Licencing to improve SW quality:

- controversial for SW

- required by law for many trades & professions

- intended to protect public from poor quality & unethical be-
  havior

- goals & effects not necessarily altruistic

  – reduces # of practitioners

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- raises prices and salaries

- violation of freedom to work

- ∃ voluntary alternatives

  - diploma from respected school

    * accredidation

  - certification programs in specialized areas

Taking Responsibility

- business pressures cause corner cutting and defective product release

- business pressures induce insistance on quality and good customer relations.

  − e.g. large voluntary payments to customers as compensation

- ∃ ethical corporate policies for responsible behavior

Computer Dependence: too much?

- Are criticisms of computer dependences warranted?

- Is "dependance" a pejorative?

- misplaced blame

- Use VS dependence

  – is dependence on computers different from dependence on other technologies?

– computer $\cong$ tool?

• breakdown reminds us of the convenience and productivity provided by the tool when it's working

• often, $\exists$ lower tech alternatives

– less productive & convenient

RISK

We continually place our trust in technology

- higher tech often $\Rightarrow$ higher penalties for failure

- most new tech relatively unsafe when introduced

- improvements are made

- problems discovered and solved

- disasters studied to learn how to prevent them or minimize them

- risk reduced via:

  - better education

  - improvements in tech

- risk not restricted to tech & machinery

- person is safer if risks are known and precautions are taken

- SW mistakes similar to those that had been made routinely in engineering practice

  - subsequently reduced in engineering via techniques and procedures for quality and safety

Differences between computer systems and other tech:

- computers make decisions

- computers' power & flexibility

  - $\Rightarrow$more critical failures

  - $\Rightarrow$ more complexity

- computer tech develops more rapidly

- SW not built from standard trusted parts (changing slowly)

- SW industry not mature

Computer Models

A mathematical model is a collection of data and equations describing or simulating characteristics and behaviors of the system being modeled.

- Computers are used because of their:

  - capacity for data

  - accuracy

  - efficiency (speed)

  - economy for multiple variations

- Computer model predictions tend to impress

  - though not necessarily warrented

  - they can vary greatly in quality

- Models allow "what if" questions to be answered

- models can vary from the original in:

  - size

    * scale of problem modeled may be limited

    * fewer factors, equations, terms etc.

– computed VS actual time

– detail

– accuracy

   ∗ nonlinear amplification of perturbations, e.g. Lorentz's "butterfly"

– unanticipated new future factors

Assessing model validity

- How well do we know underlying theory?

- Do we know all of the factors?

- How accurate is our data?

- Is the model an oversimplification?

- Do the model results match those of experiment?