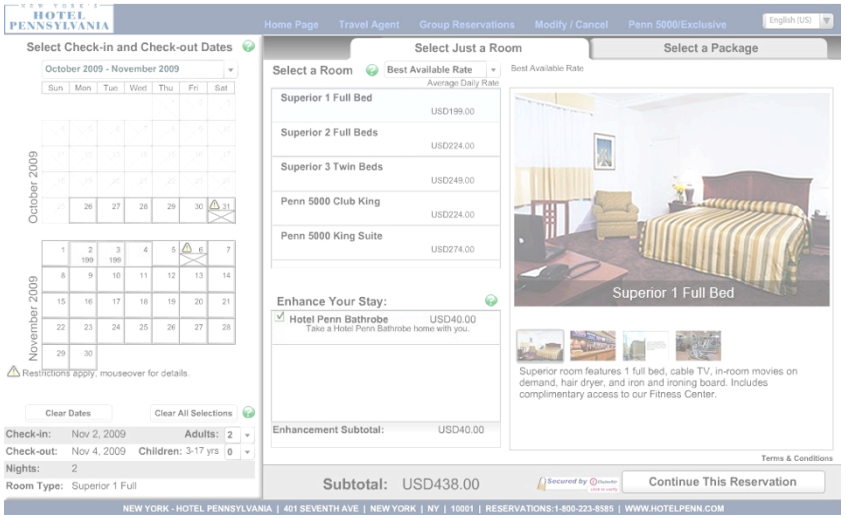
CMSC737 Software Testing



Usability Testing:

What Have We Overlooked?

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What is usability?

- *"How well users can learn and use a product to achieve their goals and how satisfied they are with that process"*
- Cannot be directly measured; quantified by means of indirect measures or attributes:
  - The number of reported problems
  - Ease of learning
  - Efficiency of use
  - Memorability
  - Error frequency and severity
  - Subjective satisfaction

Terminology

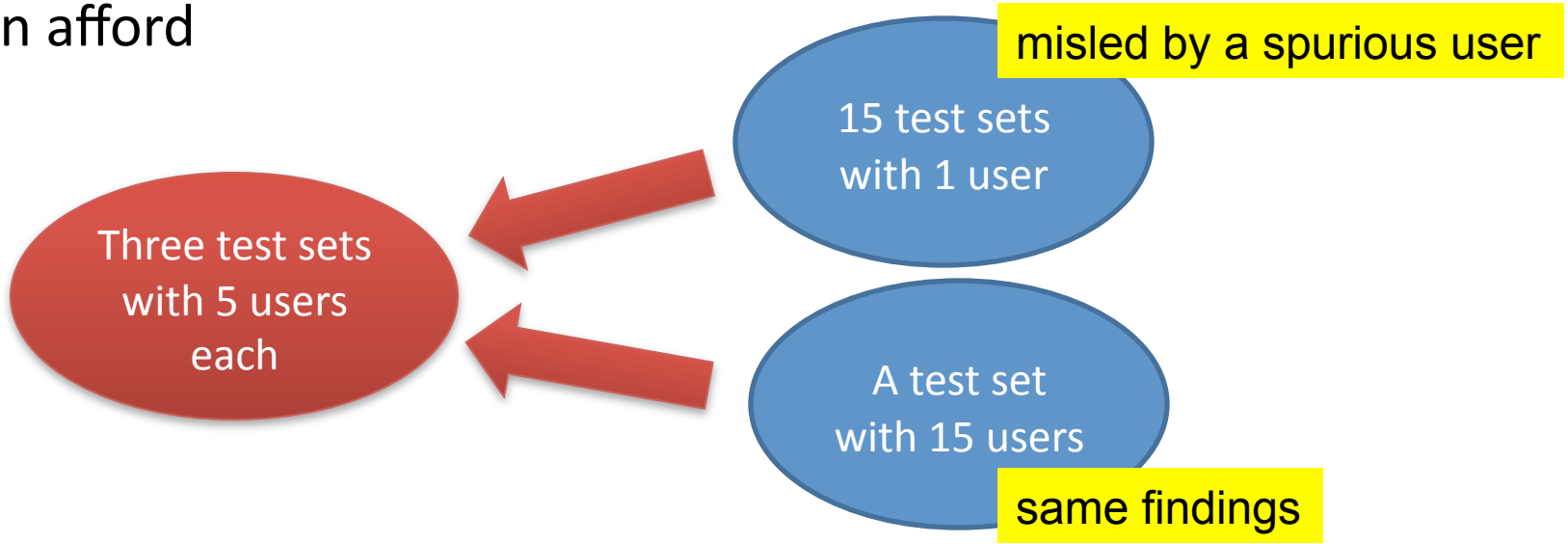
- Usability Testing: to evaluate a product by testing it on representative users from the target audience through specific tasks
- Expert Review: performed by usability experts to identify potential usability problems
- Return On Investment (ROI) of Usability: The returns from usability improvement against added efforts/costs (time & money)

Usability Testing vs. Expert Review

	Usability Testing	Expert Review
Who conducts?	Representative people from target audience	A couple of Usability Experts
Useful	When finding real usability problems	When finding violations of usability/design standards
Length	4-6 weeks	1-3 weeks
Disadvantage	-Expensive and Time consuming -Heavily depends on identifying right target group, accuracy of testing protocol	-False Positives -Miss the real problems that cause users to fail tasks

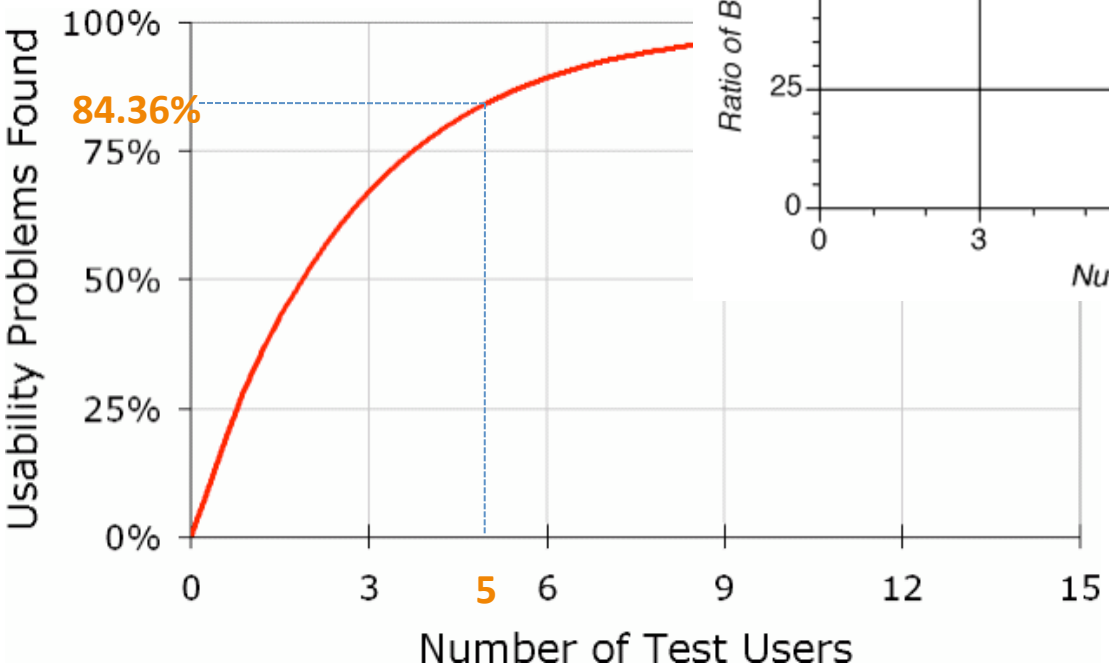
Jakob Nielsen: the Magic Number 5

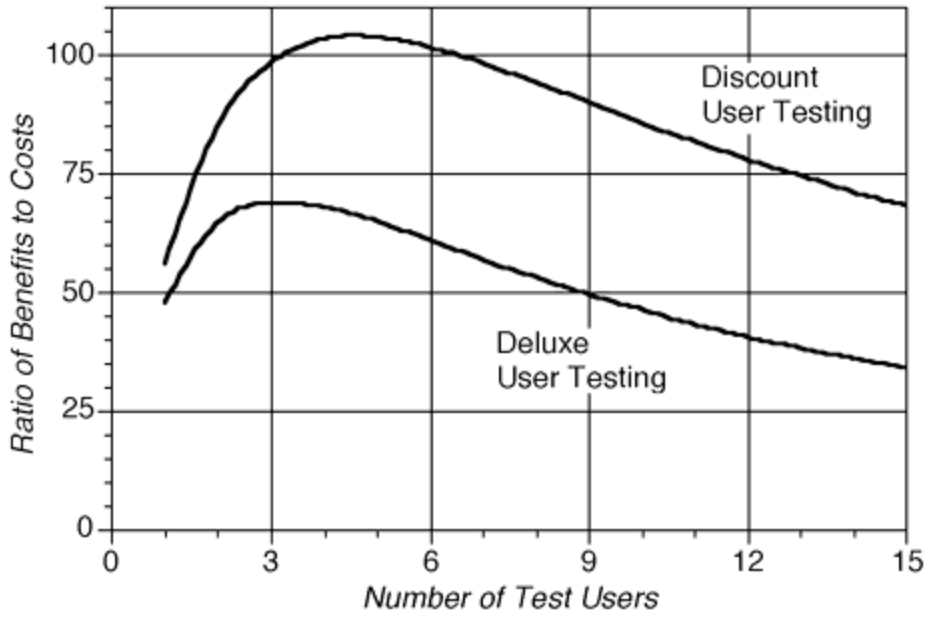
- Usability tests are very costly and complex?
  - Not True
  - *"Elaborate usability tests are a waste of resources"*
- No more than 5 users and running as many small tests as you can afford



Jakob Nielsen: the Magic Number 5

- "Discount usability" model
- The proportion of Usability
  - L: usability problems found b
  - n: number of test users





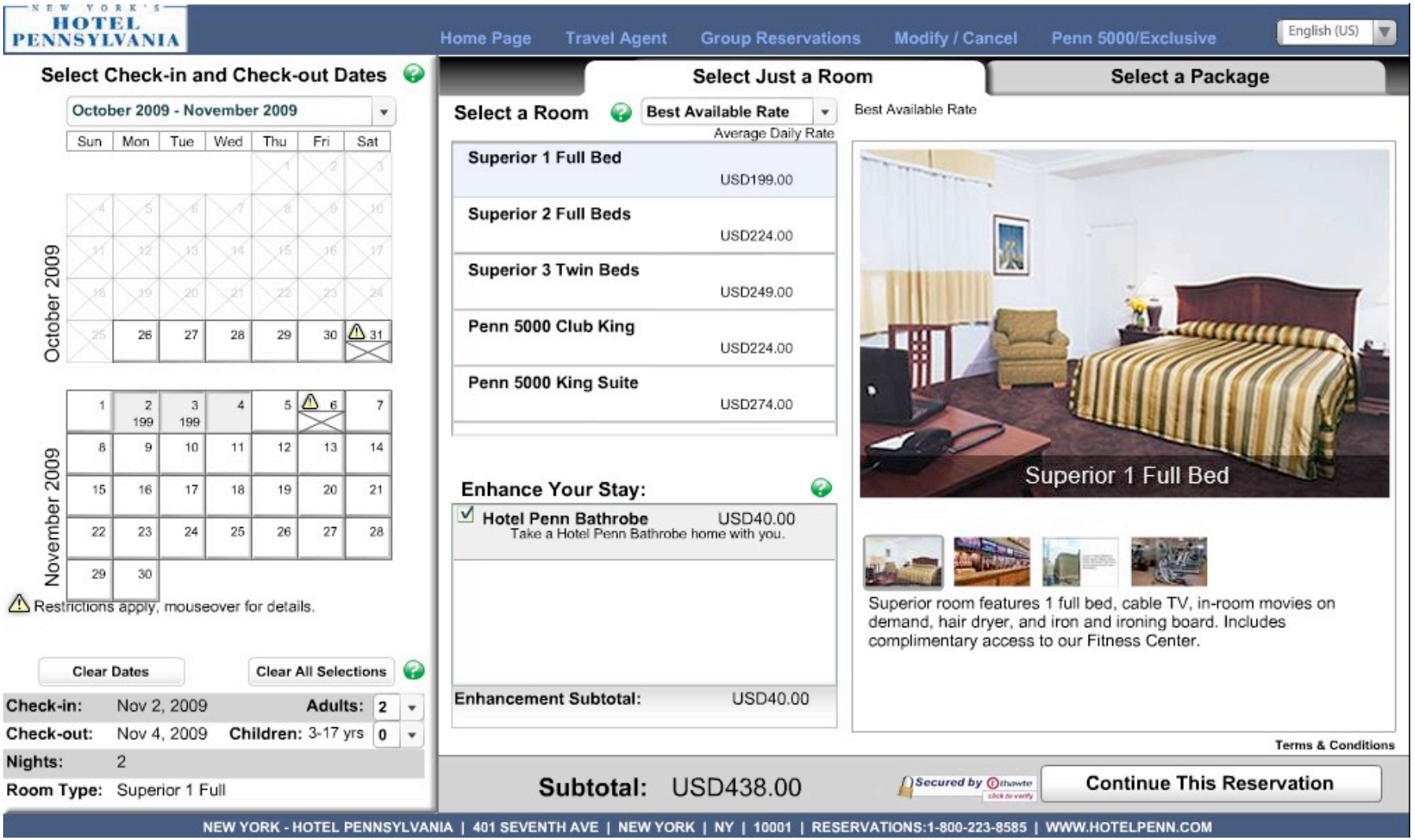
Conflicts against the magic number

- Arguing against the five-user guideline in terms of the claim on statistical methods: $1-(1-L)^n$
  - A typical L, 31% exists? (varies from 8% to 51%)
  - As the number of participants is increasing, is the proportion of usability problems found increasing?
- Some empirical researches show that testing the first five uncovered much lower percentages (Spool: 35%, Faulkner: 55%) of usability problems than 85% as Nielsen claimed.

Usability Testing: What Have We Overlooked?

- Gitte Lindgaard & Jarinee Charttratichart
- CUE: Comparative Usability Evaluation, to collect data for usability methods and techniques
- CUE-4: 17 professional teams to evaluate www.hotelpenn.com (9 teams: usability testing, 8 teams: expert review)

Usability Testing: What Have We Overlooked?



Research Questions

- There is a correlation between number of users and the proportion of problems found.
- There is a correlation between number of user tasks and the proportion of problems found.

Methods

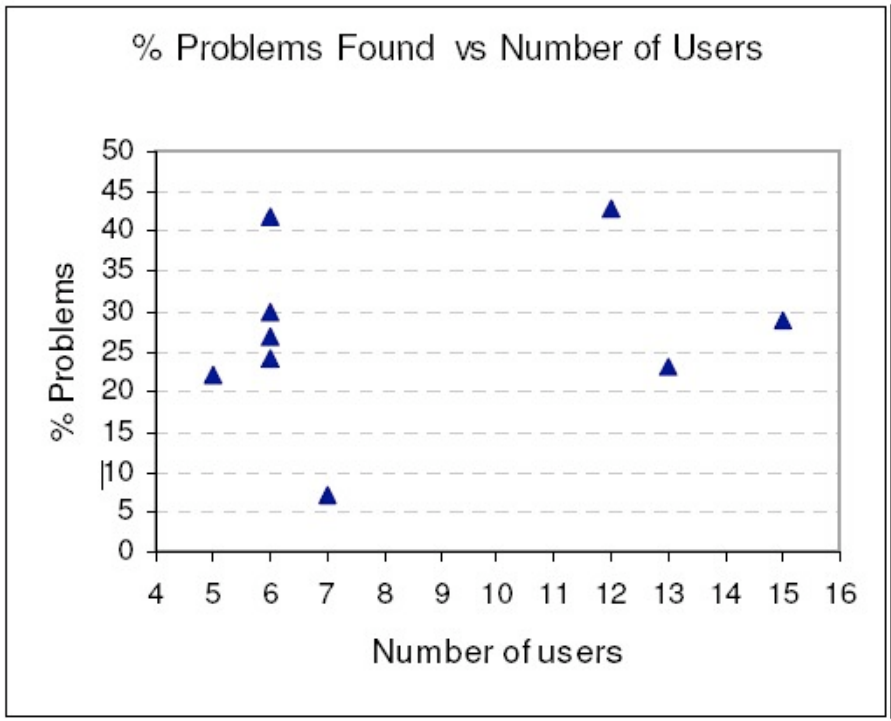
- Think-aloud Method
- 9 teams with different number of users

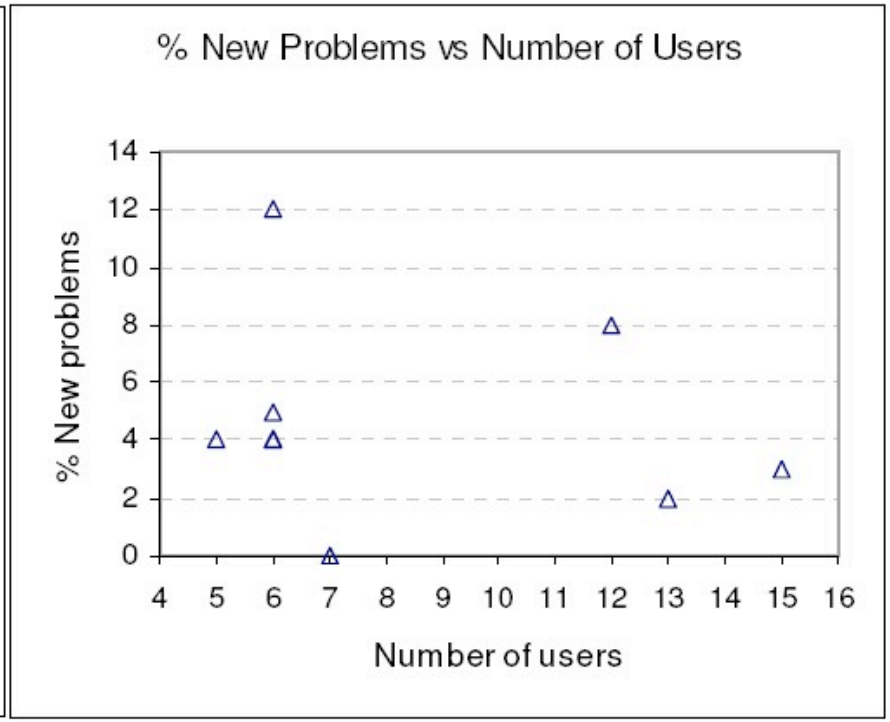
Team	A	H	J	K	L	M	N	O	S
# of Users	6	12	7	5	6	15	13	6	6

- Analyze Tasks and Scenarios
  - Task goal, e.g., Find an available room
  - User task, e.g., Check room availability of a particular room type on a certain date; check room availability for the following year, …
  - User task token, e.g., going back to the home page; making a reservation for a family of three from June 28 to July 5
- Analyze the problems reported by each usability test team

Results

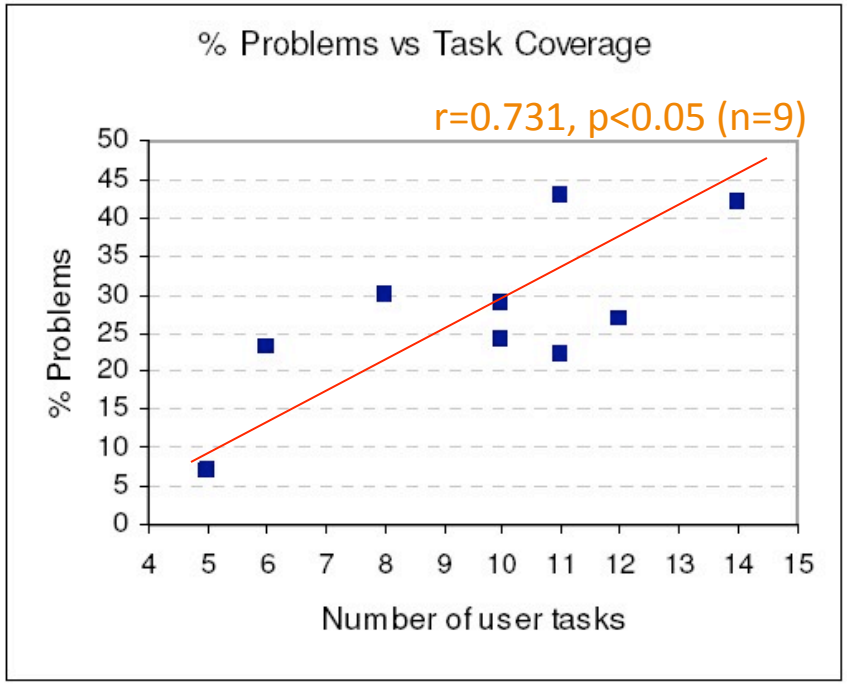
- Number of Users & Usability Problems found
  - No significant correlation

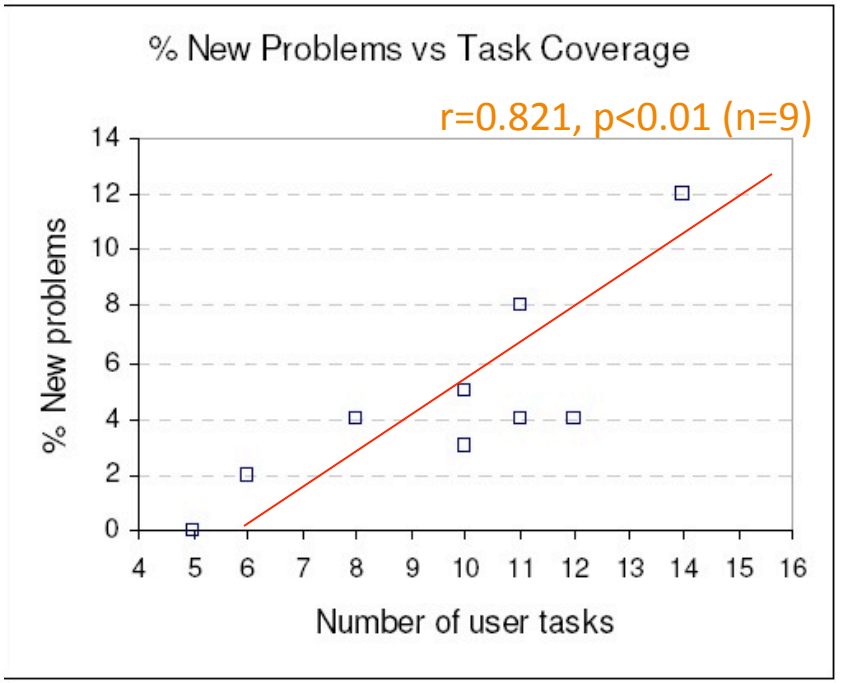




Results

- Number of Users & Usability Problems found
  - Correlation exists





Analysis on Results

Team	A	H	J	K	L	M	N	O	S
# of Users	6	12	7	5	6	15	13	6	6
# of user tasks	14	11	5	11	12	10	6	10	8
Problems Found(%)	42	43	7	22	27	29	23	24	30
% New problems	12	8	0	4	4	3	2	5	4

- Correlation between the number of users and the proportion of problems found was not supported
- Correlation between the number of tasks ands the proportion of problems found was upheld
- 5 user claim was not supported (85% of the problems found)
- Role of participant recruitment (Team A & Team L)

Summary

- What we have overlooked: Other contributing factors to improve usability such as task coverage and participant recruitment rather than sample size
  - Usability investigation on important target users & the most critical tasks
- If the goal of usability testing is to gather qualitative insights to improve products, one or two individual observations can provide them
- Nielsen's claim is useless?
  - In overall, the magic number 5 can be applied as one of quantitative assessment
  - To demystify the concept that usability testing is very costly at that time

References

- Gitte Lindgaard , Jarinee Chattratichart, Usability testing: what have we overlooked?, Proceedings of the SIGCHI conference on Human factors in computing systems, April 28-May 03, 2007, San Jose, California, USA
- Nielsen, J. Why you only need to test with 5 users, Jakob Nielsen's Alertbox, March 19, 2000, http://www.useit.com/alertbox/20000319.html
- Faulkner, L. Beyond the five-user assumption: Benefits of increased sample sizes in usability testing. Behavior Research Methods, Instruments & Computers, 35, 3, Psychonomic Society (2003), 379—383
- Jared Spool , Will Schroeder, Testing web sites: five users is nowhere near enough, CHI '01 extended abstracts on Human factors in computing systems, March 31-April 05, 2001, Seattle, Washington