



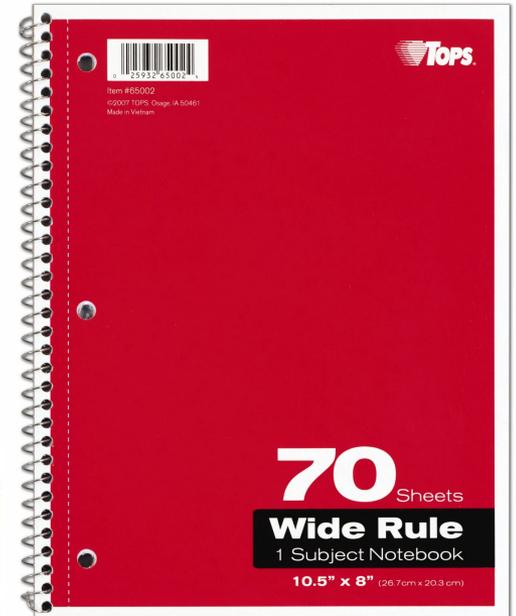
COMPUTER SCIENCE I - DESIGNING TECHNOLOGY SOLUTIONS

August 25th, 2014

Pd – 4A, 5 & 6

Welcome

- Syllabus Review
- Class materials
 - ▣ 2" Binder
 - ▣ Spiral Notebook
 - ▣ Binder Dividers



Daily Procedure

- 1) Grab binder/notebook from the cart
- 2) Begin the “Do Now” assignment

“Do Now” Format

Name: _____

Date: _____

“Do Now” Assignment Title: _____

“Do Now” Assignment:

Getting to Know Each Other

□ Networking 101





WHAT IS TECHNOLOGY?

August 25th, 2014

Objective

Objective: To enable you to understand that interrelationships exist among technologies and between technology and other fields of study.

Ford Motor Company & the Assembly Line...

Ford Motor Company



Tesla Motors

“TESLA MOTORS was founded in 2003 by a group of Silicon Valley engineers who set out to prove that electric vehicles could be awesome.”

(TeslaMotors.com, 2014)

Tesla Video

Models:

S

X

Roadster



Tesla Model S

Technology is...

- The creation of new ideas and ways of...
 - ▣ Solving problems
 - ▣ Making humans to be more productive
- Why do we study technology?
 - ▣ It helps us meet our needs
 - ▣ Creates, new tools, systems, and techniques
- It impacts the routines of daily living
 - ▣ Our jobs
 - ▣ The way we interact
 - ▣ The course of history
- Affects society directly
 - ▣ Solves practical problems
 - ▣ Serves humans needs.

How does society impact technology?

- Society determines what new technologies will be created.
 - ▣ As individuals (inventors and engineers)
 - ▣ As society (governments and markets)
- Decisions result in the promotion of some technologies and the obstruction of others.
- How we'd like this to work:
 - ▣ Don't promote harmful technology
 - ▣ Don't obstruct beneficial technology out of ignorance.

Closing

- What is technology?
- How does society Impact Technology?



WHAT IS TECHNOLOGY?

August, 2014

What influences technological improvements?

- Influences:
 - ▣ Changes in nature:
 - droughts and floods
 - ▣ Increases in population
 - ▣ Changes in values, economics and politics
 - ▣ Curiosity and creativity
- How it happens
 - ▣ Technical abilities passed through tradition and practice
 - “Standing on the shoulders of giants” theory
 - ▣ Individual technological solutions are often incorporated into larger systems:
 - Bluetooth technology
 - Global Positioning System - GPS

Factors that influence technological advancements

- A strong economy:
 - ▣ Disposable income
 - People buying items they want but do not need
 - When companies make profits from their current products, they are able to use that money to research, and create, new technologies (Research and Development, R&D)
- R & D:
 - ▣ Companies study people's habits
 - ▣ They use this data to create products
 - ▣ They market/create a need for consumers to purchase new products or services

Brief Constructed Response (BCR)

Activity (15 minutes):

- Write two paragraphs telling me how you have seen technology change in your lifetime.





THE HISTORY OF TECHNOLOGY

August, 2014

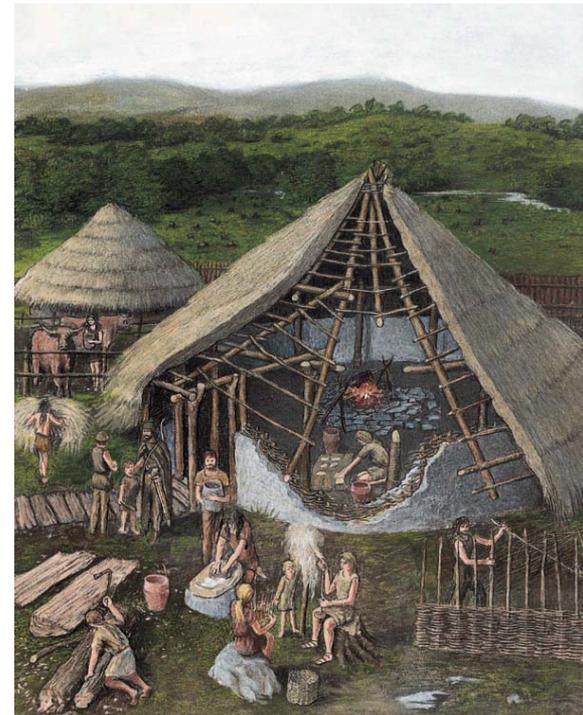
The Palaeolithic Age

- 500,000 BC – 10,000 BC
- Earliest known stone tools
 - ▣ Stone axes, bone needles
- Impact of technology
 - ▣ Improved health
 - ▣ Enhanced security
 - ▣ Enabled humans to increase population



Mesolithic Age

- 10,000 BC – 4000 BC
- Development of composite tools
 - ▣ Leatherwork, basketry, fishing tackle
- Domestication of animals
- Impacts of Technology
 - ▣ Farming, domestication of animals, beginning of settled communities.



Neolithic Age

- 4000 BC – 2300 BC
- Development of agriculture, year round settlements
- Pottery, polished stone tools, spinning and weaving tools, wooden and stone plows, sickles.
- Impacts of Technology –
 - Dependable year round food, division of labor that spurs invention and innovation



Bronze Age

- 2300 BC – 700 BC
- Earliest civilizations - the development of metallurgy, mainly the combining of copper and tin to make bronze.
- Bronze jewelry, tools, and weapons.
- Impact of Technology –
 - Stone tools were gradually replaced by metal ones. Enabled humans to alter their environment at a great rate



Iron Age

- 700 BC – 450 AD
- The use of iron as the main metal.
- Iron dagger, iron chisels, small figurines, ornamental jewelry, swords, axes, spearheads.
- Impact of technology
 - ▣ Military dominance for uses of iron weapons and the use of iron bladed plows enabled humans to cultivate heavier soils and increase food production



Middle Ages

- ❑ 450 –1400 AD
- ❑ The period of European history between fall of Rome and the Renaissance
- ❑ Wheeled plow, improved harness for horses, horseshoes, stirrups, waterwheels, crank, windmill, cast iron, cannons, mechanical clock, compass, ocean-going ships.
- ❑ Impact of technology –
 - ❑ The beginnings of urbanization and industrialization.



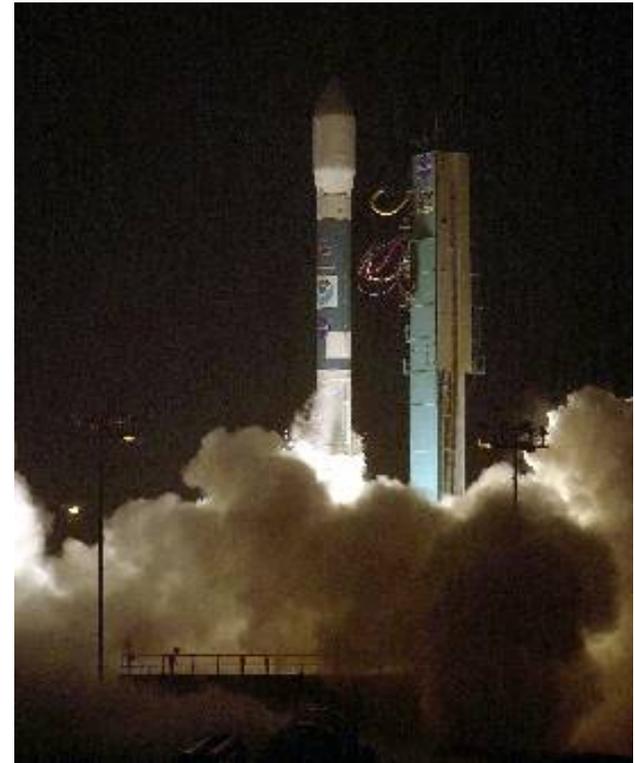
Renaissance Age

- 1400-1750 AD
- Between the middle ages and modern times
- Telescope, microscope, thermometer, clocks, barometer
- Impact of technology –
 - ▣ Instruments allow scientists to observe and study natural phenomena.



Industrial Age

- 1750-1950 AD
- Complex machinery, factories, cities
- Steam engine, electricity, automobile, airplane, radio, television, telephone, and rocket.
- Impact
 - ▣ Cities require vast government services, created
 - ▣ Peoples lives become dependent on each other
 - ▣ Population expansion, and improvement in living standards.



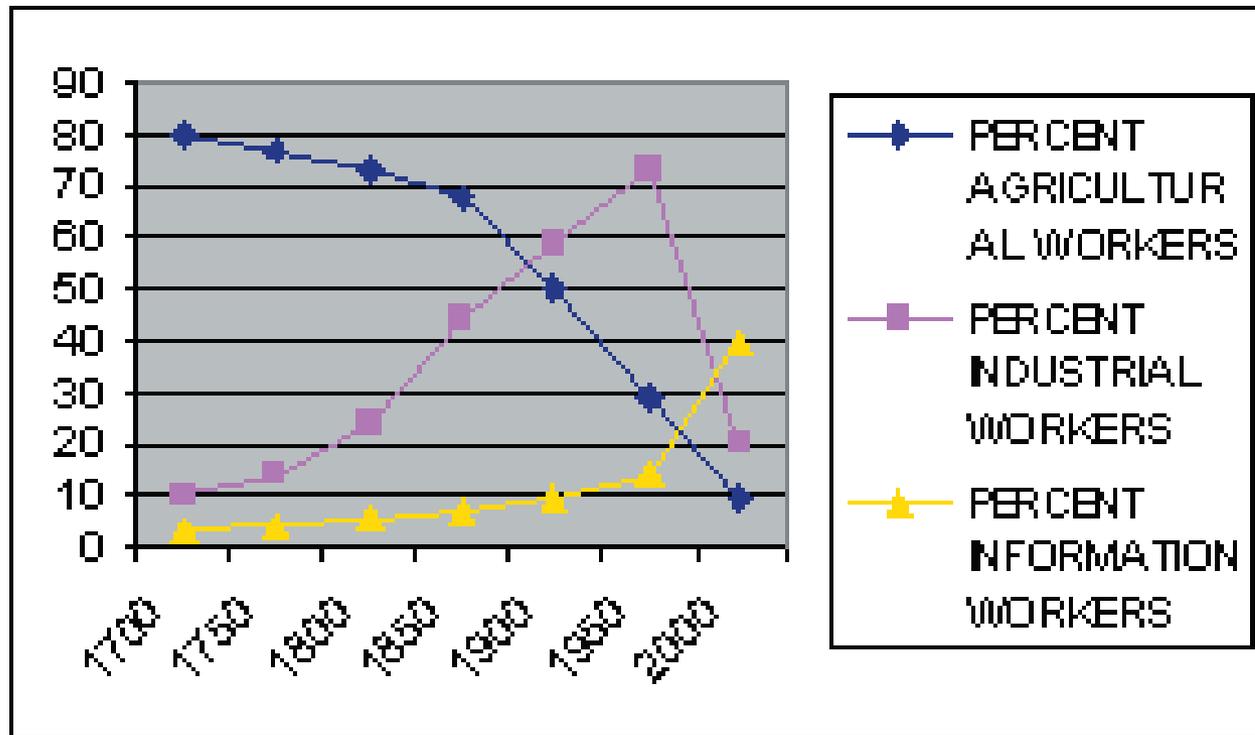
Information Age

- 1950 AD–Present
- Manipulation of information is central to the workings of society.
- Transistor, integrated circuit, computer, communication satellite, digital photography, artificial heart, nuclear power plant, space shuttle.
- Impact of technology –
 - Widely available information allows better decision making. People can no do what “experts” used to



The Nature of Work

Examine the following graph. How has the nature of work changed over time?



The History of Technology Project

- Select two of the technological ages and prepare a 5 minute presentation detailing the most important advances of that time period, and how those advances affect our lives today.



THE HISTORY OF TECHNOLOGY

August, 2014

“Do Now” (8/27/14)

How have the following items influenced the lives of the people who used them first?



Homework: None

AM/FM Radio

Computer

Television

Books

Objective:



You will develop an understanding of the various technological ages

Continue Working on your Presentations





THE HISTORY OF TECHNOLOGY

August, 2014



CREATING NEW TECHNOLOGIES & MANAGEMENT



You are an innovator...



Suppose you wanted to design a new device for your company. How would you do it?



Objective:

Understand how new technologies are created.

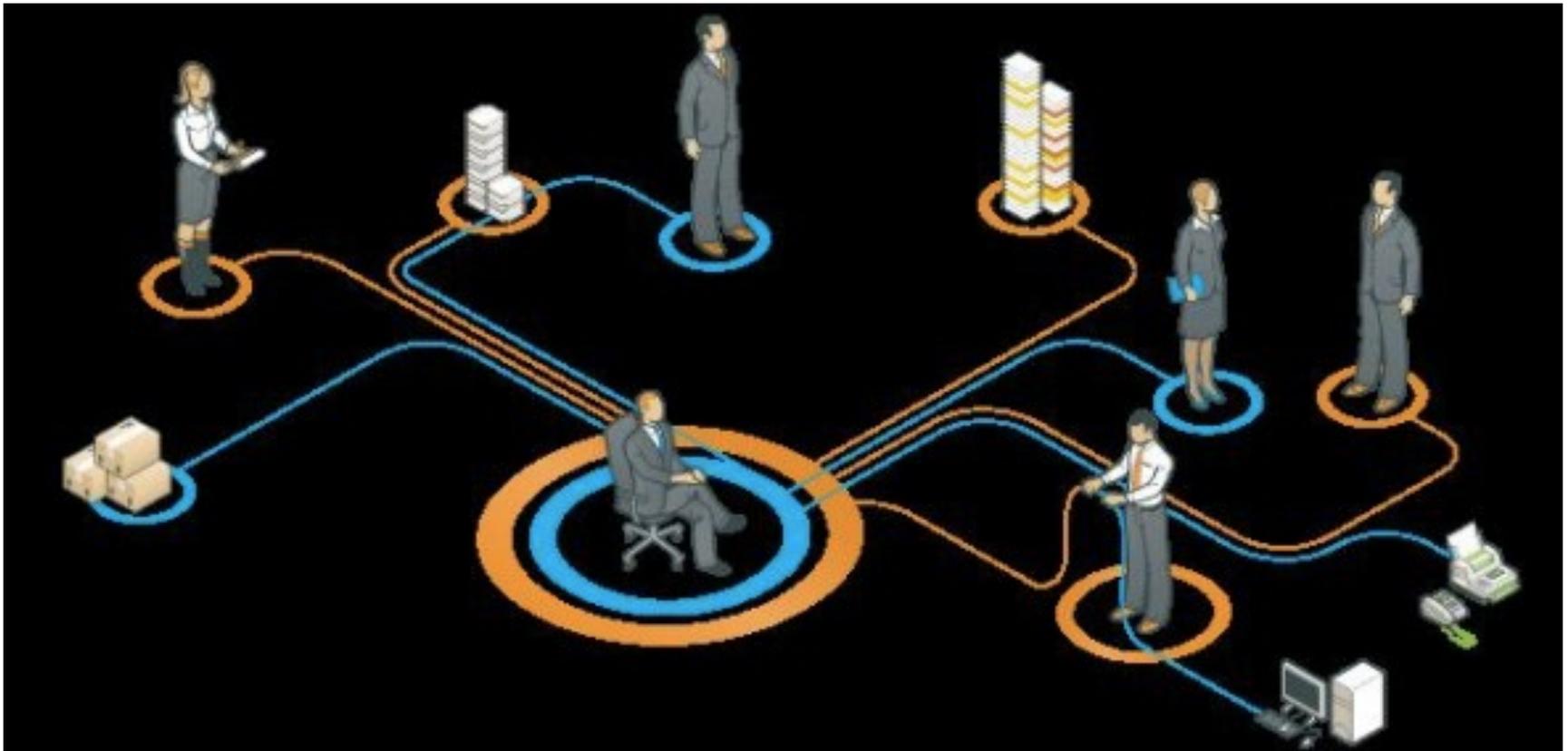
Principles of technological design

- What are they?
 - ▣ Not scientific principles (like the laws of motion)
 - ▣ Come from experience (what works?)
 - ▣ They provide the basis of professional engineering judgment.
- Three principles
 - ▣ Begins with a clearly defined need. (Need)
 - ▣ Moves forward with a creative response to that need. (Vision)
 - ▣ Results in a system, product or project that meets the need. (Delivery)

Steps in the design process

- **Defining a problem** - Ask questions, get specific.
- **Brainstorming** - Get every idea out.
- **Researching** - ideas and exploring possibilities
- **Deciding on details** - Identify Criteria and Constraints.
- **Selecting an approach** - Detail how you will tackle the problem
- **Developing a design proposal** - Explain who, what, when, where, how.
- **Making a model or prototype**
- **Testing and evaluating the design** - Identify what can be better.
- **Refining the design**
- **Produce product** - Make it
- **Recording and communicating results**
- **Maintain**

Management



Brainstorming: Where a lot of good ideas come from

- The group collects ideas without regard for feasibility
 - ▣ No criticism is allowed
 - ▣ Bad ideas are just as welcome as good ideas!
- Group tries to get as many ideas as possible
 - ▣ The more ideas, the more likely a good one will surface
 - ▣ All ideas are recorded
- Piling on: One member's idea produces a similar or better idea
- Effective brainstorming is a “free-for-all”
 - ▣ Outrageous, humorous, and seemingly unimportant ideas are welcome
 - ▣ Commonly, the most off-the-wall idea leads to the best solution

Literature review

- Frequently attempts to improve on science or technology start with a literature review
 - ▣ An account of what has been published on a topic
 - ▣ To be informed about knowledge and ideas that already exist related to the topic.
- Literature review should do these things:
 - ▣ Be organized and focused around the thesis or research question being developed
 - ▣ Result in a summary of what is and is not known
 - ▣ Identify areas of controversy in the literature
 - ▣ Formulate questions that need further research

Managing technology development (1)

- Management is the process of planning, organizing, and controlling work
- Involves four factors.
 - ▣ **Authority** – the power to influence behavior
 - ▣ **Responsibility** – moral and legal accountability
 - ▣ **Risks** – chances of loss
 - ▣ **Rewards** – things given for good service or attainment of goals
- Five functions
 - ▣ Planning
 - ▣ Organizing
 - ▣ Staffing
 - ▣ Directing
 - ▣ Controlling

Managing technology development (2)

- Planning
 - ▣ Developing the mission and goals and determining how they will be accomplished
- Organizing
 - ▣ Who works with whom?
 - ▣ Who will lead?
- Staffing
 - ▣ Attracting qualified workers
 - ▣ Hiring
 - ▣ Training
 - ▣ Evaluating
 - ▣ Paying

Managing technology development (3)

□ Directing

- Motivation
- Communication
- Leadership
- Discipline.
- Accomplish the mission while simultaneously helping workers accomplish their own

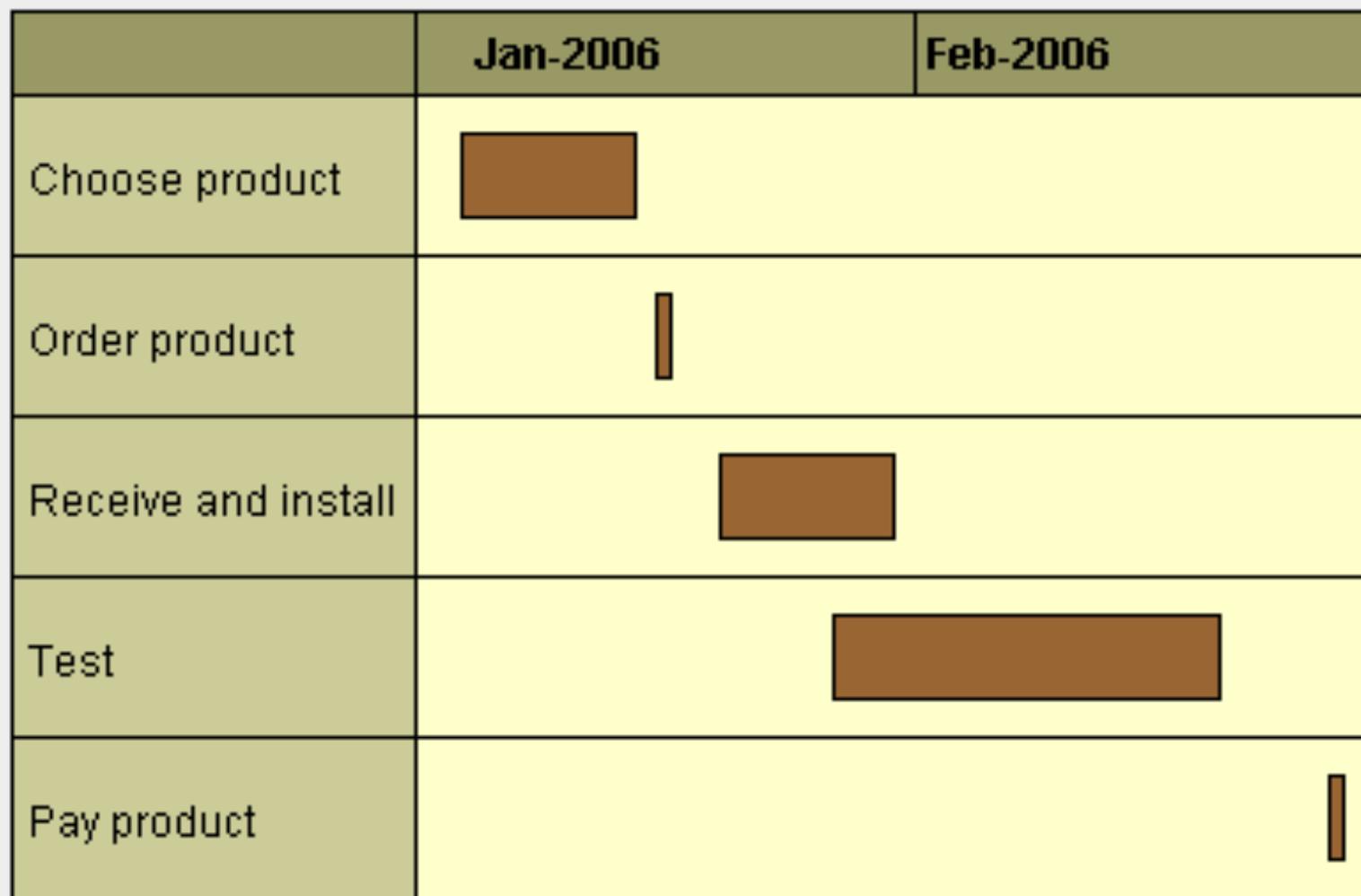
□ Controlling

- Establish expectations
- Measuring actual performance
- Compare
- Correct problems and reward excellence

Gantt Charts

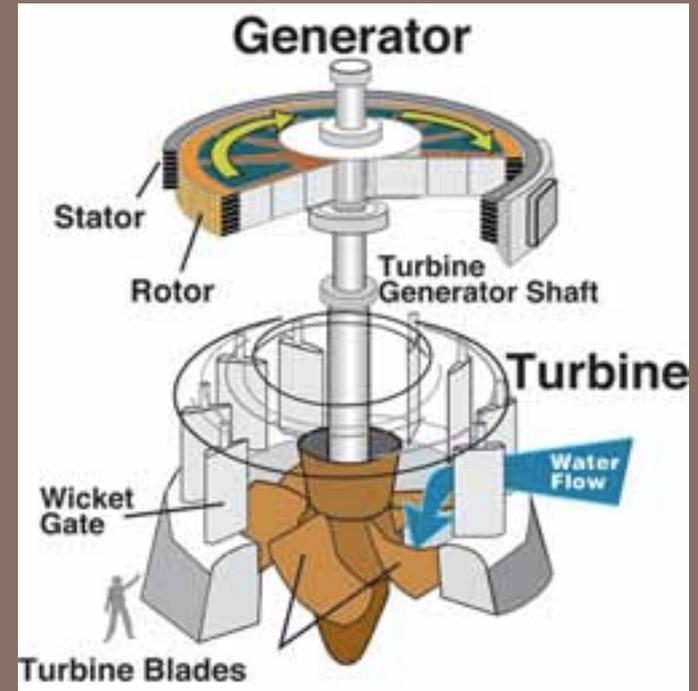
- Invented 1917 by Henry Gantt, an American engineer
- A graphical illustration of a schedule
- Helps to plan and track tasks in a project.
- Is frequently used in project management.
- How it looks
 - ▣ X-axis: The time span of the project
 - ▣ Y-axis: Task that make up the project (e.g. if the project is installing software, tasks might be: conduct research, choose software, install software, etc.)

Simple GANTT chart





Millau Viaduct, 2004



CORE TECHNOLOGIES

Core Technologies



Objective: SWBAT identify and describe the 9 core technologies

Core Technologies

- There are several engineering resources (core technologies) that are the “building blocks” of all technology systems.

Core Technologies	Mechanical
Structural	Electrical
Electronic	Thermal
Fluid	Optical
Bio-Tech	Material

Core Technologies

Mechanical Technology –

- The technology of putting together mechanical parts to produce, control, and transmit motion.
 - Levers
 - Inclined planes
 - Wedges
 - Wheels and Axels
 - Pulleys
 - Screw and Gears

Core Technologies

Structural Technology –

- The technology of putting mechanical parts and materials together to create supports, containers, shelters, connectors, and functional shapes.
 - Post and beam structures
 - Frame structures
 - Suspension structures
 - Cantilever structures
 - Mass structures
 - Pressurized structures

Core Technologies

- Electric Technology – Using or providing or producing or transmitting or operated by electricity
 - Current

Core Technologies

Electronic Technology –

- Of or relating to electronics; concerned with or using devices that operate on principles governing the behavior of electronics
 - Devices

Core Technologies

Fluid Technology –

- The technology of using fluid, either gaseous (pneumatics) or liquid (hydraulic) to apply force or to transport.
- All fluid systems have two things in common:
 - ▣ Each system contains a fluid, either liquid or gas, that moves through a system.
 - ▣ A difference in pressure creates a force. This causes fluids to move or perform some special function like pushing a piston or opening or closing a valve.

Examples:

- Air Pumps
- Water Pumps
- Automobile brakes
- Airfoils

Core Technologies

Optical Technology –

- The technology of producing light; using light for information collecting, storing, retrieving, processing and communicating; and using light to do work.
- Examples
 - ▣ Microscope and magnifier
 - ▣ Laser
 - ▣ Fiber optics
 - ▣ Optical telescope
 - ▣ Bar code reader
 - ▣ Scanner

Core Technologies

Thermal Technology –

- The technology of producing, storing, controlling, transmitting and getting work from heat energy.
- Example applications:
 - ▣ Furnace
 - ▣ hot water heater
 - ▣ Toaster
 - ▣ Insulation
 - ▣ hot air balloon.

Core Technologies

Biotechnology –

- The technology of using, adapting, and altering organisms and biological processes for a desired outcome.
 - Examples:
 - Genetically modified food
 - DNA fingerprinting
 - Oil biodegradation
 - Insulin Production
 - Bioethics

Core Technologies

Materials Technology –

- The technology of producing, altering, and combining materials.
- Examples:
 - Metals
 - Alloys
 - Nonmetals
 - Biomaterials
 - Composites