Translational User Research: Turning Results into Quick Fixes and New Visions

NEASIST Service Design, 1/12/2017
Rong Tang

Agenda

- Types of Usability Data
- Usability Measures
- Data Analysis and coding
- Group activity
- Preliminary Recommendation and Final Recommendation
- More sources of data: Heuristic Evaluation & Content Inventory
- Tools for visualizing recommended changes
- Group Activity

The Usability Testing Process

by Abhay Rautela, ConeTrees.com

Stage 1: Plan the Usability Test

Stage 2.1: Create Scenarios & Tasks

Stage 2.2: Recruit Participants

Stage 3: Conduct the Usability Test

Stage 4: Analyze Usability Test Data

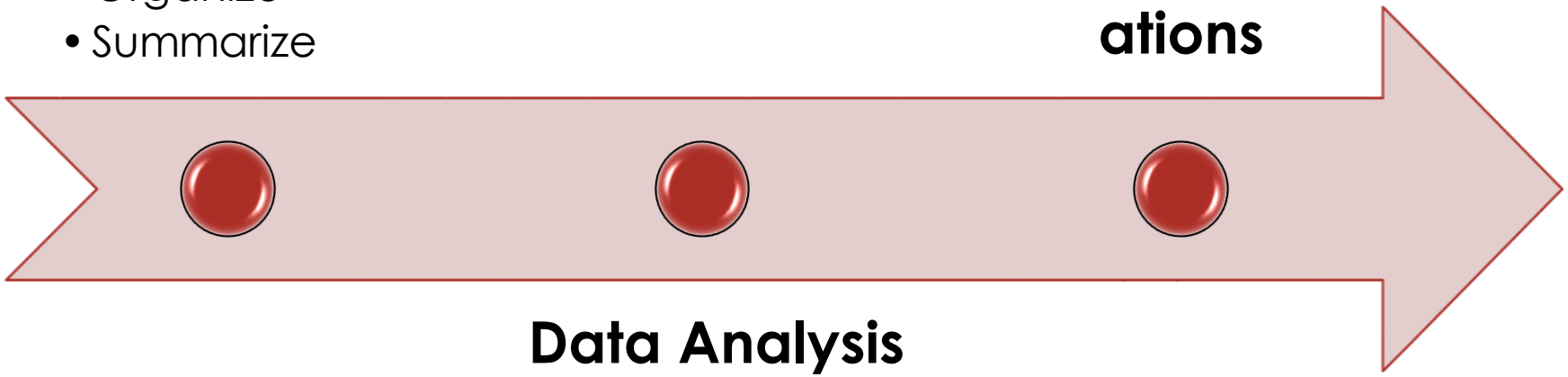
Stage 5: Create & Present the Usability Test Report

Stage 6: Check whether accepted recommendation have been incorporated

Handling Usability Data

Data Processing & Coding

- Compile
- Organize
- Summarize



Results & Recommendations

Data Analysis

- Preliminary
- Comprehensive

Types of Usability Data

By Focus

- Performance Data
- Preference Data

By Type

- Quantitative (numerical)
- Qualitative (narrative)

By Level of Process

- Raw data
  - Recordings
  - Pre-session, post-task, post-session Responses
  - Handwritten otes
- Processed
- Analyzed
- Synthesized
- Published

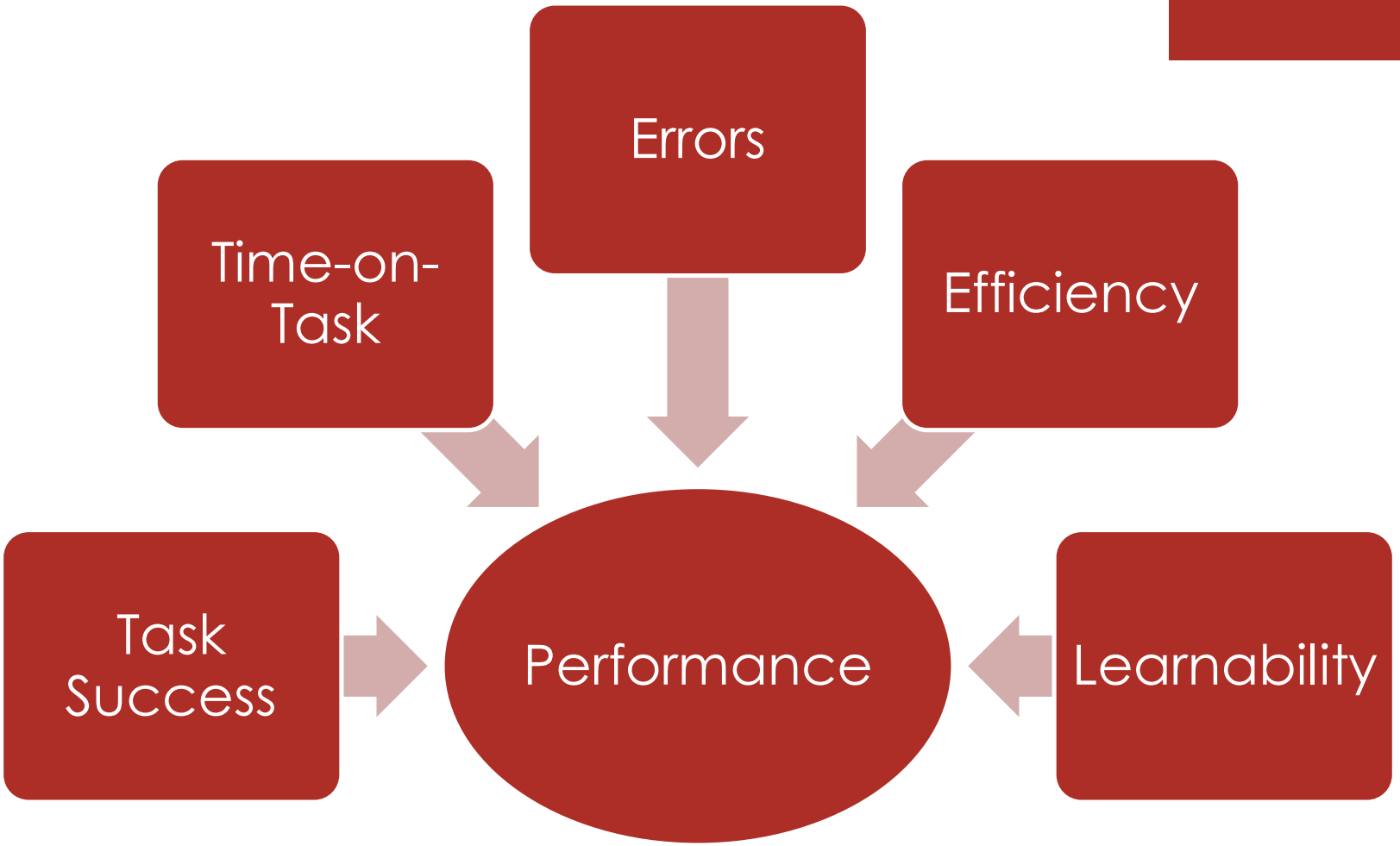
Usability Measures

Shackel (1986) Booth (1989)	Nielsen (1993)	ISO-9241-11 (1998)	Quesenbery (2003)
Effectiveness	Memorability	Effectiveness	Effectiveness
	Error		Error Tolerance
Learnability	Learnability		Easy to learn
Flexibility -- Usefulness	Efficiency	Efficiency	Efficiency
Attitude – Likeability	Satisfaction	Satisfaction	Engaging

Summarize Performance Data
(Rubin & Chisnell, 2008)

- Task accuracy
  - % of tasks performed successfully by person
  - % of participants performed successfully by task (The 70% criterion)
  - % performing successfully within a time benchmark
- Task timing
  - Mean time to complete
  - Median time to complete
  - Range of completion time
  - Standard deviation of completion times

Performance Metrics
(Tullis & Albert, 2008)



Usability Metrics: Performance (Tullis & Albert, 2008)

Performance Metrics	Measures or Levels	Score or calculations
Task Success	Complete Success (without assistance)	1
	Partial Success	0.5
	Failure (give up or wrong answer)	0
Time on Task	Mean or Median; Range; Threshold	
Errors	• Entering incorrect data into a form field • Making the wrong choice in a menu Taking an incorrect sequence of actions • Failing to take a key action	Count error frequency by task
Learnability	Collecting data multiple times (trails) • Trials within the same session • Trials within the same session but with breaks between tasks • Trials between sessions	

Usability Metrics: Performance (Tullis & Albert, 2008)

Performance Metrics	Measures or Levels	Score or calculations
Efficiency	Time on Task	Min or Sec
	Number of clicks	Average clicks/task
	Lostness $L = \sqrt{(N/S-1)^2 + (R/N-1)^2}$ • Number of different web pages visited while performing the task (N) • The *total* number of pages visited while performing the task, counting revisits to the same page (S) • The *minimum* (optimum) number of pages that must be visited to accomplish the task (R)	Perfect score =0 <0.4 participants not appear to be lost; >0.5 participants appear to be lost
Core efficiency measure $= \frac{\text{Task Completion Rate}}{\text{Mean Time Per Task}}$		

Learnability Chart
(Tullis & Albert, 2008)

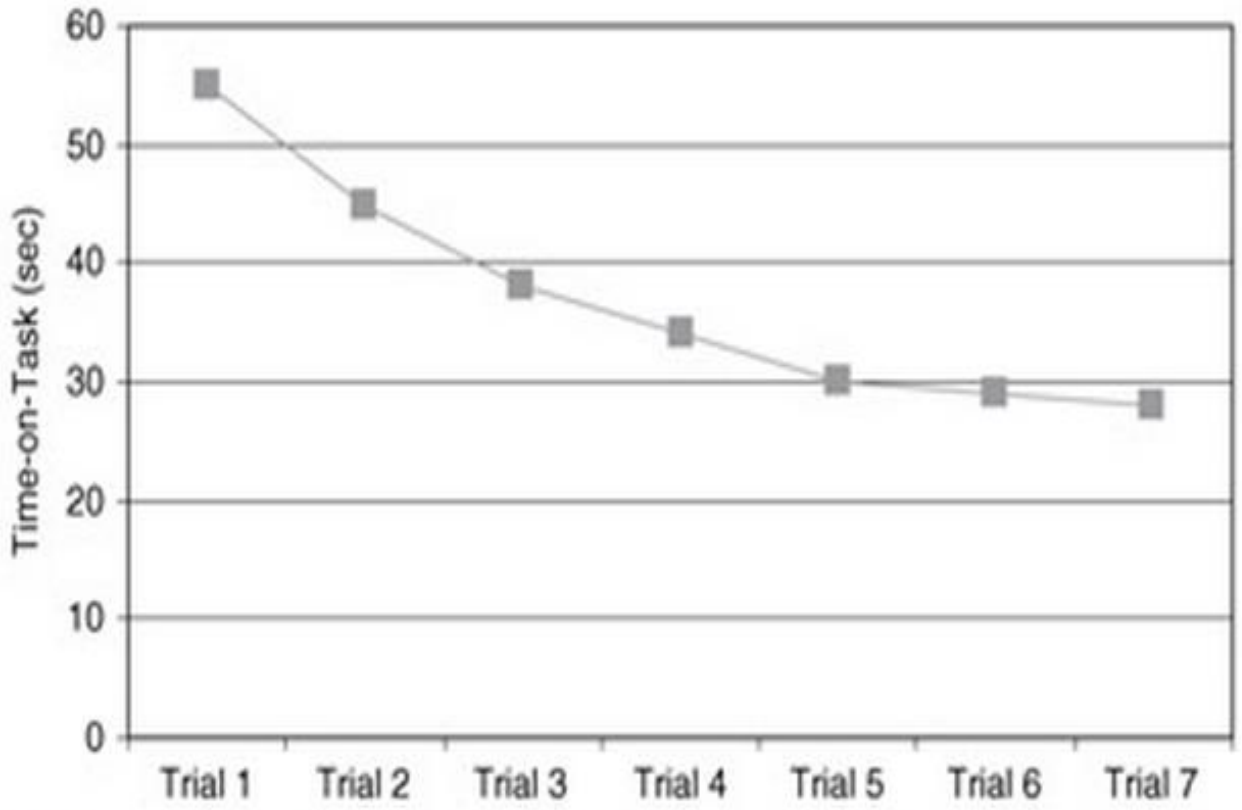


Figure 4.13: An example of how to present learnability data based on time-on-task.

Efficiency Measures

Table 4.1: Time-on-Task Data for 20 Participants and 5 Tasks

Open table as spreadsheet

Participant	Task 1	Task 2	Task 3	Task 4	Task 5
P1	259	112	135	58	8
P2	253	64	278	160	22
P3	42	51	60	57	26
P4	38	108	115	146	26
P5	33	142	66	47	38
P6	33	54	261	26	42
P7	36	152	53	22	44
P8	112	65	171	133	46
P9	29	92	147	56	56
P10	158	113	136	83	64
P11	24	69	119	25	68
P12	108	50	145	15	75
P13	110	128	97	97	78
P14	37	66	105	83	80
P15	116	78	40	163	100
P16	129	152	67	168	109
P17	31	51	51	119	116
P18	33	97	44	81	127
P19	75	124	286	103	236
P20	76	62	108	185	245
Average	**86.6**	**91.5**	**124.2**	**91.35**	**80.3**
Median	**58.5**	**85**	**111.5**	**83**	**66**

Table 4.2: Calculating an Efficiency Metric

Open table as spreadsheet

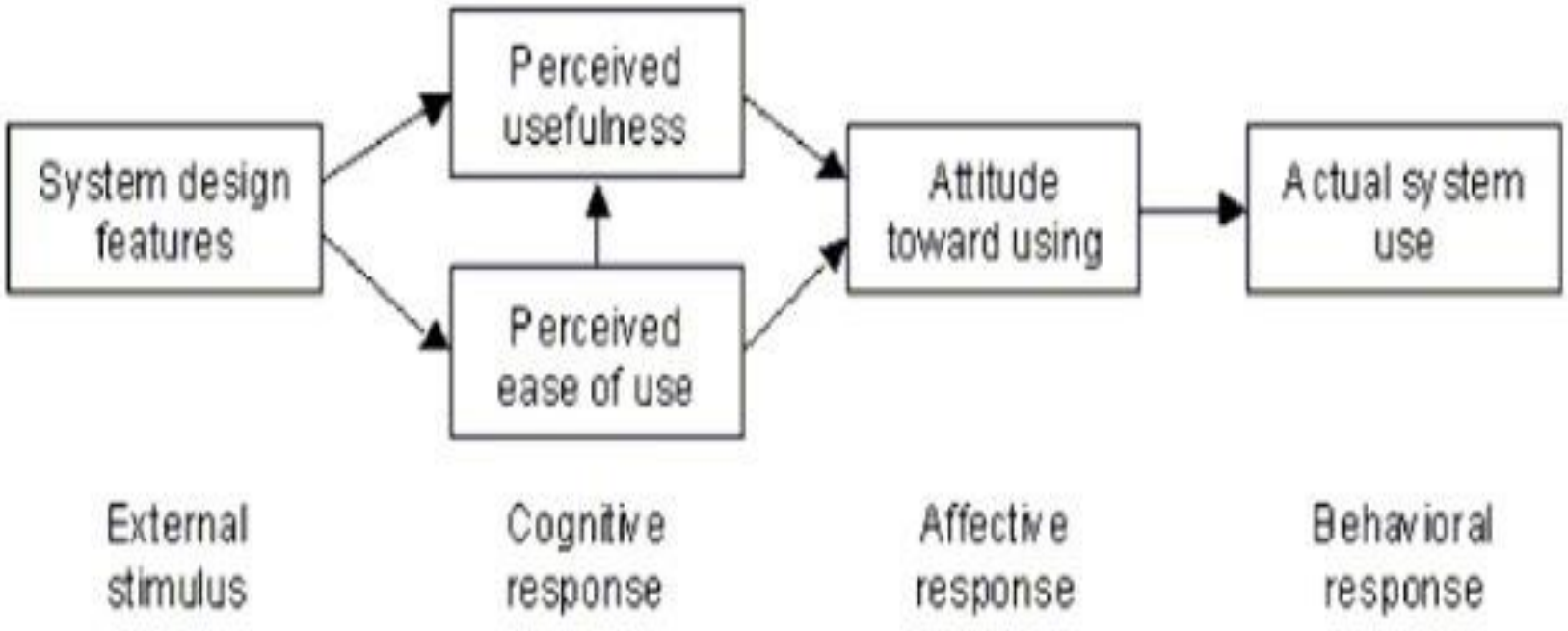
Task	Completion Rate Percentage	Task Time (mins)	Percent Efficiency
1	65	1.5	43
2	67	1.4	48
3	40	2.1	19
4	74	1.7	44
5	85	1.2	71
6	90	1.4	64
7	49	2.1	23
8	33	1.3	25

Summarize Preferences Data
(Rubin & Chisnell, 2008)

- Preference data
  - Satisfaction rating
  - Ease of use rating
  - Usefulness rating
  - Likelihood to reuse or recommend to colleagues/friends
- Other measures
  - Number of time returning to main navigation unnecessarily
  - Number of hints and prompts
  - Number of times the site map was accessed
  - Points of hesitations (and for how long)

Usefulness & EOU in TAM

(Davis, F. D.1993. User Acceptance of Information Technology: System characteristics, user perceptions, and Behavioral Impact. International Journal of Man-Machine Studies. *38,* 475-487)



Usefulness

Laitenberger & Dreyer. 1998. Evaluating the Usefulness and the Ease of Use of a Web-based Inspection Data Collection Tool. *IEEE Computer Society.*

- Using the product in my job would enable me to accomplish tasks more quickly (Quick).
- Using the product would improve my job performance (Job performance).
- Using the product in my job would increase my productivity (Increase productivity).
- Using the product would enhance my effectiveness on the job (Effectiveness).
- Using the product would make it easier to do my job (Makes job easier).
- I would find the product useful in my job (Useful).

Ease of Use

Laitenberger & Dreyer. 1998. Evaluating the Usefulness and the Ease of Use of a Web-based Inspection Data Collection Tool. IEEE Computer Society.

- Learning to operate the product would be easy for me (Easy to learn)
- I would find it easy to get the product to do what I want it to do (Clear and understandable).
- My interaction with the product would be clear and understandable (Controllable).
- It was easy to become skillful using the product (Skillful).
- It is easy to remember how to perform tasks using the product (Remember).
- I would find the product easy to use (Easy to use).

Usability Test Observation Coding Form

Date: _____ Participant ID: _____ Task #: _____

Start Time: _____ End Time: _____

Verbal Behaviors

				Notes
☐	☐	☐	Strongly positive comment	
☐	☐	☐	Other positive comment	
☐	☐	☐	Strongly negative comment	
☐	☐	☐	Other negative comment	
☐	☐	☐	Suggestion for improvement	
☐	☐	☐	Question	
☐	☐	☐	Variation from expectation	
☐	☐	☐	Stated confusion	
☐	☐	☐	Stated frustration	

Other: _____

Non-verbal Behaviors

				Notes
☐	☐	☐	Frowning/Grimacing/Unhappy	
☐	☐	☐	Smiling/Laughing/Happy	
☐	☐	☐	Surprised/Unexpected	
☐	☐	☐	Furrowed brow/Concentration	
☐	☐	☐	Evidence of Impatience	
☐	☐	☐	Leaning in close to screen	
☐	☐	☐	Variation from expectation	
☐	☐	☐	Fidgeting in chair	
☐	☐	☐	Random mouse movement	
☐	☐	☐	Groaning/Deep sigh	
☐	☐	☐	Rubbing head/eyes/neck	

Other: _____

Task Completion Status:

Incomplete:

- ☐ Participant gave up
- ☐ Task "called" by moderator
- ☐ Thought complete, but not

Complete:

- ☐ Fully complete
- ☐ Complete with assistance
- ☐ Partial completion

Notes:

Emotion Heuristics
(Lera & Garreta-Domingo, 2007)

Emotion	A Sign of …
Frowning	A necessity to concentrate, displeasure or of perceived lack of clarity
Brow Raising	Uncertainty, disbelief, surprise and exasperation
Gazing Away	Deception. Looking down convey a defeated attitude, also reflect guilt, shame or submissiveness
Smiling	Satisfaction; an element of joy
Compressing the lip	Frustration and confusion; anxious feelings
Moving the Mouth	Being lost and of uncertainty
Expressing Vocally	Sighs, gasps, coughs… are signs of frustration or deceptions
Hand Touching the Face	Confusion and uncertainty: being lost or tired

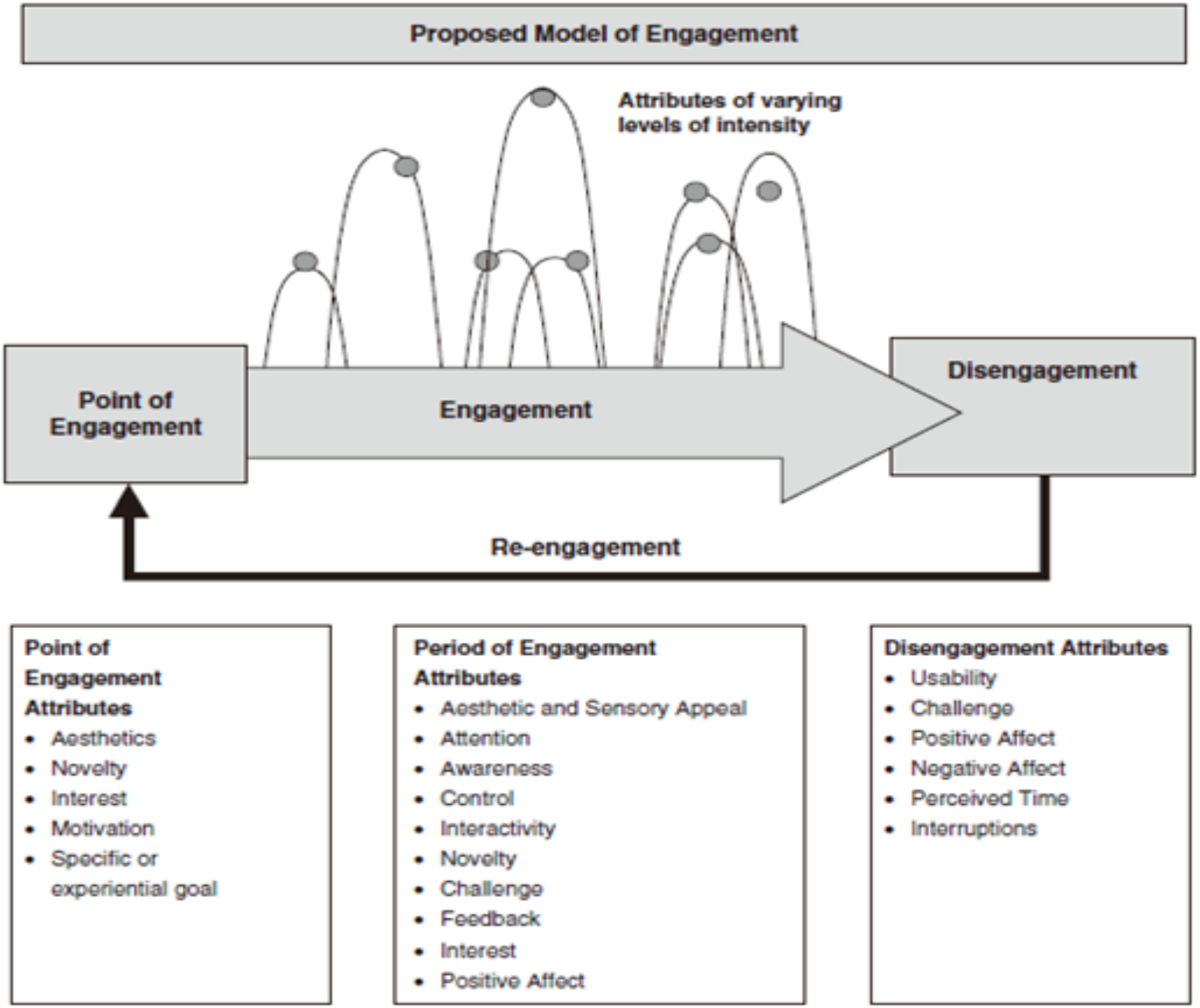


FIG. 1. Proposed model of engagement and its attributes.

Analyze data (Rubin & Chisnell, 2008)

- Identify tasks that did not meet the success criterion (70% success)
- Identify user errors and difficulties
  - Error can be defined as any divergence by a user from an expected behavior
- Conduct a source of error analysis:
  (1) the flow of transaction (mismatch in users' mental model)
  (2) information architecture (used domain specific language unfamiliar to users)
- Prioritize problems
- Analyze differences between groups or product versions

Prioritize Problems

- **Criticality** = Severity + Probability of Occurrences
- **Severity Scales**

	1	2	3	4
Severity Scale 1	Irritant	Moderate	Severe	Unusable
Severity Scale 2	No problem	Minor hindrance	Serious problem	Task failure

- Frequency of occurrences of the Problem
  - The percentage of total users affected
  - The probability that user from that affected group will experience the problem

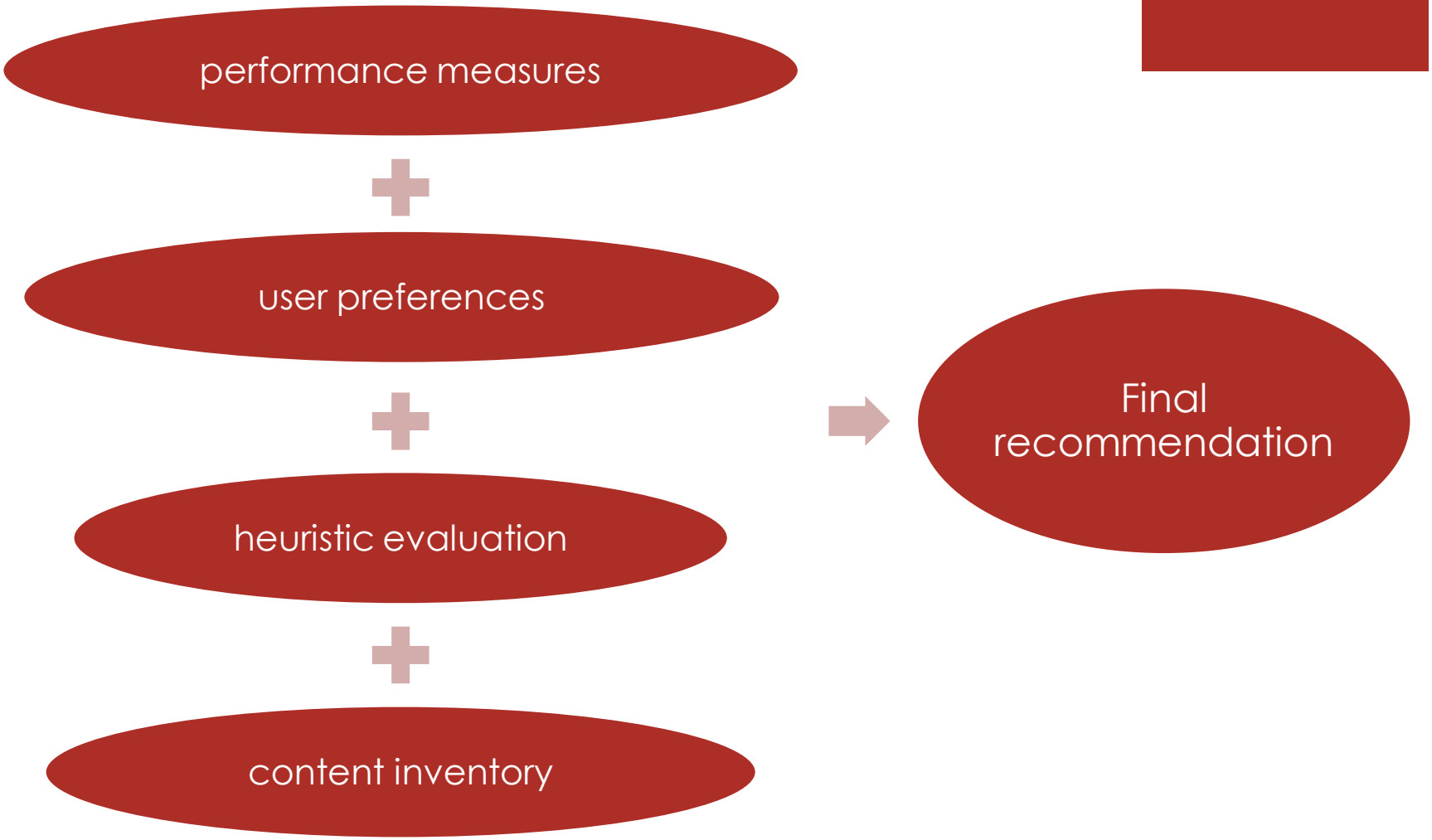
Data Analysis Processes (Rubin & Chisnell, 2008)

- **Preliminary** Analysis
  - Focus: quickly ascertain the hot spots
  - Timing: Immediately after the testing is complete
  - Deliverable: short written report or verbal presentation on findings and recommendations
  - Purpose: eliminate the noises to see larger trends/patterns
- **Comprehensive** Analysis
  - Focus: include all the analyses and findings
  - Timing: 2 to 4 weeks after the test
  - Deliverable: final, exhaustive report

Recommendations

- **Preliminary recommendations**
  - Must be timely, typically after the user testing
  - Must be thorough and not missing anything important
  - Should avoid being taken as the final recommendations
  - Focus on translatable solutions and doable quick-fixes
- **Final recommendations**
  - After triangulate results from multiple sources of evidences
    - Usability tests
    - Heuristic Evaluation
    - Content inventory
  - Comprehensive, focus more on conceptual changes and fundamental restructuring

From Results to Final Recommendations



Data Processing & Analysis Plans: Group Activity

- You are asked to evaluate the usability of google flight site. (https://www.google.com/flights/)
  - What kind of measures will you collect data on?
  - Which usability measures are more important than others?
  - How would you process and analyze your data based on the data processing, coding, and analysis plan?
  - After you review the site, what quick fixes will you recommend?
  - What problems are more in-depth and may need a complete revamp

More Data Sources: User Inspection (Nielsen & Mack, 1994)

- User Inspection Methods:
  - Heuristic evaluation
  - Heuristic estimation
  - Cognitive walkthrough
  - Pluralistic walkthrough
  - Feature inspection
  - Consistency inspection
  - Standards inspection
  - Formal usability inspection

Nielsen's 10 Heuristics (Nielsen, 1994)

- Visibility of system status.
- Match between system and the 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, and recover from errors.
- Help and documentation.

Severity Rating (Nielsen, 1994)

0 = I don't agree that this is a usability problem at all

1 = Cosmetic problem only

2 = Minor usability problem

3 = Major usability problem

4 = Usability catastrophe

HE Example: BPL

Usability Heuristic Used: Gerhardt-Powals
Severity Levels: 5 pt

Heuristic Number	Problems Identified	Severity Rating
1	**Map zoom feature** Many mouse clicks, mobile and trackpad zooming malfunctions. Requires user to continually refine search	4
2	**Reduce uncertainty** Map does not have legend. Not possible to search within map - only possible to zoom. Duplicate images of world continents leads to confusion of which to zoom into. Other continents are in different languages so not possible for non-native speakers to understand their map location.	4
3	**Fuse data** Spiral feature is confusing, doesn't condense the results.	3

Content Inventory

(source: https://www.usability.gov/how-to-and-tools/methods/content-inventory.html)

- A content inventory is a list of all the content on your site.
- Content inventory can turn into an audit or assessment with regard to:
  - What pages should be removed
  - Whether content need to be revised
  - Which content needs to be written due to gaps
  - Where content should be mapped to if being moved or if it requires redirects

Content Inventory Example (http://maadmob.com.au/resources/content_inventory)

		Navigation title	Page title	Files	Last updated	Owner	Comments	Delete?
2	0.0	Home	Wine Tasmania					
3	1.0	Wine Tasmania					No page at this level - displays 'History'	
4	1.1	History	History					
5	1.2	Touring Tasmania	Touring Tasmania					
6	1.3	Touring Links	Touring Links					
7	1.4	Wine Industry Tasmania	Wine Industry Tasmania					
8	1.5	Industry Statistics & Info	Industry Statistics & Info					
9	1.6	Investment	Investment					
10	1.7	Partners	Wine Industry Tasmania Partners					
11	2.0	The Wine Route					No page at this level - displays 'Overview'	
12	2.1	Wine route overview	The wine route					
13	2.2.0	Tamar Valley Wine Route	Tamar Valley Wine Route					
33	2.3.0	Southern Wine Region	Southern Wine Region					
49	2.4.0	East Coast Wine Region	East Coast Wine Region					
55	2.5.0	North West Wine Region	North West Wine Region					
61	3.0	Latest News	Latest News				No content on page	
62	4.0	Events					No page at this level - displays 'Overview'	
63	4.1	Overview	Events				No left-nav	
64	4.2	Booking	Event booking				No left-nav	
65	4.3	Privacy Policy	Privacy Policy				No left-nav	
66	4.4	Security and Refunds	Security and Refunds				No left-nav	
67	5.0	Members	Wine Industry Tasmania Members					
68	6.0	Resources	Resources	5 PDF files				
74	7.0	Contact Us	Contact Us				Email address & contact form	
75								

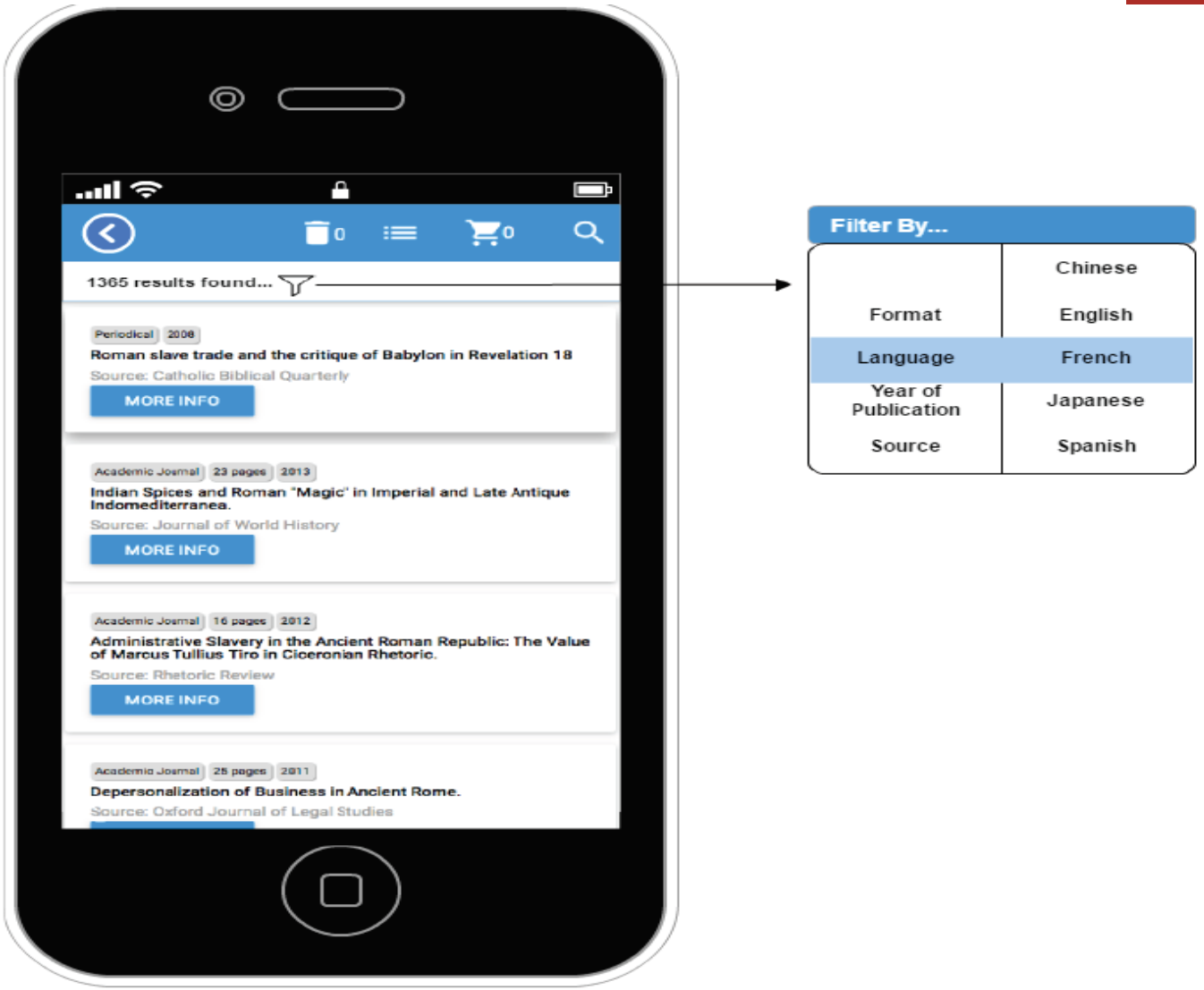
Content Inventory Example: MBLC Team

	A	B	C	D	E	F	G	H	I
1		**Navigation title**	**Page title**		**team comments**	**Recommendations (I**	**Notes**		
2	0	Massachusetts Libraries Board of Library Commissioners							
3	0.1	Find a liibrary in Massachusetts							
4	0.2	Contact							
5	0.3	FAQs							
6	1	Section 1				Delete			
7	1.1	Carousel			Looks like an add	Delete			
8	1.2	your Library is your gateway			Looks like an add. Redundant- can do these things under digital collections				
9	2	Section 2							
10	2.1	Research and Articles							
11	2.2	Digital Collections							
12	2.3	Books & Ebooks							
13	2.4	Your Local Library							
14	3	Section 3							
15	3.1	Twitter feed							
16	3.2.1	Video 1				Delete			
17	3.2.2	Video 2			Redundant- only need one vide	Delete			
18	3.3.1	Video 3			Redundant- only need one vide	Delete			
19	3.3.2	Video 4			Redundant- only need one video to showcase				
20	4	Section 4				Delete			
21	4.1	Find a liibrary in Massachusetts			Redundant	Delete			
22	4.2	Research and Articles			Redundant	Delete			
23	4.2.1	Complete list of databases			Redundant	Delete			
24	4.3	Digital Collections			Redundant	Delete			
25	4.3.1	Browse Digital Libraries			Redundant	Delete			
26	4.3.2	Browse Colections by Topic & Type			Redundant	Delete			
27	4.4	Books and Ebooks			Redundant	Delete			
28	4.4.1	Find books, music & dvds			Redundant	Delete			
29	4.4.2	download ebooks			Redundant	Delete			

Wireframes: Definitions

- A wireframe is a **schematic** or other **low-fidelity rendering of a computer interface,** intended to primarily demonstrate functionality, features, content, and user flow without explicitly specifying the visual design of a product. (http://userpathways.com/2008/06/the-what-when-and-why-of-wireframes/)
- A **visual representation** of the content of a web page that is the culmination of user research, business objectives and content. (http://facweb.cs.depaul.edu/sgrais/wireframes.htm)

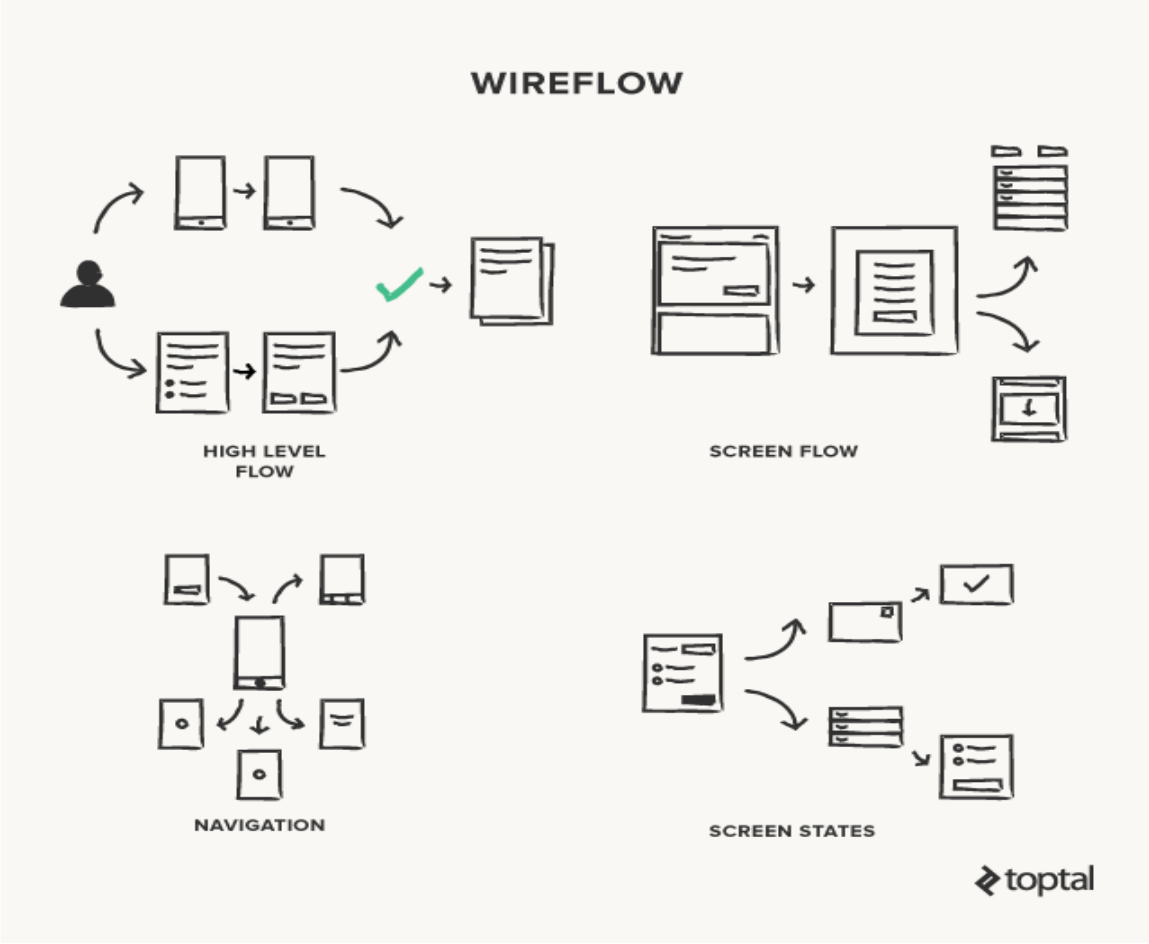
Wireframing: EBSCO Team



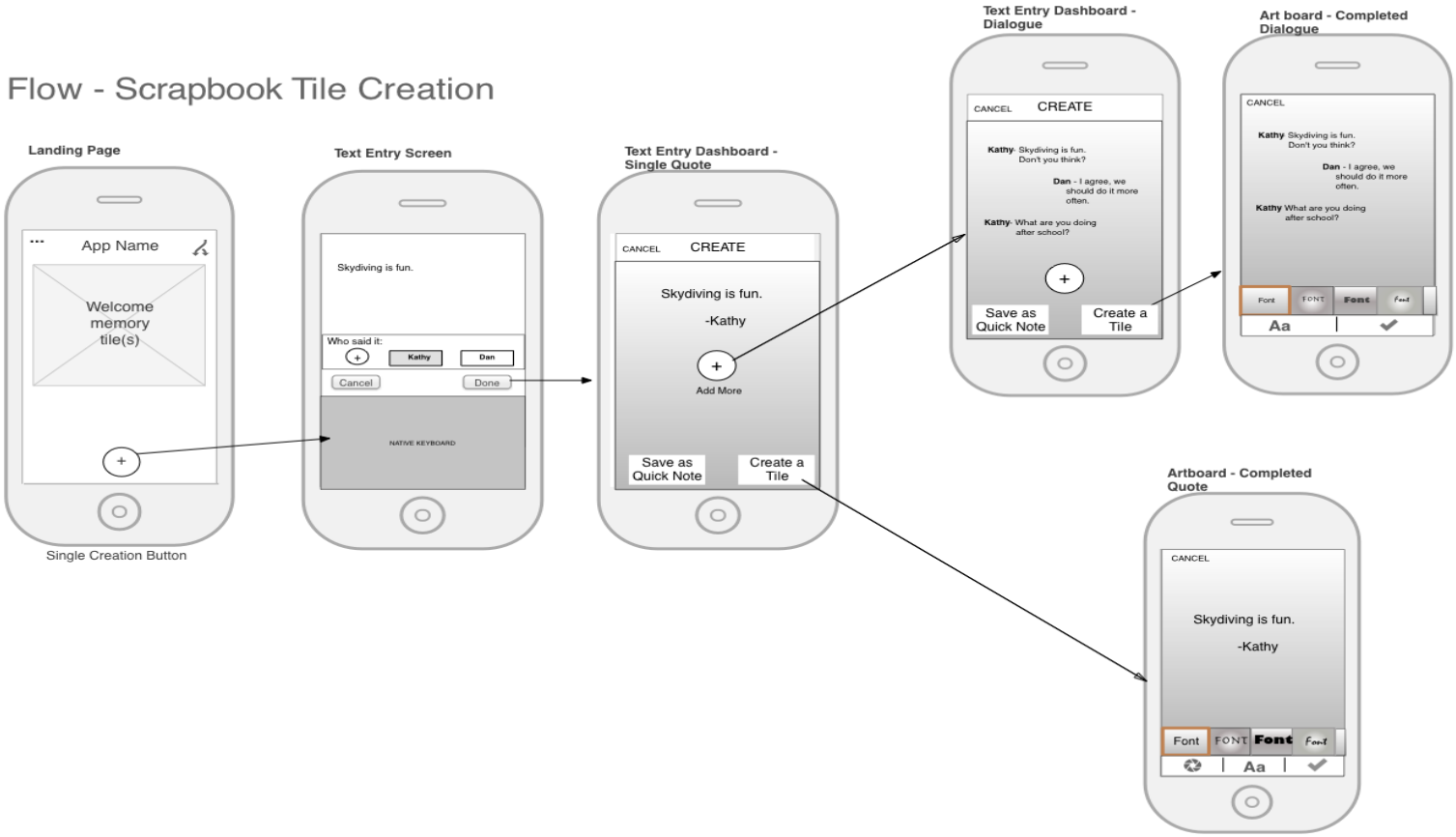
Wireflow: An emerging UX deliverable

- Wireflows are a design-specification format that combines wireframe-style page layout designs with a simplified flowchart-like way of representing interactions. (Source: https://www.nngroup.com/articles/wireflows/)
- A Wireflow is a blend of a wireframe and a user journey. (Source: https://matthewgoddard.net/2010/02/24/ux-technique-wireflows-diagram/)
- The wireflow is essentially a sequence of the system flow, screen after screen, with branches and decision points. (source: https://www.toptal.com/designers/ux/guide-to-ux-sketching)

Wireflow Types



Wireflow Example



Group Activity

- Create a hand-drawn wireflow of a revised google flight site.
  - Task: Book a flight from Boston to Wuhan University, China departing 3/20 and returning 3/26.
  - Identify problems in the task flow
  - Create a wireflow of revised design and put it on the easel pad
- Report back.

Questions?

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