DEFINING PROJECT REQUIREMENTS

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OUTLINE

- Importance of Requirements
- Usage Case
- Design Constraints
  - Computational Constraints
  - Electrical Constraints
  - Thermal/Power Constraints
  - Mechanical Constraints
  - Economic Constraints

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IMPORTANCE OF REQUIREMENTS

I CAN'T START THE PROJECT BECAUSE THE USER WON'T GIVE ME HIS REQUIREMENTS.
START MAKING SOMETHING ANYWAY. OTHERWISE WE'LL LOOK UNHELPFUL.
SO, OUR PLAN IS TO CLEVERLY HIDE OUR COMPETENCE.
YOU THINK TOO MUCH.

- Vital part of the planning process
- Helps drive all other aspects of project design
- Glean useful thoughts and insights about the customer (who your project is being designed FOR) and the environment (where/how your project will be used)

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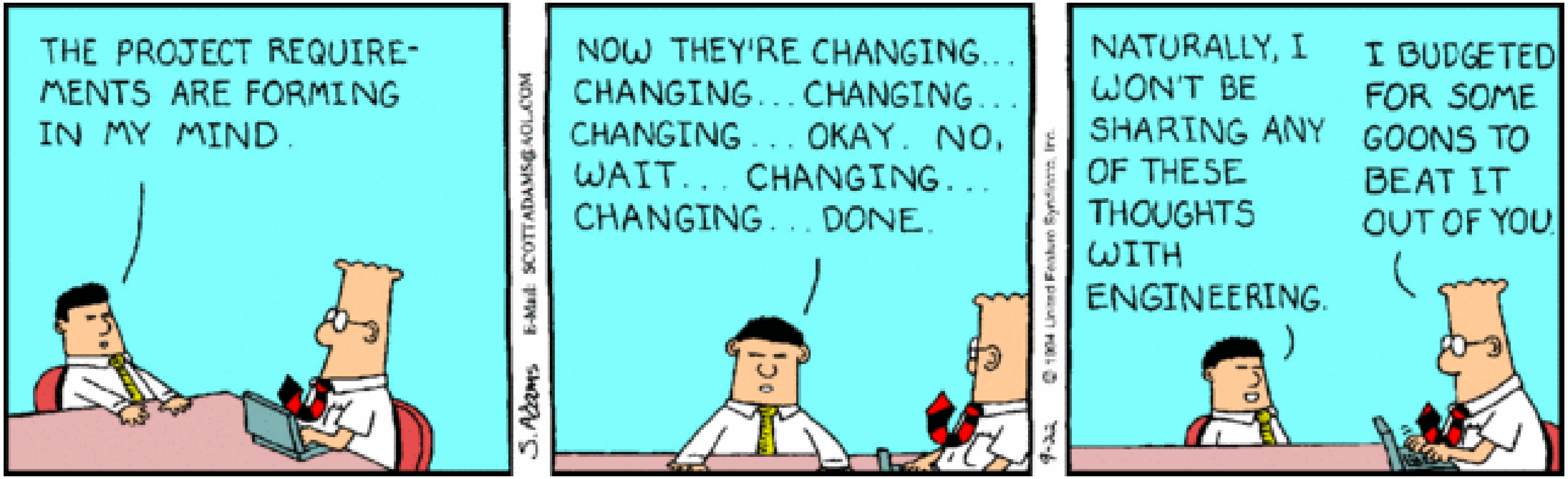
USAGE CASE

- The usage case is a short technical description that details how, where, and by whom the final project/product will be used
- Should include relevant details about the user (examples below, can be omitted if irrelevant):
  - What is/are the user’s target demographic(s)?
    - Young? Old? Particular gender? Particular level of technical expertise?
  - How will the user use the end project/product? (Frequency of use? Duration of use? Portability?)
  - How many people will use an instance of the project? (One? Many?)

USAGE CASE (CONT.)

- The usage case should include details about the environment in which the end project is being used:
  - What is the nature of the environment? (Residential? Commercial? Industrial? Other? (e.g. a deep sea probe))
  - What environmental factors/influences is the device subject to? (Weather conditions? Vibration/falls/shocks? Humidity? Moisture?)

DESIGN CONSTRAINTS


THE PROJECT REQUIREMENTS ARE FORMING IN MY MIND.
S. Adams
E-Mail: SCOTTADAMS@AOL.COM
NOW THEY'RE CHANGING... CHANGING... CHANGING... CHANGING... OKAY. NO, WAIT... CHANGING... CHANGING... DONE.
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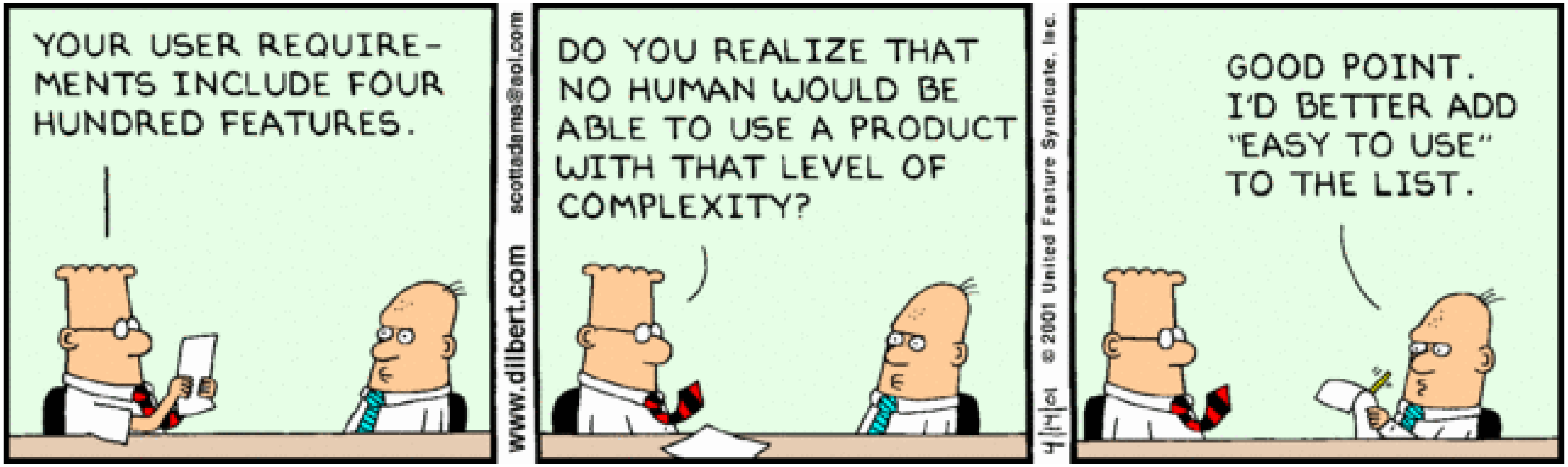
9-22
NATURALLY, I WON'T BE SHARING ANY OF THESE THOUGHTS WITH ENGINEERING.
I BUDGETED FOR SOME GOONS TO BEAT IT OUT OF YOU.

- Design constraints specify criteria which the implemented project must satisfy
- Large commercial designs may have hundreds of criteria; student projects will generally have less (~5-20)
- Designs split into a variety of categories

COMPUTATIONAL CONSTRAINTS


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'D BETTER ADD "EASY TO USE" TO THE LIST.
www.dilbert.com
scottadams@aol.com
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4/14/01

- What algorithms/methods does your software need to use? (FFT? Sorting algorithms? Table lookup?)
- What computing resources does your design require? (Floating point? Cryptography?)
- What requirements are imposed on your processor? (Clock speed? Memory?)

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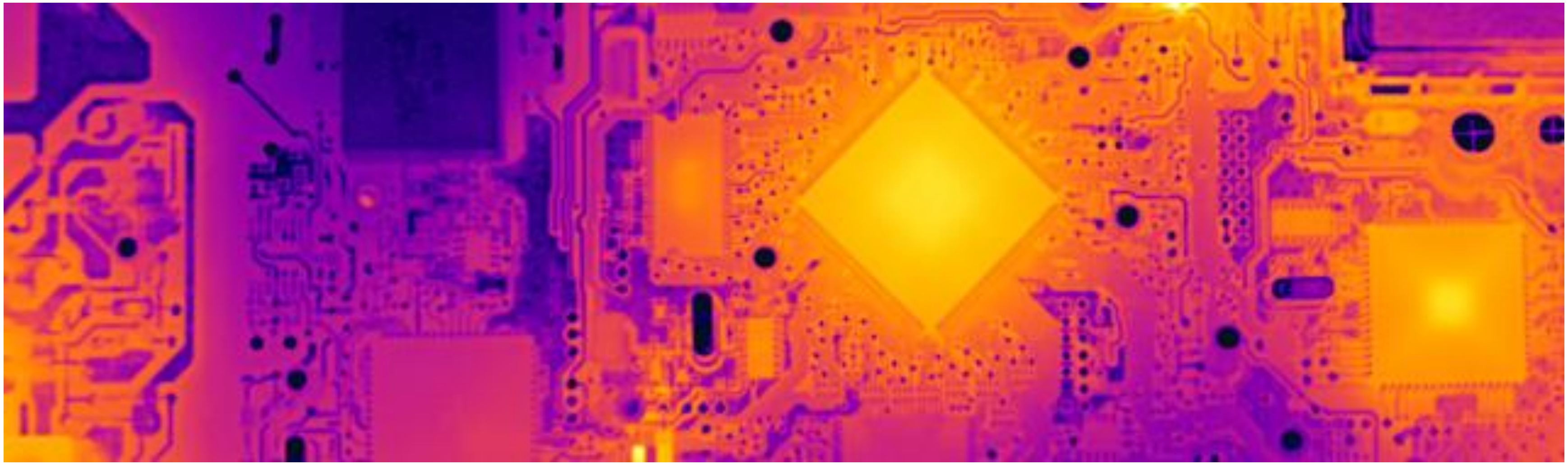
ELECTRONICS CONSTRAINTS

- What major components does your design use? (Sensors? LCDs? External memory?)
- What major interfaces does your design use? (e.g. if your design uses Ethernet, it will need a physical Ethernet interface and dedicated control hardware)
- How many I/O lines will your microcontroller need? (Largely derived from components and interfaces used by your design)
- What special interface considerations might you need? (Buffering? Impedance matching? Protocol considerations?)

THERMAL/POWER CONSTRAINTS



- Max temperature/power dissipation requirements? (How “hot” is your project allowed to get?)
- Target battery life/operation life (relevant to mobile/battery-powered projects)
- Charging time (relevant to battery-powered projects)

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MECHANICAL CONSTRAINTS

- Physical constraints (size, weight, etc.)
- Mechanical standards (e.g. project follows the rack-mount standard and must fit within a 1U form factor)
- Durability constraints – How much “abuse” does your project need to be able to withstand? From what height should your project be able to withstand a fall?
- Environmental constraints – Does your project need to be waterproof? Weatherproof? Dust proof? Shock proof? Bullet proof? (Or any other ‘proofs you can think of?)

ECONOMIC CONSTRAINTS

- Cost constraints – Generally influenced by the existence of other products within the market
- Import/Export constraints – Generally influenced by laws of target markets. Best known constraint in this category would be Removal of Hazardous Substances (RoHS) regulations, which specifies banned materials for products bound for the European Union. (Covered in further detail with regulatory analysis, later in the course)

Questions?