

Preliminaries

CS5540 *HCI*

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What is the HCI Issue?

- Is the interface the concern?
- Is the matter of accomplishing some work, some set of tasks, the issue?
- Are we emphasizing the wrong thing?

Doing Work View

- Computer is simply the *medium*
- Interface focus can be distracting
- Need to understand the characteristics of the computer/interface
- Need to understand the user and human behavior

What do we already know as good interface principles?

- Interesting, pleasing, attractive
- Effective to use
- Intuitive
 - Alan Kay's children
- Organized, hierarchically structured

What do we know as good interface principles? (cont)

- Help functions, Search, etc
- Consistent form (aka design integrity)
- Automatic assistance
 - Completions
 - Spelling

What do we know as good interface principles? (cont)

- Lead the user
 - Prompts
 - Indicate nature of any problem
 - Specific communication

What do we know as good interface principles? (cont)

- Meaningful error msgs
 - Don't send you elsewhere
 - Give useful number
 - Area of inadequate traditions

What do we know as good interface principles? (cont)

- Multiple paths to a function
- Keep it *simple*
- Gain user's trust.
- Bottom up is probably most acceptable
- Simple tasks should be *simple*

Our history hurts us...

- Developed some poor communications habits
- Resources were scarce
- Other priorities, historically

Our history hurts us...

- Early computing:
 - “Compiler error”
- Systems error: EM732851
- Small road signs
- Confusing directions

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Our history hurts us...



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Our history hurts us...

- Korean Airlines Flight 007, with its 269 passengers and crew, had strayed off course over a Soviet missile installation in the far Pacific and was shot out of the sky
- Pilot had to *key* in the numerical coordinates *by hand* corresponding to flight plan!

Our history hurts us...

- How about an automatic download?
- How about picking from a menu?
- How about symbolic names

Our history hurts us...

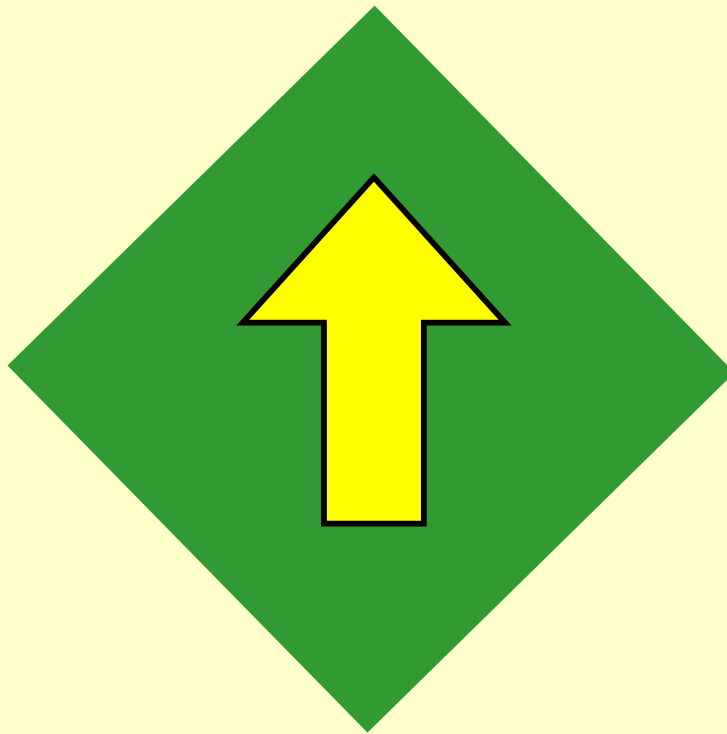
- Audi
 - Cars took off from a standing position
 - *Driver error*, claimed Audi...
 - Whose error was it?

Our history hurts us...

- NASA
 - Lost a major mission over mistake in units
 - One group worked in SI units
 - One group worked in English units
 - Combining the results led to bad numbers

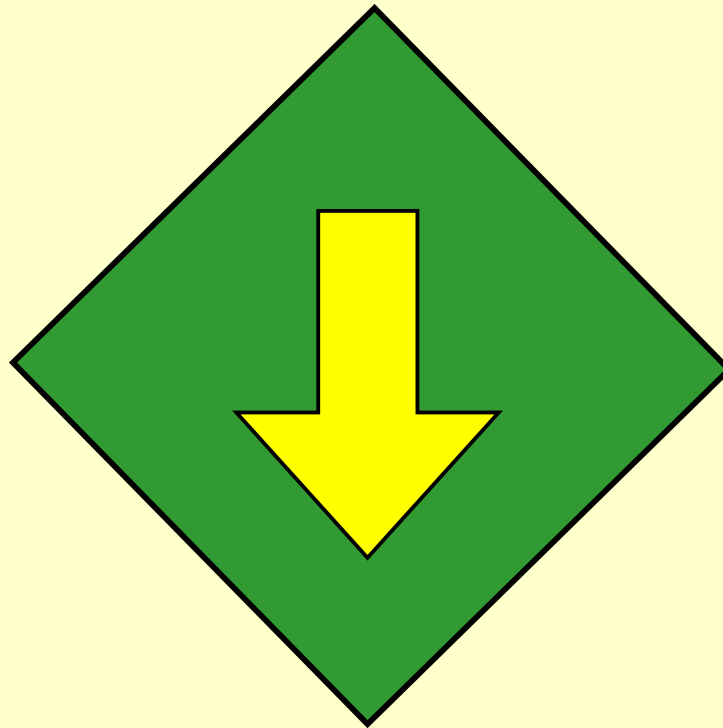
Culture

What does
This sign mean?



Culture

What does
This sign mean?



Critical Interfaces

- Nuclear power plants
 - Interface had better be clear
- Airplane cockpit controls
 - Computer graphics has simplified

Effect of function: Examples

- Water faucets in a sink
- Manual gear shift
- Chords on a guitar

- Interface is dictated (confused) by needed effect

Other historical examples

- Books are essentially linear
- Stories or communications needs might not be
- Hyper-text breaks the bound with linear text

HCI is a “design problem”

- Design is *old* subject
- Well studied topic
- Apply design methodologies to build better interfaces
- We will look at this viewpoint

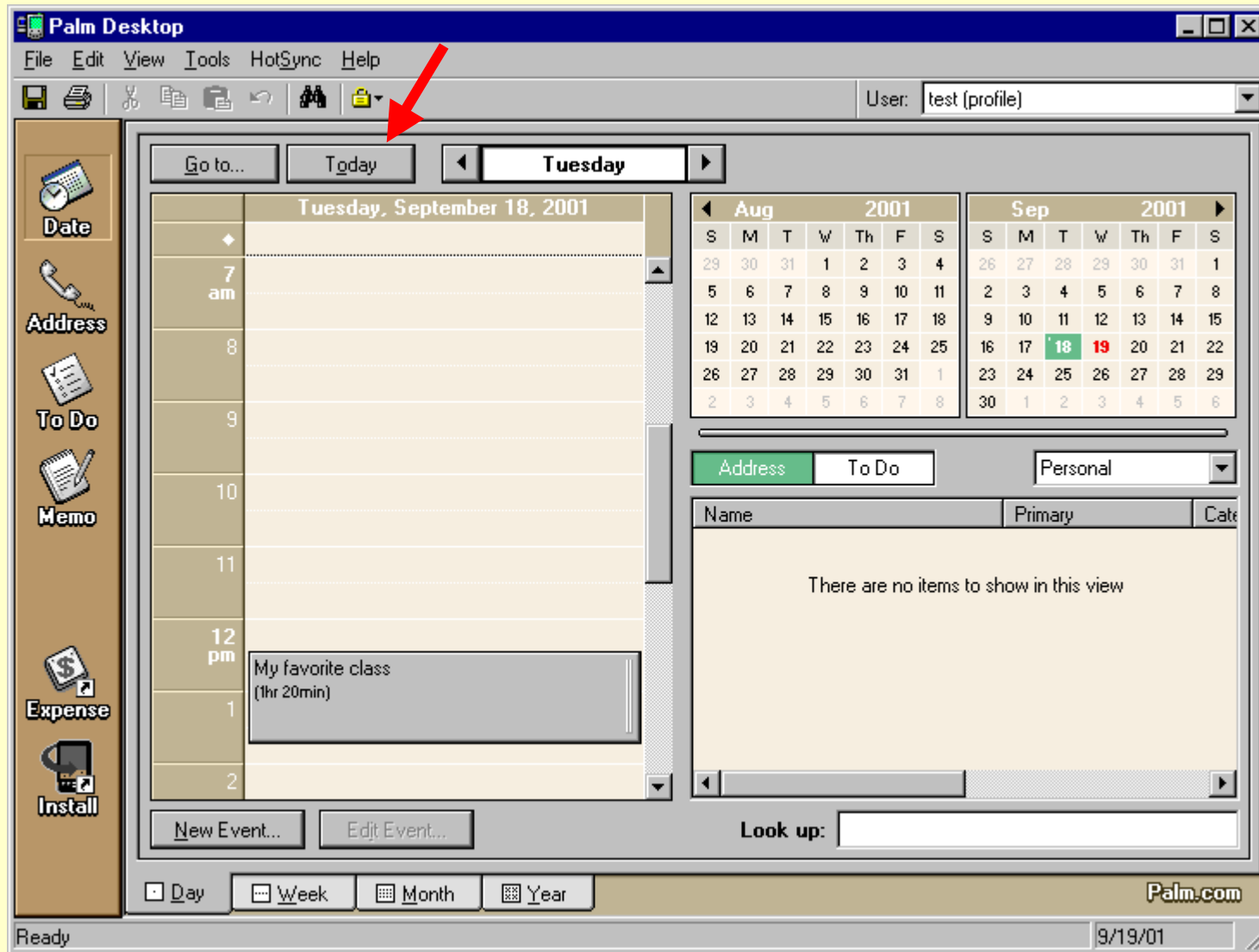
Important operational issues

- Reliability
- Availability
- Security
- Data integrity

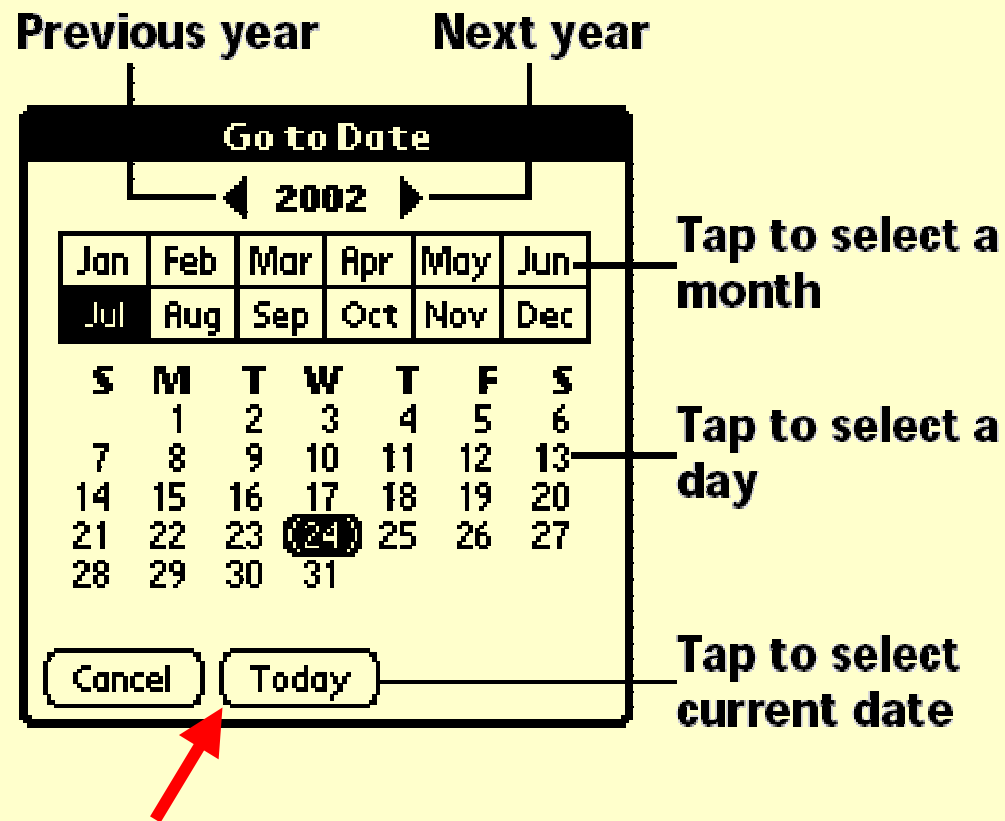
Important Basics

- Standardization across app's
 - Apple first did this
- Integration of packages and tools
 - Unix does this well
- Consistency in actions, design style, terms, menus, color, fonts, etc, etc
- Portability across platforms
 - Less true than advertised (Quicken, eg)

Palm Desktop Calendar



Palm Handheld Calendar



Important stats

- Time to learn
- Speed of performance
 - How much coffee can one drink?
- Rate of errors by users
 - “The *user* is always right!”

Important stats (cont)

- Retention over time
 - Do you have to start at square 1?
- Subjective satisfaction
 - Do you like it (no explanation needed!)
 - Can you develop an attachment for it?

Dramatically different needs

- Life-critical systems
 - Air traffic; nuclear reactors; cockpits; power utilities; emergency, military, medical, operations
- Commercial
 - Banks, resv's, inventory, point-of-sales (Hertz, Fedex,..), registration,..

Different needs (cont)

- Home, office, entertainment
 - Obvious needs
- Exploratory, creative, cooperative systems
 - Bad interface (computer or otherwise) can *destroy* the process

Human Diversity

- Ergonomics, anthropometry
 - Anyone here “average?”
- Physical consideration
 - Height, stiffness, posture, shapeness, size of working area
 - IPD, headsize, light sensitivity

Cognitive processes (from *Engineering Abstracts*)

- Short-term memory
- Long-term memory
- (Over 40 users...)
- Problem solving
- Decision making

Cognitive processes (from *Engineering Abstracts*) (cont)

- Attention and set (scope of concern)
 - ADHD, Ritalin population (5%)...
- Search and scanning
- Time perception

Perceptual and Motor Performance Factors (*ibid*)

- Arousal and vigilance
- Fatigue
- Perceptual (mental) load
- Knowledge of results
- Monotony and boredom

Perceptual and Motor Performance Factors (*ibid*)

- Sensory deprivation
- Sleep deprivation
- Anxiety and fear
- Isolation

Perceptual and Motor Performance Factors (*ibid*)

- Aging
- Drugs and alcohol
- Circadian rhythms

Gender Differences

- Males and Females are different!
- Much has been observed
- Firm principles are scarce

Carl Jung's Personality differences

- Extrovert v Introvert
 - Extroverts like action
- Sensing v Intuition
 - Routine v discovering new

Carl Jung's Personality differences (cont)

- Perceptive v judging
 - New situations v planning
- Feeling v thinking
 - Sensitive v logical

Recent study result ...

- Multi-tasking does not work.
- Ergo, one should not:
 1. Drive a car
 2. Talk on a mobile phone
- Q: Is driving a car a single task??

Cultural and International Diversity

- Characters, numerals, special characters, diacriticals
- Left-to-right v right-to-left v vertical and reading
- Date and time formats
- Numeric and currency formats

Cultural and International Diversity (cont)

- Weights and measures
- Telephones and addresses
- Names and titles
 - Mr., Ms., Mme, M., Dr.
- SSNs, national Ids,
- Capitalization and punctuation

Cultural and International Diversity (cont)

- Sorting sequences
- Icons, buttons, colors
- Pluralization, grammar, spelling
- Etiquette, policies, tone, formality, metaphors.

Users with Disabilities

- Can truly open doors
 - Man with ALS who uses head to type
- Doing it well requires good client model
- Designer challenges

Evaluating interfaces

- Understanding of a practical problem
- Lucid statement of a testable hypothesis
- Manipulation of small number of independent variables
- Measurement of specific dependent variables

Evaluating interfaces (cont)

- Careful selection and assignment of subjects
- Control for bias in subjects, procedures, and materials
- Application of statistical tests
- Interpretation of results, refinement of theory, and guidance for experimenters

Possible research directions

- Reduced anxiety of computers
- Graceful evolution of systems
- Specification and implementation of interaction
- Direct manipulation

Possible research directions (cont)

- Input devices
- Online assistance
- Information exploration

End of Chapter 1