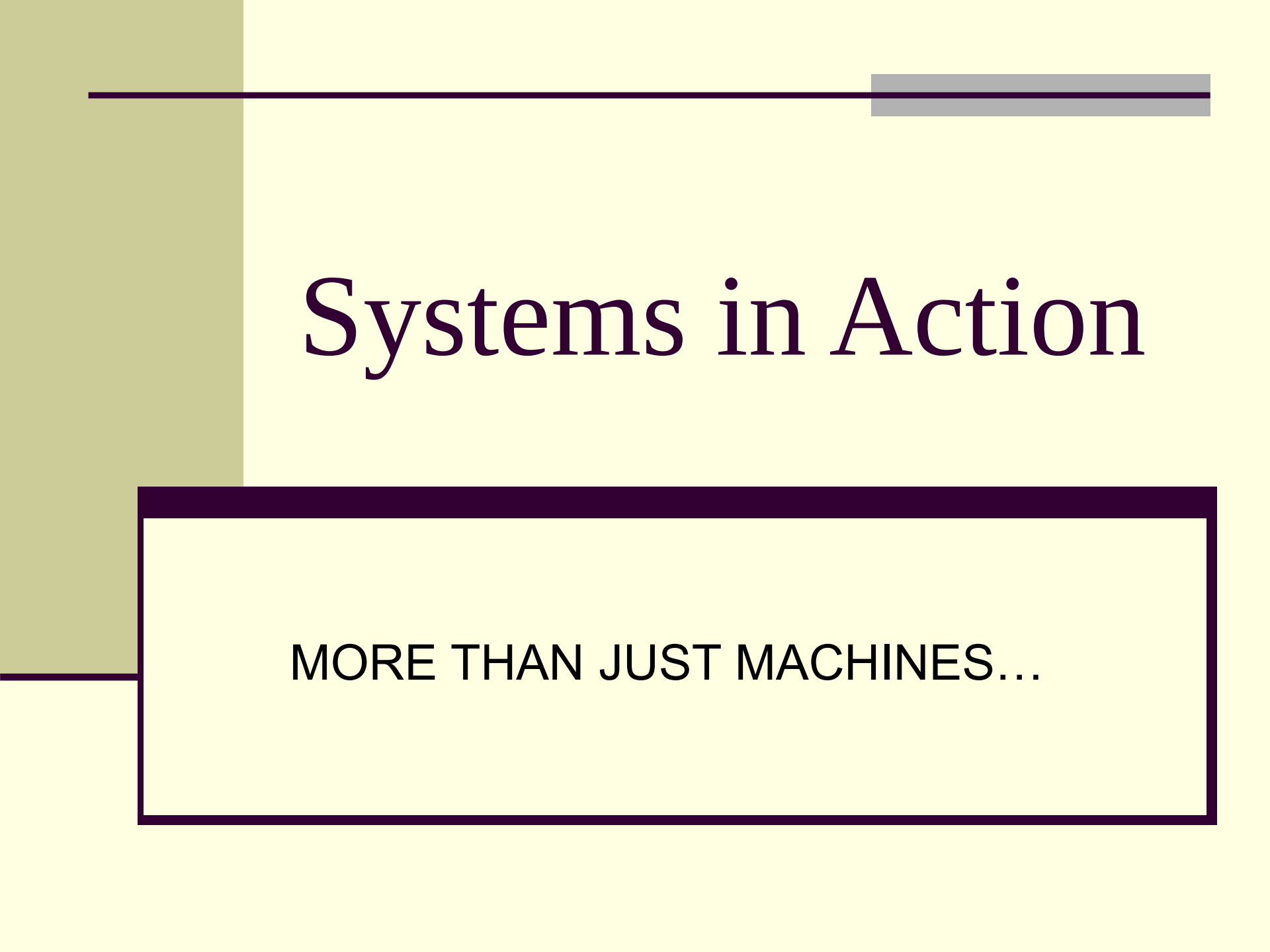




Systems in Action

MORE THAN JUST MACHINES...

Other Systems in Action

Mechanical systems are not the only systems in our world. We have studied many systems in school over the years. This slideshow is designed to help you understand that systems are all around us and influence us every day. Knowing systems better will educate us to the fact that many systems are dynamic and interactive. Lots of careers deal with designing, building, monitoring and maintaining systems.

- Mr. Romero-Sierra

Types of Systems

System – composed of parts that work together to perform a function

Systems may be **physical** (telephone, electronic games, organs) or **social** (health care, education, transportation, police force, ant colony)

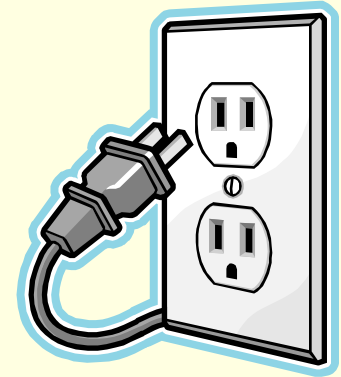
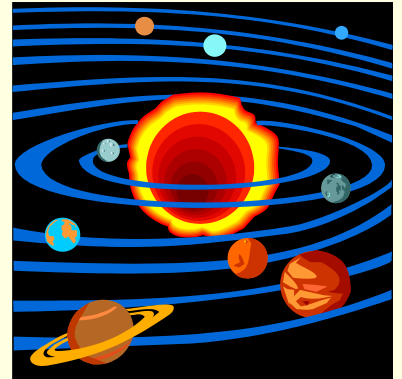
Physical Systems

- **Physical System** – a group of physical parts that need to work together to perform a function.
- Physical systems may be natural or human-made.

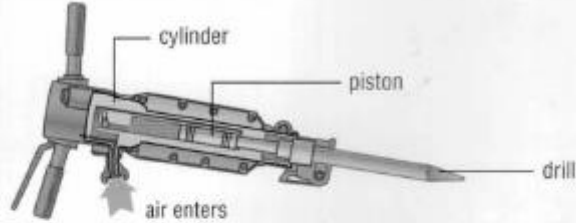
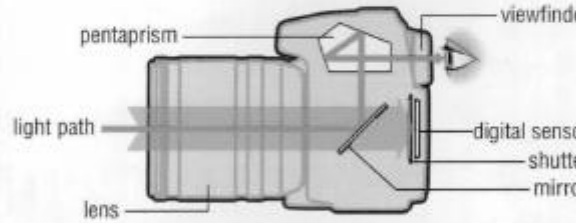


Physical Systems

- **Natural** physical systems include the solar system and an animal's digestive system.
- **Human-made** physical systems include mechanical systems, optical systems, electrical systems, and combinations of these.
- The names of these systems come from the type of energy they use.



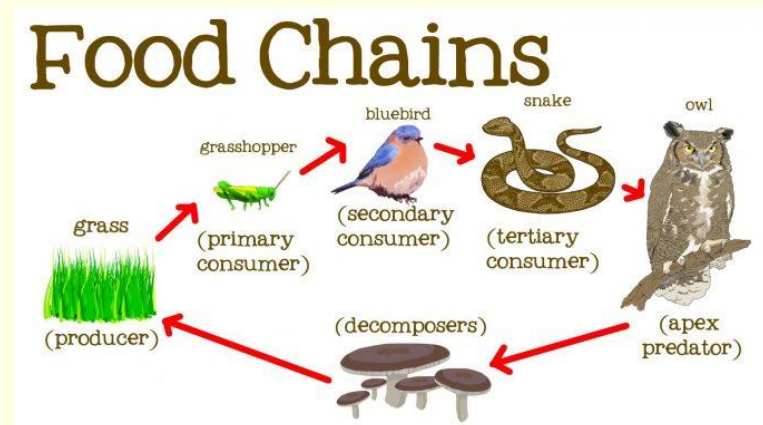
Human-Made Physical Systems

Type of system	Example	Type of energy used	
mechanical	jackhammer (pneumatic drill)	energy stored in pressurized air	
optical	camera	light energy	
electrical	electric circuit	electrical energy	

Remember: the name of the system comes from the type of energy used.

Social Systems

- **Social System** - a group of people, or other organisms, joining together to perform tasks and establish relationships.
- Social systems may be natural or human-made.



Social Systems

- Examples of **natural** social systems are ant colonies, bee colonies, and a wolf or coyote pack.
- **Human-made** social systems include health care, education, transportation and waste management systems, symphony orchestras and rock bands.
- Social systems establish ways that people or other organisms interact and relate to one another.

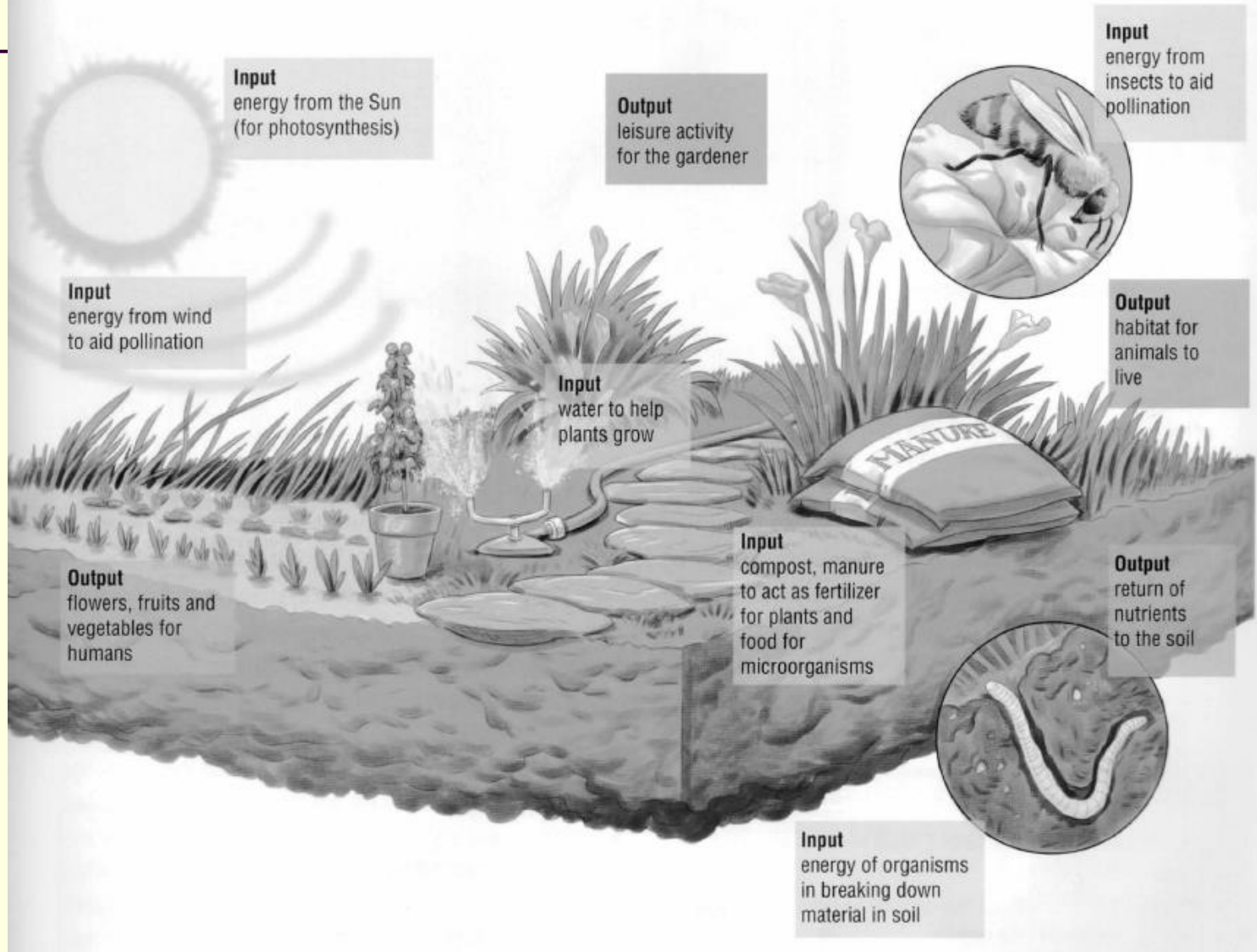


Systems - inputs, outputs, & side effects

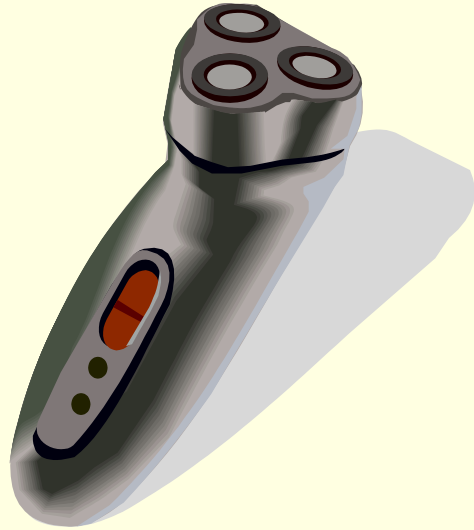
- All systems (and subsystems) have inputs and outputs.
- **Inputs** are all of the things that go into a system to make it work. Inputs may include forces, energy, and resources (raw materials). The input of a can opener includes the force your hand puts on the handles.
- **Outputs** are all of the tasks or services that the system performs. The output of a can opener is the turning and cutting of the can's lid. Outputs can be good (desired) and bad (waste). Nuclear power plants have both.
- **Side Effects/Byproducts** are influences on other systems that are not intended outputs. This is easy to think of in medication. Pain relief medication can cause other systems to fail – nervous and digestive systems. Other things produced may be pollution.



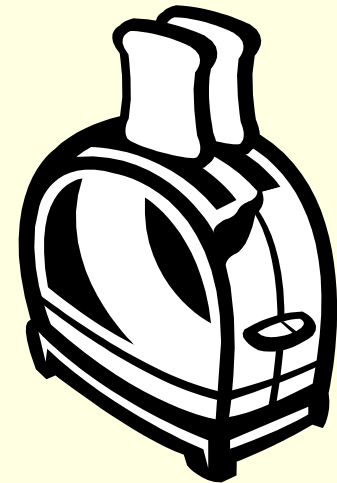
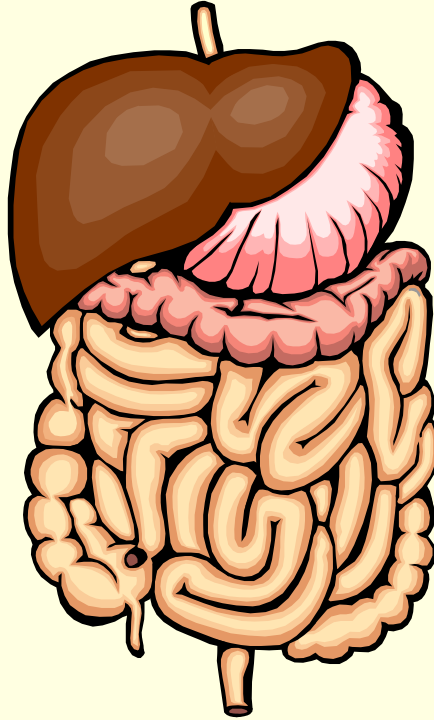
Inputs and Outputs



What type of system?

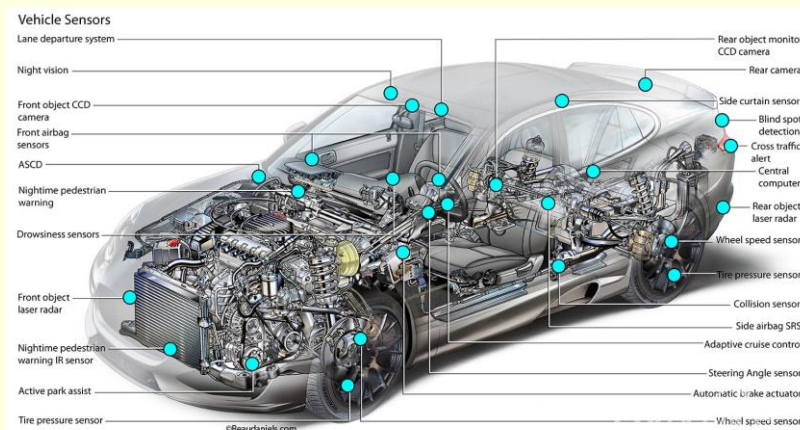


What type of system?



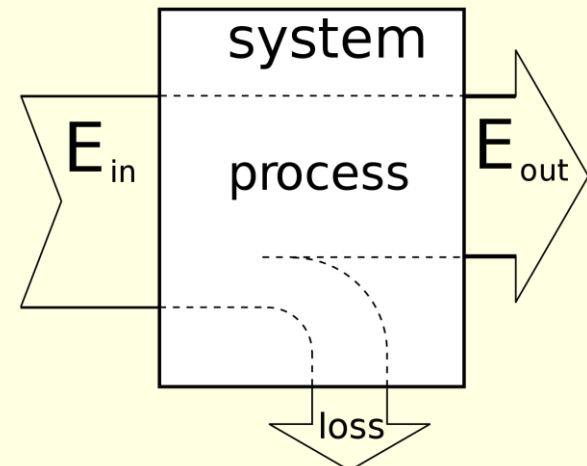
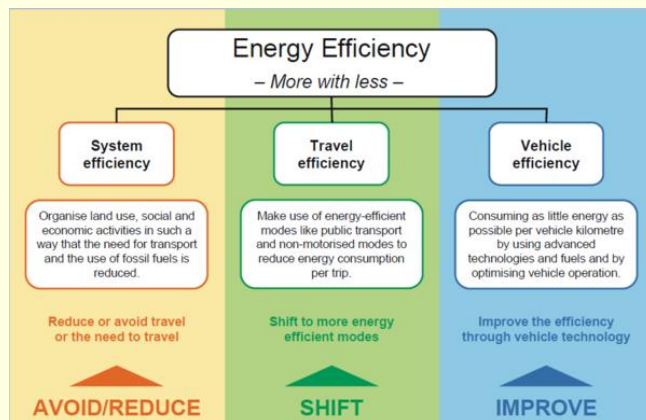
Feedback Within Systems (AI, IoT)

- Systems depend on the flow of inputs to produce outputs. The outputs can be positive (desired outputs come from the purpose of the system) and negative (waste products or inefficiency). In both human systems and natural systems, checks are placed in order to monitor the system to ensure proper function. In an ecosystem, this is a constantly changing set of feedback as things grow and change. This happens in things like digestion too. It also happens in factories and complex systems like cars that have sensors to detect malfunctions (i.e., gas, airbags, speed, temperature, oil pressure, battery, etc).



System Efficiency

- Any given system can be evaluated as efficient (effective) or inefficient (ineffective). This can be said for a simple machine (pulley or lever) or a very complex system (Education, healthcare or a factory and distribution system). If systems are not properly monitored and maintained, they can become inefficient (i.e., political systems, healthcare, cars, rail systems for trains, etc.). Sometimes entire systems have to be replaced since they do not serve the purpose any longer (i.e., new car or revolution in a country).



System Overlap

- Most systems do not stand on their own. They overlap with other systems and affect other things. Try to imagine how an inefficient education system might affect other systems like the employment system, justice system, the correctional system and other social systems such as welfare and healthcare. People are an input to many systems and when they are not productive, many systems are affected.

