EPICS Project Management and Resources

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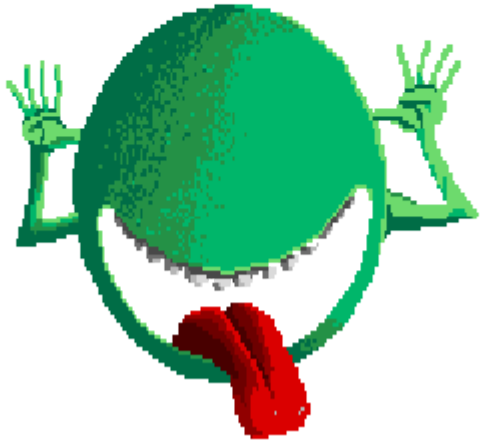
Project Management and Resources

- Topics
  - Project management
  - Building things
  - Reference materials
- This is just an intro
- Look at the EPICS web site, http://purcell.ecn.purdue.edu/~epics

DON'T PANIC!



Project Management

- EPICS projects are big enough
- There is a lot to this...
  - TQM, 6 Sigma, ISO 9000, etc.
  - Scheduling (PERT, etc.)
  - Team & project organization
- Don't *just do it*; have a plan

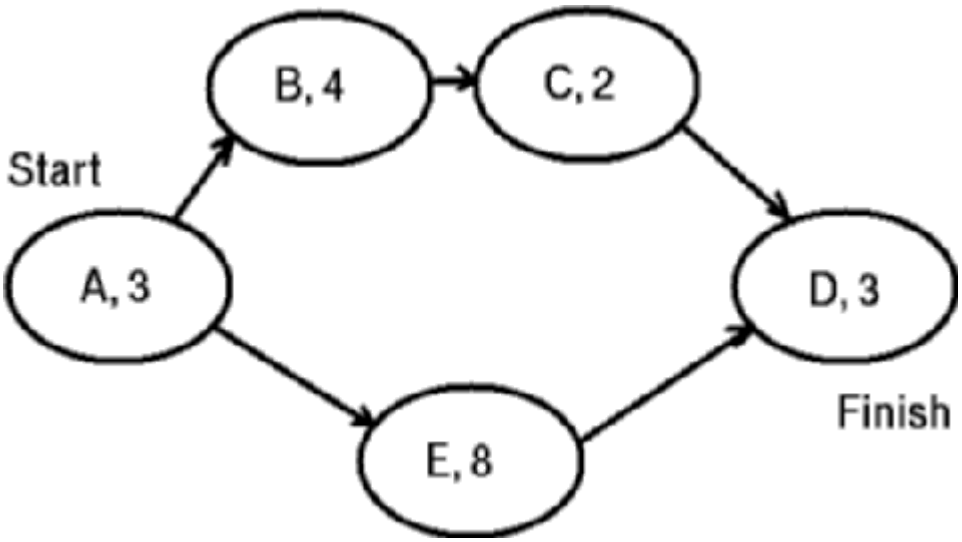
TQM (And Friends)

- Quality is an issue in EPICS because your sponsoring agencies will really use your products
- Total Quality Management
  - Measure quality as your customer sees it
  - Continuously improve quality
  - Do this internally too

Scheduling

- Identify "critical path" for project
- Have frequent "milestones" to monitor progress
- Use Gantt Chart to show timespan for each activity
- PERT (Program Evaluation and Review Technique) Chart
  - A DAG (Directed Acyclic Graph) showing which development steps must be completed before each step can begin
  - Can determine expected completion time and "slip" in schedule from specific delays

Sample PERT Chart



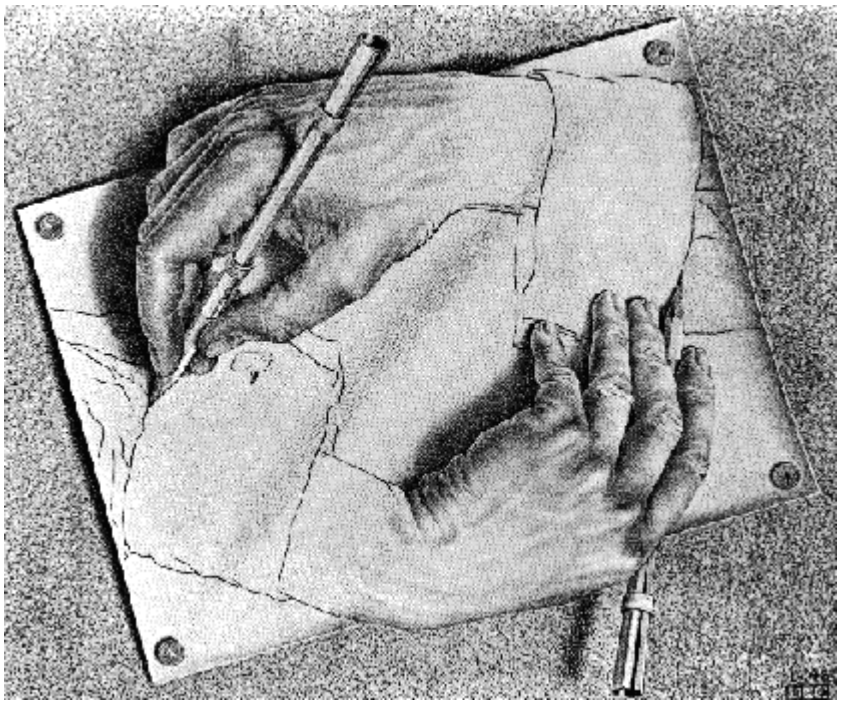
Team and Project Organization

- Lots of methods...
- *The Mythical Man-Month*, by Fred Brooks, Jr.:
  - Software development time is not compressible
  - The surgical team
  - The need for communication & formal specifications
  - Plan to throw one away; you will, anyhow
  - The second-system effect
  - A good workman is known by his tools

Avoid "Single Point Failures"

- Things
- People
- Timing

Building Things



Building Things

- EPICS projects build usable prototypes
- Each project may include
  - Computer software
  - Computer hardware
  - Mechanical systems
- Sponsor may require use of a specific system
- Budget and quantity are both low

Software Environments

- Macs
  - System 6.? - 7.5
  - Hypercard, C, etc.
- PCs
  - DOS, Windows (3.1, NT, 95), OS2
  - Basic, Visual Basic, C, etc.
- Workstations (& PCs under Linux)
  - UNIX (Solaris, HPUX, AIX, Linux, etc.)
  - C, Awk, Shell, Perl, TCL/TK, etc.
  - True multitasking and protection is supported

Copylefts, Copyrights, & Licenses

- You **must** have rights to any software the project uses
- A few definitions:
  - Public Domain
  - "Berkeley" Copyright
  - Copyleft (GNU copyright)
  - Shareware
- Site/multi-user licenses, university discounts may apply
- Any software you produce **must** carry the appropriate disclaimers, etc.

Hardware Environments

- Mac
  - Monitor, keyboard, mouse, some audio
  - Expansion difficult; power Macs add audio & video
- PCs
  - Monitor, keyboard, mouse, PC speaker
  - Cheap & easy to add audio, video, etc.
- Sun Workstations
  - Monitor, keyboard, mouse
  - Not cheap, but easy to add audio, video, etc.

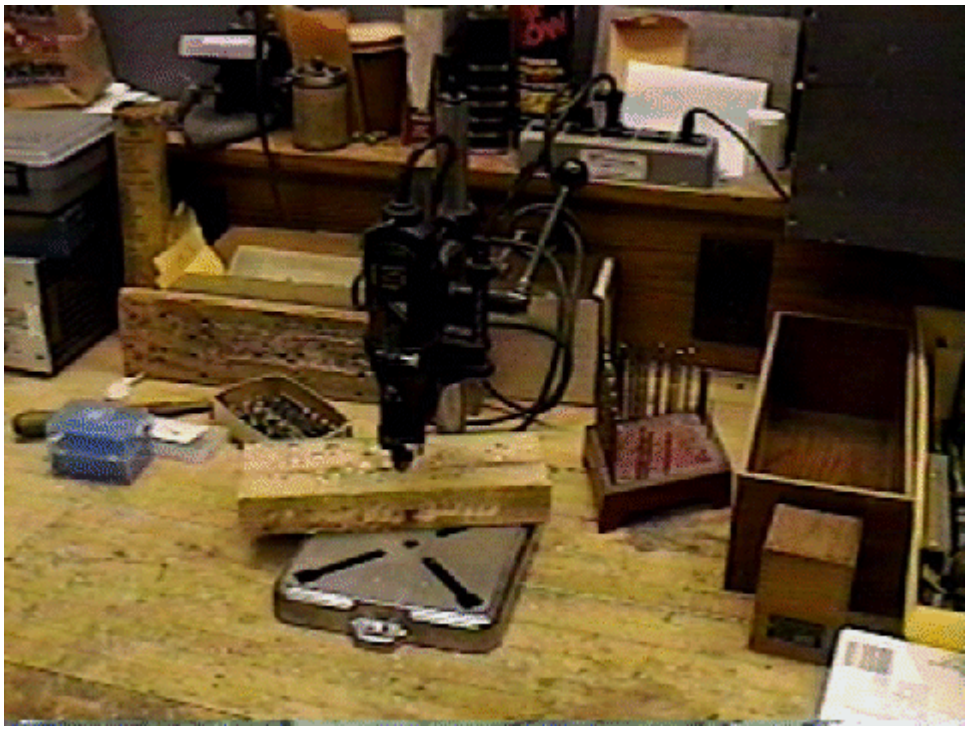
Where Do I Plug It In?

- Mac I/O
  - RS422 serial, keyboard
  - SCSI (Small Computer Systems Interface)
  - Soon to have PCI...?
- PCs
  - RS232C serial, parallel (printer), "game" port, keyboard
  - IDE (Integrated Drive Electronics) or EIDE; SCSI
  - ISA (plus EISA or VLB extensions), now also PCI
- Workstations
  - RS232C serial, parallel (printer) on most
  - SCSI
  - Proprietary bus (e.g., Sun's SBUS), now also PCI

Making Your Own Circuit Boards

- What you can't do here
  - Boards with more than 2 layers and/or thru plating
  - NC hole drilling, surface mounting, etc.
  - VLSI, ASICs, etc.
- What you can do here
  - Hand drilled 2-layer boards (via the Instrument Room, EE162)
  - Generic "Radio Shack" PCBs
  - Anything wire-wrap (provided you can get sockets)
  - TTL, some PLAs & FPGAs, and micros

Room EE162



Software Tools For PCB Design

- Mentor Graphics on ECN HP workstations...
  good for circuit design & complex PCBs
- DOS-based tools distributed by Alberta Printed Circtuits at
  http://www.apcircuits.com/htmls/apc/nwdef.html#DFWare
- Linux-based tools for circuit design, including PCB at ftp://sunsite.unc.edu/pub/Linux/apps/circuits/
- Be sure that your tools can produce what you need!

PCB Assembly And Testing

- Room EE338 (EPICS lab) will be reasonably equiped
- Room EE016
  - HKN-sponsored lab open to ECE students
  - Fairly minimal equipment...
- Room EE065 & EE067
  - Advanced Digital Systems/Embedded Microcontroller Design Laboratory
  - Lab used for courses, but has supervised open hours
  - Contact Prof. Meyer meyer@ecn.purdue.edu for access and facilities info
  - Good facilities for PLA and FPGA work, PCB testing

Room EE067

To Build...
Or Not To Build

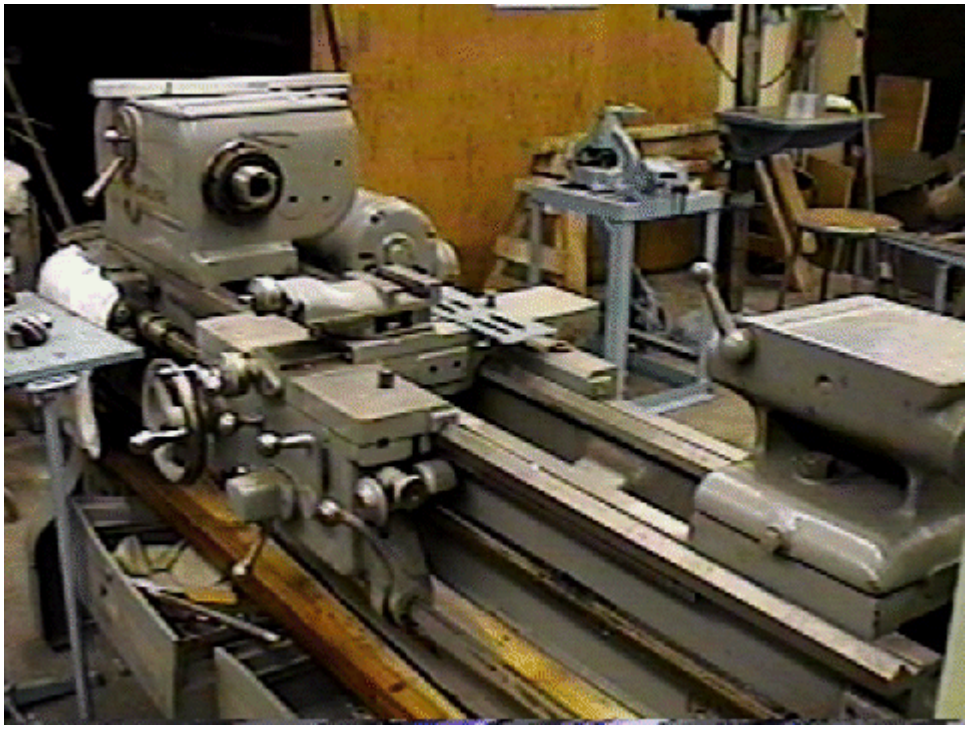
- Consider an ISA parallel port card...
  - PCB is two sided, plated thru holes, ~$100
  - Electronic parts, ~$10 (~$50 using FPGA)
  - Board-mount DB25 connector, ~$8.50
  - Mounting hardware, ~$2
  - At least 1 month development time
- Complete price in *Computer Shopper*, **$7.90**
- Similar things happen for software development

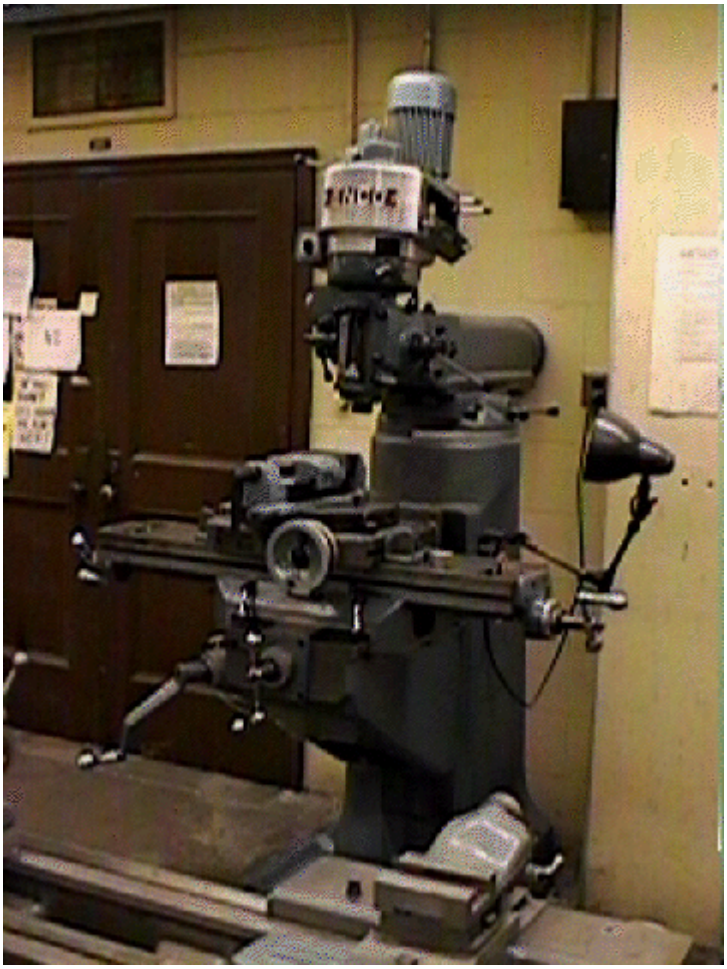
Mechanical systems

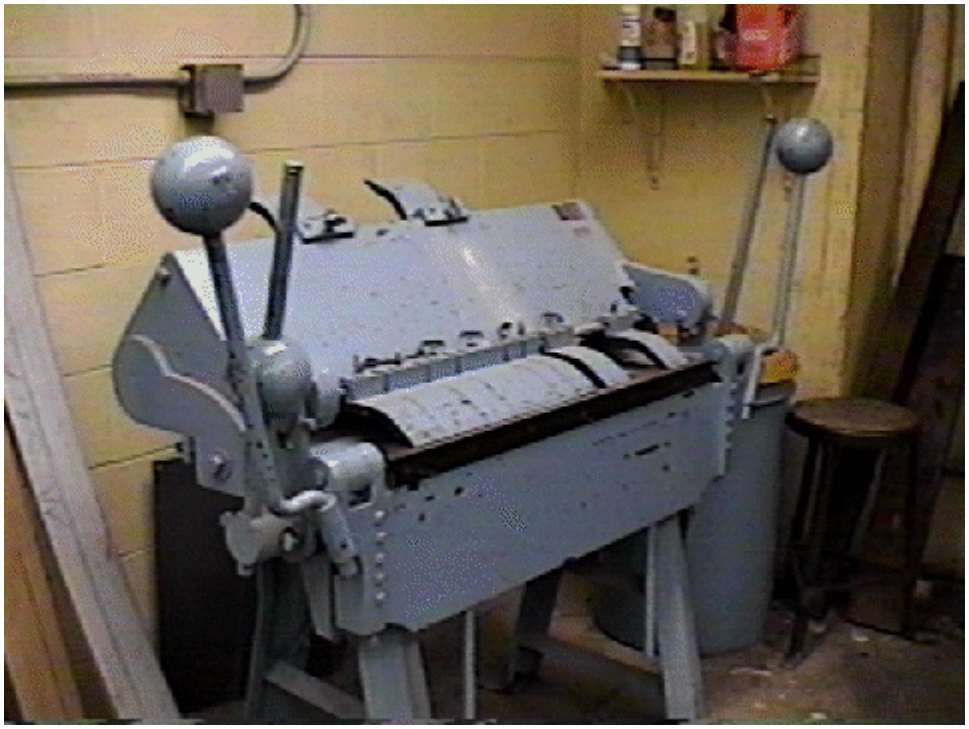
- Plastic & metal boxes are available commercially
- Can build things out of metal, wood, some plastics
  - There is a machine shop by the EE loading dock
  - Woodworking is easily done with cheap tools
- Don't forget mounting hardware!
- Motors, sensors, etc. can be obtained from:
  - Electronic parts vendors
  - Surplus houses
  - Toys

Machine Shop

- EE building room B66 contains:
  - Drill presses, lathes, and a milling machine
  - Brake, shear, and bending jigs
  - Table saw and band saw
  - Lots of other stuff (but not lots of space)
- Access & training by appointment
- Operated by Chuck Harrington, x43338








DANGER

Room EEB66

Rules For Shop Use

- Notify shop supervisor of your intentions
- Sign for tools taken from office
- Wear goggles -- safety first
- Don't know how to run equipment? -- Ask!
- Return tools to proper storage locations
- Clean up after yourself

- Be sure to read and follow safety instructions, and to wear safety glasses.
- Measure twice, cut once.

Reference Materials

- Room EE338 (EPICS lab) will accumulate things
- To browse books, journals, magazines, etc.
  - Engineering Library (Potter)
  - Computer Science Library (Math)
  - Others (e.g., Krannert for business-related info)
- Faculty & staff members (not just ECE faculty!)
- Other students
- The WWW (World Wide Web)

Finding Things On The WWW

- The WWW isn't a reliable source (yet)
- Use a "forms-capable browser":
  - `Mosaic` on ECN workstations
  - `lynx` on ECN for text-only display
  - Netscape is available from http://home.netscape.com
- Use search engines
  - Archie, Lycos, Web Crawler, Yahoo, etc.
  - Meta-engines like "Savvy Search," at http://www.cs.colostate.edu/~dreiling/smartform.html
- Use & maintain HTML reference lists

External Contacts

- Use a campus phone
  - Local calls: dial 9, then number
  - 800 numbers: dial 1 800, then number
  - Other long distance: ask EPICS faculty
- Use a fax
  - Incoming: to you, care of EPICS faculty, (317) 494 3371
  - Outgoing: ask EPICS faculty
- Use email (or WWW forms)

How To Buy Things

- Unless you are donating, don't buy anything yourself
- Fill-out the purchase request form and submit it to the EPICS faculty
- Where to look?
  - *Computer Shopper* is thick, but very complete
  - Catalogs from various mail-order companies
  - Local places (e.g., Radio Shack)
- If approved, purchases still take time
  - Order from open account (Digikey, Newark, etc.) or under $100 can be very fast
  - Expect a 3 week delay for other purchases