Why are good UIs important?

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 ▼ .44 (.22%) ]

Sources tell CNBC the enormous trade may have been triggered by an error. (CNBC's Jim Cramer)
Why are good UIs important?

The command to reboot the select set of new systems that needed to be updated was mis-typed, and instead specified all servers in the datacenter. Unfortunately the tool in question does not have enough input validation to prevent this from happening without extra steps/confirmation, and went ahead and issued a reboot command to every server in us-east-1 availability zone without delay.”

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.
Why are good UIs hard to build?

- **User** interface
- **Human**–computer interaction

People are human

- People like “features”!

[Images and links provided]
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—Delora Vian 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

People are human

DILBERT by Scott Adams

YOUR USER REQUIREMENTS INCLUDE FOUR HUNDRED FEATURES.

DO YOU REALIZE THAT NO HUMAN WOULD BE ABLE TO USE A PRODUCT WITH THAT LEVEL OF COMPLEXITY?

GOOD POINT. I DO BETTER ADD “EASY TO USE” TO THE LIST.
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,…

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
      - 4th cone with sensitivity between r and g, > 3-channel system + higher-dimensional perceptual experience (females only)

http://www.ncl.ac.uk/ion/staff/profile/gabrielle.jordan
People differ

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

People differ

- Cognitive processes
  - Gender differences
    - Subjects 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
People differ

- Personality differences
  - Tests
  - Behavior

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
### Cultural differences: color

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

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### Geographic differences: time zones

People differ

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

People differ

- Disabilities
  - Vision
  - Hearing
  - Motor skills
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.”

ADA 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
ADA

Section 508  www.section508.gov

- 1998 US Congressional amendment to Rehabilitation Act of 1973
- 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,...
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

Situations differ

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