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# Faculty Summit 2010

## Bing Dialog Model: Intent, Knowledge, and User Interaction

Harry Shum, PhD  
Corporate Vice President  
Microsoft Corporation  
[www.bing.com](http://www.bing.com)

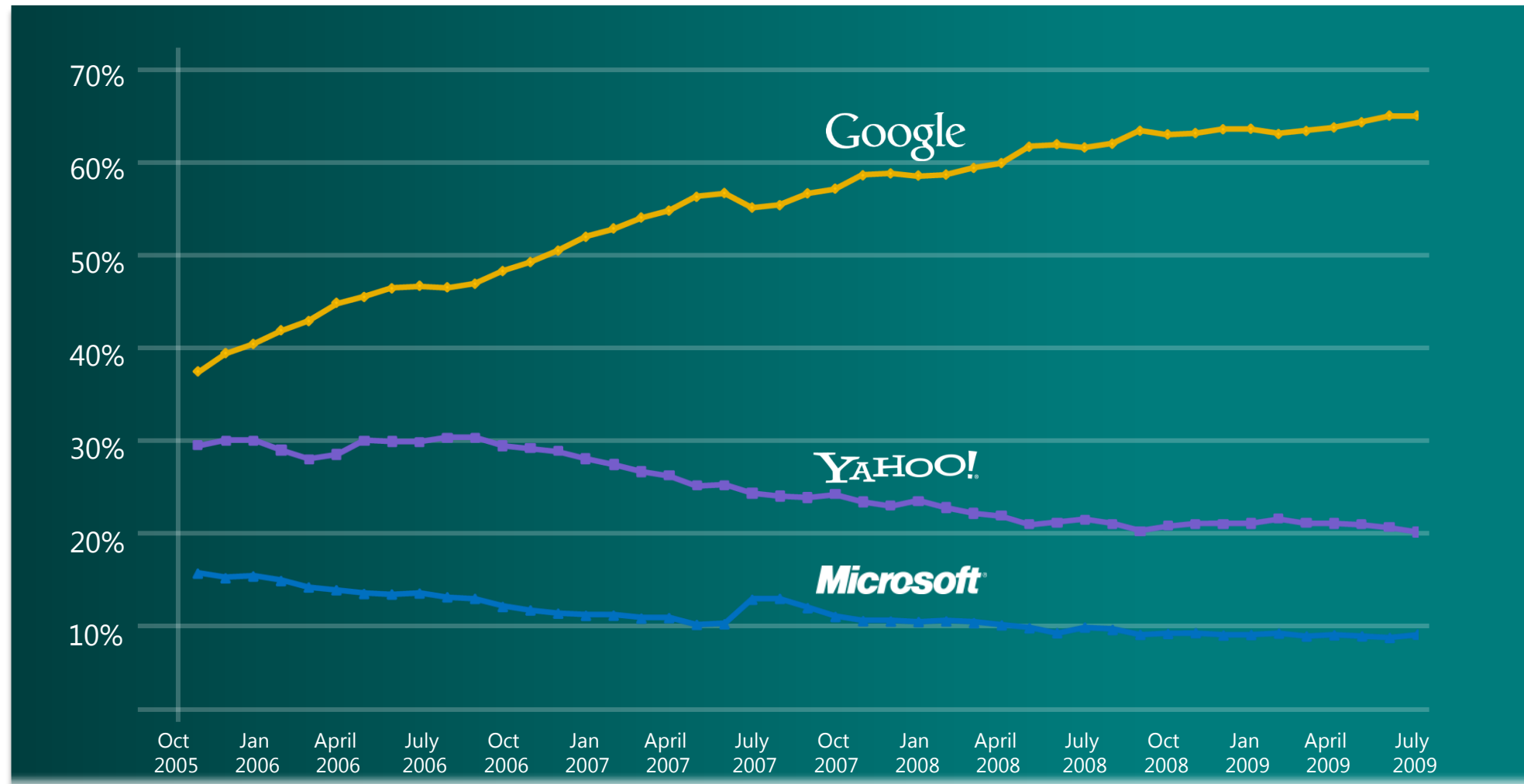
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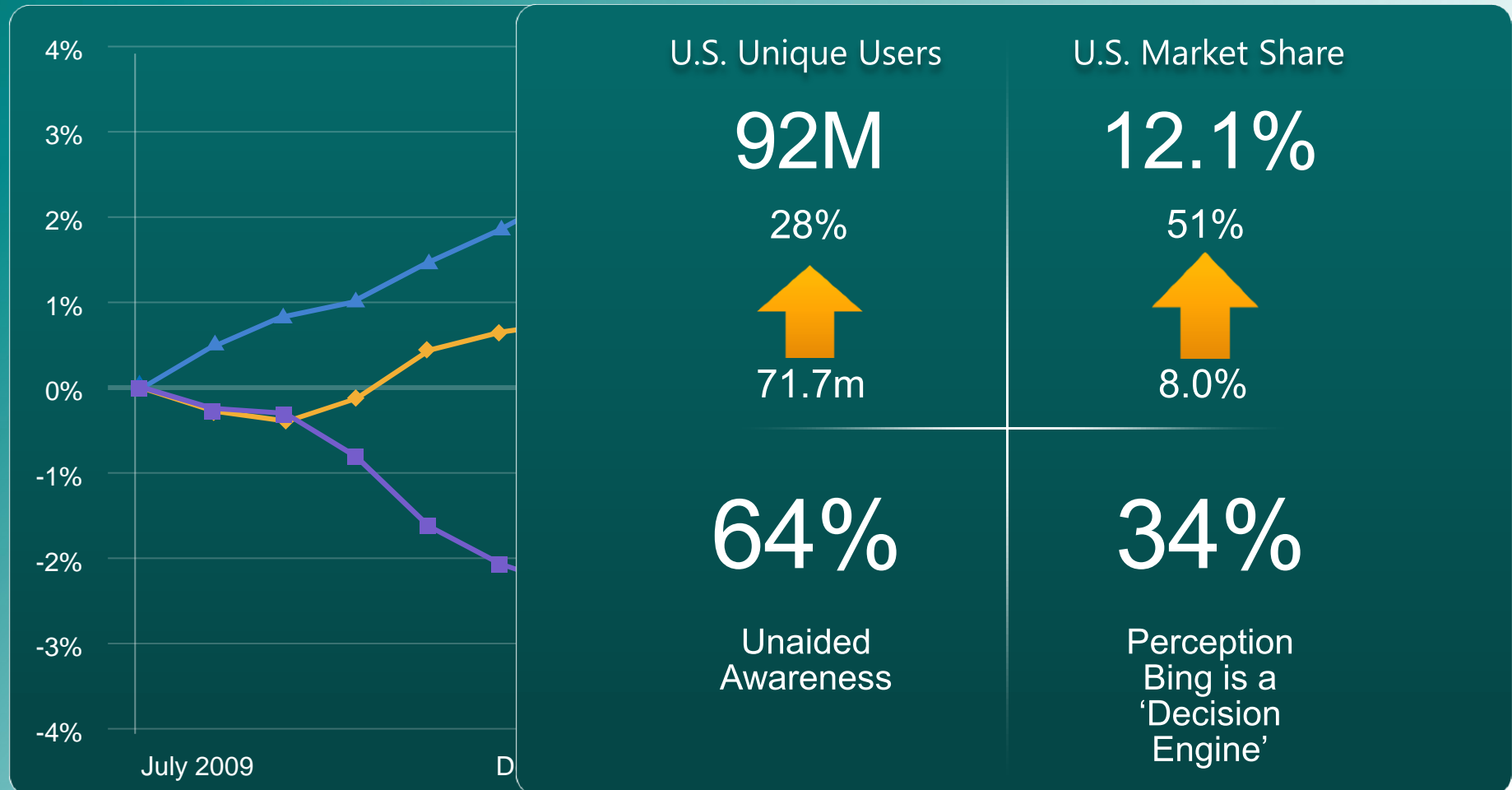
Evelyn Viegas, PhD  
Senior Research Program Manager  
Microsoft Corporation

# A Year Ago: The Challenge



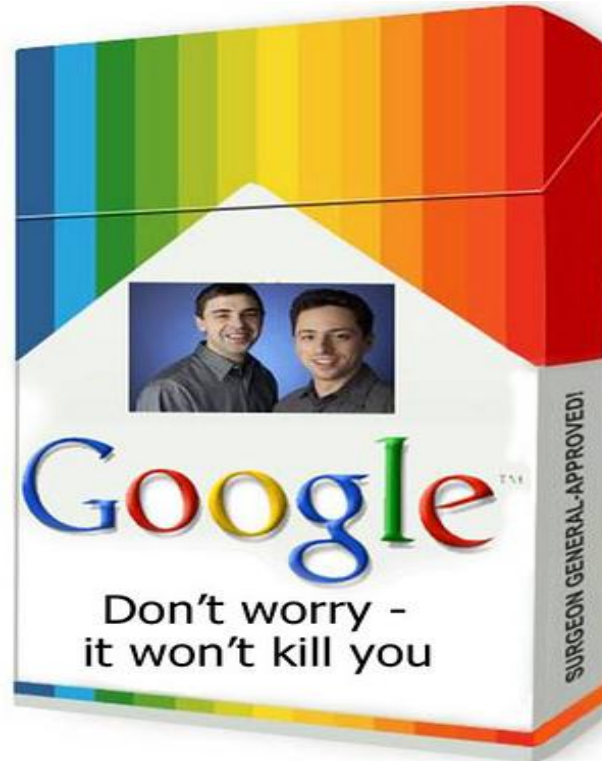
# A Year Later: The Bing Momentum

- Launched on June 1, 2009 and called a “Decision Engine”
- Fastest growing search engine in 2009
- “The best new product of the year 2009” - Crunchies Award by TechCrunch



# Google's not just a brand; it's a habit

- Tough Love for Microsoft Search: Danny Sullivan
  - <http://searchengineland.com/tough-love-for-microsoft-search-15968>
  - Dec. 30, 2008



# Elements of Search Quality

## Relevance



Ensuring that best results rank at top

Completeness

Freshness

## Speed



How fast do result pages render?

## Ease of Use



Simple interface

Query & click

# Semantic Impact on Search Quality

## Relevance



Selection and ranking based on **meaning** and **concepts**, not keywords

Direct answers

## Speed



Reduce efforts to **task completion**

Direct answers

Fewer clicks

## Ease of Use



Intuitive queries

**Simplified tasks**

Information aggregation & classification



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## Bing 2010 Summer Release

***demo***

Yu-Ting Kuo  
Principal Program Manager  
[www.bing.com](http://www.bing.com)



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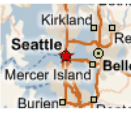



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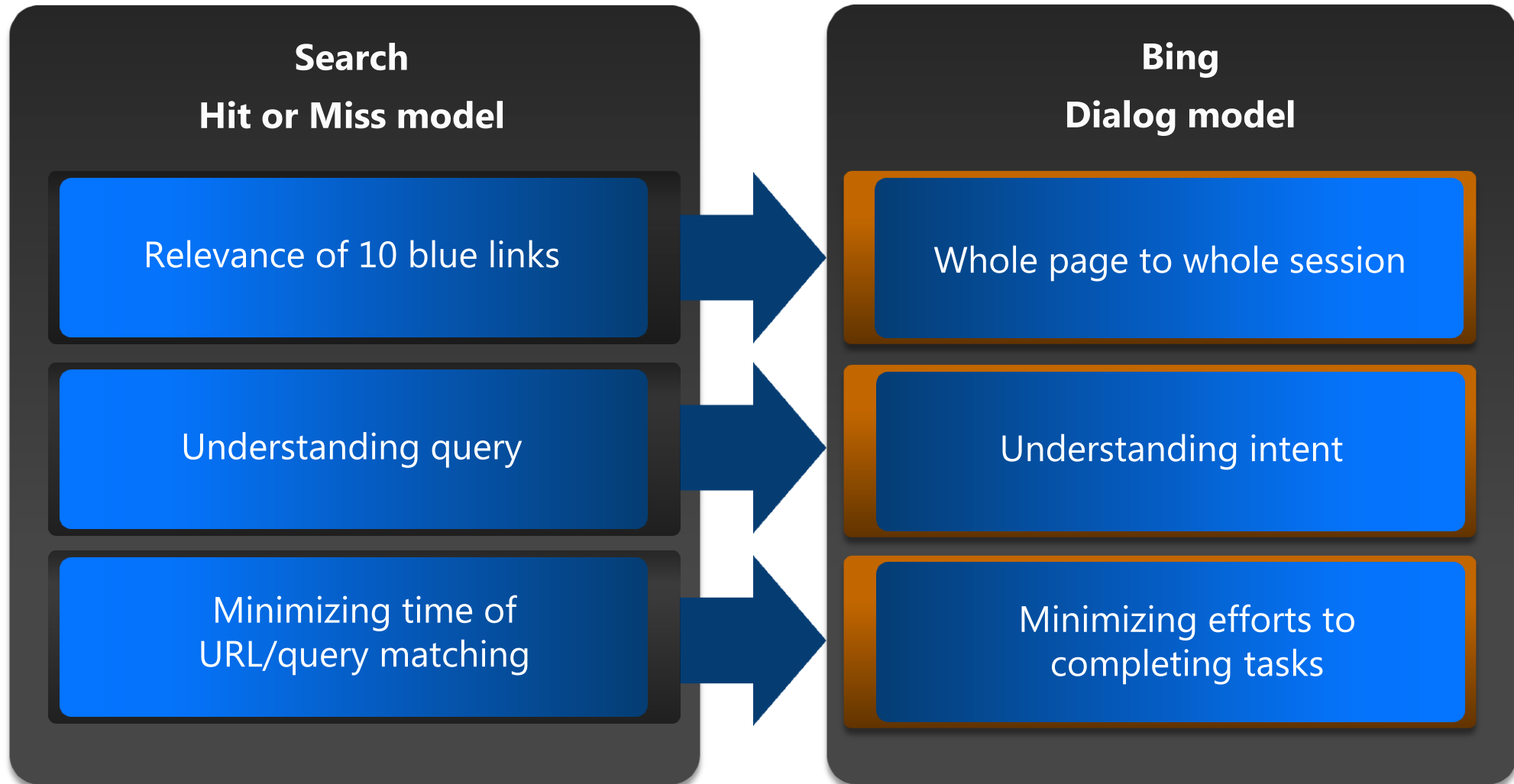
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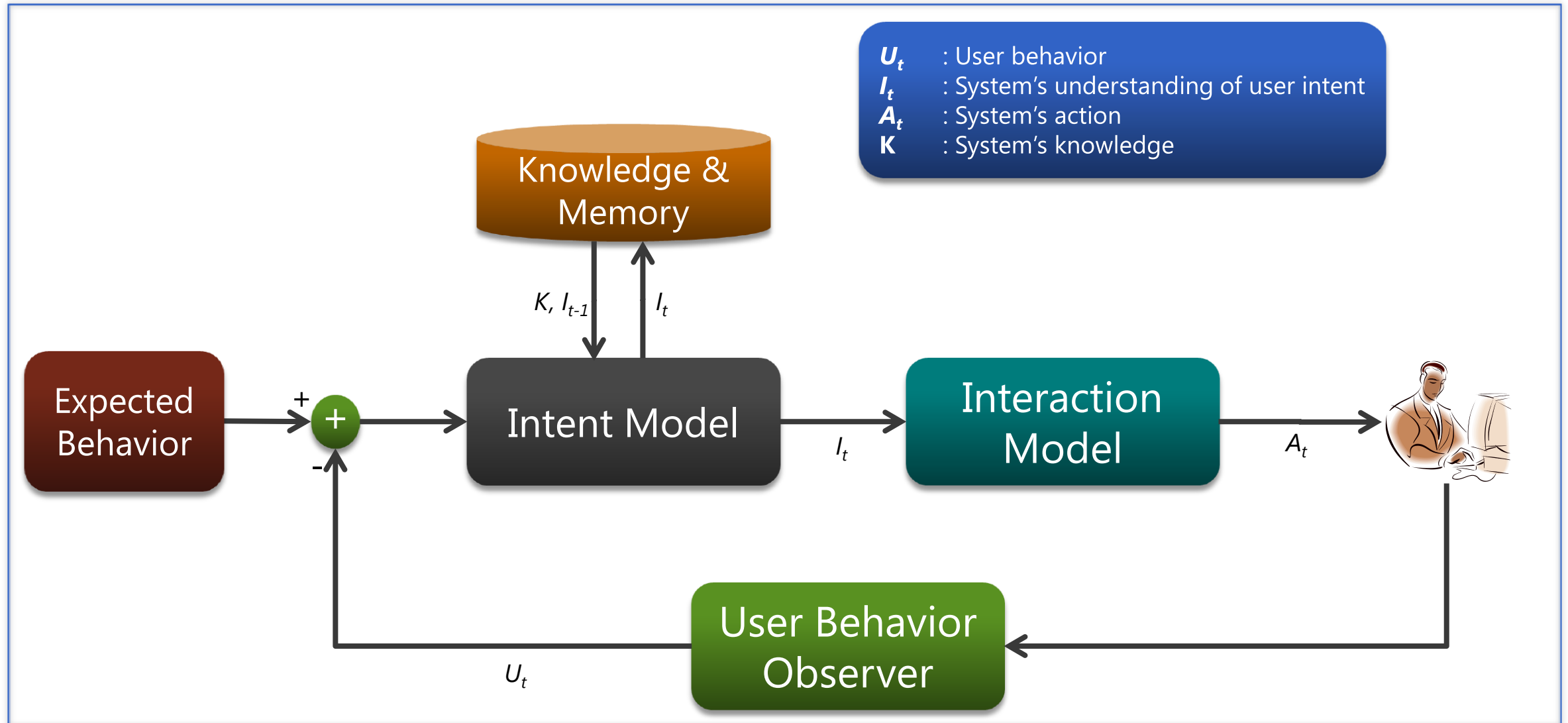
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# The Search Evolution: Organizing the Web for Tasks



# Bing Dialog Model: A Stateful Feedback System



# Bing Dialog Model: BMR Framework

- Applying Bayesian Minimum Risk (BMR) Framework
  - Intent Model:  $I_t = \mathbf{argmax}_I P(I | U_t, I_{t-1}; K)$
  - Interaction Model:  $A_t = \mathbf{argmin}_A E[\mathbf{Cost}(A, I_t)]$
- Considering productization feasibility
  - Local optimum vs. theoretical optimum
- Leveraging rich presentation capability
  - Infer multiple intent candidates
  - Generate dialog actions at multiple levels

# Bing Dialog Model Implementation

$$I_t = \operatorname{argmax}_I P(I | U_t, I_{t-1}; K)$$
$$A_t = \operatorname{argmin}_A E[\operatorname{Cost}(A, I_t)]$$

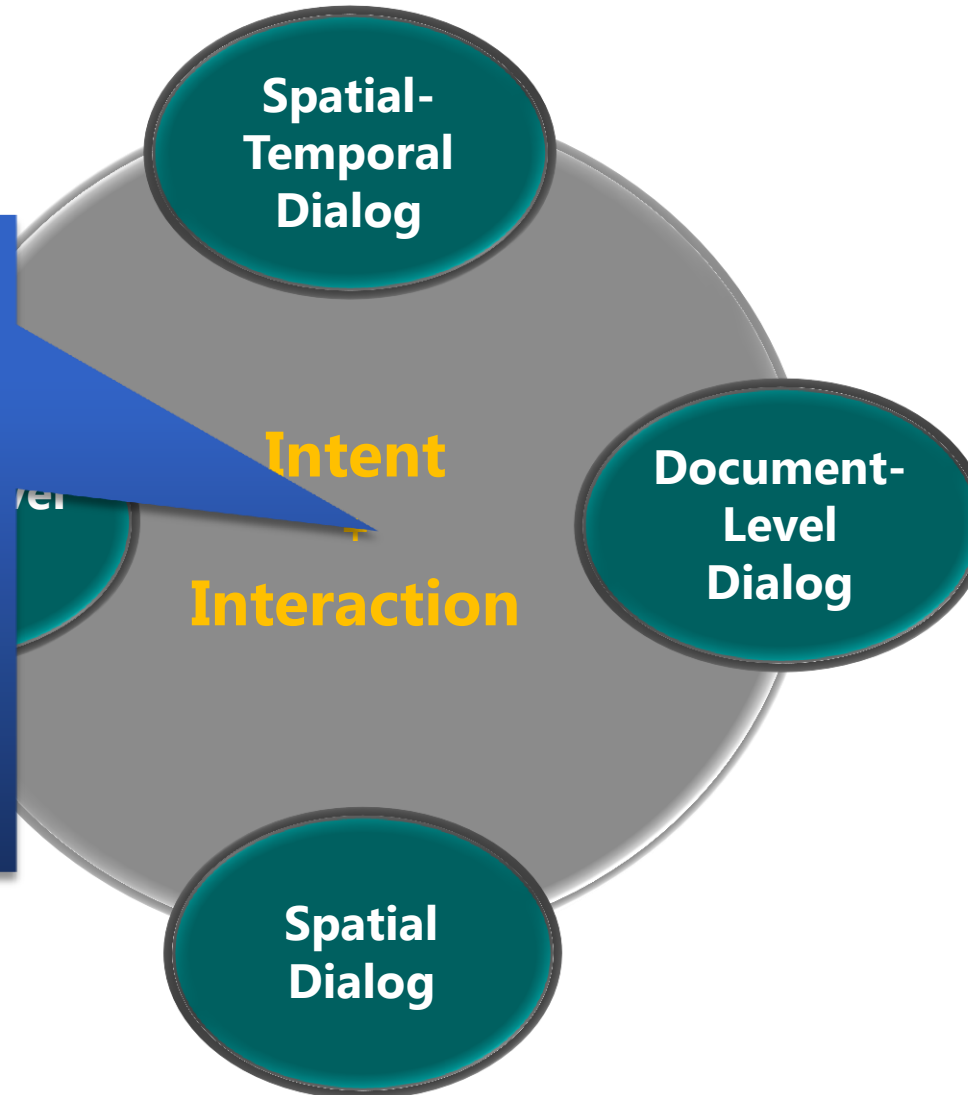
When applied to Autosuggest:

$U_t$  is key stroke

$I_t$  is closest seen queries

$A_t$  is list of suggested queries

**Cost()** is selection efforts





# Simple & Explicit Query-Level Dialog

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City Population: 3,694,820


Median household income: \$36,687

Median age: 31.6


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# Structured Query Composition

***demo***

Kuansan Wang, PhD  
Principal Researcher  
Microsoft Research

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**MAPS**

**ECONOMIC FACTS**

GDP per capita: \$6,100  
Labor Force: 807.7 million  
External Debt: \$420.8 billion  
Public Debt: 15.7% of GDP

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The **Book of Eli** is a 2010 American post-apocalyptic action film directed by the Hughes brothers, written by Gary Whitta, and starring Denzel Washington, Gary Oldman, Jennifer Beals ...  
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User rating: 7/10 · Action/Adventure/Drama/Thriller/ · R · 118 min

A post-apocalyptic tale, in which a lone man fights his way across America in order to protect a sacred **book** that holds the secrets to saving humankind.  
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Quick Tabs for relevant Bing verticals, domains, answers

Entity-based result summary



# Spatial-Temporal Dialog: Re-Rank with Session

The screenshot displays a Bing search interface with a session of searches. The top navigation bar includes links for Web, Images, Videos, Shopping, and News. The main search bar shows the query 'toyota prius'. Below the search bar, the results are categorized into 'ALL RESULTS', 'News about Toyota Prius', 'Videos of Toyota Prius', 'Images of Toyota Prius', and 'Wikipedia Articles on Toyota Prius'. A 'RELATED SEARCHES' section lists various car models and problems. A 'SEARCH HISTORY' section shows previous searches for 'honda civic' and 'toyota prius'. A red box highlights a link to 'honda civic vs. toyota prius | Hybrid Cars' in the search results.

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bing MS Beta 10301

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Images of Honda Civic

News about Honda Civic

Wikipedia Articles on Honda Civic

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SEARCH HISTORY

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The official web site for the 3rd Generation Toyota Prius.

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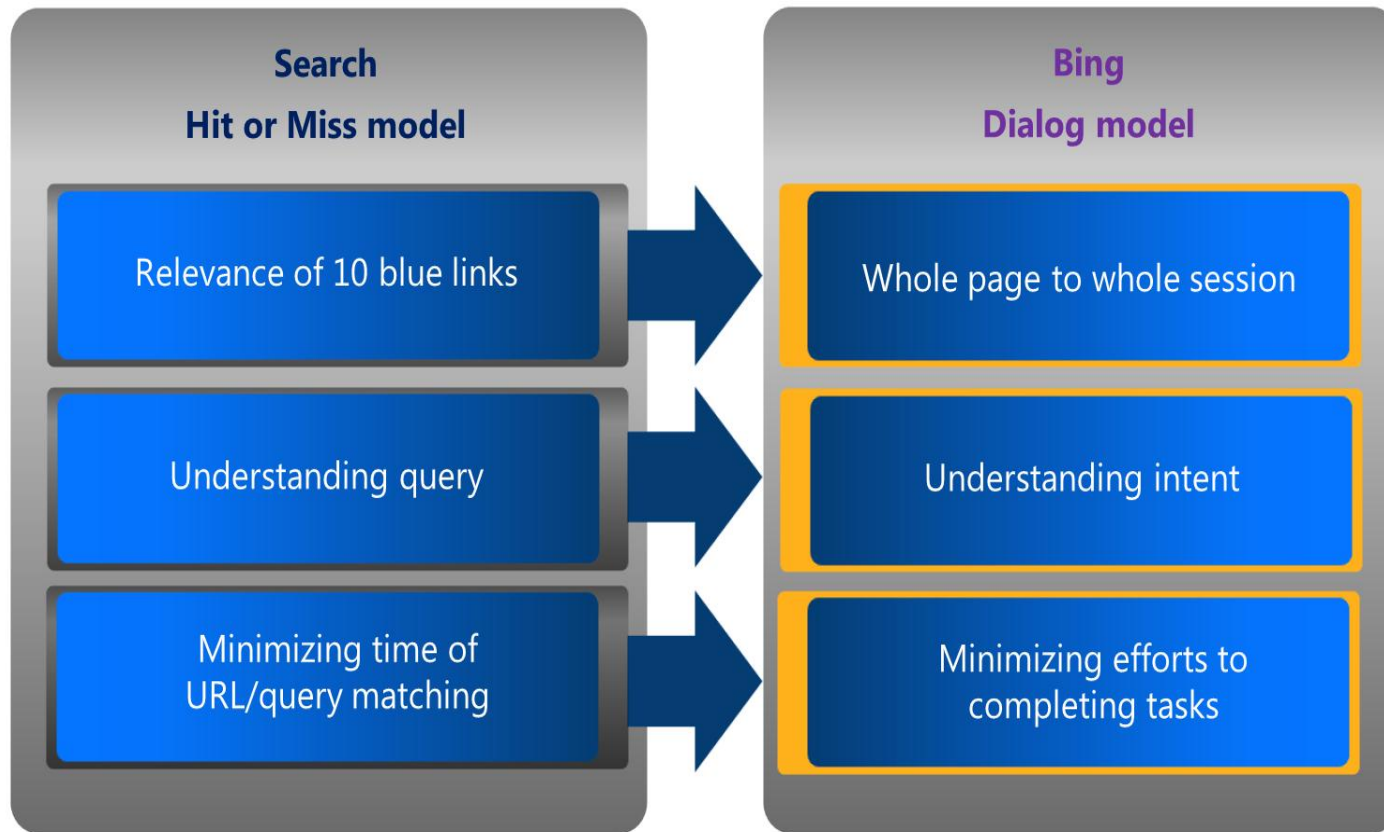
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History-aware Autosuggest

History-aware Compare

History-aware Implicit Compare

# Bing: The Decision Engine



- Driving the Search Evolution from topical directory to site finder to task completion
- Acquiring and computing knowledge
- Understanding user intent and designing user interaction
- Minimizing **Cost()** i.e. the user efforts to accomplish a task

# Bing & Research Community

- Microsoft Web N-gram Services
  - Provide large scale web index data for language modeling research work
  - Public beta since April 2010 (<http://research.microsoft.com/web-ngram>)
  - SIGIR workshop July 2010
  - New API Services and query data in Microsoft Web N-gram Services starting TODAY on <http://research.microsoft.com/web-ngram>
- Announcing the first Bing-MSR Challenge (Fall 2010)
  - Awards
    - Bing-MSR Fellowships
    - Conference/Workshop Travel grants
  - Check <http://research.microsoft.com/web-ngram> for more details beginning August



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