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**Wharton Interactive Media Initiative
Research Opportunity**

PREDICTING & OPTIMIZING CONSUMER RESPONSE

TO PRODUCT SEARCH RESULTS

expedia inc.

WHARTON INTERACTIVE
MEDIA INITIATIVE

WI
MI

REFLECTING THE FUTURE

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WHARTON INTERACTIVE MEDIA INITIATIVE

- Brings a passionate **data-driven perspective** to media businesses (content distribution and information acquisition).

- Distinguishes itself with a **tight focus on the interaction between content provider and user**, capitalizing on the wealth of individual-level data that is exploding at the crossroads of commerce, technology, and entertainment.

- Is dedicated to bringing **world-class research rigor** to better understand these complex interactions in order to drive new business strategies and tactics that will reshape the media landscape.

WIMI RESOURCES FOR RESEARCHERS

- Research opportunities with corporate partners (e.g., today)

- Assistance with "data wrangling"

- Research funding (e.g., MSI/WIMI CFP on Modeling Multi-Channel Data)

- Promotion of research results among academics
  - Conferences at Wharton
  - Sponsored sessions at conferences (e.g., Marketing Science)
  - WIMI working paper series

- Promotion of results & methods among practitioners
  - Updates on current projects for corporate partners
  - Conferences
  - White papers and other summaries for practitioners
  - On-site tutorials and seminars

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EXPEDIA, INC.

THE DEPTH AND DIMENSION IN EXPEDIA'S PORTFOLIO IS TRULY UNIQUE IN TRAVEL

Retail

Opaque

Package

Corporate

Media

THE WORLD'S LARGEST AND MOST INTELLIGENT TRAVEL MARKETPLACE

UGC – travelers create relevance, value for each other

Supply relationships enhance traveler selection, experience

Supply

- Hotels
- Airlines
- Rental cars
- Cruise
- Destination services and activities
- Global base

expedia inc.

Selection

Value

Convenience

Multiple business models

Demand

- Leisure travelers
- Corporate travelers
- Budget to luxury
- Affiliate network
- Offline retail travel agents
- Global footprint

Scale and reach strengthen supplier value proposition
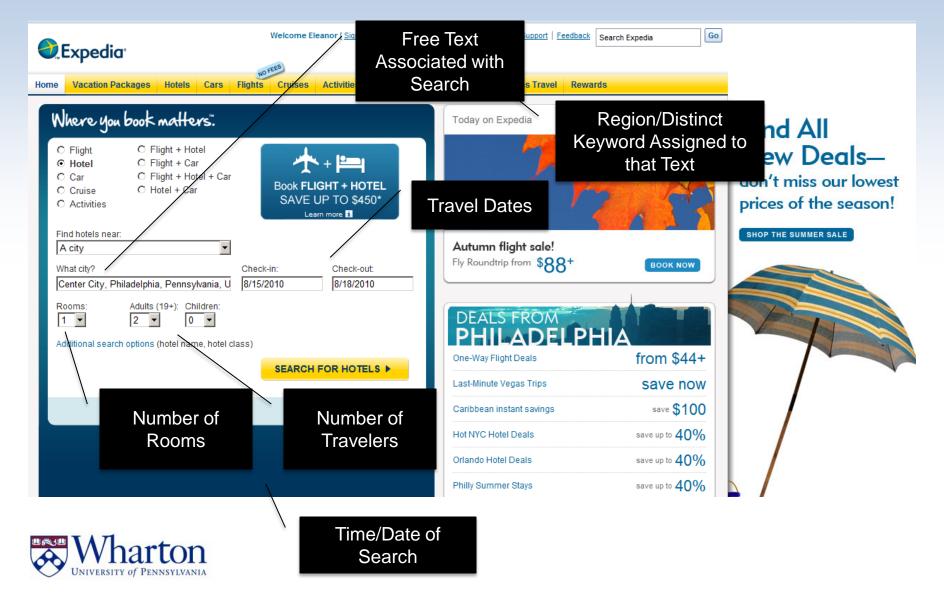
Creates media value for advertisers
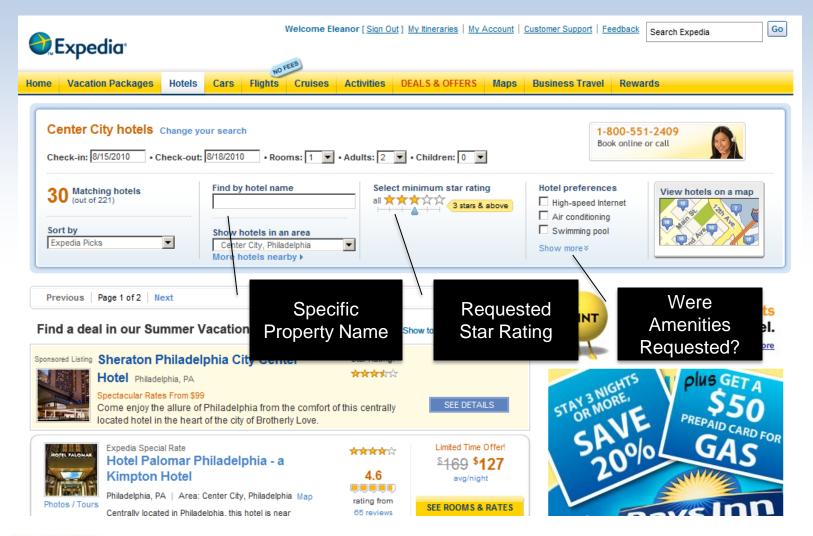
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- How does the list of hotels displayed to an Expedia user affect the conversion rate for that user?

  o Does the listing order matter? If so, how?

  o Do users respond better to listings that are geographically diverse or diverse in price/quality?

  o Which listing strategies seem to encourage users to continue to refine their criteria versus dropping out? Is there value to looking at the sequence of searches a particular users does?

- How should the search results be optimized to maximize conversion?

- Is there value in tailoring the search results based on other characteristics of the user session? If so, which characteristics are most important?

  o Should results be tailored based on which channel (search engine, tripadvisor.com, etc.) the customer arrived to Expedia through? If so, how?

  o Should results be revised based on which hotels the users looking at in more detail? If so, how?

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DATA

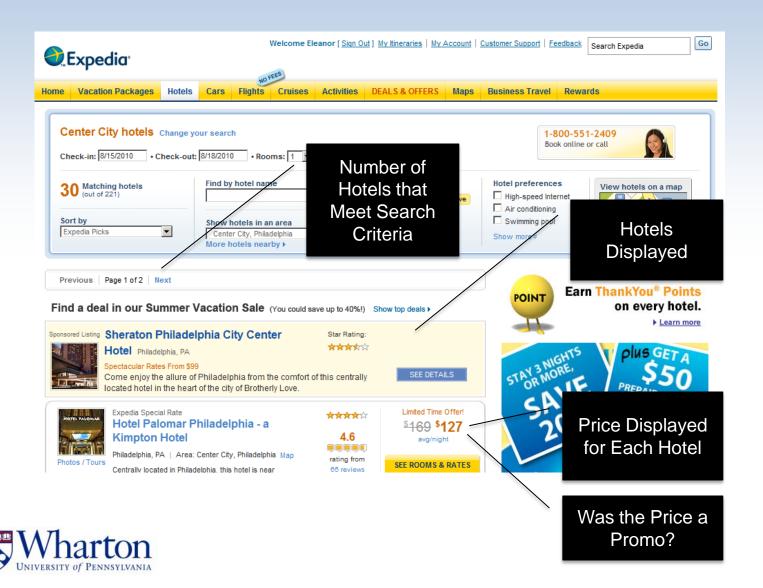## DATA ON 10,000K+ HOTEL SEARCHES CONDUCTED OCT 1-15, 2009
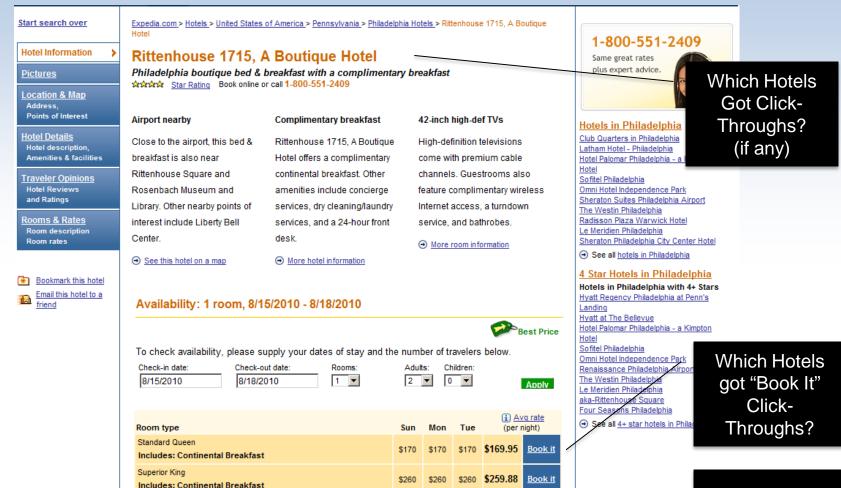
DATA

SOME SEARCHES INCLUDE ADDITIONAL DETAILS

DATA

FOR EACH SEARCH WE OBSERVE WHICH HOTELS WERE DISPLAYED

DATA

WE ALSO OBSERVE WHICH HOTELS WERE VIEWED AND PURCHASED

Which Hotels Got Click-Throughs? (if any)

Which Hotels got "Book It" Click-Throughs?

Which Hotels Were Purchased?

DATA ON ALTERNATIVE HOTELS DEFINES THE SET THAT COULD HAVE BEEN DISPLAYED

- All hotels available on Expedia in each (Expedia-defined) market
  - Location (latitude and longitude)
  - Star rating
  - Room capacity
  - Parent chain
  - Nearest airport
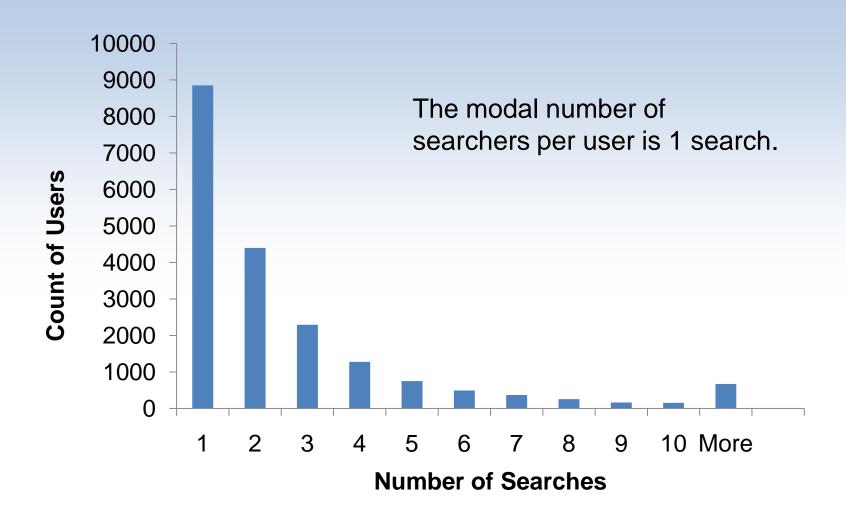
DATA

COMPETITIVE TRAVEL SITES

- It is difficult to collect comprehensive data on pricing at competitive sites even using automated scraping tools, due to the large number of possible search criteria

- Some data on available hotels and pricing at competitive travel sites may also be available
  - Competitive site
  - Shop date
  - Check in date / Check-out date
  - Hotel ID
  - Competitive sort rank order
  - Competitive price
  - Boolean indicating whether hotel is sold out on competitor site
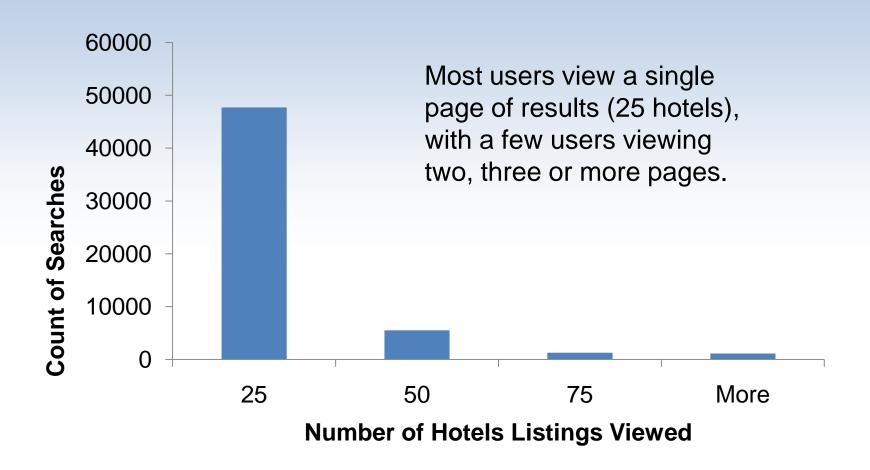
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DATA

SUMMARY OF SEARCHERS BY MARKET

Market	Budapest	Cancun	Paris	Manhattan
Hotels	321	115	1674	328
Regions / Distinct Keywords	17	13	102	30
Observed users (cookie-based)	5175	4985	4737	4778
Average number of searchers per user	2.9	2.5	2.8	3.2
Average number of hotel listings viewed for each search	28.5	25.9	28.1	28.4
Average number of hotel details viewed for each search	0.566	0.488	0.394	0.351
Average number of purchases for each search	0.053	0.017	0.024	0.024

DATA

The modal number of searchers per user is 1 search.

DATA

Most users view a single page of results (25 hotels), with a few users viewing two, three or more pages.
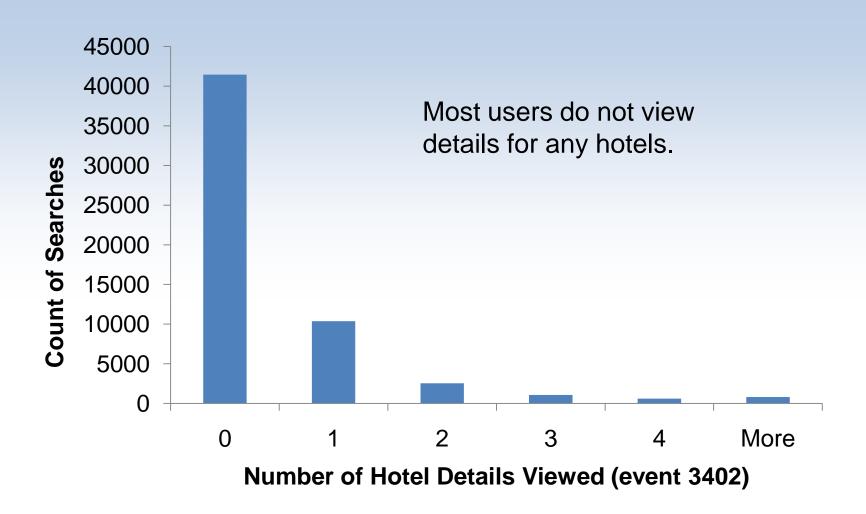
DATA

CLICK STREAM LEADING UP TO THE SEARCH

- In addition to the search, we have a detailed click stream history for each observed user. From this click stream, we can extract information such as:

  - How did the user arrive at Expedia.com (referring site, search keyword, via online marketing)?
  - What was the landing page at Expedia.com?
  - What promotional pages on Expedia.com were viewed by the user (if any) prior to the search ?

EXAMPLE COMPLETE CLICKSTREAM

	Date	Channel	Time on Page	Page	
12:34s	6/18/2010 22:17:57	SEM BRANDED	0:39s	Home Page	First visit, 9 days earlier, looking for flights to Seattle
			0:33s	Flight Search Disambig	
			1:12s	Flight Search Results (Seattle)	
			0:07s	Home Page	
			0:20s	Flight Search Results (Seattle)	
			2:37s	Flight Search Results (Seattle)	
			0:49s	Flight Search Results (Seattle)	
			2:19s	Flight Search Results (Seattle)	
			3:25s	Flight Search Results (Seattle)	
			0:06s	Flight Search Results (Seattle)	
			0:08s	Flight Search Results (Seattle)	
			0:19s	Home Page	
				Flight Search Results (Seattle)	
	6/27/2010 17:36:56	SEM BRANDED	0:26s	Home Page	
			0:22s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:13s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:50s	Opaque Search Results (Seattle, 02-Jul, 03-Jul)	Discovers Opaque
			0:20s	Opaque Search Results (Seattle, 02-Jul, 03-Jul, Area Map and Details)	
			5:10s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:35s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:46s	Hotel Search Results (Seattle, 02-Jul, 03-Jul, Show Hotels in an Area)	Begins to filter hotels in area
		Overview Page	0:46s	Hotel Infosite Overview (The Inn at El Gaucho)	
			0:19s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:15s	Hotel Infosite Overview (Hotel Max)	
			0:28s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:08s	Hotel Infosite Overview (The Paramount, a Coast Hotel)	
			0:20s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:28s	Hotel Infosite Overview (The Paramount, a Coast Hotel)	
			0:15s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	
			0:28s	Hotel Infosite Map (The Paramount, a Coast Hotel)	
			0:11s	Hotel Search Results (Seattle, 02-Jul, 03-Jul)	

ADDITIONAL RESEARCH QUESTIONS

- Consumer Behavior/User Interface Design Issues

  - Should Expedia ensure consistency in sort order for repeating shoppers?

  - Would consumers be comfortable with product search listings that adapt to each consumer's past behavior? How can user confusion be minimized?

  - Are there ways to use framing effects to our advantage? E.g., would it be beneficial to show a high priced 5-star next to a great 4-star price to make it more appealing? Or lead in with a very compelling 3-star at the top of page?

  - Should we ensure consistency between our rank order of our hotels vis-à-vis competitors / Trip Advisor to facilitate easy cross-comparison and reinforce the quality of our sort order?

- Strategic issues

  - Can search results can be used by Expedia to manage relationships with hotels (where hotels typically set prices and service quality while Expedia controls search results)?

  - A good majority of Expedia shoppers search on Expedia but buy on the hotel's direct channel? Should we penalize the sort order for those hotels?

We encourage proposals that combine game theoretic or experimental approaches with empirical modeling and optimization.

PLEASE TYPE IN YOUR QUESTIONS FOR EXPEDIA ABOUT THE RESEARCH PROBLEM.

NEXT STEPS

TO PURSUE THIS RESEARCH OPPORTUNITY:

- Submit a brief proposal to efeit@wharton.upenn.edu by August 16, 2010
  - Research team
  - Objectives & contribution
  - Proposed methods
  - Timeline
  - Potential for managerial insights & impact
  - Preferred data format
  - Funding requests (if any)

- WIMI and Expedia will evaluate the proposals and choose a team

- Clean data can be in your hands by the end of August!

PLEASE TYPE IN QUESTIONS FOR
WIMI ABOUT THE PROCESS

THERE ARE MANY OTHER WAYS TO GET INVOLVED

- See www.whartoninteractive.com/research.asp for the latest information on

  o Future Research Opportunities like this one
  o Funding opportunities
  o WIMI working papers
  o Other ways to get involved with WIMI

- Sign up for e-mail updates at www.whartoninteractive.com/newsletter.asp

- Attend the MSI/WIMI Conference on Modeling Multichannel Consumer Behavior, December 9-10, 2010 at Wharton

- Contact Elea McDonnell Feit, WIMI Research Director (efeit@wharton.upenn.edu)

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