

# *COMS W4170*

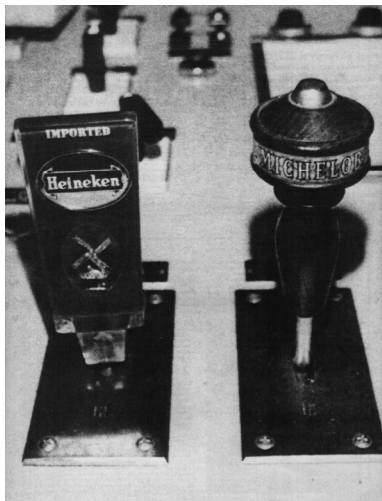
## *UI Background 2*

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September 6, 2018

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## *Why are good UIs important?*



- Distinguishing full and partial control rod levers in a nuclear plant

R. Sugarman, Nuclear power and the public risk, *IEEE Spectrum*, 16(11), November 1979, 58–79.

2

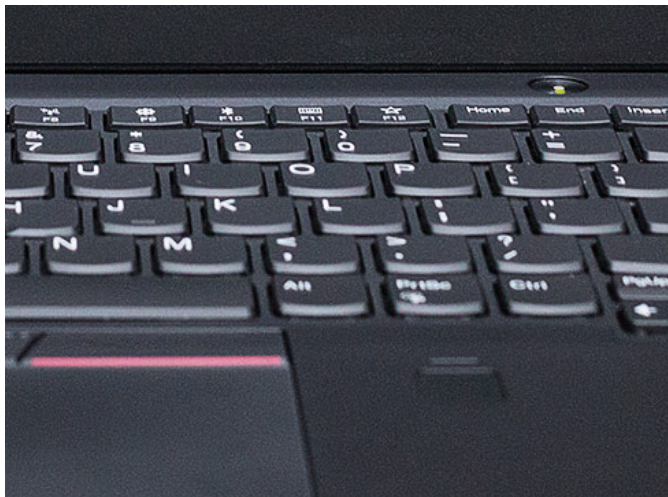
## *Why are good UIs important?*



Lenovo  
IdeaPad 720s

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## *Why are good UIs important?*



Lenovo  
ThinkPad Carbon X1

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## Why are good UIs important?

### Stock Selloff May Have Been Triggered by a Trader Error

Published: Thursday, 6 May 2010 | 7:06 PM ET

By: CNBC.com With Reuters

Text Size

In one of the most dizzying half-hours in stock market history, the Dow plunged nearly 1,000 points before paring those losses—all apparently due to a trader error.



According to multiple sources, a trader entered a "b" for billion instead of an "m" for million in a trade for **Procter & Gamble** (PG 60.75) component in the Dow. (CNBC's Jim Cramer noted suspicious on air during the Watch.)

Sources tell CNBC the erroneous trade may have plunged the Dow 4.04 ▼ -0.14 (-3.35%)

According to multiple sources, a trader entered a "b" for billion instead of an "m" for million in a trade possibly involving **Procter & Gamble** (PG 60.75 ▼ -1.41 (-2.27%) 📉), a component in the Dow. (CNBC's Jim Cramer

"We, along with the rest of the financial industry, are investigating to find the

<https://www.cnbc.com/id/36999483>

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## Why are good UIs important?

### Summary of the Amazon S3 Service Disruption in the Northern Virginia (US-EAST-1) Region

We'd like to give you some additional information about the S3 service disruption that occurred in the Northern Virginia (US-EAST-1) Region on the morning of February 28th, 2017. The S3 team was debugging an issue that caused progress more slowly than expected. A team member using an established playbook executed a command which was intended to remove a small number of servers for one of the S3 subsystems that is used by the S3 billing process. Unfortunately, one of the inputs to the command was entered incorrectly and a larger set of servers was removed than intended. The servers that were inadvertently removed supported two other S3 subsystems. One of these subsystems, the index subsystem, manages the metadata and location information of all S3 objects in the region. This subsystem is necessary to serve all GET, LIST, PUT, and DELETE requests. The second subsystem, the placement subsystem, manages allocation of new objects to the placement subsystem to be functioning properly to correctly operate. The placement subsystem is used during PUT requests to allocate storage for new objects.

progress more slowly than expected. At 9:37AM PST, an authorized S3 team member using an established playbook executed a command which was intended to remove a small number of servers for one of the S3 subsystems that is used by the S3 billing process. Unfortunately, one of the inputs to the command was entered incorrectly and a larger set of servers was removed than intended. The servers that were inadvertently removed supported two other S3 subsystems. One of these subsystems, the index subsystem, manages the metadata and location information of all S3 objects in the region. This subsystem is necessary to serve all GET, LIST, PUT, and DELETE requests. The second subsystem, the placement

<https://aws.amazon.com/message/41926/>

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## Why are good UIs important?



The screenshot shows the Nest Support website. The header includes the Nest logo and a search bar. Below the header, there's a section titled "Frequently asked questions regarding the Nest Protect safety notice". The main content area contains a notice dated April 3rd, 2014, stating that the Nest Wave feature has been disabled on all Nest Protects. The notice explains that during internal testing, it was discovered that movements near the Nest Protect that are not intended as a wave can be misinterpreted by the Nest Wave algorithm, potentially delaying the alarm. The notice concludes that the feature has been removed for safety.

As of April 3rd, 2014, Nest Wave has been disabled on all Nest Protects.

During internal testing, we discovered that movements near Nest Protect that are not intended as a wave can be misinterpreted by the Nest Wave algorithm. If this occurs during a fire, this could delay the alarm going off. So, we have removed this feature.

<https://nest.com/support/article/Nest-Protect-Safety>

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## Why are good UIs hard to build?

- **User** interface
- **Human**—computer interaction

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# People are human

- People like “features”!



<https://www.frankmuller.com/grand-complications>



<http://partsolutions.com/engineering-the-worlds-largest-swiss-army-knife-the-1300-wenger-giant/>

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# People are human



You might think, then, that companies could avoid feature creep by just paying attention to what customers really want. But that's where the trouble begins, because although consumers find overloaded gadgets unmanageable, they also find them attractive. It turns out that when we look at a new product in a store we tend to think that the more features there are, the better. It's only once we get the product home and try to use it that we realize the virtues of simplicity. A recent study by a trio of marketing academics—Debora Viana Thompson, Rebecca W. Hamilton, and Roland T. Rust—found that when consumers were given a choice of three models, of varying complexity, of a digital device, more than sixty per cent chose the one with the most features. Then, when the subjects were given the chance to customize their product, choosing from twenty-five features, they behaved like kids in a candy store. (Twenty features was the average.) But, when they were asked to use the digital device, so-called “feature fatigue” set in. They became frustrated with the plethora of options they had created, and ended up happier with a simpler product.

<https://hbr.org/2006/02/defeating-feature-fatigue>

[http://www.newyorker.com/talk/financial/2007/05/28/070528ta\\_talk\\_surowiecki](http://www.newyorker.com/talk/financial/2007/05/28/070528ta_talk_surowiecki)

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## *People differ*

- Physical abilities
  - **Anthropometry**: Study of human body measurements
    - Static vs. dynamic properties
      - Height, weight, reach,...
      - Speed at which you read, “double click”,...
  - **Ergonomics**: Design of places and tools in and with which we work; “human engineering”
    - Design of work surfaces, chairs, keyboards, mice,...

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## *People differ*

- Perceptual abilities
  - Screen refresh rate, flicker
  - Depth perception
  - Hearing
  - Color
    - Color blindness (color vision deficiency)
      - ~ 8% males vs. ~ 0.4% females (“red-green” color blind)
    - Tetrachromacy
      - 4<sup>th</sup> cone with sensitivity between r and g, > 3-channel system + higher-dimensional perceptual experience (females only)

<http://www.uic.edu/depts/vpl/teaching/Jameson2001.pdf>

<http://www.ncl.ac.uk/ion/staff/profile/gabriele.jordan>

<https://theneurosphere.com/2015/12/17/the-mystery-of-tetrachromacy-if-12-of-women-have-four-cone-types-in-their-eyes-why-do-so-few-of-them-actually-see-more-colours/>

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## *People differ*

- Cognitive processes
  - Individual differences
    - Short-term memory (STM)
    - Long-term memory (LTM)
    - Ability to solve problems, make decisions, search, attend

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## *People differ*

- Cognitive processes
  - Gender differences
    - M. Czerwinski, D. Tan, and G. Robertson, "Women take a wider view," *Proc. CHI 2002*, 195–202.
    - Participants navigate in 3D environment presented on
      - Small displays with a narrow field of view
      - Large displays with a wide field of view
    - Results
      - Narrow field of view: Men outperform women (well replicated finding)
      - Wide field of view: Women and men both perform better, and gender bias is significantly reduced

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## People differ

- Cultural differences
  - Tone of interface
  - Reading left-to-right, right-to-left, top-to-bottom
  - Formats
    - Date, time, currency, capitalization, spelling, punctuation, colors
  - Icons
    - Garbage can, mailbox



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## Cultural differences: color

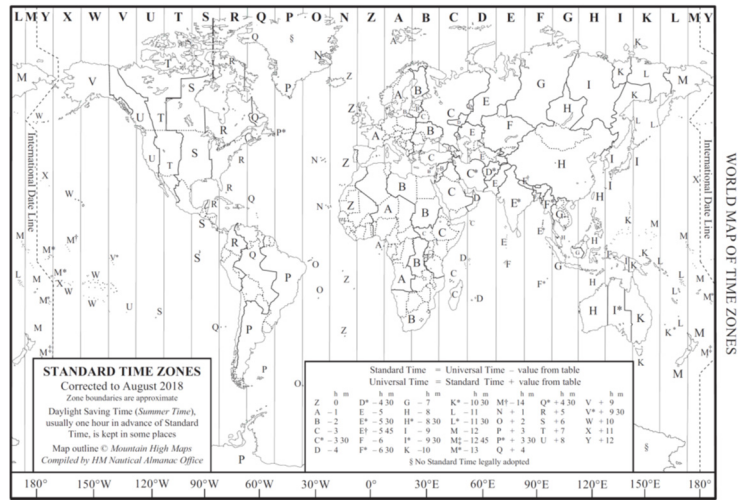
P. Russo & S. Boor, *How fluent is your interface?* Proc. INTERCHI '93

	Red	Blue	Green	Yellow	White
<b>U.S.</b>	Danger	Masculinity	Safety	Cowardice	Purity
<b>France</b>	Aristocracy	Freedom Peace	Criminality	Temporary	Neutrality
<b>Egypt</b>	Death	Virtue Faith Truth	Fertility Strength	Happiness Prosperity	Joy
<b>India</b>	Life Creativity		Prosperity Fertility	Success	Death Purity
<b>Japan</b>	Anger Danger	Villainy	Future Youth Energy	Grace Nobility	Death
<b>China</b>	Happiness	Heavens Clouds	Ming Dynasty Heavens Clouds	Birth Wealth Power	Death Purity

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## Geographic differences: time zones



<http://astro.ukho.gov.uk/nao/miscellanea/WMTZ>

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## People differ

- Age
  - Childhood
    - Literacy
    - Motor skills
    - Abstraction
  - Old age
    - Vision
      - Large fonts
      - Dark adaptation
      - Focus
    - Hearing
    - Memory

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## *People differ*

- Disabilities
  - Vision
  - Hearing
  - Motor skills

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## *Section 504*

- Section 504 of US Rehabilitation Act of 1973
  - *“No otherwise qualified handicapped individual in the United States...shall, solely by reason of his handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.”*

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## ADA [www.ada.gov](http://www.ada.gov)

- Americans with Disabilities Act of 1990 (ADA)
  - Equal opportunity law for people with disabilities
  - Issues with screen readers
    - <http://www.columbiaspectator.com/2012/02/09/exclusion-google-docs-avoids-ada-challenges>
      - Notably, while LionMail Drive will be available for classroom use, because of the lack of access for certain types of disabilities, the University prohibits faculty from requiring it for any academic interaction. Requiring its use might exclude some students from full class participation and access to the full academic environment.

—Email from LionMail Team, July 9, 2014

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## ADA

The screenshot shows the top portion of a web browser displaying a New York Times article. The page header includes the 'The New York Times' logo, a 'LOG IN' button, and a navigation menu with 'SECTIONS'. Below the header is a row of four small article teasers. The main article is titled 'EdX Online Accessibility Settlement Reached' by Tamar Lewin, dated April 2, 2015. The article text discusses a settlement between EdX, MIT, and Harvard with the Department of Justice regarding accessibility for blind and hard-of-hearing students. A sidebar on the left contains social media sharing options (Email, Share, Tweet, Save, More). At the bottom of the article, a note states that a print version of the article appeared in the New York Times edition of April 3, 2015, on page A12.

U.S.

### ***EdX Online Accessibility Settlement Reached***

By TAMAR LEWIN APRIL 2, 2015

EdX, the nonprofit online-learning venture [MIT](#), and [Harvard](#) formed in 2012, agreed to a settlement with the Department of Justice under which it will make its 450 massive open online courses accessible to blind and hard-of-hearing students, and to those with other disabilities, such as a tremor that makes it difficult to operate a mouse.

EdX did not admit any wrongdoing, and maintains that its online operations are not covered by the Americans With Disabilities Act. The settlement underscores the government's policy of ensuring that online education is as accessible to those with disabilities as on-campus education is.

A version of this article appears in print on April 3, 2015, on page A12 of the New York edition with the headline: Online Accessibility Settlement Reached.  
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<http://www.nytimes.com/2015/04/03/us/online-accessibility-settlement-reached.html>

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## Section 508 [www.section508.gov](http://www.section508.gov)

- 1998 US Congressional amendment to Rehabilitation Act of 1973  
Now called ICT (Information and Communication Technology)
- Requires Federal agencies to make EIT (Electronic and Information Technology) accessible to people with disabilities
- Federal agencies must procure EIT that gives disabled employees and members of the public access that is comparable to that available to others
  - Except where it imposes a documented “undue burden” (significant difficulty or expense)
    - In that case, “alternative means of access” must be provided
  - Except for “national security systems”: intelligence, command & control, weapons,...

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## Website Accessibility

- Website accessibility
  - Standards
    - Web Content Accessibility Guidelines (WCAG) 2.0
      - <http://www.w3.org/TR/WCAG20/>
    - Accessible Rich Internet Applications Suite
      - <http://www.w3.org/WAI/intro/aria>
  - Compliance analysis
    - <http://wave.webaim.org>

**Summary**

WAVE has detected the following:

- 0 Errors
- 9 Alerts
- 28 Features
- 40 Structural Elements
- 108 HTML5 and ARIA
- 29 Contrast Errors

**Panel Options**

- DETAILS: A listing of all the WAVE icons in your page.
- DOCUMENTATION: Explanation of the WAVE icons and how you can make your page more accessible.
- OUTLINE: The heading structure of the web page.



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## *Situations differ*

- Work ↔ Play
- Routine ↔ Emergency
- Individual ↔ Group
- Stationary ↔ Mobile
- Indoors ↔ Outdoors

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## *Devices differ*

- Old ↔ New (e.g., slow ↔ fast, less memory ↔ more memory)
- Disconnected ↔ High bandwidth connectivity
- Size, weight, shape, look, feel
- Display/Interaction
  - Small ↔ Large
  - One ↔ Many
  - Low res ↔ High res
  - Vertical ↔ Horizontal (↔ Wearable)
  - No touch input ↔ Multitouch (↔ 3D)
  - ...



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