Vocabulary

System: A regularly interacting or interdependent group of items forming a unified whole.

Subsystem: A small system which is one part of a larger system. Example: A rocket's fuel system is a subsystem of the larger transportation system known as space transportation.
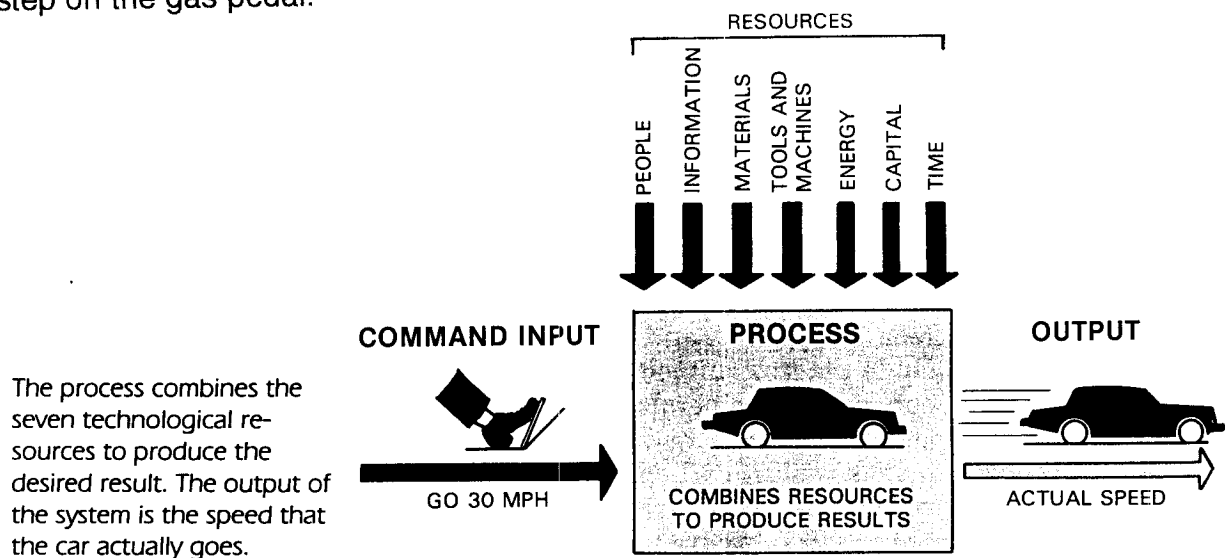
Technological System: A system through which a technological process combines resources to provide an output in response to an input. All technological systems have input, process and output.

Input: The command we give a system (it is also the desired result.) Example: A car moves when we tell it to by stepping on the gas pedal. The command input (or desired result) might be: "Go 30 mph."

Process: The action part of a system. It combines the resources and produces results. Example: In an auto, the process involves both the car and driver. The seven resources are used in the process. Energy is stored in gasoline. The machine is the car. People (the driver), information, time, materials and capital work together to make the car go 30 mph.

Output: Is what is produced. It is the actual result. Example: We hope that the car will go 30 mph when we step on the gas pedal.

#1

RESOURCES

PEOPLE INFORMATION MATERIALS TOOLS AND MACHINES ENERGY CAPITAL TIME

COMMAND INPUT   **PROCESS**   **OUTPUT**

The process combines the seven technological resources to produce the desired result. The output of the system is the speed that the car actually goes.

GO 30 MPH

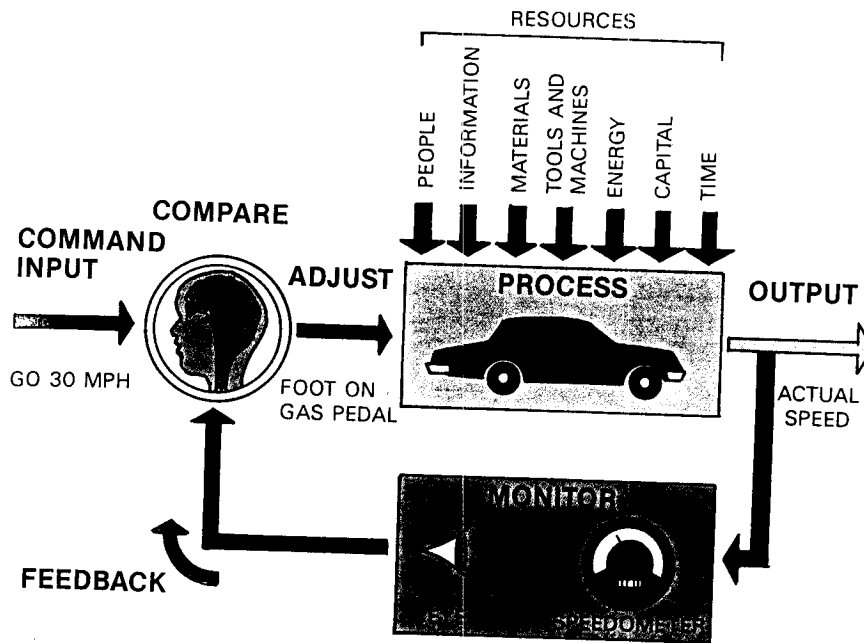COMBINES RESOURCES TO PRODUCE RESULTS

ACTUAL SPEED

Feedback: Information about the output that can be used to change the output. Example: To see if your car is going 30 mph, you check the speedometer. It gives you feedback. If you are going 30 mph, you maintain your foot pressure. If you are going faster or slower, you adjust your foot accordingly.

Monitor: Monitor gives feedback about the output. Example: speedometer.
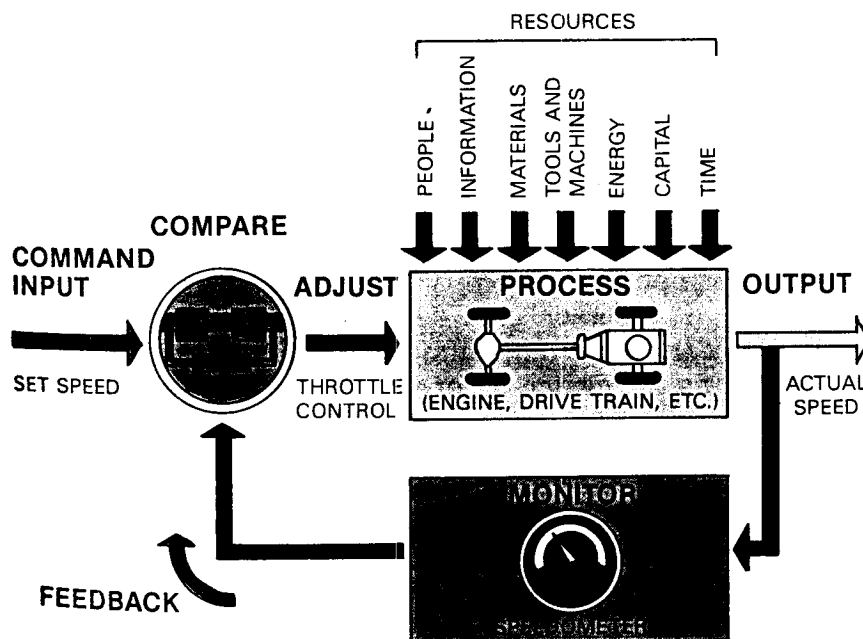
Control System: A person provides feedback. Example: The combination of the speedometer, the driver's eyes, and the driver's brain forms the feedback loop.

#2

RESOURCES

PEOPLE INFORMATION MATERIALS TOOLS AND MACHINES ENERGY CAPITAL TIME

COMPARE

COMMAND INPUT

GO 30 MPH

ADJUST

FOOT ON GAS PEDAL

PROCESS

OUTPUT

ACTUAL SPEED

MONITOR

SPEEDOMETER

FEEDBACK

Feedback Control Systems: Feedback is provided automatically. Example: A car has a cruise control system. The driver is removed from the feedback loop. The speed is monitored automatically and compared to the desired speed set by the driver.

#3

RESOURCES

PEOPLE INFORMATION MATERIALS TOOLS AND MACHINES ENERGY CAPITAL TIME

COMPARE

COMMAND INPUT

SET SPEED

ADJUST

THROTTLE CONTROL

PROCESS

(ENGINE, DRIVE TRAIN, ETC.)

OUTPUT

ACTUAL SPEED

MONITOR

SPEEDOMETER

FEEDBACK

Open Loop System: Systems that do not use feedback. Example: A person who tries to drive a car with a blindfold will not get feedback (open loop system.) Without feedback, the person cannot compare the output to the input.