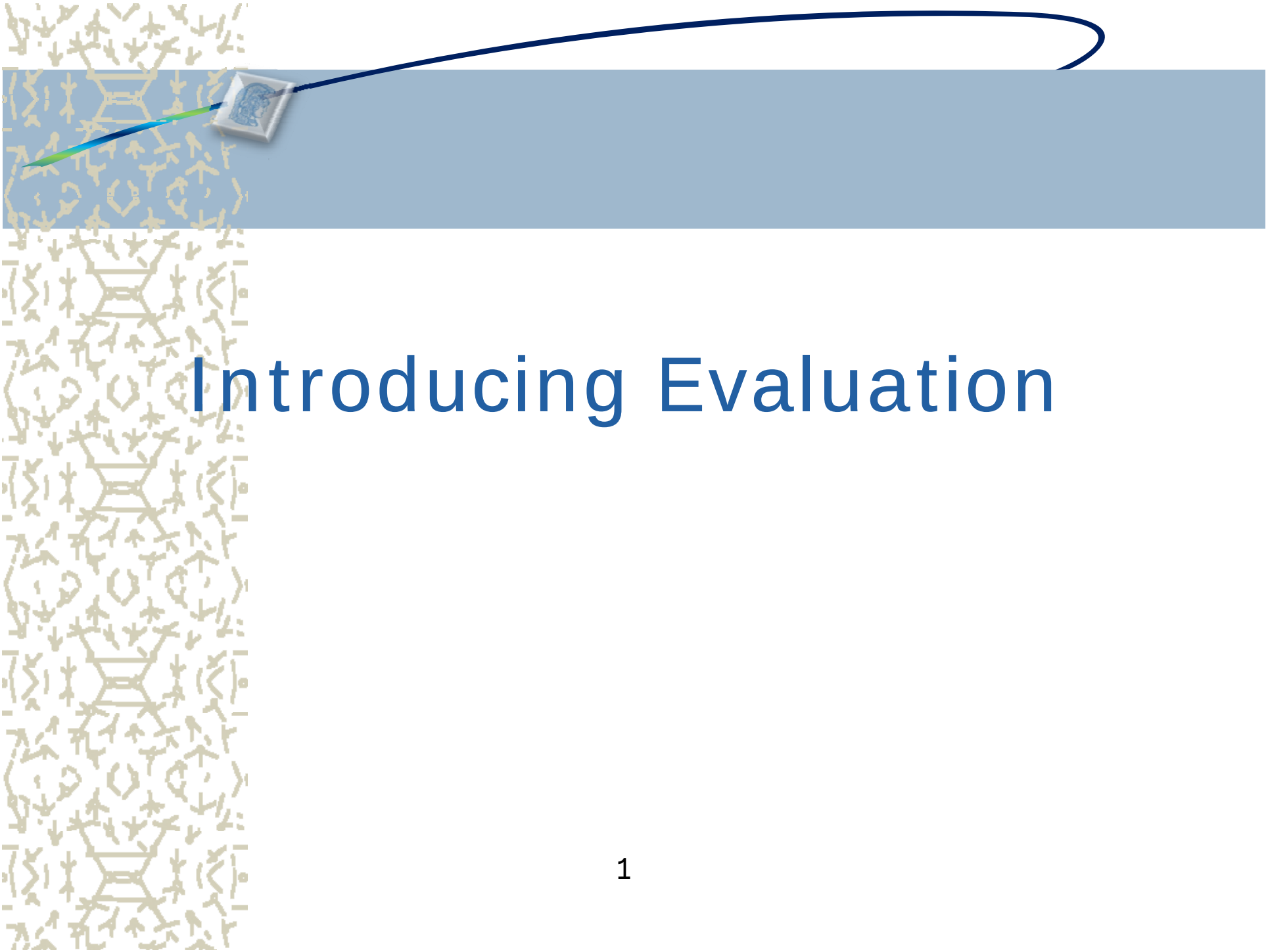


Introducing Evaluation

The aims

- Explain the key concepts used in evaluation.
- Introduce different evaluation methods.
- Show how different methods are used for different purposes at different stages of the design process and in different contexts.
- Show how evaluators mix and modify methods.
- Discuss the practical challenges

Why, what, where and when to evaluate

Iterative design & evaluation is a continuous process that examines:

- Why: to check users' requirements and that users can use the product and they like it.
- What: a conceptual model, early prototypes of a new system and later, more complete prototypes.
- Where: in natural and laboratory settings.
- When: throughout design; finished products can be evaluated to collect information to inform new products.

Bruce Tognazzini tells you why you need to evaluate

"Iterative design, with its repeating cycle of design and testing, is the only validated methodology in existence that will consistently produce successful results. If you don't have user-testing as an integral part of your design process you are going to throw buckets of money down the drain."

See AskTog.com for topical discussions about design and evaluation.

Types of evaluation

- Expert Based Evaluation Methods
- User-Based Evaluation Methods
  - Controlled settings involving users, eg usability testing & experiments in laboratories and living labs.
  - Natural settings involving users, eg field studies to see how the product is used in the real world.
- Automated Usability Testing Methods

Expert-Based Usability Methods

- Usability experts “inspect” your interfaces during formative evaluation.
- Widely used in practice.
- Often abused by developers that consider themselves to be usability experts.

Expert-Based Usability Methods

- Heuristic Evaluation
- Cognitive Walkthroughs
- (Pluralistic Walkthroughs)
- (Feature, Consistency & Standards Inspection)

Heuristic Evaluation

- Applicable Stages:
  - Design, Code, Test & Deployment
- Personnel
  - Usability Experts, approximately 4.
  - Developers, 0.
  - Users, 0.

Heuristic Evaluation

- Usability Issues Covered
  - Effectiveness: Yes
  - Efficiency: Yes
  - Satisfaction: No
- Quantitative Data is not collected.
- Can be conducted remotely.
- Can be used on any system.

Heuristic Evaluation

- What is it?
- Several evaluators independently evaluate the interface & come up with potential usability problems.
- It is important that there be several of these evaluators and that the evaluations be done independently.
- Nielsen's experience indicates that around 5 evaluators usually results in about 75% of the overall usability problems being discovered.

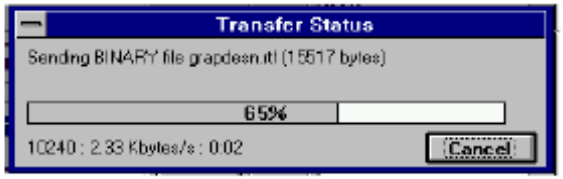
Heuristic Evaluation

- How can I do it?
- Obtain the service of 4, 5 or 6 usability experts.
- Each expert will perform an independent evaluation.
  - Give experts a heuristics inspection guide.
- Collect the individual evaluations.
- Bring the experts together and do a group heuristic evaluation. (Optional)
- http://www.cs.umd.edu/~zzj/Heuristi.htm

Visibility of system status

- Dealing with long delays
  - Cursors
    - for short transactions

  - Percent done dialogs
    - time left
    - estimated time

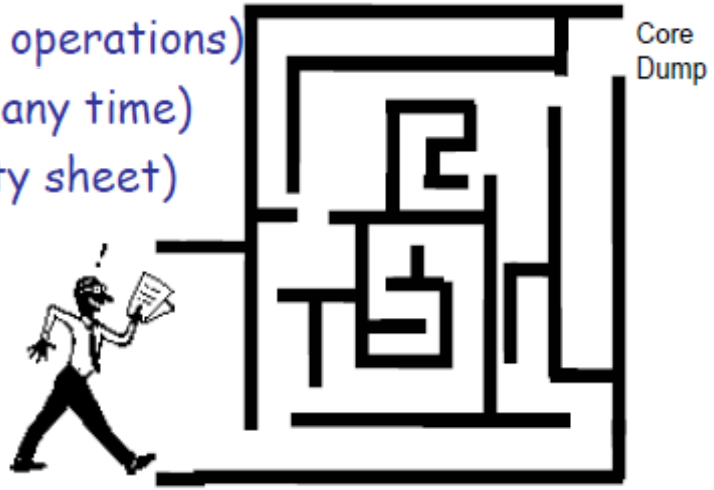


  - Random
    - for unknown times

User control and freedom

User control and freedom (II)

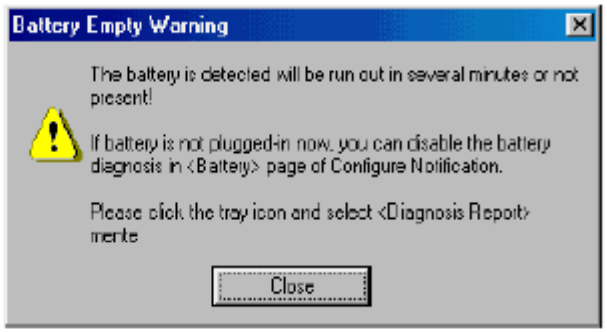
- Users don't like to feel trapped by the computer!
  - should offer an easy way out of as many situations as possible
- Strategies:
  - Cancel button (for dialogs waiting for user input)
  - Universal Undo (can get back to previous state)
  - Interrupt (especially for lengthy operations)
  - Quit (for leaving the program at any time)
  - Defaults (for restoring a property sheet)

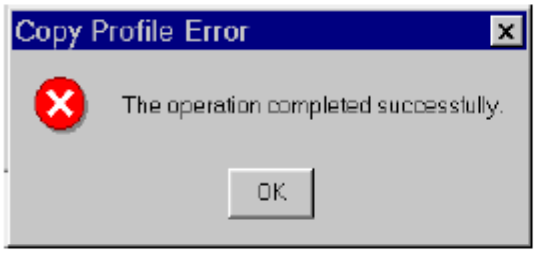


Help users recognize, diagnose, recover from errors

- Provide meaningful error messages
  - error messages should be in the user's task language
    - Error 25
    - Cannot open this document
    - Cannot open "chapter 5" because the application "Microsoft Word" is not on your system
    - Cannot open "chapter 5" because the application "Microsoft Word" is not on your system. Open it with "Teachtext" instead?
  - don't make people feel stupid
    - Try again, bonehead!

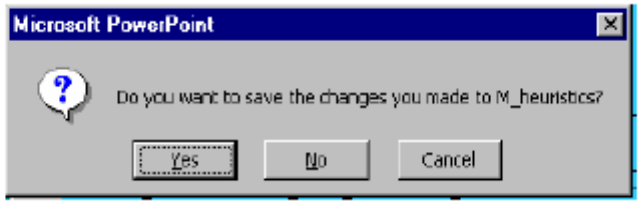
Help users recognize, diagnose, recover from errors (II)





Error prevention

- intended action similar to others that are possible
  - usually occurs when right & wrong objects physically near each other
    - pour juice into bowl instead of glass
    - throw sweaty shirt in toilet instead of laundry basket
    - move file to wrong folder with similar name



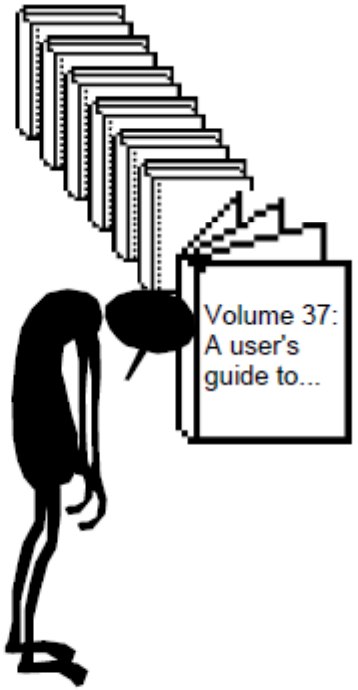
- minimize by
  - rich feedback
  - check for reasonable input, etc.
  - undo

Recognition rather than recall

- Computers good at remembering, people are not!
- Promote recognition over recall
  - menus, icons, choice dialog boxes vs commands, field formats
  - relies on visibility of objects to the user (but less is more!)

Help and documentation

- Help is not a replacement for bad design!
- Simple systems:
  - walk up and use; minimal instructions
- Most other systems
  - feature rich
  - simple things should be simple
  - learning path for advanced features



Cognitive Walkthroughs

- Applicable Stages:
  - Design, Code, Test & Deployment
- Personnel
  - Usability Experts, approximately 1 - 4.
  - Developers, 0 - 2.
  - Users, 0.

Cognitive Walkthroughs

- Usability Issues Covered
  - Effectiveness: Yes
  - Efficiency: No
  - Satisfaction: No
- Quantitative Data is not collected.
- Can NOT be conducted remotely.
- Can be used on any system, but works best on systems that you can walk up and use systems that don't require explicit learning.

Cognitive Walkthroughs

- What is it?
- Cognitive walkthroughs involve one or a group of evaluators inspecting a user interface by going through a set of tasks and evaluate its understandability and ease of learning.
- The input to the walkthrough also include the user profile, especially the users' knowledge of the task domain and of the interface, and the task cases.
- Based upon exploratory learning methods.
  - Exploration of the user interface.

Cognitive Walkthroughs

- What is it?

- The evaluators may include
  - Human factors engineers
  - Software developers
  - People from marketing
  - Documentation, etc.

  - Best used in the design stage of development.

Cognitive Walkthroughs

- How can I do it?
- Select the participants, who will be involved?
- Select the tasks, what task will be examined?
- Select the interfaces, which interface(s) will be evaluated?

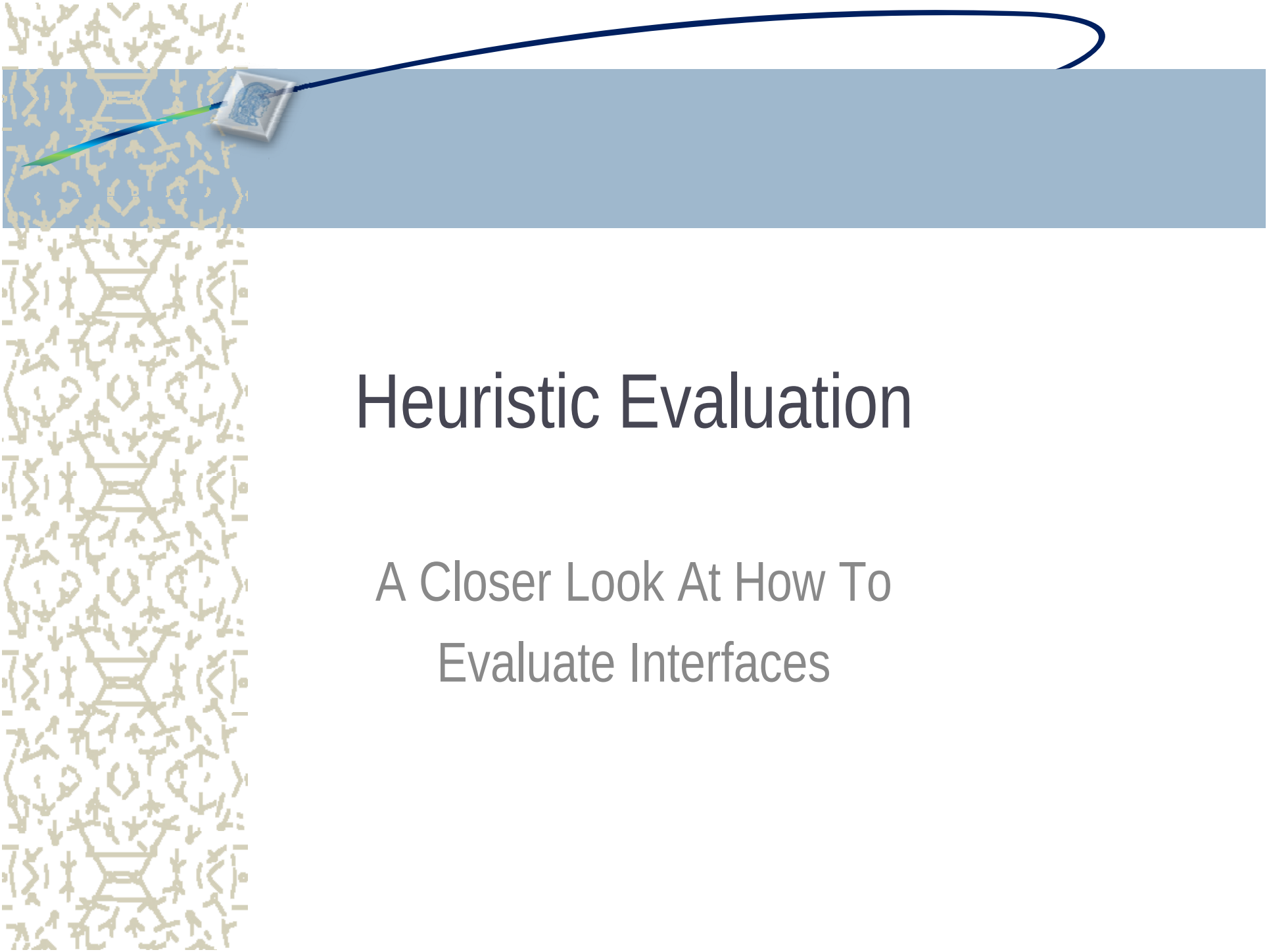
Cognitive Walkthroughs

- How can I do it?

- During the walkthrough:
  - Illustrate the task and then ask a user to perform a task.
  - Accept input from all participants: do not interrupt demo.

- After the walkthrough:
  - Make interface changes.
  - Plan the next evaluation.

- http://www.cs.umd.edu/~zzj/CognWalk.htm



Heuristic Evaluation

A Closer Look At How To Evaluate Interfaces

A Closer Look At Heuristic Evaluation

- Evaluation is easier than design.
- The principles that drive design, drive evaluation as well.

5 Human Factors Principles

1. Language
2. Layout
3. Color
4. Tone & Etiquette
5. Special Considerations such as standards, disabilities, etc.

Evaluating Language

- What is the language?
  - English, Chinese, Hindi, etc.
- Do the text messages convey a message?
  - If so, what is the message?
- Is the text long, short, organized, etc.

Evaluating Layout

- Symmetry
  - Is the interface symmetrical?
  - Left-Right, Top-Bottom, Center
- Attention & Focus
  - Where does your attention & focus go?

Evaluating Color

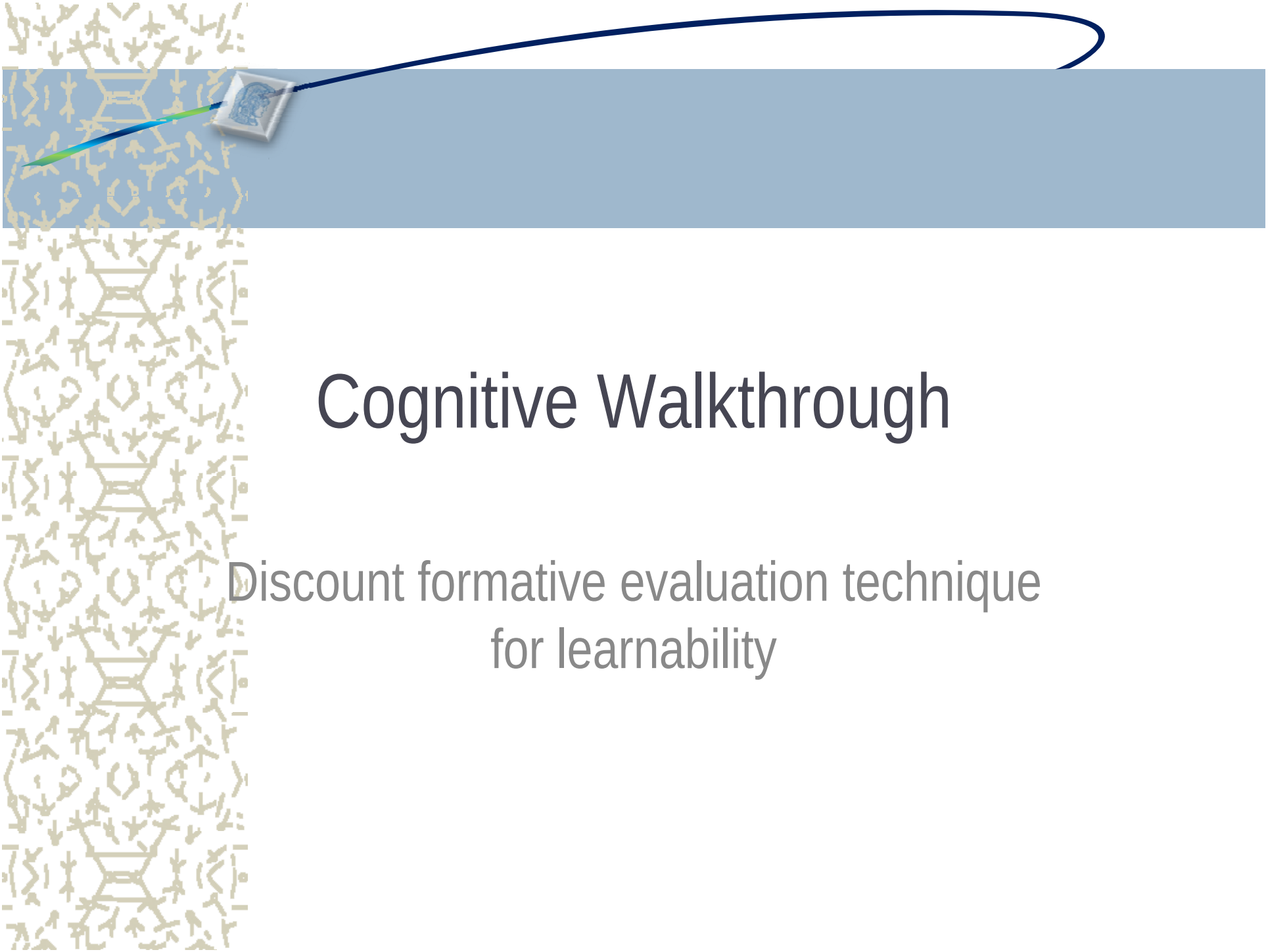
- Contrast
  - Are the color contrasts good?
- What meanings do the colors convey?
  - Pink … it's a girl.
  - Blue … it's a boy.

Evaluating Tone & Etiquette

- Is the language offensive?
- Are the messages polite?
- Will the content offend anyone?

Evaluating Special Considerations

- Features, Consistency & Standards.
- Does it work the way it is suppose to work?
- Is it consistent?
- Does it follow the standards?
  - Disabilities



Cognitive Walkthrough

Discount formative evaluation technique
for learnability

Agenda

- Announcements
  - Out of town Mon-Tues next week
- Questions
- Cognitive walkthrough
- Homework 3

Discount usability techniques

Less demanding on resources

Good candidates for project evaluation plan

- cognitive walkthrough
- heuristic evaluation

Cognitive Walkthrough

- Evaluate a design for ease of learning
  - especially via exploration
- Requires fairly detailed description of prototype
- Analogy to code walkthrough

CW Procedure

- Define inputs
- Walk through action sequences for task
- Record critical information
  - believability story

Inputs

- Define interaction tasks
- Identify users
  - what knowledge & experience
- Prototype
  - Decompose tasks into action sequences
  - Must know how interface looks for each step

Doing the walkthrough

Address each step of task sequence in turn

Formulate a believability story

- answer 4 questions

Question 1

Will the user be trying to produce whatever effect the action has?

Common supporting evidence

It is part of their original task.

They have experience using the system.

The system tells them to do it.

No supporting evidence?

Construct a failure story.

Question 2

Will the user be able to notice that the correct action is available?

Common supporting evidence

Known through experience

Visible device, such as a button

Visible representation of an action, such as a menu entry)

Question 3

Once the user finds the correct action at the interface, will she know that it is the right one for the effect she is trying to produce?

Common supporting evidence

Experience

The interface provides a prompt or label that connects the action to what she is trying to do.

All other actions look wrong .

Question 4

After the action is taken, will the user understand the feedback given?

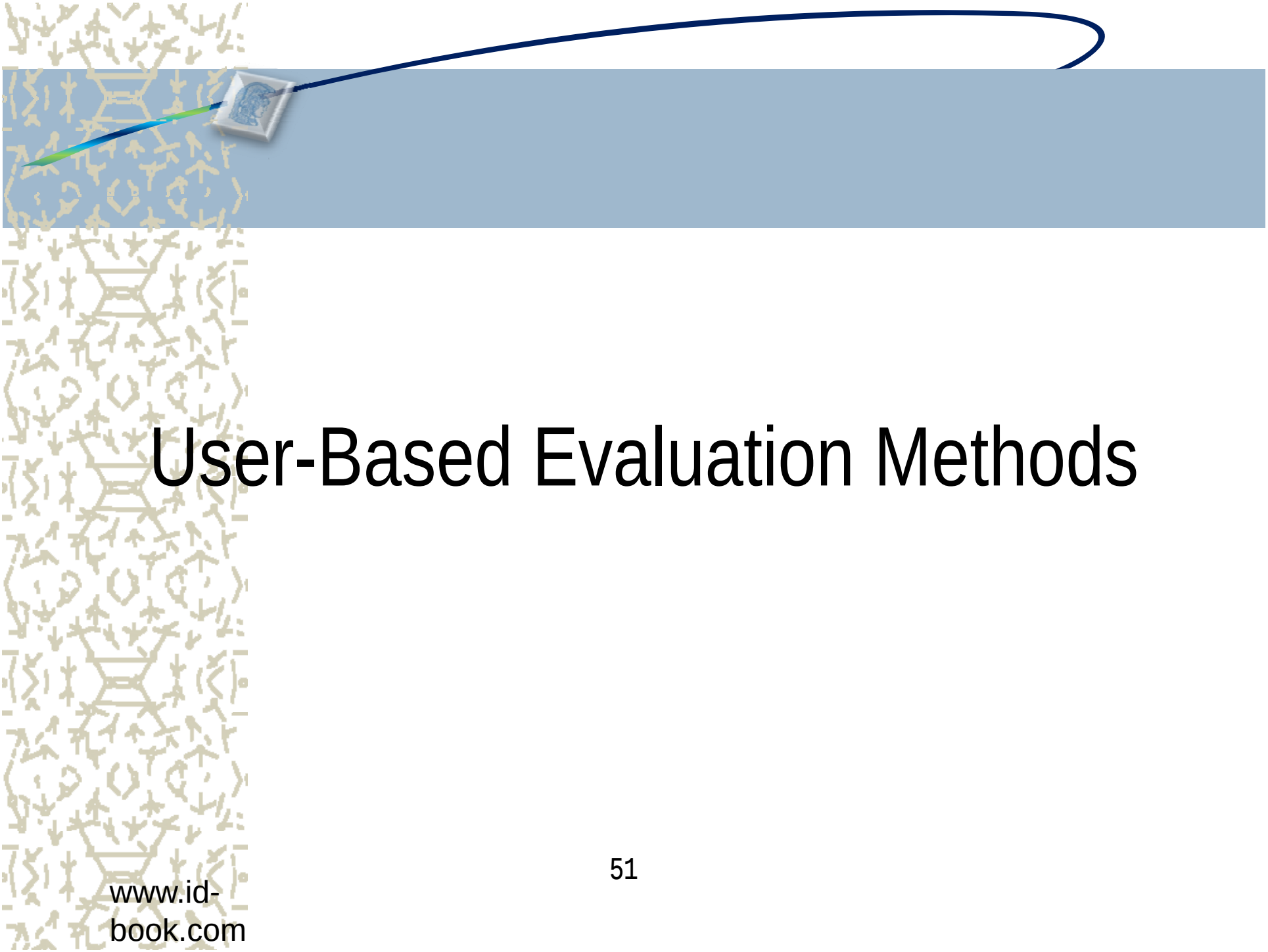
Common supporting evidence

Experience

Recognizing a connection between a system response and what she was trying to do.

Believability story

1. *Will the user be trying to produce whatever effect the action has?*
2. *Will the user be able to notice that the correct action is available?*
3. *Once the user finds the correct action at the interface, will she know that it is the right one for the effect she is trying to produce?*
4. *After the action is taken, will the user understand the feedback given?*



User-Based Evaluation Methods

Usability lab

http://iat.ubalt.edu/usability_lab/

Living labs

- People's use of technology in their everyday lives can be evaluated in living labs.
- Such evaluations are too difficult to do in a usability lab.
- Eg the Aware Home was embedded with a complex network of sensors and audio/video recording devices (Abowd et al., 2000).

Evaluation methods

Method	Controlled settings	Natural settings	Without users
Observing	X	X	
Asking users	X	X	
Asking experts		X	X
Testing	X		
Modeling			X

The language of evaluation

Analytics

Analytical evaluation

Controlled experiment

Expert review or crit

Field study

Formative evaluation

Heuristic evaluation

In the wild evaluation

Living laboratory

Predictive evaluation

Summative evaluation

Usability laboratory

User studies

Usability testing

Users or participants

Definitions

Predicted problem set = the merge of all analyst predictions

Actual problem set = the merge of all empirically derived problems

Hit = successful prediction (in predicted and actual problem sets)

Miss = unpredicted problem (in actual problem set only)

False Alarm = unsuccessful prediction (in predicted problem set only)

$$\text{Thoroughness} = \frac{\text{hits}}{\text{hits+misses}}$$

$$\text{Validity} = \frac{\text{hits}}{\text{hits+false alarms}}$$

Effectiveness = Thoroughness x Validity