

# COMS W4170

## UI Design Principles 3

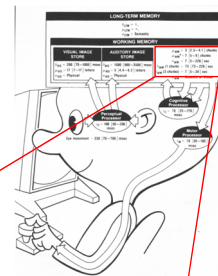
Steven Feiner  
Department of Computer Science  
Columbia University  
New York, NY 10027

September 20, 2018

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## Golden Rules of UI Design: 8. Reduce STM Load

- Remember
  - $\mu_{WM}$  (and even  $\mu_{WM}^*$ ) are small
  - $\delta_{WM}$  is short
- Minimize
  - amount of information to remember
  - time information must be remembered



$\mu_{WM} = 3 \mid 2.5 \sim 4.1 \mid$  chunks  
 $\mu_{WM}^* = 7 \mid 5 \sim 9 \mid$  chunks  
 $\delta_{WM} = 7 \mid 5 \sim 226 \mid$  sec  
 $\delta_{WM} (1 \text{ chunk}) = 73 \mid 73 \sim 226 \mid$  sec  
 $\delta_{WM} (3 \text{ chunks}) = 7 \mid 5 \sim 34 \mid$  sec

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## Golden Rules of UI Design: 8. Reduce STM Load

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**ISMAR 2009 Registration**

International Symposium on Mixed and Augmented Reality  
Orlando Florida USA, October 19-22, 2009

**Welcome:**  
Thank you for registering for the 2009 ISMAR Conference in Orlando, Florida from October 19th-22nd 2009. We have new options this year to provide a more comprehensive Symposium and Expo to the diverse ISMAR community. Conference attendees are free to visit other programs based upon available seating. Please carefully observe these options:  
Conference Tuesday is the part of the 3 day ISMAR conference where you can choose one of two options: 1) the traditional Science and Technology research program or 2) the new Arts, Media and Humanities program.  
Monday Workshops: We are offering several special sessions and commercial workshops. You may sign up for just one. Registration includes the ISMAR Expo reception on Monday evening where you will be able to mix with diverse disciplines and sectors of the ISMAR community.  
Topics: are taught daily Monday-Thursday by ISMAR members and a per day registration is available.

**ISMAR 2009 Conference Registration Fees:** *Due to demand, Early registration has been extended thru 25 September...*

	Early	Regular	Non-Member Fee	Early	Regular
Conference (10/20-22/09)	Member Fee \$100.00	Member Fee \$150.00	Student Non-Member Fee \$50.00	Student Non-Member Fee \$100.00	Student Non-Member Fee \$150.00
Workshop (10/19/09)	Member Fee \$150.00	Member Fee \$200.00	Non-Member Fee \$240.00	Non-Member Fee \$290.00	Non-Member Fee \$340.00
Per Day (10/19-22/09)	Member Fee \$150.00	Member Fee \$250.00	Non-Member Fee \$240.00	Non-Member Fee \$290.00	Non-Member Fee \$340.00

**MEMBER\***  
1. Members of IEEE receive the Member Discount. Include the discount code IEEE2009 on agenda selection page and provide proof of membership upon checking in at conference registration desk.  
2. Members of partnering organizations also receive the Member Discount, please obtain your discount code through your affiliated organization (ISA, DMAP, NCS, ITS, Mobile Monday, Sharp, iCOP, etc.)  
\*As a special bonus, all ISMAR participants can sign up for the special ISMAR Mobile Social Network and Local Search service, called "iCivicCrew" and operated by Kaywa. We strongly recommend going to the below link and completing the short registration process to receive your personal QR code for use of this no cost ISMAR special network. It is available to all registered attendees during and after ISMAR 09.  
[WWW.DOUGDARE.KAYWA.COM](http://WWW.DOUGDARE.KAYWA.COM)

**ISMAR 2009 Conference**  
Marriott Orlando Downtown  
Orlando, Florida 32801  
USA

To get started, please enter your email address: (already registered?)

• Email Address:

• Verify email by entering it again:

You can add people to your group below finishing your registration. (What's this?)

[Continue](#)

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## Golden Rules of UI Design: 8. Reduce STM Load

- Minimize
  - amount of information to remember
  - time information must be remembered

**ISMAR 2009 Registration**

International Symposium on Mixed and Augmented Reality  
Orlando Florida USA, October 19-22, 2009

**ISMAR 2009 Conference**

Personal Information    Agenda    Checkout    Confirmation

• Email:

• Verify Email:

• First Name:

• Last Name:

• Name as it would appear on a badge:

• Company/Organization:

• Address Line 1:

• City:

• State/Province/Region:

• Zip (Postal Code):

• Country:

• Work Phone:

**Your Password**

Please create your own password below (8-32 characters long).  
This will ensure the security of your personal information.  
It will also enable automatic login of your personal information the next time you register.

• Password:

• Repeat Password:

**Please select the Mobile Platform that you will have with you at ISMAR 2009:**

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  - time information must be remembered

ISMAR Registration  
International Symposium on Mixed and Augmented Reality  
Orlando Florida USA, October 19-22, 2009

Please enter a discount code::  (A valid code is required for this item)

Personal Information Agenda Checkout Confirmation

Please register for the selected programs. Conference attendees of one program are invited to visit other programs (same day) based upon available seating. Monday-Tuesday and Wednesday registration provides admittance to the ISMAR EXPO reception and dinner on Monday evening. Conference registration includes the Tuesday evening reception, the presentations and the Wednesday evening awards banquet. Contact your affiliated organization (IEEE, TEA, NCS, ISMAR, SIGGRAPH, IUTS, Sharp, etc.) to request your member discount code. \*Note: Early registration fees increase 09/26/09.

**Member Registration**  
Early register before 09/26/09 Regular register after 09/26/09

Please enter a discount code:  (A valid code is required for this item)

**Monday Workshops** (one day) 10/19/09  
Please enter a discount code:  (A valid code is required for this item)

**Tutorial Program Monday** (10/19/09)  
Please enter a discount code:  (A valid code is required for this item)

**Tutorial Program Tuesday** (10/20/09)  
Please enter a discount code:  (A valid code is required for this item)

**Tutorial Program Wednesday** (10/21/09)  
Please enter a discount code:  (A valid code is required for this item)

**Tutorial Program Thursday** (10/22/09)  
Please enter a discount code:  (A valid code is required for this item)

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## Golden Rules of UI Design: 8. Reduce STM Load

Back to that initial page,...

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Monday-Tuesday we are offering several special students and commercial workshops. You may sign up for just one. Registration includes the ISMAR EXPO reception on Monday evening where you will be able to mix with diverse disciplines and discuss of the ISMAR community. \*Tutorials are taught daily. Monday-Thursday by ISMAR postdocs and a per day registration is available.

ISMAR 2009 Conference Registration Fee: **Due by demand, Early registration has been extended thru 25 September..**

	Early Register	Regular Register
Conference (10/20-22/09)	\$105.00	\$175.00
Student Member Fee	\$50.00	\$105.00
Student Non-Member Fee	\$30.00	\$45.00
Life Member Fee	\$500.00	\$550.00

	Member Fee	Non-Member Fee
Monday Workshops (10/19/09)	\$150.00	\$220.00
Per Day Tutorial (10/19-22/09)	\$150.00	\$220.00
Member Fee	\$150.00	\$220.00
Non-Member Fee	\$240.00	\$310.00

**MEMBER\*\***  
Members of IEEE receive the Member Discount, include the discount code IEEE2009 on agenda selection page and provide proof of membership upon checking in at Conference registration page.  
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We a special bonus, all ISMAR participants can sign up for the special ISMAR Mobile Social Network and Local Search service, called "CitySense" and generated by Hayrex. The strategy equipment going to the below link and completing the short registration process to receive your personal QR code for use of this no cost ISMAR feature. It is available to all registered attendees before, during and after ISMAR 09.  
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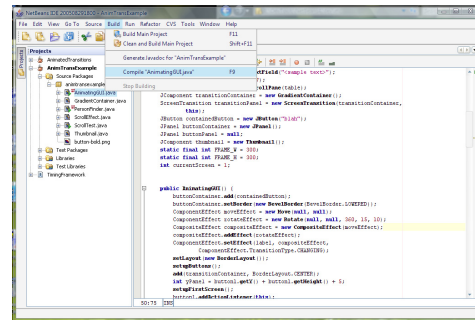
You can add people to your group before finishing your registration. (What's this?)

[Continue](#)

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# Errors

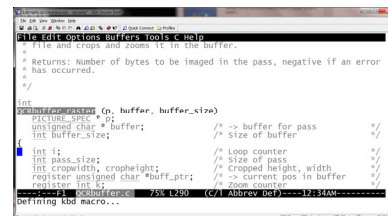
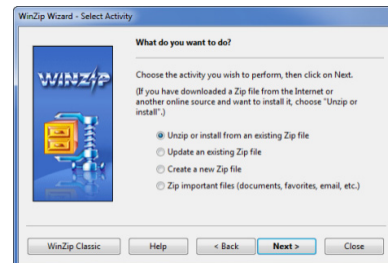
- Matching pairs: [], {}, <TAG> </TAG>, ...
  - If possible to correct, why require?
- Editor support for language
  - Automated checks
    - ↕
  - Syntax-directed editors / Structure editors
    - Editor knows about / enforces language syntax



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# Errors

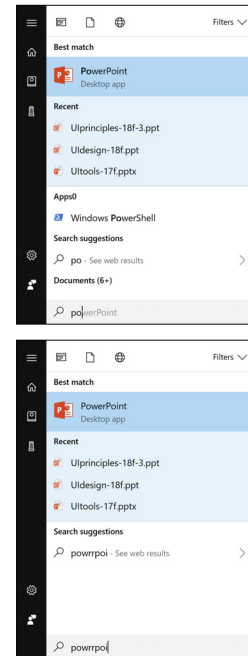
- Package complete sequences of actions
  - Minimize need for user to repeatedly issue the same set of commands
    - Predefined sequences ("wizards")
    - Facilities for defining/invoking sequences
      - Macros



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# Errors

- Prevention
  - Command completion
    - Automated vs. requested
    - Menu of possible completions
- Correction
  - Fix individual commands/arguments
    - “Thier” → “Their”



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## Example: Forcing your user to make a mistake May 2005

- Fill out an address
- Note
  - “Address”
  - “Zip/postal code”
  - “City”
  - “State, region or county”
  - “Country”

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## Example: Forcing your user to make a mistake May 2005

- Address is automatically “propagated” from previous page,...
- But, what went wrong?
- How can I fix it?

The screenshot shows the Skype payment interface. At the top, the Skype logo is visible. A pink callout bubble with the text "No banner!" points to a green horizontal bar. Below this, the order details are listed: "Skype Order 6640423 consists of:". A table shows the breakdown: "SkypeOut calling worth of €10.00" (€10.00), "Subtotal" (€10.00), "0% LUX VAT (who must pay this)" (€0.00), and "Total (this amount will be charged to you)" (€10.00). Below the table, there is a link to "Cancel Order" and a note about payment handling by Skype Payments Services. The "Payment Details" section shows the payment reference number 6640423, amount to pay of EUR 10.00, and payment method of Visa. It includes fields for credit card number, expiration date, name of card holder, and card verification code. A link "What Is Card Verification Code?" is provided. The billing address is pre-filled: "128 Bitwise Way, Apt. 4F", "New York", "10027", "United States". A "Place Order" button is at the bottom.

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## Example: Forcing your user to make a mistake May 2005

- What's wrong?
- It's worse than you think!
- Charge is denied (instantly)

### Address page

The Address page shows a form with the following fields: "Address" (pre-filled with "128 Bitwise Way, Apt. 4F"), "Zip/postal code" (pre-filled with "10027"), "City" (pre-filled with "New York"), "State, region or county" (pre-filled with "NY"), and "Country" (pre-filled with "United States").

### Details page

The Details page shows a form with the following fields: "Street Name" (pre-filled with "128 Bitwise Way, Apt. 4F"), "House or Apartment Number" (empty), "Town/City" (pre-filled with "New York"), "State" (empty), and "Zip Code" (pre-filled with "10027"). A "Place Order" button is at the bottom.

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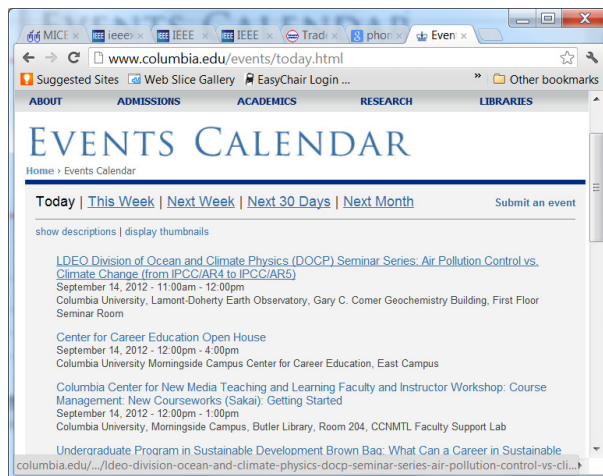
## *Test, test, test!*

- Heuristics aside, how do *users* respond to the design/system?
  - Do they “get it”?
- Does the system implement the design?
- What about boundary conditions?

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## *Example: Terminology*

- Consistency with standard usage

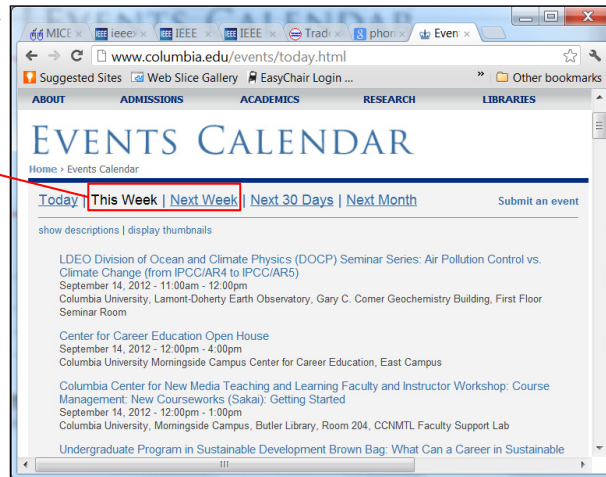


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## Example: Terminology

- Consistency with standard usage

- What do “This Week” and “Next Week” mean?



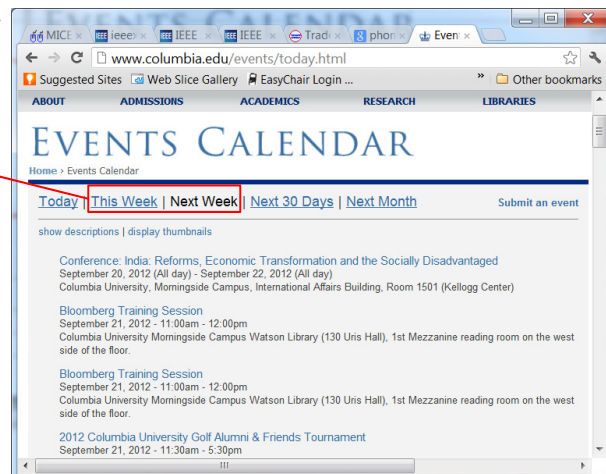
Friday, September 14, 2012

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## Example: Terminology

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Friday, September 14, 2012

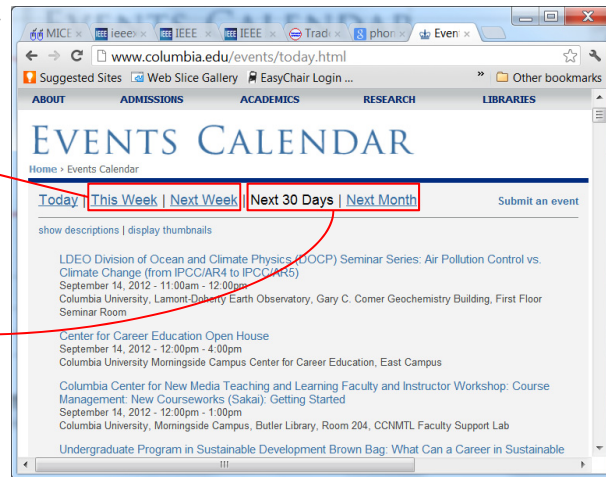
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## Example: Terminology

- Consistency with standard usage

- What do “This Week” and “Next Week” mean?
- How about “Next 30 Days” and “Next Month”?



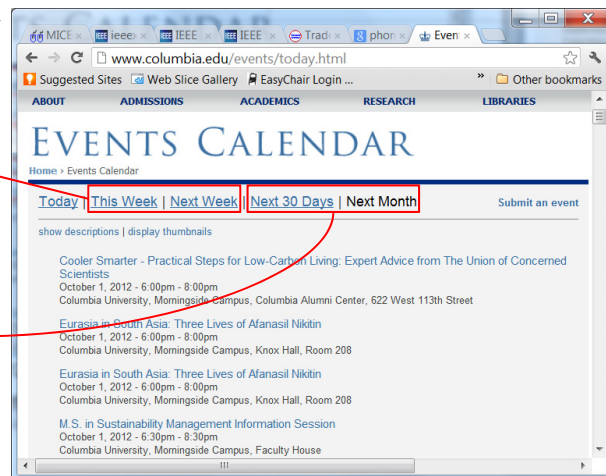
Friday, September 14, 2012

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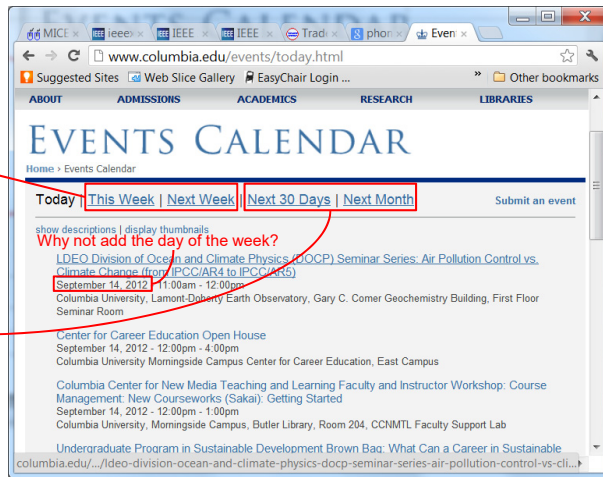
Friday, September 14, 2012

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## Example: Terminology

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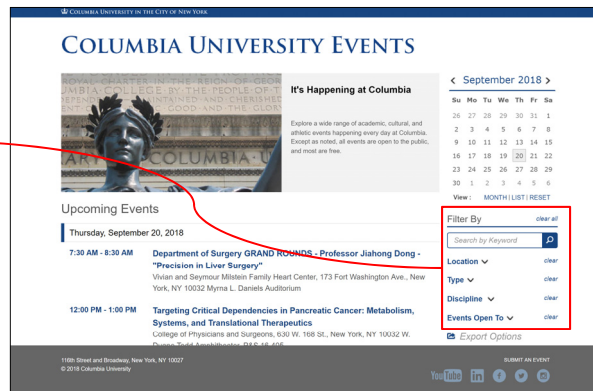


Friday, September 14, 2012

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## Example

- New version, new problems,...
- Filtering



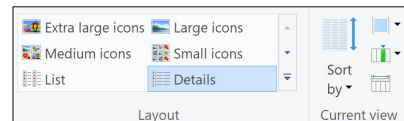
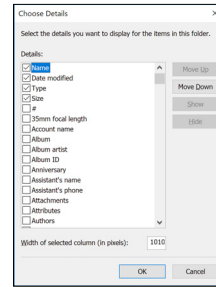
Thursday, September 20, 2018

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## Guidelines for Display

Smith & Mosier 86 ([hcibib.org/sam/](http://hcibib.org/sam/))

- Consistency of data display
  - Unless there's a good reason to be inconsistent
- Efficiency of information assimilation by the user
  - Familiar terminology/formatting
  - Understandable layout
  - Minimize unneeded information
  - Choose appropriate “encoding”
- Minimal memory load on the user
- Compatibility of display and input
  - Use same format for both
  - Combine if possible (make output editable)
- Flexibility for user control
  - Fit the task
    - What: Is, Is -a, Is -l, Is -lt, . . .
    - How/when: Mapping to display, spatiotemporal layout of output



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## Guidelines for Input

Smith & Mosier 86 ([hcibib.org/sam/](http://hcibib.org/sam/))

- Consistency of data input
  - Unless there's a good reason to be inconsistent
- Minimal input actions by user
  - But note tradeoffs
    - Consistency: Keep the rules simple (Reisner)
    - Memory load
    - KLM/CPM issues (e.g., homing time may outweigh keystroke and widget manipulation savings; are savings on the critical path?)
- Minimal memory load on the user
- Compatibility of display and input
  - Use same format for both
  - Combine if possible (make output editable)
- Flexibility for user control
  - Fit the task
    - What: Quantity and kind of information input
    - How/when: Spatiotemporal order of input

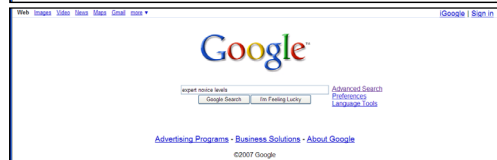
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## Keeping it Simple

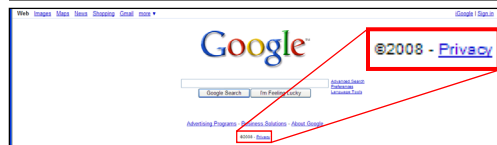
2006



2007



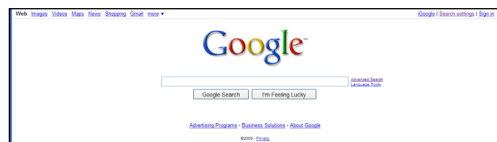
2008



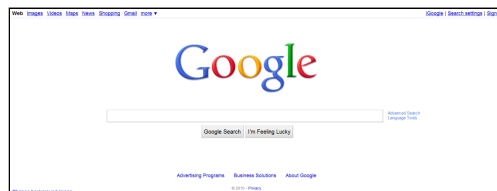
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## Keeping it Simple

2009



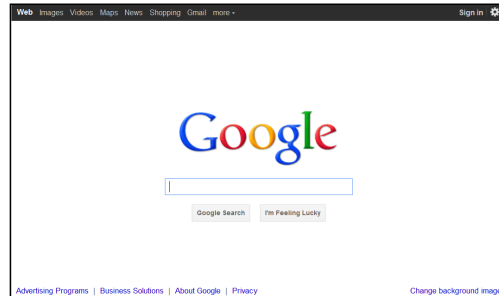
2010



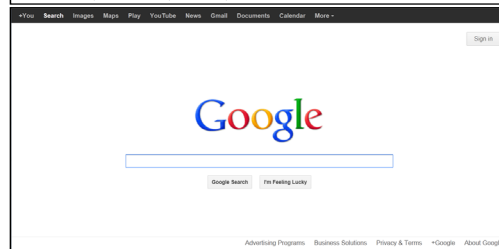
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## *Keeping it Simple*

2011



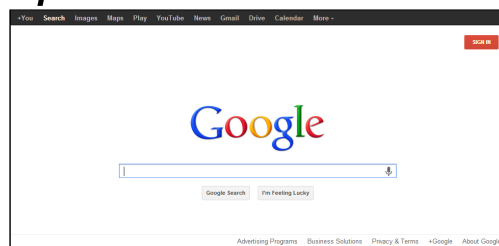
2012



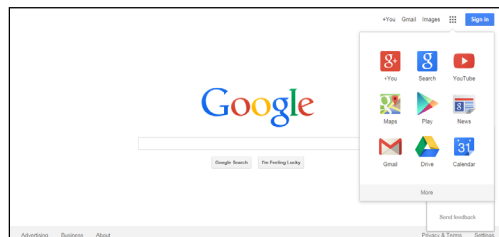
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## *Keeping it Simple*

2013



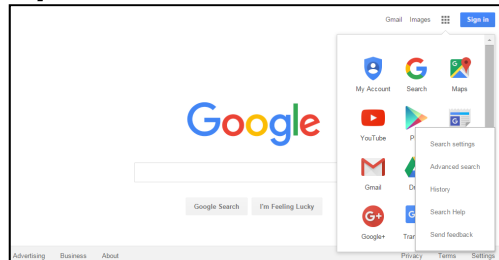
2014



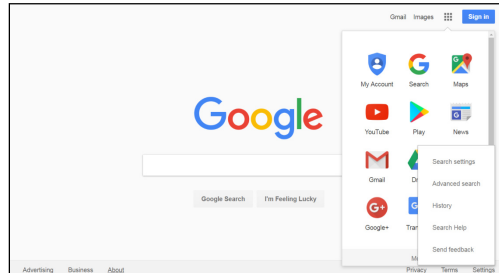
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## *Keeping it Simple*

2015



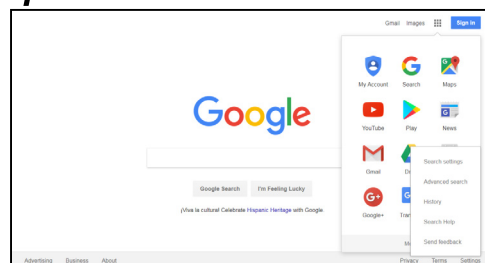
2016



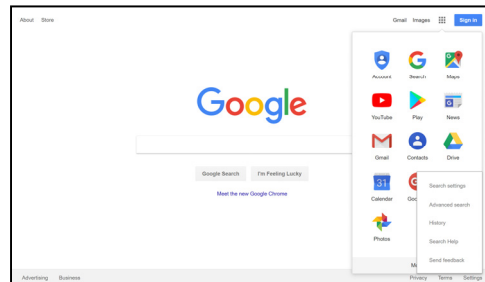
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## *Keeping it Simple*

2017



2018



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