Arguments in Favor of Usability
1. Major catastrophes
2. Minor catastrophes
3. The productivity paradox

The Productivity Paradox
As the investment in information technology has gone up, the return on assets has actually been going down.
- The investment of 254 firms versus their return on assets. Firms that spent more of their income on computers had a slightly lower return on their

The Trouble with Computers.

The Productivity Paradox
- In phase one, computers are used to automate mathematical, scientific, and routine tasks.
- Examples: Radar-directed gunfire, CAT scan x-ray and MRI, telephone switching networks, production-line robots.
- In phase two, computers work as digital "power tools" to augment human endeavors that cannot be completely turned over a machine.
  - Examples: any task that require human activities such as speaking, understanding language, reading, writing, creating art, persuading, negotiating, organizing, socializing
  - "Phase two helpers are not helpful enough to be worth their wages." - Landauer.

Building Useful Computer Systems
- Question: How can engineers design and build computer systems that are truly useful to people and will help people do real tasks?
- Answer: The same way they build other useful human-machine systems, by applying known methodologies and techniques from the field of human factors.

Human Factors
- Human factors discovers and applies information about human behavior, abilities, limitations, and other characteristics to the design of tools, machines, systems, tasks, jobs, and environments for productive, safe, comfortable, and effective human use. (Sanders and McCormick, 1987)
  - Don Norman (1990)
  - The vocabulary draws from psychology and human factors.
  - The perspective come largely from the field of human factors, and provides a human factors perspective for the non-practitioner.
  - Makes a compelling argument.

How can anyone get anything done?
- People use the information available in the appearance of objects, which Norman calls the Psychology of Everyday Things (POET).
  - The designer makes operations clear, taking advantage of what people already know.
  - Hence, designers must combine a knowledge of how-things-work with a knowledge of how people work and what they expect.

Basic Concepts of Design
- A good conceptual model allows us to predict the effects of our actions, and is necessary when things go wrong.
  - The correct parts must be visible, and they must convey the correct message. Visibility is a major component in the mapping between the intended actions and the actual operations.

Norman's fundamental principles for designing for people:
1. Provide a good conceptual model.
2. Make things visible.
One more is needed: Test with real people doing real tasks.

+ Affordances.
  - What is the mapping between the perceived and actual properties?
  - Term is from Gibson; the psychological phenomena is "stimulus-response compatibility".
  - But many affordances are actually learned. Example: the holes on scissors invite fingers. What about the hole in a cigar cutter? Which way should faucet handles go? Which way do you screw in a light bulb?
  - Cordless phone example: How do you turn the ringer on and off? Right now, is it on or is it off?
  - ATI example.

+ Conceptual Models
  - The designer has a conceptual model that guides the design of the device.
  - The device presents the user with a system image.
  - The user forms a mental model by looking at and interacting with the device.

- The seven stages of action