

# Chapter 15

## Evaluation: Inspections, Analytics & Models

# Aims:

- Describe the key concepts associated with inspection methods.
- Explain how to do heuristic evaluation and walkthroughs.
- Explain the role of analytics in evaluation.
- Describe how to use Fitts' Law – a predictive model.

# Inspections

- Several kinds.
- Experts use their knowledge of users & technology to review software usability.
- Expert critiques can be formal or informal.
- Heuristic evaluation is a review guided by a set of heuristics.
- Walkthroughs involve stepping through a pre-planned scenario noting potential problems.

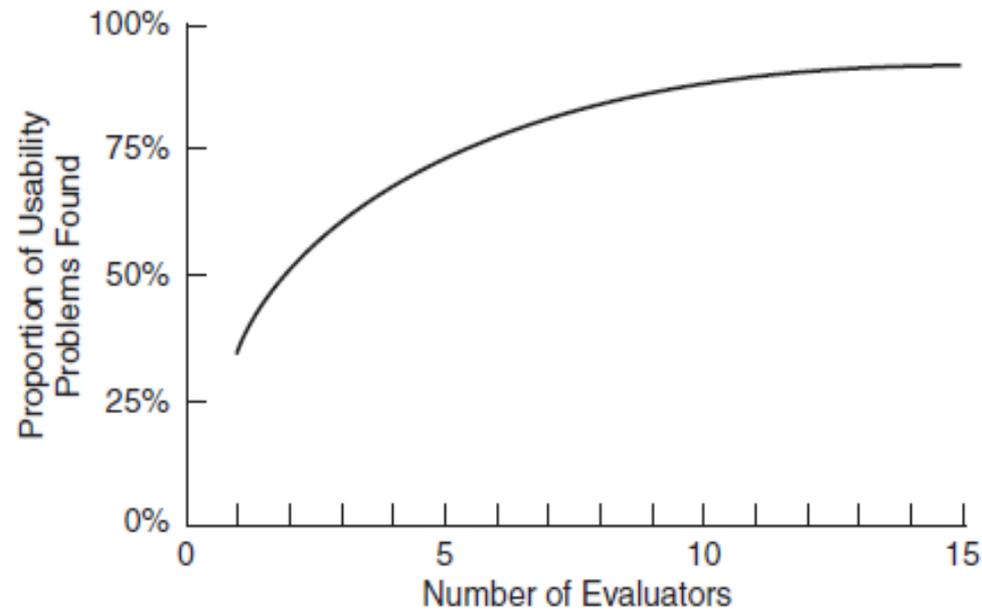
# Heuristic evaluation

- Developed by Jacob Nielsen in the early 1990s.
- Based on heuristics distilled from an empirical analysis of 249 usability problems.
- These heuristics have been revised for current technology by Nielsen and others for:
  - mobile devices,
  - wearables,
  - virtual worlds, etc.
- Design guidelines form a basis for developing heuristics.

# Revised version (2014) of Nielsen's original heuristics

- Visibility of system status.
- Match between system and real world.
- User control and freedom.
- Consistency and standards.
- Error prevention.
- Recognition rather than recall.
- Flexibility and efficiency of use.
- Aesthetic and minimalist design.
- Help users recognize, diagnose, recover from errors.
- Help and documentation.

# No. of evaluators & problems



**Figure 15.1** Curve showing the proportion of usability problems in an interface found by heuristic evaluation using various numbers of evaluators. The curve represents the average of six case studies of heuristic evaluation

*Source:* Usability Inspection Methods, J. Nielsen & R.L. Mack ©1994. Reproduced with permission of John Wiley & Sons Inc.

# Number of evaluators

- Nielsen suggests that on average 5 evaluators identify 75-80% of usability problems.
- Cockton and Woolrych (2001) point out that the number of users needed to find 75-80% of usability problems depends on the context and nature of the problems.

# Heuristics for websites focus on key criteria (Budd, 2007)

- Clarity
- Minimize unnecessary complexity & cognitive load
- Provide users with context
- Promote positive & pleasurable user experience

# Using heuristics to evaluate to evaluate ambient displays



**Figure 15.2** Two ambient devices: (a) bus indicator, (b) lightness and darkness indicator

Source: J. Mankoff, A. K. Dey, G. Hsieh, J. Kientz, Lederer and A. Morgan (2003) Heuristic evaluation of ambient devices. In *Proceedings of CHI 2003*, ACM Fig.1, p. 170. ©2003 Association for Computing Machinery, Inc. Reprinted by permission.

# 3 stages for doing heuristic evaluation

- Briefing session to tell experts what to do.
- Evaluation period of 1-2 hours in which:
  - Each expert works separately;
  - Take one pass to get a feel for the product;
  - Take a second pass to focus on specific features.
- Debriefing session in which experts work together to prioritize problems.

# Advantages and problems

- Few ethical & practical issues to consider because users not involved.
- Can be difficult & expensive to find experts.
- Best experts have knowledge of application domain & users.
- Biggest problems:
  - Important problems may get missed;
  - Many trivial problems are often identified;
  - Experts have biases.

# Cognitive walkthroughs

- Focus on ease of learning.
- Designer presents an aspect of the design & usage scenarios.
- Expert is told the assumptions about user population, context of use, task details.
- One or more experts walk through the design prototype with the scenario.
- Experts are guided by 3 questions.

# The 3 questions

- Will the correct action be sufficiently evident to the user?
- Will the user notice that the correct action is available?
- Will the user associate and interpret the response from the action correctly?

As the experts work through the scenario they note problems.

# Pluralistic walkthrough

- Variation on the cognitive walkthrough theme.
- Performed by a carefully managed team.
- The panel of experts begins by working separately.
- Then there is managed discussion that leads to agreed decisions.
- The approach lends itself well to participatory design.
- Also other adaptations of basic cognitive walkthroughs.

# Evaluation using analytics

- A method for evaluating user traffic through a system or part of a system.
- Many examples: Google Analytics (chapter 7), Visistat (shown below), Learning Analytics
- Times of day & visitor IP addresses



Figure 15.5 Clicking on May 8 provides an hourly report from midnight until 10.00 p.m. (only midnight and 2.00 p.m.–7.00 p.m. shown)

Source: <http://www.visistat.com/tracking/monthly-page-views.php>

	Unique Visitor	Views	Detail
1.	Los Angeles, California	6	[Detail]
2.	Sharpsburg, Maryland	1	[Detail]
3.	Phoenix, Arizona	3	[Detail]
4.	Lemesos, Limassol	2	[Detail]
5.	Targu-mures, Mures	1	[Detail]

Figure 15.6 Clicking on the icon for the first hour in Figure 15.5 shows where the IP addresses of the 13 visitors to the website are located

Source: <http://www.visistat.com/tracking/monthly-page-views.php>

# Social action analysis

(Perer & Shneiderman, 2008)

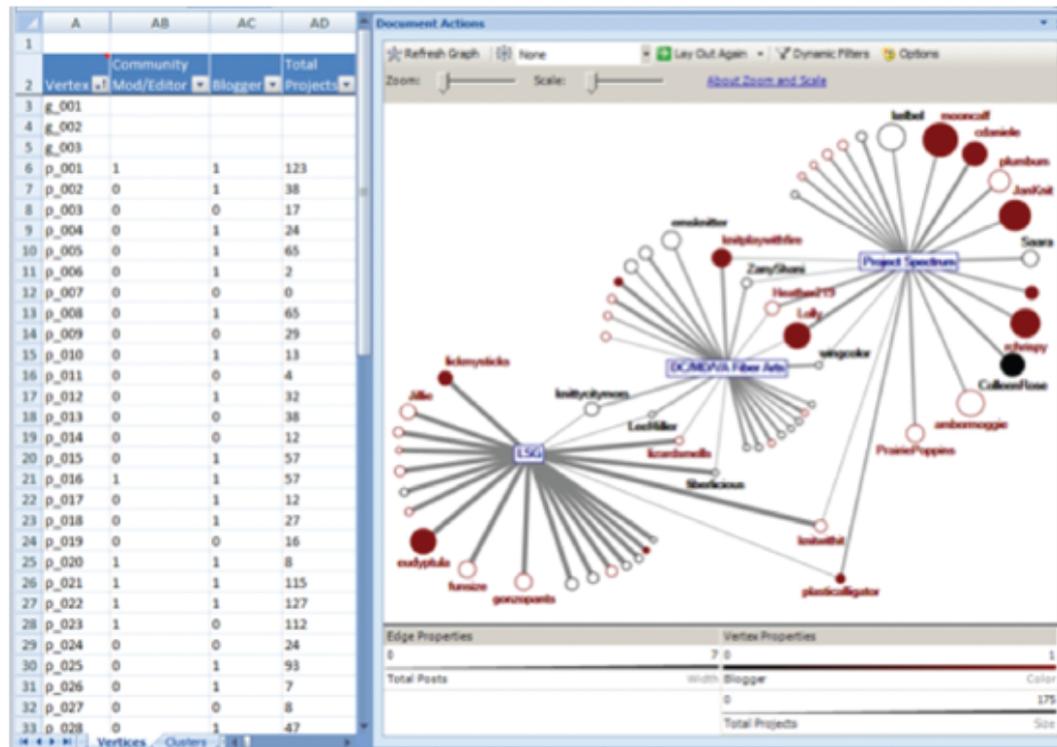


Figure 15.7 Social network analysis showing clusters and the relationships between the entities and the clusters

Source: Perer, A. and Shneiderman, B. (2008) Integrating Statistics and Visualization: Case Studies of Gaining Clarity during Exploratory Data Analysis. *CHI 2008 Proceedings*. Visual Synthesis April 5–10, 2008, 265–274. ©2008 Association for Computing Machinery, Inc. Reprinted by permission.

# Predictive models

- Provide a way of evaluating products or designs without directly involving users.
- Less expensive than user testing.
- Usefulness limited to systems with predictable tasks - e.g., telephone answering systems, mobiles, cell and smart phones.
- Based on expert error-free behavior.

# Fitts' Law (Fitts, 1954)

- Fitts' Law predicts that the time to point at an object using a device is a function of the distance from the target object & the object's size.
- The further away and the smaller the object, the longer the time to locate it and point to it.
- Fitts' Law is useful for evaluating systems for which the time to locate an object is important, e.g., a cell and smart phones, a handheld and mobile devices.

# Key points

- Inspections can be used to evaluate requirements, mockups, functional prototypes, or systems.
- User testing & heuristic evaluation may reveal different usability problems.
- Design guidelines can be used to develop heuristics
- Walkthroughs are focused so are suitable for evaluating small parts of a product.
- Analytics involves collecting data about users activity on a website or product
- Fitts' Law can be used to predict expert, error-free performance for clearly defined tasks with limited key presses, eg. data entry and smart phone use.