

Usability Differences between Single-Screen and Multi-Screen Booking Interfaces

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Travel Users

- User emphasis on informational availability for easy comparison
 - through pictures, prices, descriptions, etc.
- Used to the multi-step booking experience
- Complex travel planning phenomenon
- Need for richly interactive travel booking interfaces



Background - Emerging Technology

- Rich Internet Applications (RIAs)
 - Potential to build intuitive user interfaces richer in interactivity and responsiveness
 - RIA based interfaces are typically built using Flash and AJAX (Asynchronous JavaScript + XML).
- Conventional multi-step interfaces built using HTML
- RIA based interfaces are largely single-screen



Single –Screen Booking Interfaces

- User can search, deliberate and complete purchase in one screen or frame.
- Inputs search parameters (check-in dates, number of passengers etc.) and receives dynamic feedback on availability and rates
 - without having to click on a submit button.
- Supplement search parameters (room types, views etc.) with dynamically changing visuals.
- Leads to instant gratification and also enhances the quality of the search process (Willemsen, 2006).



Context of Study

- Does the single-screen user interface adequately serve the usability requirements of travel booking?
- Contentious debate over viability in industry circles over the merits and demerits of single-screen and multi-screen booking interfaces (Carkeek, 2008; Farrell, 2006; Starkov & Price, 2006; Kistner, 2008).
- Significant usability issues remain unsolved and relatively unknown
- Immediate need for greater understanding of user-interface issues in the travel industry at large (Carkeek, 2008).
- Multi-screen booking interfaces have been the norm since the advent of transactional technologies on the Internet.



Purpose of the Study

- Examine usability differences between single-screen and multi-screen booking engines within a hotel reservation context.
- Are single-screen interfaces markedly superior in usability when compared with multi-screen booking interfaces?



Literature - I

- Two Dominant Models of User Interface Design
- (1) GOMS - Goals, Operators, Methods and Selection Rules Model (Card et al. 1983)
 - Goals articulate the user's needs
 - Operators underpin actions performed to accomplish the goals
 - Methods outline the sequence of action and
 - Selection rules describe user preference of one method over others.



Literature - II

- Seven Stages of Action (SSA) model (Norman, 1983).
 - goals
 - forming the intention
 - specifying action
 - executing action
 - perceiving system state
 - interpreting system state
 - evaluating the outcome
- Consistency, error recovery, perceived control and lastly reduce short-term memory load (Schneiderman, 1998).



For and Against Single-Screen & Multi-Screen

<i>For Single-screen Interfaces (With RIA)</i>	<i>For Multi-Screen Interfaces (With HTML and related technologies)</i>
<ol style="list-style-type: none"> 1. Dynamic input/output on one page (requests do not travel to server) 2. Visuals supplement text based output across search parameters (graphics of rooms change based on user changes in search parameters) 3. Real-time error feedback (validation of user input without a trip to the server) 4. Works akin to a desktop simulation (change in options or upgrade to higher levels of service results in effect on total price). 5. Within-page calculations 6. Enables non-linear flow of information search. 7. *Lesser likelihood of drop out (not validated) 8. Increased perceived control 	<ol style="list-style-type: none"> 1. Has been around for a while and hence, customers are used to it 2. Simplifies travel planning by presenting information in installments with larger text and visuals (not concentrated with all the parameters of search in one page). 3. Easily found on search engines (can be indexed) 4. Greater security of transactions 5. Separates search and purchase effectively and thereby reduces complexity
<i>Against Single-screen Interfaces (With RIA)</i>	<i>Against Multi-Screen Interfaces (With HTML and related technologies)</i>
<ol style="list-style-type: none"> 1. Lack of addressability (no unique URL for each state of the application that user can mail to other users) 2. Not easily found on search engines because of indexing issues 3. The increased amount of information on one page results in smaller visuals and text 4. Security issues because of JavaScript/ActiveX Controls or rich media 5. Takes more time to load interface as opposed to a multi-screen interface 	<ol style="list-style-type: none"> 1. User has to move across multiple pages as and when search parameters change 2. Visuals typically not supplemented with results 3. Errors in input often presented only after a trip to the server. 4. Dispersed calculations or information spread over multiple pages (options, rules, prices etc.) 5. Presumes linear flow of information search and purchase 6. Higher likelihood of drop out (not validated) 7. Lesser perceived control



Other Contentions

- Limited in capturing the inherent complexity of a travel product.
- travel information search and planning is a complex, multi-stage decision making process (Fodness & Murray, 1997; Jeng & Fesenmaier, 2002).
- Limited space can diminish quality of visuals and text support (Kistner, 2006).
- Multi-screen enables logical series of steps (e.g. selecting the hotel, room type, payment options) by going from one web-page to another so as to complete the reservation process.
- Lastly, a single-screen booking interface does not mean that visitors are getting rid of the steps of the reservation.



DATA

- Experimental setup at a Mid-Eastern University in the United States
- A total of 98 undergraduate students enlisted for participation
- Participants - Students of first year undergraduate studies
- Incentive - 5 extra credit points (2% to their overall grade)
- Data collection supervised



Methodology

- Two travel intermediary sites
 - multi-screen booking interface - (www.expedia.com)
 - single-screen booking interface (www.paguna.com)
- All participants visited both sites
- Order of visitation (1st half to Expedia 1st & Paguna 2nd & 2nd half - Vice Versa)
- Evaluate interface immediately after visiting
- Scenario - Purchase a hotel room by browsing through the websites



Measures

- Sixteen items pertaining to the operational aspects of usability in user interface design were adapted from Kumar, Smith & Banerjee (2004).
 - arrangement of information such as amount, logic, visual appearance (colors, size, contrast etc.), price clarity, navigability, billing etc.
- Five Contextual Parameters of Usability (learnability, efficiency, memorability, error recovery and satisfaction) - Joshi & Mathur (2004), (Davis, 1989) (Schneiderman, 1998).
 - All contextual parameters were single item measures
- Operational and contextual parameters measured along a five point Likert Scale (1=Strongly Disagree to 5 = Strongly Agree).



Findings

- Sample - 45 males (44.6%) and 56 females (55.4%).
- 95.3% between 18-22 years, rest between 23-27
- Number of travel purchases – Mean 3.50
- Mean value of the number of websites that respondents had purchased travel from prior - 2.09



T-Tests – Operational Parameters

Usability Parameter	Paguna	Expedia
Various steps that I had to go through to buy rooms were clear	4.03	3.93
The price of rooms was clearly displayed*.	4.18	4.01
It was easy to keep track of what steps I had completed in the hotel booking process (what I had done and what I need to do).	3.69	3.63
There was adequate information pertaining to the hotel and its facilities.	3.83	3.95
There was adequate information about each hotel's surroundings.	3.55	3.68
The salient features of individual rooms for sale were clearly displayed.	3.60	3.70
Amount of information displayed on the screen was adequate.	3.83	3.87
Arrangement of information on the screen was very logical.	3.84	3.80
The amount of billing information I was required to enter before revealing the credit card information was reasonable.	3.81	3.83
Use of colors on the screen was pleasant.	3.94	3.90
Contrast of lettering with the background made the reading of the material on the website easy.	3.97	3.95
It was easy to change parameters to generate new search results.	3.80	3.73
Instructions for correcting wrong inputs were clear.	3.42	3.44
Searching for the rooms within the Web site is easy.	3.89	3.88
The size of the lettering used on the screen makes reading the material on the website easy.	3.81	3.81
There was too much information on the screen at any given time.	2.95	3.07

* $p < .05$, ** $p < .01$, *** $p < .001$

T-Tests – Contextual Parameters

Contextual Parameter	Paguna	Expedia
1. Learnability	3.83	3.68
1. Efficiency***	3.85	3.29
1. Memorability*	3.77	3.43
1. Error recovery*	4.08	3.71
1. Satisfaction***	3.45	4.02

* $p < .05$, ** $p < .01$, *** $p < .001$



Mean Differences in Contextual Usability Based on Past Purchase on Expedia

Contextual Parameters	Purchased Earlier on Expedia		MANOVA Results	
	Yes	No	Univariate F	Multivariate F
Paguna				
Learnability	3.84	3.67	.35	Pillai's Trace (F=1.37)
Efficiency*	4.09	3.51	6.67**	
Memorability	3.76	3.76	.00	
Error Recovery	4.09	4.00	.23	
Satisfaction	3.50	3.44	.23	
Expedia**				
Learnability**	4.00	3.33	11.03***	Pillai's Trace (F=3.19**)
Efficiency**	3.60	2.95	7.66**	
Memorability	3.58	3.27	2.07	
Error Recovery	3.60	3.83	0.32	
Satisfaction*	4.25	3.83	5.05*	



* $p < .05$, ** $p < .01$, *** $p < .001$

Discussion & Implications

- Findings are mixed
- Lack of significant differences in operational parameters
- Significant differences in contextual parameters
- Expedia evaluation – Experience effect, impact of content.
- Paguna – Potential novelty effect



Discussion & Implications Contd..

- Single screen – considered significantly more efficient
- Single screen - learnability effect & error recovery
- RIA may have significant potential to impact user experience in search
- RIA may not make as much of an impact if visuals and adequate text do not supplement well



Limitations & Conclusion

- Promise of potential – single screen
- Needs to be done across multiple websites for generalizability
- Cohort effect (young users only)
- Travel product complexity and the nature of user interface applicability
- Network access effect (university broadband)



Thank you

- Questions?

