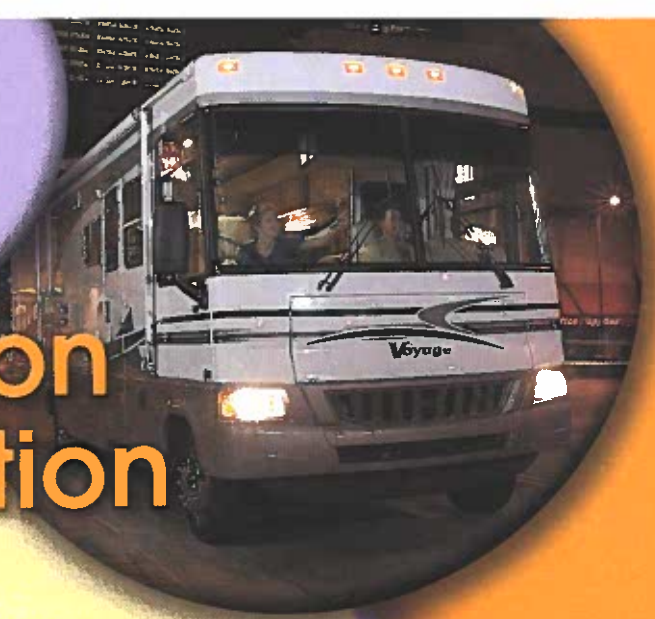


15

An Introduction to Transportation Systems



Basic Concepts

- Define a transportation system.
- List the five types of transportation systems.
- Name several transportation system inputs.
- Recognize several transportation system processes.
- State the expected output of a transportation system.
- Identify the types of goals that affect a transportation system.

Intermediate Concepts

- Explain the function of feedback within a transportation system.
- Make a list of devices used to provide feedback in transportation systems.
- Describe the functions of at least one government agency that controls transportation.

Advanced Concepts

- Create a flowchart of the production processes in a specific environment of transportation.
- Give examples of societal and economic goals of transportation systems.

When we think of transportation, we often think of our personal cars and trucks. We may forget there is a “moving” world all around us. The size of the transportation system in the United States alone is enormous. The roads within the system could extend to the moon and back 8 times. The railroad tracks used in just the United States could circle the earth 7 times. Oil and gas pipelines are, quite possibly, the most overlooked type of transportation. The length of these pipelines would wrap the earth over 55 times! Other often overlooked forms of transportation include the following:

- Escalators that move people from one level of a building to another.
- Satellites that circle the earth.
- Conveyors that move products and materials.

Types of Transportation Systems

Transportation system: An organized process of relocating people and cargo using the various modes of transportation.

Transportation is one of our major technological systems. As defined in Chapter 1, a *system* is a combination of parts that work together to accomplish a desired result. A *transportation system* is a group of components, including inputs, processes, outputs, and feedback, used together to move people and goods from one location to another. The various transportation systems can be placed into one of the following categories:

- Land transportation.
- Water transportation.
- Air transportation.
- Space transportation.
- Intermodal transportation.

Each of these transportation systems functions as a separate system. See **Figure 15-1**. In addition to the transportation system categories, transportation vehicles fall into one of four transportation system environments—land, water, air, or space. See **Figure 15-2**.

Land transportation: A transportation system using vehicles on land, including subways, buses, trains, trucks, bicycles, and motorcycles.

Land Transportation

Land transportation is the movement of goods and people in a vehicle operating above or under the ground. Think of all the types of transportation vehicles you see on land. Vehicles include subways, buses, trains, trucks, bicycles, and motorcycles. These, and all other types of land transportation vehicles, can be placed into one of five different modes of land transportation:

Figure 15-1. There are five different types of transportation systems. A—This light rail train is a form of land transportation. (Siemens) B—Cargo ships are a type of water transportation vehicle. C—Commercial airliners are the most common type of vehicle in air transportation. D—This is a privately financed space transportation vehicle shown during a test flight. (Scaled Composites) E—Intermodal transportation interchanges people or cargo between different types of vehicles. These containers have been unloaded from a ship and will be reloaded onto train cars or trucks.

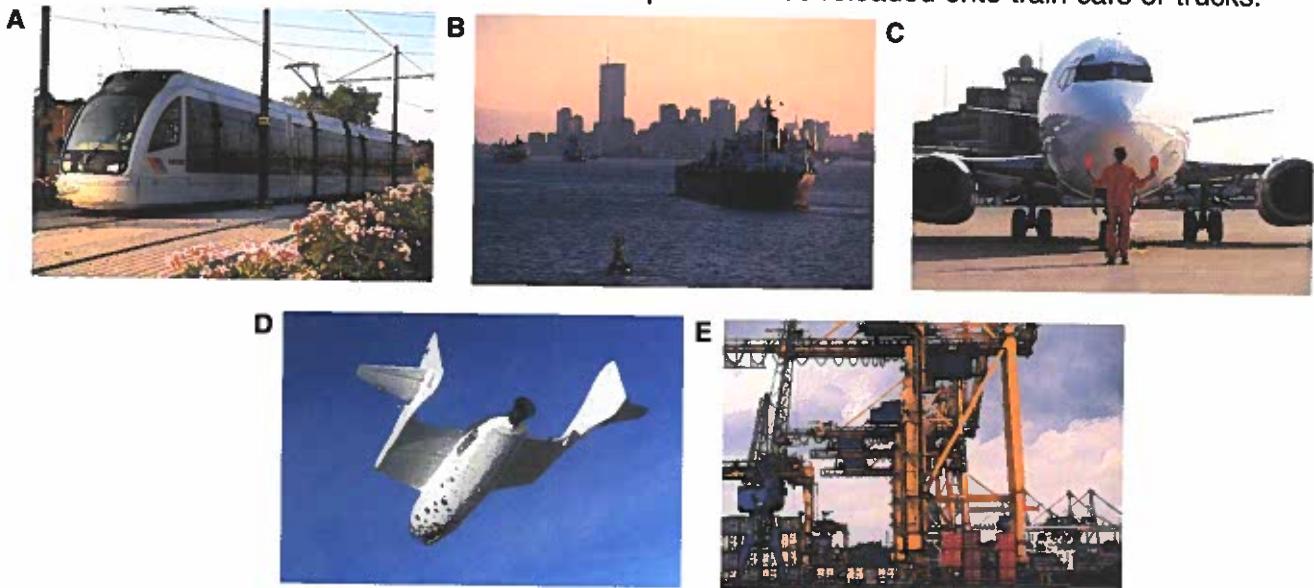
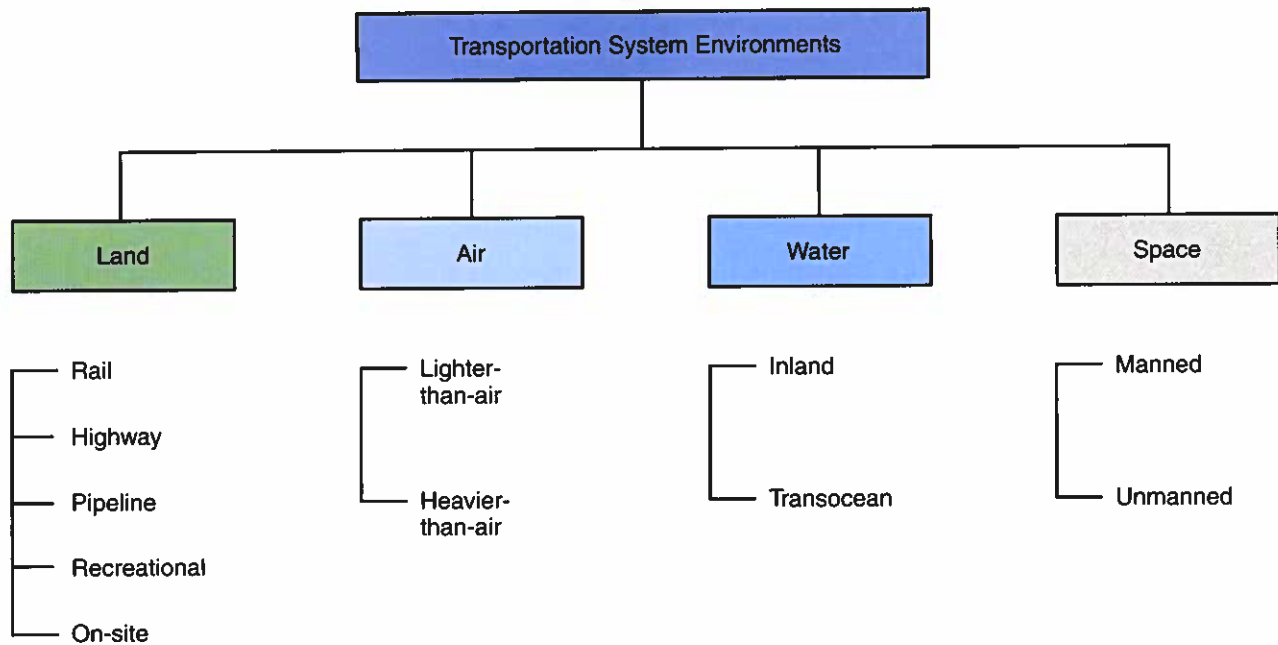


Figure 15-2. There are four different transportation environments. Each has specific vehicles that can travel in that environment.



- Highway transportation occurs on local roads and highways.
- Rail transportation involves vehicles that use rails for guidance while traveling.
- Pipeline transportation moves cargo through stationary pipes.
- On-site transportation moves people and cargo short distances, such as between buildings or complexes.
- Recreational transportation is used for fun, sport, and general leisure.

Land transportation is discussed in greater detail in Chapter 17 and Chapter 18.

Water Transportation

Water transportation is the way in which people and cargo are moved on bodies of water. There are two forms of water transportation: inland (rivers, canals, and lakes) and transoceanic (across the ocean). Vessels used in water transportation include ships, sailboats, barges, tugboats, and submarines. Passenger vessels are used for commercial transportation, such as the ferries used by daily commuters, and to transport people for recreation, such as cruise liners and sailboats. The armed forces also use military versions of passenger vessels in many of their branches and operations. Vessels that move cargo typically transport goods within and between countries. Water transportation is discussed in greater detail in Chapter 19 and Chapter 20.

Air Transportation

Air transportation is the movement of people or cargo above the ground and within the earth’s atmosphere. When you think about air transportation, one of the first things that comes to mind may be an airplane. Other examples include hot air balloons, airships, hang gliders,

Water transportation: A transportation system in which people and cargo are moved on bodies of water. Vessels used include ships, sailboats, barges, tugboats, and submarines.

Air transportation: A transportation system using either lighter-than-air or heavier-than-air modes of transportation, including airplanes, hot air balloons, airships, hang gliders, military fighter jets, and helicopters.

Lighter-than-air:
Of less weight than the air displaced.

Heavier-than-air:
Of greater weight than the air displaced.

Space transportation: A transportation system in which people and cargo are moved within near space and into outer space.

Intermodal transportation: A transportation system that uses more than one environment or mode.

military fighter jets, and helicopters. All air transportation vehicles may be categorized as either lighter-than-air or heavier-than-air modes of transportation. *Lighter-than-air* vehicles rise and float on their own, such as balloons and hang gliders. *Heavier-than-air* vehicles require power to create the movement needed to transport people and cargo, such as airplanes, jets, and helicopters. Air transportation is discussed in greater detail in Chapter 21 and Chapter 22.

Space Transportation

Space transportation is the movement of people or cargo within near space and into outer space. Some of the vehicles used in space transportation include missiles, rockets, satellites, space shuttles, and spacecraft. Space transportation vehicles can be categorized as manned or unmanned systems, meaning either a human is inside the vehicle operating the controls or the vehicle does not require onboard human operation. These vehicles serve many purposes. Satellites are commonly used to collect data on the earth's atmospheric and geographical changes for weather prediction and scientific study. Probes are launched into deep space for exploration purposes. Vehicles such as the space shuttle have been to transport people and cargo into space for exploration, scientific studies, and sometimes, for construction and repair of man-made structures in space. Space transportation is discussed in greater detail in Chapter 23 and Chapter 24.

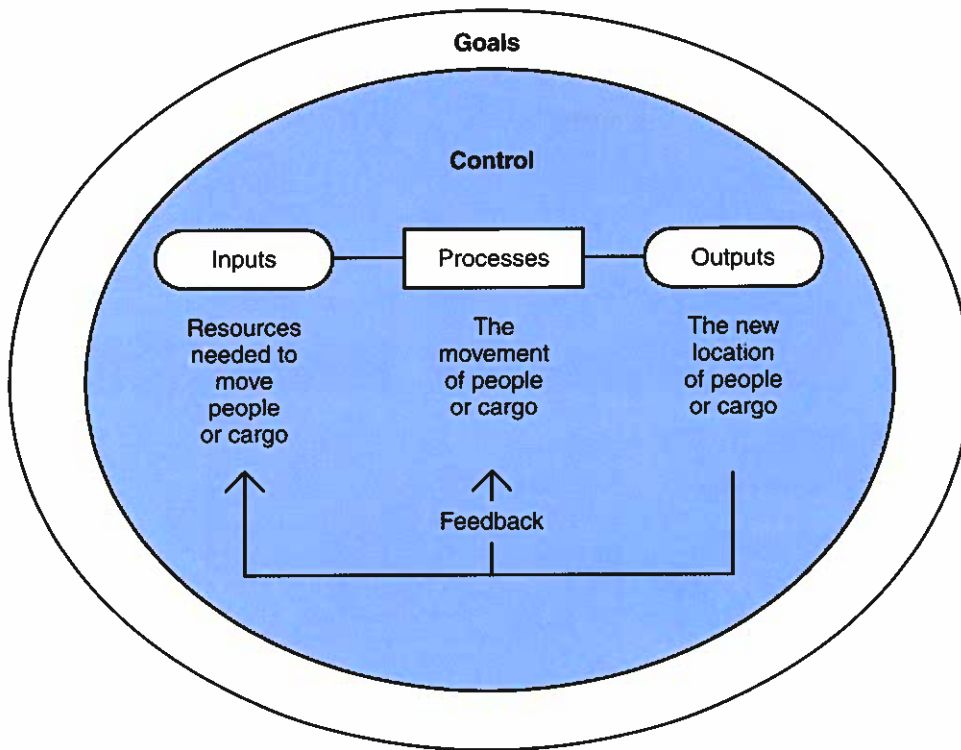
Intermodal Transportation

While most systems use only one of the environments (land, water, air, or space) for transportation, some systems utilize more than one environment. When more than one environment is used in a system, it is called *intermodal transportation*. For example, intermodal transportation is used to transport imported products to cities in the midwestern United States. A container of products may cross the ocean on a ship, be transported inland on a railroad car, and be delivered to the final destination on a tractor-trailer. Products transported using intermodal transportation are exposed to several transportation environments and modes. The two types of intermodal transportation are cargo and passenger. Intermodal cargo transportation involves moving cargo from one point to another using various modes of transportation. Intermodal passenger transportation is the process of moving people using various modes of transportation. Think of the various modes of transportation you used on your last out-of-state vacation. During a single trip, you may have been transported by car, taxi, airplane, escalator, moving sidewalk, shuttle bus, and boat. Intermodal transportation is discussed in greater detail in Chapter 25.

Components of Transportation Systems

Transportation systems, like all technological systems, operate based on the needs of society. The development and use of any transportation system consists of inputs, processes, and outputs. See **Figure 15-3**.

Figure 15-3. For every type of technological system, there are goals, inputs, processes, feedback, an output, and a method of control.



Transportation System Inputs

Transportation system inputs are the various resources needed in order to begin and maintain the use of the system. These resources include the following:

- **People.** They serve as both operators and passengers in transportation systems. Regardless of the mode of transportation, people are needed for repairs, manual operation, ticket sales, and instrument monitoring. See **Figure 15-4**.
- **Capital.** Within a transportation system, this includes the assets used to help operate the system and the possessions of a transportation company. Vehicles, roads, and buildings are all forms of capital in transportation systems.
- **Knowledge.** Within a transportation system, this is information attained through application and experience of the various tasks performed by people. Once information is understood, it becomes knowledge and can be applied to jobs in the system.
- **Materials.** The raw materials used in the construction and functioning of a transportation system include iron, wood, fuel, plastic, and concrete. See **Figure 15-5**. New and innovative materials allow transportation engineers to make improvements to new systems.
- **Energy.** Within a transportation system, this provides power and movement within the system. See **Figure 15-6**. Various forms of energy include heat, mechanical, chemical, nuclear, light, and electrical.

Transportation system input: A resource needed in order to begin and maintain the use of the system, including people, capital, knowledge, material, energy, and finances.

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While the majority of land vehicles may be powered by gasoline, there are several alternative fuels being researched, such as ethanol, hydrogen, and electricity.

Figure 15-4. What would any transportation system be without people? People repair broken equipment, drive land vehicles, fly airplanes, and assist travelers. More than 7% of the U.S. labor force (9.9 million people) work in a transportation industry. (United Airlines, U.S. Postal Service)



Figure 15-5. Many materials are essential in a transportation system. Transportation means more than powering systems. Pathways, such as roadbeds, must be constructed. This railroad bed requires wood, gravel, and steel.



Transportation system process: An action that converts inputs into desired outputs.

- Finances.** This includes the money needed to pay for equipment, materials, personnel, and energy sources. As with any system in our society, finances are needed for the system to function as efficiently and effectively as possible.

Whenever a transportation system begins, it must have some input. The input needed may be immediate, such as the need for an energy source before the system can run. It may be long-term, such as the financing of equipment or services. Either way, a transportation system cannot function without all the necessary inputs incorporated into the system.

Transportation System Processes

Transportation system processes are the actions that convert the inputs into the desired outputs. Without processes, the goal of moving people or cargo would not be achieved. There are a number of processes that must take place for people or cargo to reach their destinations. These processes can be divided into two groups: production and management.

Production

The *production processes* of a transportation system are the “on the scene” part of the system and are the most recognizable components of a transportation system. Each of the processes involved has a distinct purpose within the transportation system and is needed whether people or cargo are being transported. The processes can be viewed as a cycle of events that include the following:

- **Receiving.** In the receiving phase, the passenger or cargo is physically placed at the location of departure and enters the destination terminal. Paperwork and tickets are processed to ensure the passengers and cargo will be transported to the correct place.
- **Holding.** After the receiving phase, people and cargo move to a holding area. Holding areas are places for people and cargo to wait for the transportation vehicle. Often, the path to the holding area is determined by the destination. For example, mail at a post office is sorted and placed in different holding areas, depending on the specified destinations. A platform in a subway terminal is an example of a passenger holding area.
- **Loading.** Both people and cargo are moved onto, or are loaded into, the vehicle. Cargo is typically loaded with forklifts and other specialized vehicles. See Figure 15-7. With most modes of transportation, passengers board the vehicles themselves. Both people and cargo are secured with safety restraints, such as seat belts or cargo straps.
- **Moving.** This phase involves the actual transporting of people or cargo. It is often the most recognizable part of any transportation system. During this phase of the system, cars, planes, and boats are driven, flown, and sailed.
- **Unloading.** Once the destination is reached, unloading the vehicle begins. Cargo is removed, and passengers exit the transportation vehicle. Unloading the vehicle usually occurs at a terminal within a station or port.
- **Storing and delivering.** These are the final stages within the production process cycle of events. If passengers or cargo have reached their final destination, the transportation process is over. Many times, people and cargo must go through the production process several times before reaching their final destination. If this is the case, the passenger and cargo start over at the receiving stage and enter the transportation production process again.

Production process: The “on the scene” part of a transportation system, including receiving, holding, loading, moving, unloading, storing, and delivering.

Figure 15-6. It takes energy to ride a scooter, pedal a bicycle, drive a truck, fly an airplane, and sail a sailboat. This scooter moves only with the addition of human power. Take away the power source, and the scooter remains still.



Figure 15-7. Luggage is loaded onto the vehicle as part of the production process. Conveyors, forklifts, and other specialized machinery may be used.



Technology Link

Manufacturing: Product Distribution

Transportation is used in connection with many areas of technology. Possibly the most vital use of transportation by another form of technology is in manufacturing. The purpose of manufacturing is to produce and sell products. In order to move a product throughout the manufacturing process and to the consumer, companies must use transportation systems.

All manufactured products have been moved by at least one form of transportation. Take the book you are reading, for example. This book has been a part of many transportation processes prior to arriving in your classroom. During manufacturing, this book and the materials used to make it were moved throughout the production plant on conveyors, carts, and forklifts. Once the book was complete, it was boxed, crated, loaded onto a truck, and then transported to a warehouse. Inside the warehouse, the crates were moved to the storage location by a forklift.

When your school ordered the book, an automated retrieval system collected all the books in the order and placed them on a conveyor. From the conveyor, the books were again boxed, and shipping labels were attached. The shipping company then picked up the books using a truck or delivery van and took them to a distribution center. Depending on the distance the books needed to travel and the number of books in the order, the books were either loaded on a delivery van, an airplane, or a tractor-trailer. The books may have encountered several additional transportation processes before your school received them. Finally, the books were loaded onto a cart and brought to your classroom. This book you are holding is an example of a manufactured product that would have never reached the consumer without transportation systems and processes.

The production processes are the phases of the transportation process you see most often—for instance, trains speeding down the tracks, trucks and cars on a highway, and speedboats in a local waterway. See **Figure 15-8**. These processes are found in any transportation system, large or small. The production processes can even be identified on a family vacation. Your parents make sure everyone is present and accounted for (receiving) and have everyone wait by the car (holding). You place all the luggage into the car and sit in your seat (loading). The family vehicle then travels to the destination (moving). Once you arrive, you get out of the car and unload the luggage (unloading). The baggage is then moved to the destination, and you relax at the vacation spot (storing and delivering).

Management

The *management processes* of transportation systems include the “behind the scenes” activities necessary in keeping people and cargo organized and on schedule. Without the managed portion of the process, our transportation systems could get very chaotic. For example, without a schedule and planned routes for a subway system, you would have no idea which subway train will take you to your destination. See **Figure 15-9**. The subway trains would move down the track, representing the production process, but the system would be too confusing for most people to use. Management processes are needed to plan, organize, and control the system.

- **Plan.** In planning the transportation system, people decide what must be done. People plan the best route and decide how the system will run to be the most efficient. During the planning stage of management, goals are set, and a course of action is determined.
- **Organize.** Organizing a transportation system involves the preparations made for transporting people or cargo. This may be assigning jobs and related personnel or determining a schedule of maintenance for the machinery used in the system.

Figure 15-8. This boat is in the moving stage of the production process.

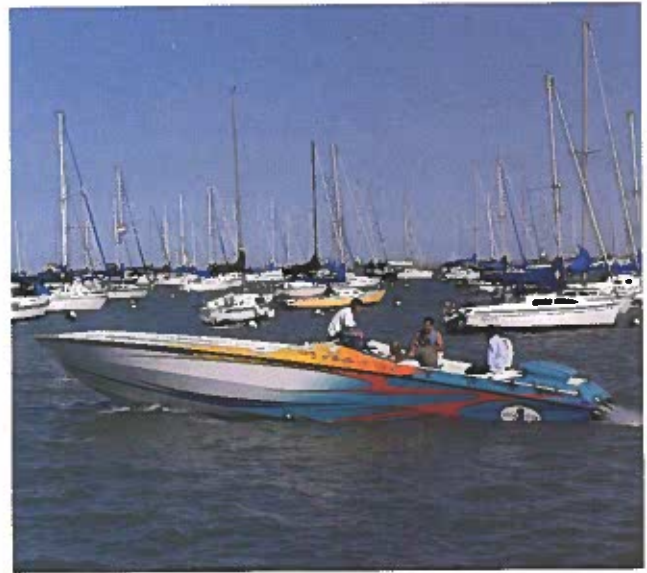


Figure 15-9. Management is a necessary part of any transportation system. Even with the most efficient running transportation vehicle, someone must schedule stops to ensure that people or cargo arrive at their intended destinations.



Management process: The “behind the scenes” part of a transportation system necessary to plan, organize, and control the system.

- **Control.** In controlling a transportation system, records are kept, computers are used, and systems are monitored. Computers may be used to control the flow of oil through a pipeline. Controlling a transportation system also includes the signs and signals used within the system itself. See **Figure 15-10**. A guard with a stop sign at a school crossing controls the flow of vehicles when children are present.

Figure 15-10. The flow of traffic is controlled by various signs and signals. This helps to keep transportation systems safe and functioning properly.



Management functions also apply to the family vacation example used in the previous section. The travel route needs to be mapped out before leaving home. Stops along the way should be decided (planning). The car may need to be serviced and filled with fuel along the way (organization). During the trip, the performance of the vehicle may be monitored by figuring the miles per gallon and occasionally checking the other gauges (controlling).

Transportation System Outputs

The *transportation system output* is the relocation of people or cargo. This output is the result of successful inputs and processes. Upon achieving the output in a transportation system, many events may occur that bring about change. For instance, a log truck transports logs from California to a sawmill in Iowa. Inputs are brought together to begin the system of transporting the logs using a land transportation system:

- Fuel is needed to power the truck.
- A person is needed to operate the truck, read the map, and follow directions.
- Money is needed to operate the truck.

Once the inputs are gathered, the truck enters the processes of the transportation system, or begins the journey of transporting the logs. See **Figure 15-11**. When the truck reaches the sawmill with the logs, the output has been achieved. The logs have been relocated. This is the main purpose of a transportation system—relocating people and cargo. Upon delivering the logs, change will occur with the logs themselves and with the driver of the truck. The driver drops the load of cargo and moves on to a new destination.

Career Connection

Dispatchers

One of the key roles in most commercial transportation systems is the dispatcher. Dispatchers organize and monitor the movement of their company's vehicles. There are several types of dispatchers, including emergency, trucking, taxi, bus, and railroad dispatchers.

The largest number of dispatchers work in the emergency field. These dispatchers work at communication centers and receive phone calls from people who are in need of emergency services. The dispatcher obtains information from the caller and then sends the appropriate response units to the caller's location. Truck, bus, and railroad dispatchers work for specific transportation companies and plan the routes of all the vehicles. Taxi dispatchers receive calls from prospective customers and then coordinate with their drivers to make sure the customers are picked up and taxied to their desired locations.

All dispatchers use computer mapping and tracking systems. These systems allow the dispatcher to have current location information. Their goal is to ensure efficient movement of the passengers and cargo. The qualifications for most dispatcher positions include good communication skills, good computer and processing skills, a good understanding of maps and charts, and a high school diploma. Some positions, however, especially in the railroad industry, may require an associate or bachelor's degree in logistics or experience in the field. Most positions are paid hourly, with the average yearly salary ranging from around \$26,000 to \$50,000.



A Functioning Transportation System

Any type of system is developed based on goals and expected outcomes and is monitored through feedback. This is also true of a transportation system. The goals of a transportation system must be defined before the system can be designed or constructed. Feedback regarding the system's use and performance allow a transportation system to be maintained and improved. Placing controls within the system contribute to its functionality and may help to ensure safety.

Transportation system output: The relocation of people or cargo.

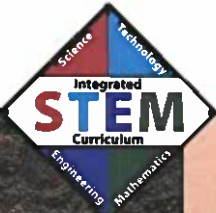
Goals

When planning a transportation system, there are certain goals that need to be met:

- **Systemic goal.** The goal of an entire transportation system, regardless of the mode of transportation in use, is to relocate people and cargo to the proper destination at the proper time.
- **Personal goals.** The goals of individuals affect transportation when, for example, selecting a personal automobile. Some vehicles may indicate higher socioeconomic status than others. A personal goal for others may be to purchase some type of recreational vehicle when they retire.

Figure 15-11. These logs are being transported to their final destination, the sawmill. Upon arriving at the sawmill, the truck's participation in the transportation system is complete.





STEM Connection

Science: Traffic Signals

The first traffic signal was used in London in 1868. It was fashioned from gas lanterns and had to be manually operated. These particular traffic lights did not gain much popularity, but the idea of traffic signals did. By the 1920s, inventors in the United States created working automatic electric traffic lights. The use of red, yellow, and green lights eventually replaced the moving signals of early models.

Incandescent bulbs were used for decades to light traffic signals. These bulbs wasted energy and burned out quickly. Because of the amount of traffic lights per intersection, as well as the number of intersections per city, an efficient alternative was needed. Today, the incandescent bulbs of many traffic lights are being replaced with light-emitting diodes (LEDs). LEDs are more energy efficient than their predecessors and, therefore, will not burn out as quickly.

Traffic signals have also evolved in the sense that they no longer have to rely on timers. Using an inductive loop, traffic lights can be told to change whenever necessary. This technique is typically used to let the traffic signals know if any cars are waiting in a turn lane. The inductive loop uses coils of wire positioned in specific places in the road. When a car is sitting over the wire, a magnetic field is built, which alerts the traffic signal of the car's presence.

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The construction of new roads has an impact on the surrounding ecosystems. In some cases, for example, forests must be destroyed to create new roads. This is something that is being taken into account now when roads are being developed.

- **Economic goals.** These goals consider the potential profits for business and possible income opportunities for the people in the immediate area. Access to highways, railways, airports, and docks can increase property values and allow resources to be imported and exported.
- **Societal goals.** These goals are outcomes from transportation systems that affect the entire society, such as an improved standard of living due to the implementation of a local transportation system. As more communities become accessible by roads and highways, new people and ideas begin to fill the communities. The safe and expedient transport of people and cargo is another important goal of transportation systems. See **Figure 15-12**.

Feedback

Feedback is essential to efficiently operate, maintain, and improve a successful transportation system. Feedback allows the operator or monitor to evaluate how well the system is running, based on the information returned. When driving down the highway, for example, the speedometer provides feedback as you accelerate or decelerate the vehicle. The speedometer helps you determine if you are driving too fast or too slowly, relative to the road conditions and posted speed limit. An instrument panel and various gauges provide feedback needed in the control of a transportation system. See **Figure 15-13**.

Figure 15-12. Any type of transportation system has several different goals.

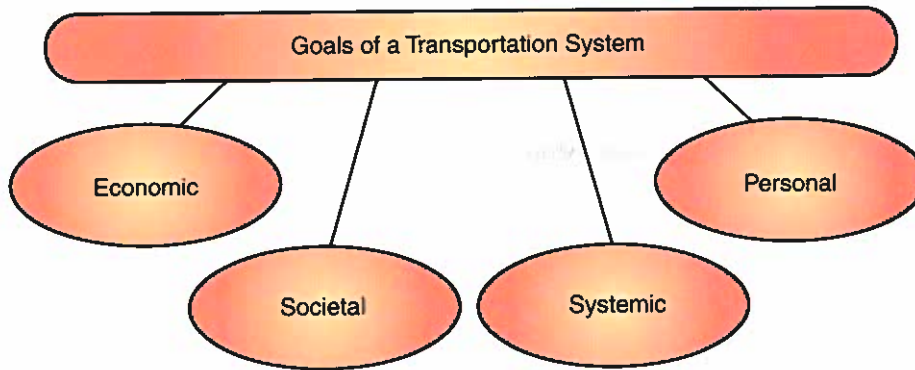


Figure 15-13. The instrument panel on this aircraft provides feedback to the pilot on how the aircraft is functioning.



Control

Like all technological and mechanical systems, a transportation system must have devices in place to control it. Imagine a plumbing system in a house without any controls. Water would flow, but no one would be able to shut the water off. Without controls, transportation systems would not operate efficiently or safely. Most of the control in a nation's transportation system comes from the country's governmental regulations, which help control how the system is used.

In the United States, the Department of Transportation is the organization that sets federal transportation regulations. Within the Department of Transportation, there are several administrations that create and monitor the regulations specific to each mode of transportation. Investigators from

GREEN TECH

Another U.S. government agency that handles transportation issues is the Environmental Protection Agency (EPA). The EPA works with issues such as emissions and air quality.

some of these agencies study crash tests, vehicle accidents, and normal transportation operations to determine legislative changes for transportation systems. Industry regulations and limitations are set and enforced by these various agencies. See **Figure 15-14**. State governments participate in controlling transportation systems by issuing drivers' licenses and handling the construction of new roads.

Figure 15-14. Some of the agencies that regulate transportation systems within the U.S. Department of Transportation.

U.S. Department of Transportation Agencies	
Federal Aviation Administration (FAA)	The FAA creates and enforces regulations that apply to the safety, manufacturing, operation, and maintenance of civil (commercial and private) aviation facilities and aircraft.
Federal Highway Administration (FHWA)	The FHWA is responsible for the construction, improvement, and preservation of America's system of highways.
Federal Motor Carrier Safety Administration (FMCSA)	The FMCSA creates and enforces safety regulations that apply to the motor carrier industries (trucking and buses).
Federal Railroad Administration (FRA)	The FRA creates and enforces rail safety regulations and is responsible for the research and development of railroad improvements and rehabilitation.
Federal Transit Administration (FTA)	The FTA is responsible for designating federal funds for the development, maintenance, improvement, and operation of public transportation systems.
Maritime Administration (MARAD)	MARAD is responsible for developing and maintaining the U.S. maritime transportation system. This agency is also responsible for ensuring that the maritime transportation system can meet the country's future demands.
National Highway Traffic Safety Administration (NHTSA)	The NHTSA creates and enforces safety and performance standards for vehicles and related equipment. This agency also assists state and local governments develop highway safety programs and provide consumers with safety information.

Summary

A transportation system is a systematic way of relocating people and cargo. There are four environments of transportation systems: land, water, air, and space. Transportation systems that involve more than one of these environments are considered intermodal transportation systems. Each type of transportation system includes inputs, processes, outputs, feedback, and goals and is controlled by regulations. The determined goals of a transportation system affect its design and use. Various inputs are necessary before beginning the production and management processes of a transportation system. Once the system processes are under way, an output is expected. The expected output of a transportation system is the relocation of people or cargo. Feedback within the system is needed in order to control, maintain, and improve the system.

Key Words

All the following words have been used in this chapter. Do you know their meanings?

air transportation	production process	transportation system
heavier-than-air	space transportation	output
intermodal transportation	transportation system	transportation system
land transportation	transportation system	process
lighter-than-air	input	water transportation
management process		

Test Your Knowledge

Write your answers on a separate sheet of paper. Do not write in this book.

1. Define *transportation system*.
2. List the five categories of transportation systems.
3. _____ transportation includes highway, rail, and pipeline transport.
4. Space transportation systems are commonly used for _____ and _____.
5. _____ transportation makes use of more than one transportation environment.
6. Name the six transportation system inputs. Provide an example of each.
7. The _____ phase is the portion of the production process cycle in which people and cargo wait for the transportation vehicle.
8. Describe the difference between production and management processes in a transportation system.

9. Management processes are needed to _____, _____, and _____ the transportation system.
10. Write two sentences describing the expected outcome of a transportation system.
11. Identify the four types of goals that affect transportation systems.
12. Give three examples of societal goals for any type of transportation system.
13. What is the main purpose of feedback within a transportation system?
14. Briefly discuss an agency that creates government regulations regarding transportation systems.



STEM Activities

1. Interview someone who works in a transportation industry. Ask him about the knowledge and skills required to properly perform his job. Report your findings to the class and discuss what courses would be most helpful in preparing for such a job.
2. Make a list of the transportation systems used inside your school. Keep in mind the definition of a transportation system when deciding what systems qualify as transportation. Name the inputs and processes of each system. Explain why each system is important.
3. Working alone or in a group, select a transportation vehicle and prepare a visual presentation of the vehicle's systems. Note the inputs, processes, feedback, output, and goals of the system in which the vehicle is used. List any undesirable outputs related to the use of the vehicle.
4. Imagine what our transportation systems would be like without any inputs. Consider the absence of people, for example. If you wanted to fly in an airplane across the country, but there was no pilot to fly the plane, you would not get anywhere. Therefore, that particular air transportation system would not function without the input of a person. List several transportation system inputs and explain how removing them would affect the operation of a transportation system.