformation process. In the service economy, customer needs are satisfied through the provision of knowledge, skill, or a combination of knowledge/skill with a physical product (which is an input to the process). Examples of service industries include education, health care and the military.

The military provides a simple example of a service industry. There are inputs to the transformation process such as PT (physical training), obstacle courses, weapon

## Unit Six

### Modern Organization as a T-Box



handling (rifles, grenades, bayonets, and basic anti-tank weapons), and basic combat training. All of the above listed inputs have physical substance, so they are tangible. In most service industries, a mix of tangible and intangible inputs exists. There are very few organizations that function exclusively on intangible inputs.

Finally, in the service sector, **one input is usually the customer, patient, or civilian**, and in this case the main input is the civilian. This is a significant difference from the manufacturing/production environment where the inputs are selected and specified by the producer (Figure 6.4).

In the military sector, the inputs to the process enter the transformation process as separate entities. During the initial transformation process, which is known as "boot camp", the drill instructor presents, through a variety of techniques, the goals of the branch of service represent-

ed. The drill instructor designates all activities, and demands exactly when and how these activities will be completed.

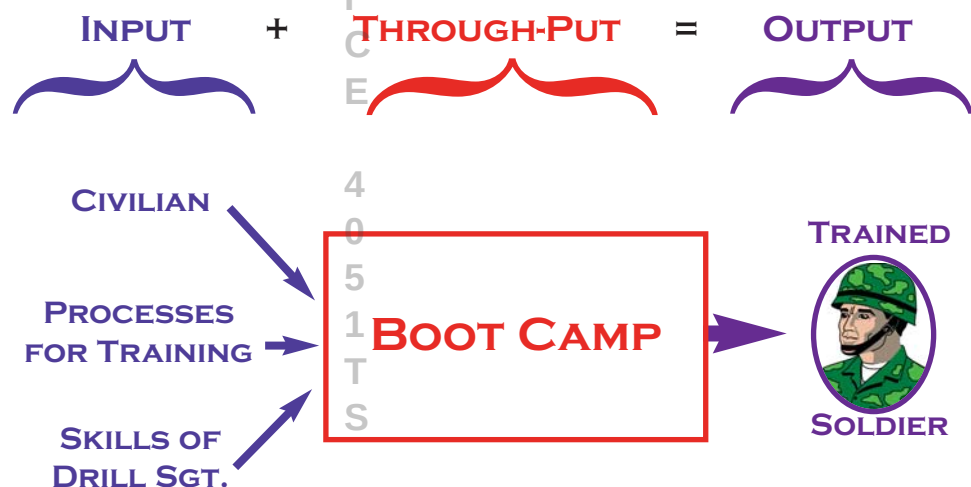
The soldier trainee has no control over the inputs to the transformation process or the process itself.

At the conclusion of the process, the soldier has acquired (learned or experienced) specific skills and tactical maneuvers.

The "trained" soldier is now an output of the military system. The soldier will interact with the external environment, which is comprised of other soldiers, but of a platoon different from the original.

Feedback results from this either in the form of communication between the soldier and his commanding officer or by the soldier's communication with his unit about the quality of the experience or tactical maneuvers. At the conclusion of the process, the soldier has acquired new knowledge and skills needed to help him or her fulfill duties that will in turn represent the nation.

**Figure 6.4** In the military, the person is both the input and the output of the transformation process.

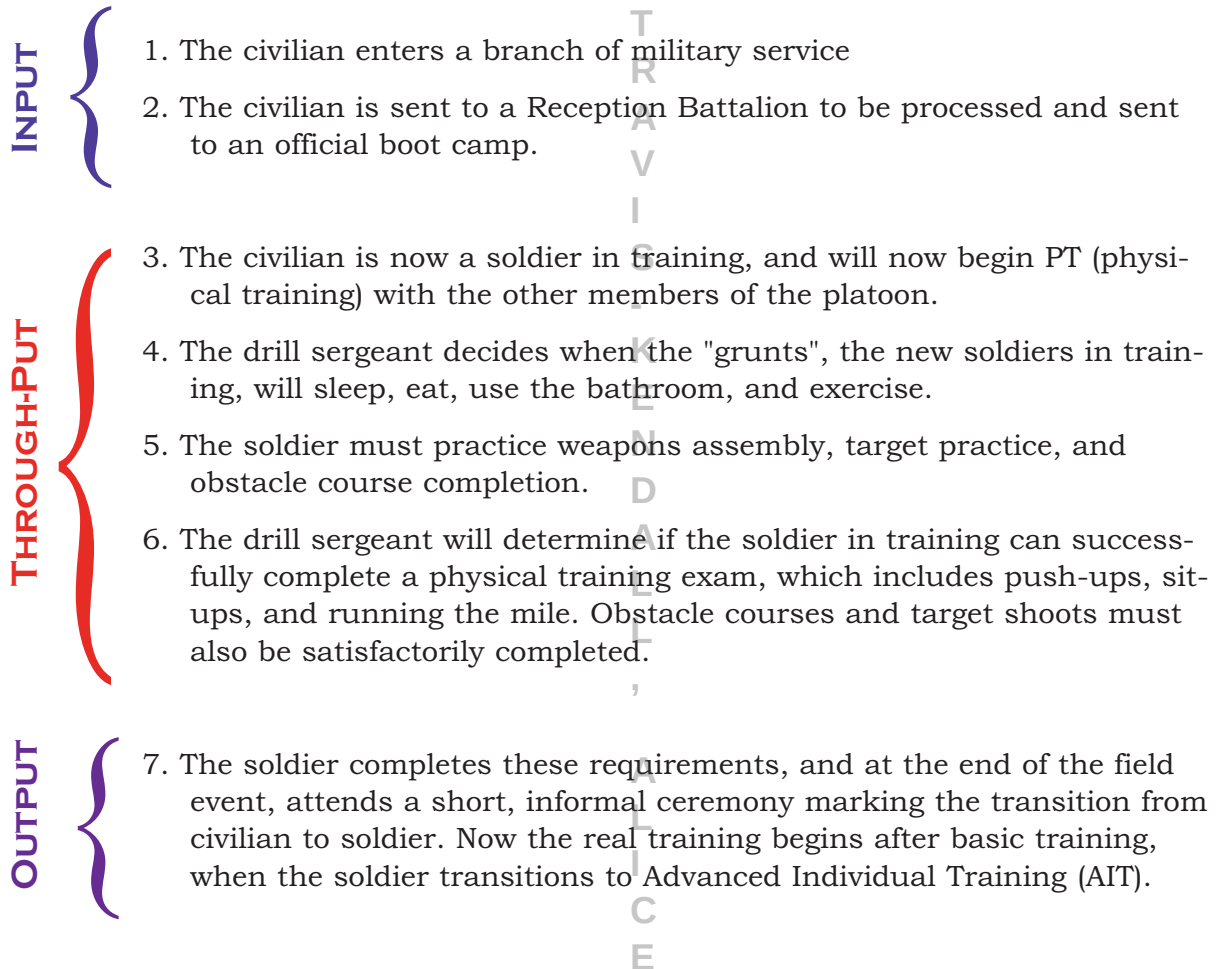


## Unit Six

### Modern Organization as a T-Box



In traditional boot camps of the armed forces, the transformation process operates along a few basic steps.



Another example of a sub-system within an education system is the library. Library books must be purchased. This can be viewed as a transformation process in itself. (Figure 6.5) Librarians and faculty members determine what materials are appropriate. The librarians contact book sellers who provide the books. Once the books are received by the library, they are inventoried (catalogued) and placed on shelves where they are available for people to read. The college, usually through its business or financial office, arranges for payment of the books. Other types of resources pass through a similar process. The electronic journals, now available in

## Unit Six

### Modern Organization as a T-Box



most libraries, are selected and pass through a similar process although there is no tangible "book."

Also, as in the manufacturing environment, knowledge management is an important component of the system. The faculty and library staff must communicate about the types and content of the courses to be offered; the library must keep books and resources available for the courses that the school actually offers. A hundred years

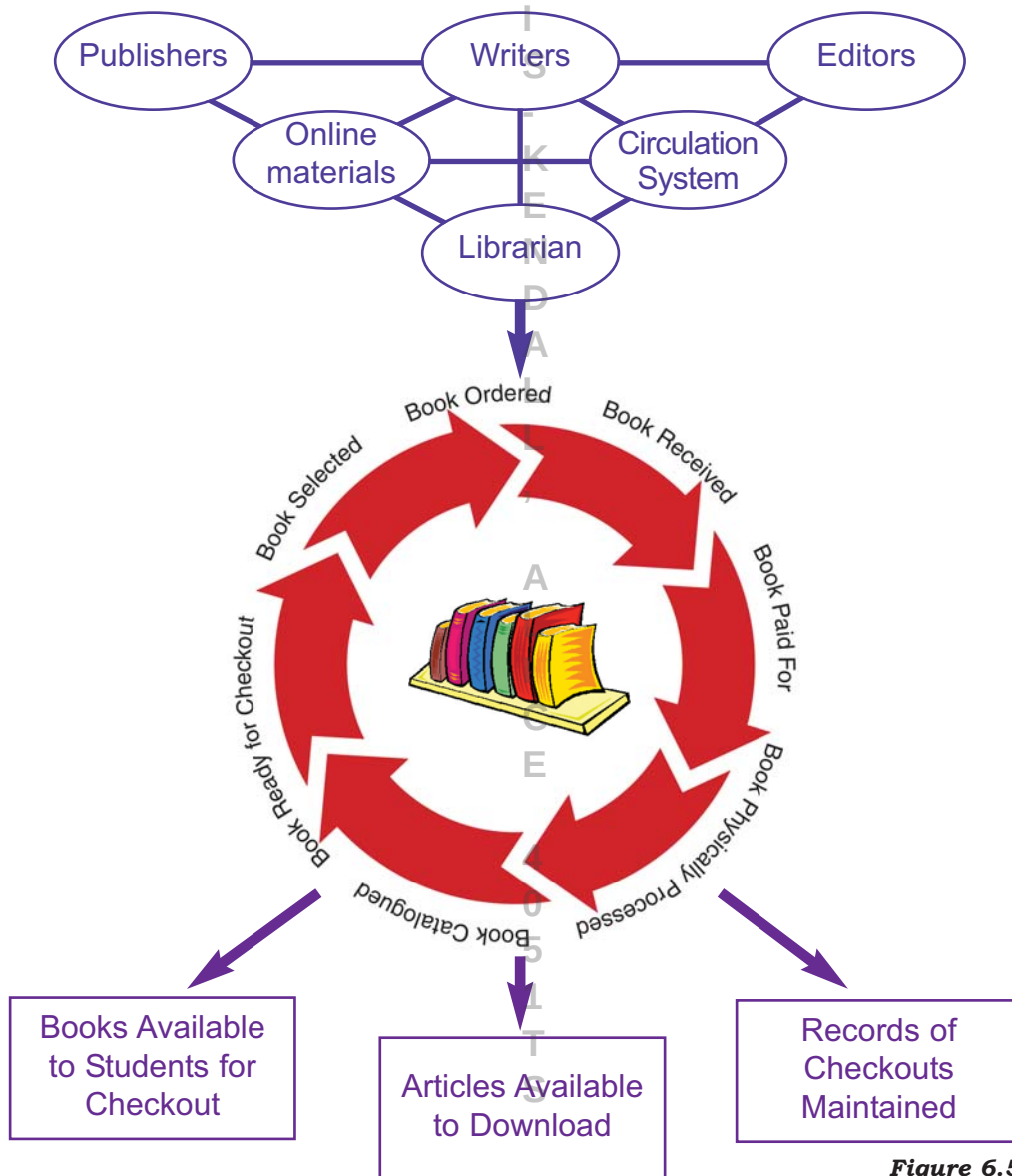


Figure 6.5

## Unit Six

### Modern Organization as a T-Box



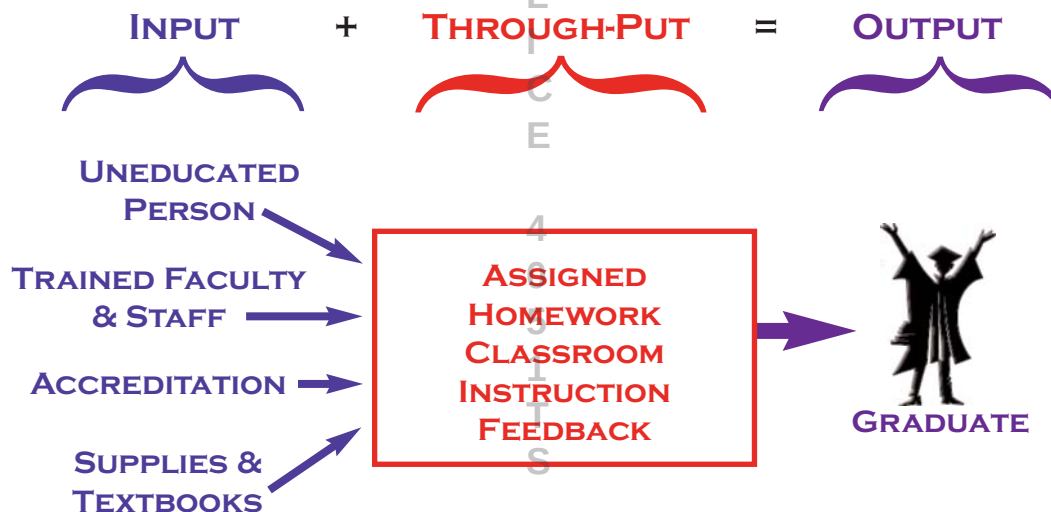
ago, practically every college offered Greek and Latin as major portions of its curriculum. Today, while many colleges offer introductory courses in these languages, very few have them as the central components of the curriculum. Therefore, a library of 100,000 books with 30,000 books in Greek or Latin would not be able to serve the students of the college.

Interconnectedness is important in the service sector as it is in the manufacturing sector. The influence of the external environment can be observed in the course offerings of colleges. In the 18th and early 19th centuries, many colleges focused on the preparation of ministers. Hence, they placed great emphasis on the classical languages. By the 1960s, a shift in society at large had occurred and increased demand for a different set of skills. Written and oral communication and critical thinking replaced the ability to read and speak the classical languages. The paradigm of the expectations and mission of institutions changed between 1860 and 1960.

Take a moment and consider how the transformation process of your program, which was designed for adult students, differs from the transformation process in the traditional undergraduate program.

#### Examples of a T-Box Within Other Industries

##### Education (Figure 6.6)

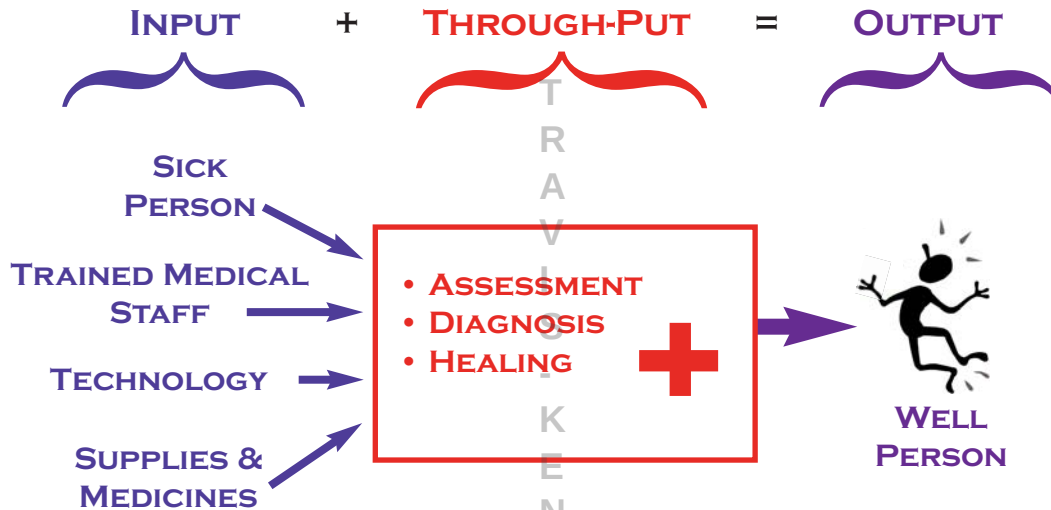


## Unit Six

### Modern Organization as a T-Box



#### Healthcare (Figure 6.6)



#### Why Organize?

Why organize? Simply stated, an organization is the best way to maximize the return on individual efforts. Individuals working together produce more than individuals working independently. This is true in terms of returns to the individual as well as the community. Thus, when individuals organize their efforts together, they are able to produce more and experience a substantially higher standard of living than if they work alone. In essence, the true nature of a modern organization is that of a transformational box taking inputs through the transformational process to

create output in the form of a product or service. All organizations, from factories to hospitals, fit the mold.

Organizations are needed to complete the complex work processes and without them, the production of many complex products will not be feasible. **Modern complexity is one of the**



## Unit Six

### Modern Organization as a T-Box



**primary reasons that made systems theory the dominant school of thought that best describes the nature of modern organizations.**

Modern complexity is what makes the three core concepts of systems theory so critical to understanding the behavior of modern organizations operating in a global environment.

**A modern organization, effectively structured and efficiently operated, is the best means to maximizing the return on individual efforts.**

Just consider the standard of living, if each individual within a community worked alone; his efforts would yield significantly lower returns for himself as well as the community as a whole.

This is a key shift in business thinking because only a century or so ago, the relevance or importance of this theory was largely unrecognized. An organization was closer to being a family or an extended family complete needed tasks. Now, it takes thousands or millions of interconnected segments to complete massive transformations producing airplanes or providing support for Air Force operations (radar and communica-

tions). The sheer complexity of today's world is what gives this theory prominence. Consider cell phones, airplanes, cars, communication networks, MBA's, MD's etc. Without complex interdependent systems, such products would not be possible.

The global nature of commerce in the information age creates a well connected web of many systems (organizations) designed to create sophisticated products (computers, cars, and airplanes). All such systems are interconnected, where each organization is in essence a transformation box that sponsors a segment of a large, complex, and continuous transformation process.



"Image courtesy of the Image Analysis Laboratory, NASA Johnson Space Center." <http://eol.jsc.nasa.gov>

#### Organizational Productivity

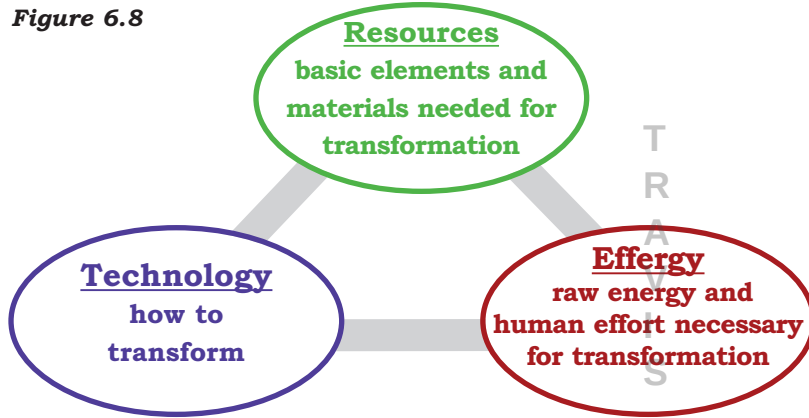
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Organizational productivity is the result of properly managing the 3 elements of transformation. **All transformational processes have the three critical elements of transformation.** They are: *resources, technology, and efficiency.*

## Unit Six

### Modern Organization as a T-Box



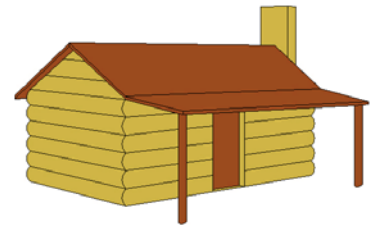
Figure 6.8



Consider at the lumber industry in terms of organizational productivity. Transformation has always been with us and can be demonstrated by focusing on how a single organization made a tremendous impact on the nation using the raw resource of trees

The year was 1800. Out of the rugged wilderness a frontiersman would struggle, sweat, and toil to build one of the first log cabins, which would serve as his family's home. This dwelling measured only 14' X 20', approximately 280 square feet of living space for his family of six.

In order to build this home, each log, an approximate total of 30 were needed, required extreme effort. Each tree would be cut down with an ax, all branches were then removed with the ax, and then the tree would be moved to the building site. Horses, mules, or in some cases persons were used to move the trees to the building site and to maneuver the log into place as the cabin was built. Building sites were usually chosen in relation to how many trees were available and their proximity to the site.



An average of one tree could be cut, disbranched, and moved each day. If weather permitted, enough trees could be ready for assembly in a matter of a month, providing a family with shelter against the elements. The great forestlands of the Northwest offered



what appeared to be limitless opportunities to the settlers of the day. Farmers cleared the land, railroads provided opportunity for growth, and timber men worked to provide lumber that the entire country needed.

The lumber business, of which Weyerhaeuser, profiled on the next page, is a leader, transformed from single logger-builders logging and using the lumber, to an industry in which a single company produces enough

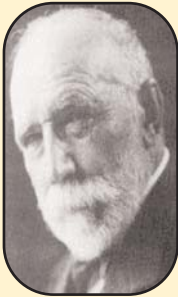
## Unit Six

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lumber, theoretically, to supply a whole nation. Trees (input) were always available, but Weyerhaeuser Company created a transformation process, an extremely complex process with many sub-processes, to refine the raw material into finished products needed to meet the demands of a rapidly growing nation. All of the critical elements: raw resources, technology, and energy, are present in Weyerhaeuser's T-box to take trees and create homes.

#### Profiles of Great Organizers of Productivity



#### **Frederick Weyerhaeuser** 1834-1914

In 1900, Weyerhaeuser, with 15 partners, made the largest private purchase of land in U.S. history (900,000 acres), thus forming the Weyerhaeuser Timber Company.

Weyerhaeuser, or so the legend says, made his first lumber sale while a laborer at a tiny saw mill in

Illinois. Weyerhaeuser began the forest fire prevention movement and was the first timber company to treat trees as a crop. Many of Weyerhaeuser's innovations relied upon research conducted at its laboratories with products such as particle board and wood cellu-



lose-based insulation. Weyerhaeuser developed into a complex organization with operations in 19 countries and 54,000 employees.

In 2003, the Weyerhaeuser Company's lumber operations were capable of producing 7.7 billion board feet of dimension lumber per year. An average house in the U.S. today is approximately 2000 square feet of living space. A 2000 square foot house requires 2800 board feet of lumber. The Weyerhaeuser Company produced enough lumber to build 27,500,000 homes. To produce that many homes annually, an average of 2,291,667 homes would have to be constructed per month. Compare that to

the single log cabin a colonist could construct in a month.



**Weyerhaeuser**  
The future is growing™

## Profiles of Great Organizers of Productivity



**Sam Walton**  
**1918-92**

Most people know Sam Walton from the Wal-mart and Sam's Club discount retail chains. When Walton opened the first Wal-mart in Rogers, Arkansas in 1962, he already was a successful innovator in the discount retail industry with 15 Ben Franklin store franchises. Walton's first innovation in discount retailing was the recognition that tremendous markets were open in small towns, particularly in small cities and rural areas. Thus began a tradition at Wal-mart of continuous innovation and improvement to "find the one best way."

Wal-mart, with over 1.7 million employees and more than 5,200 stores worldwide, squeezes every possible percentage point of profit from its revenue.



Wal-mart can attribute a substantial proportion of its success to the efficient supply chain management system it developed.

Wal-mart successfully

exploits technology to track, order, and deliver its inventory to stores. Wal-mart established an innovative technology-based system to communicate effectively with its suppliers and track its own inventory. The system, collaborative planning, forecasting, and replenishment (CPFR), allows Wal-mart's suppliers to track the inventory status of their products within Wal-mart's own system in order to

adjust their own production and delivery systems. A supplier can access detailed, real-time information about sales levels. By making the system "transparent," Wal-mart facilitates its suppliers' development of more efficient systems and hence, the ability to offer

Wal-mart lower prices.

When a customer purchases a product at Wal-mart and checks out, the item is scanned into Wal-mart's on-line, real-time inventory management system.

The system automatically updates Wal-mart's inventory for the store. Suppliers can immediately see that an item has been sold and, based on the information they receive from Wal-mart, make adjustments in their own production

Wal-mart continued . . .



## Profiles of Great Organizers of Productivity

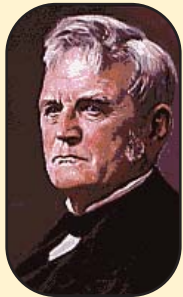
planning. Wal-mart also tracks this information and can use it for decision-making in



ordering additional stock and scheduling shipping to replenish the stock at the store. The next time you check out at Wal-mart, the companies that make many of the items you buy may know about the purchase before you reach the parking lot!

Wal-mart's second advantage based on technology is the use of Radio Frequency Identification microchips (RFID) to track inventory internally. The RFID chips replace barcodes and can provide information about the status of an item-not just about location-but also if it has an expiration date or if it requires special handling. The chips allow Wal-mart managers to access highly detailed information about sales levels by time, date, and location. Wal-mart uses this information to develop extremely accurate models to forecast demand for particular products and adjust the entire supply chain from ordering to delivery at specific Wal-mart stores.

**WAL-MART®**



**John Deere**  
**1804-86**

Plowing was a slow and laborious task for farmers. One person could plow between one and three acres per day using a cast-iron plow. The cast-iron plows brought from the East by the new settlers were designed for light, sandy New England soil. The rich Midwestern soil clung to the plow bot-

toms, which made it necessary for farmers to stop every few steps and scrape the soil from the plow. This necessity now made farming, an already difficult and time consuming profession, more difficult for the producers of one of the nation's basic needs, food.

In 1837, a young man by the name of John Deere studied the farming problem and



## Profiles of Great Organizers of Productivity

became convinced that a highly polished, self-scouring steel plow would solve the farmers' problem. Deere's steel plow proved to be the needed answer for the pioneer farmers in the West. This steel plow enabled the farmer to cultivate between 12 and 15 acres per day. Deere entered into the business of manufacturing plows before he had orders. He would produce a supply of plows and then take them to the country to be sold - an entirely new approach to manufacturing and selling in early pioneer days.

Deere's first plows were produced by using whatever pieces of steel he could



locate, including the old, discarded blades from saws. In 1843, he arranged for shipments of steel

to come from England. Ten years after he developed his first plow and two factories later, the John Deere Company

was producing 1000 plows in a year. Deere laid down several precepts that have been followed faithfully since then by the company he founded.

The company is one of the nation's 100 largest manufacturing companies and the largest company in the agricultural manufacturing

industry. Deere's development of the world's first commercially successful, self-scouring steel plow helped change the agricultural business of today. In just nine hours of labor, the 2% workforce comprised of today's farmers can now efficiently cultivate and produce 100 bushels of wheat on just four acres as compared to the 275 hours of labor needed from 1850s farmers to produce the same amount thanks to John Deere's initiative in using steel (input) and transforming it into plows (output) that better serve the demands of those who supply our nation with the food we demand.



**JOHN DEERE**

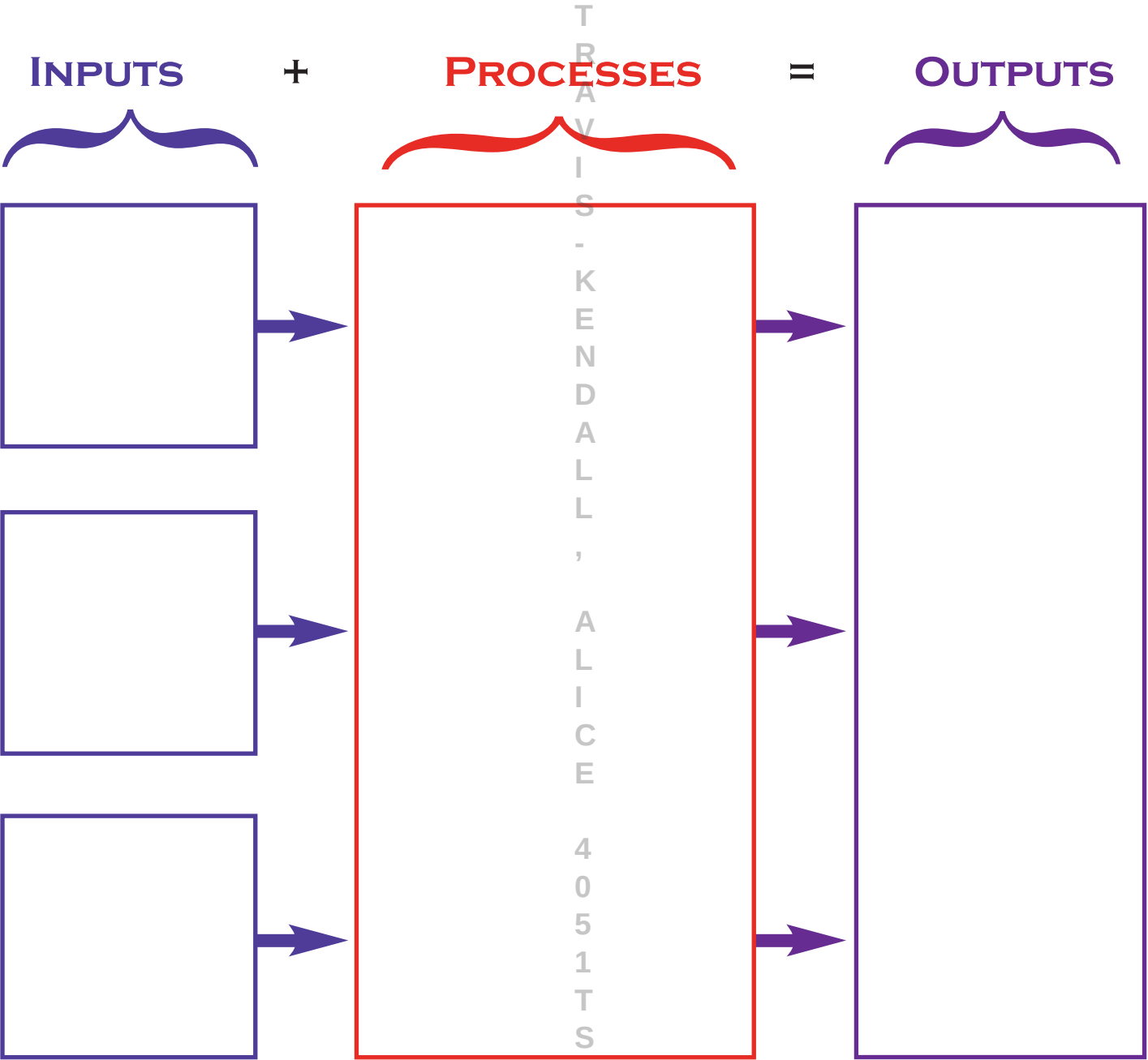
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*This is a copy of the online form you will fill out in the COMPLETE section of this unit's coursework.*

**YOUR COMPANY'S T-BOX**

Use the boxes below to illustrate the input, processes, and output produced **by your organization**.

Name of your organization: \_\_\_\_\_



*This is a copy of the online form you will fill out in the COMPLETE section of this unit's coursework.*

## Organizational Productivity Questionnaire

Identify options that can improve organizational productivity.

**R + T + E = OP**

**Resources:**  
Can your company acquire higher quality materials or find a more reliable or less expensive supplier. If so, list in the provided space.

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**Technology:**  
List any technology element (software or hardware) that holds potential to increase organizational productivity.

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**Effergy:**  
List and briefly describe any manual process currently performed by human labor that can be automated or should be outsourced.

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