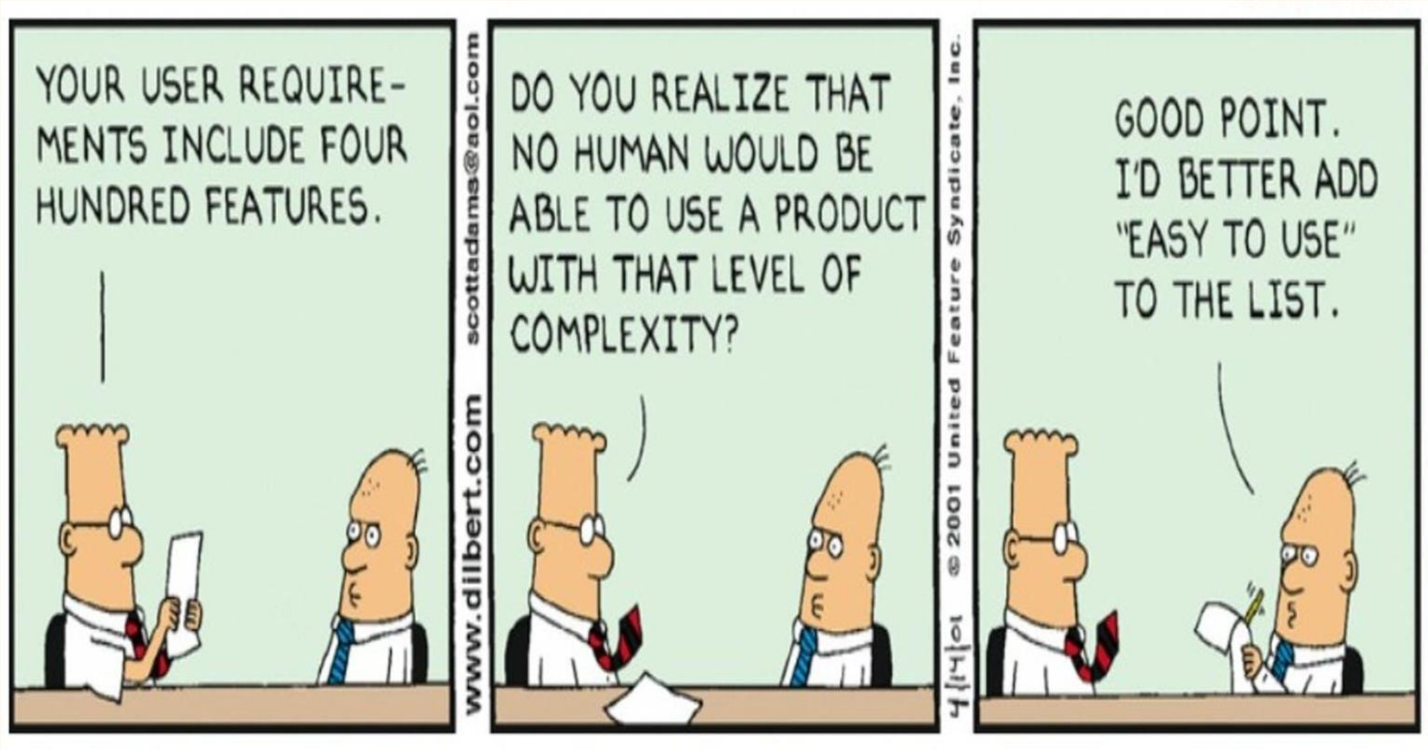
CSci 3081W: Program Design and Development

Lecture 6 – Intro to SE, requirements and documentation

Announcements

- Quiz 1
- Workshop 2
- Homework 1
- Homework 2
- Project Groups

Requirements


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.
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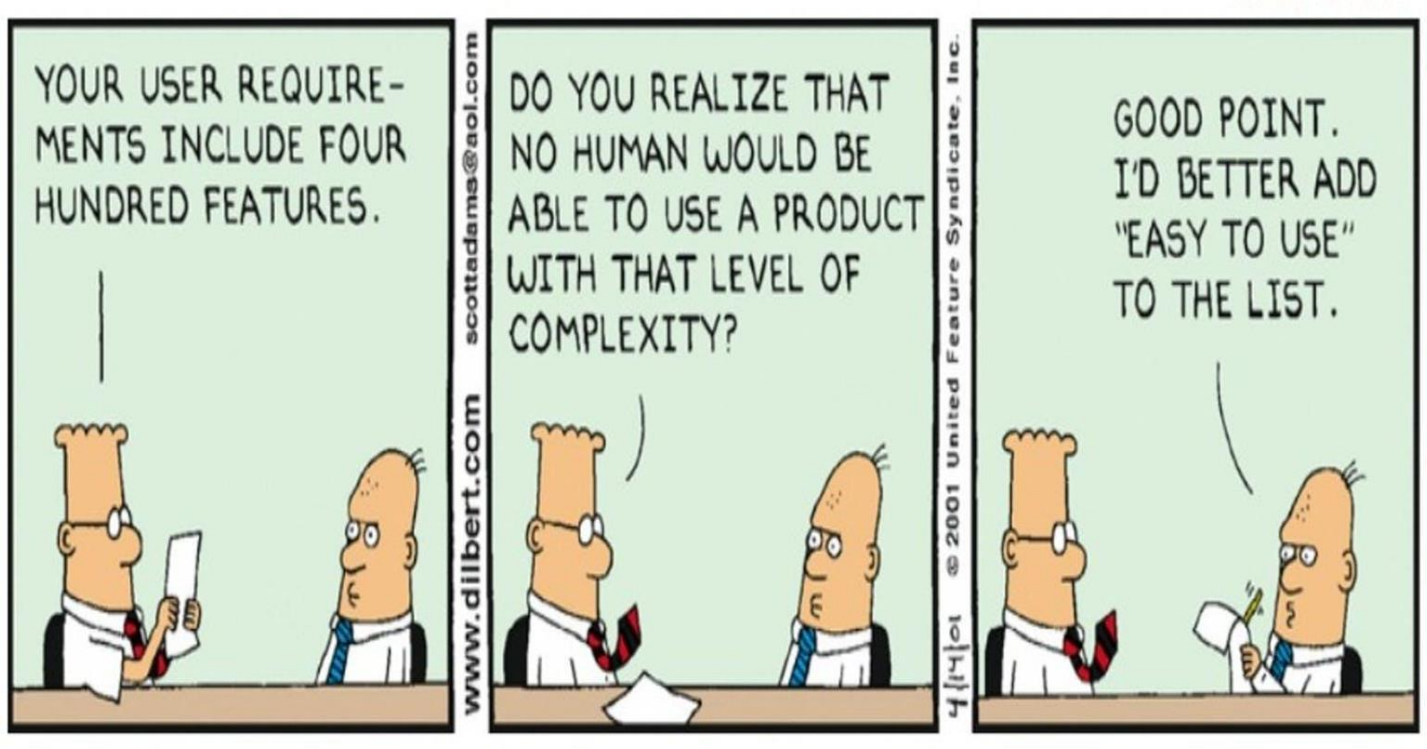
What is a "requirement"?

A requirement in software engineering is a feature of new software that someone either wants, needs or commands.

Requirements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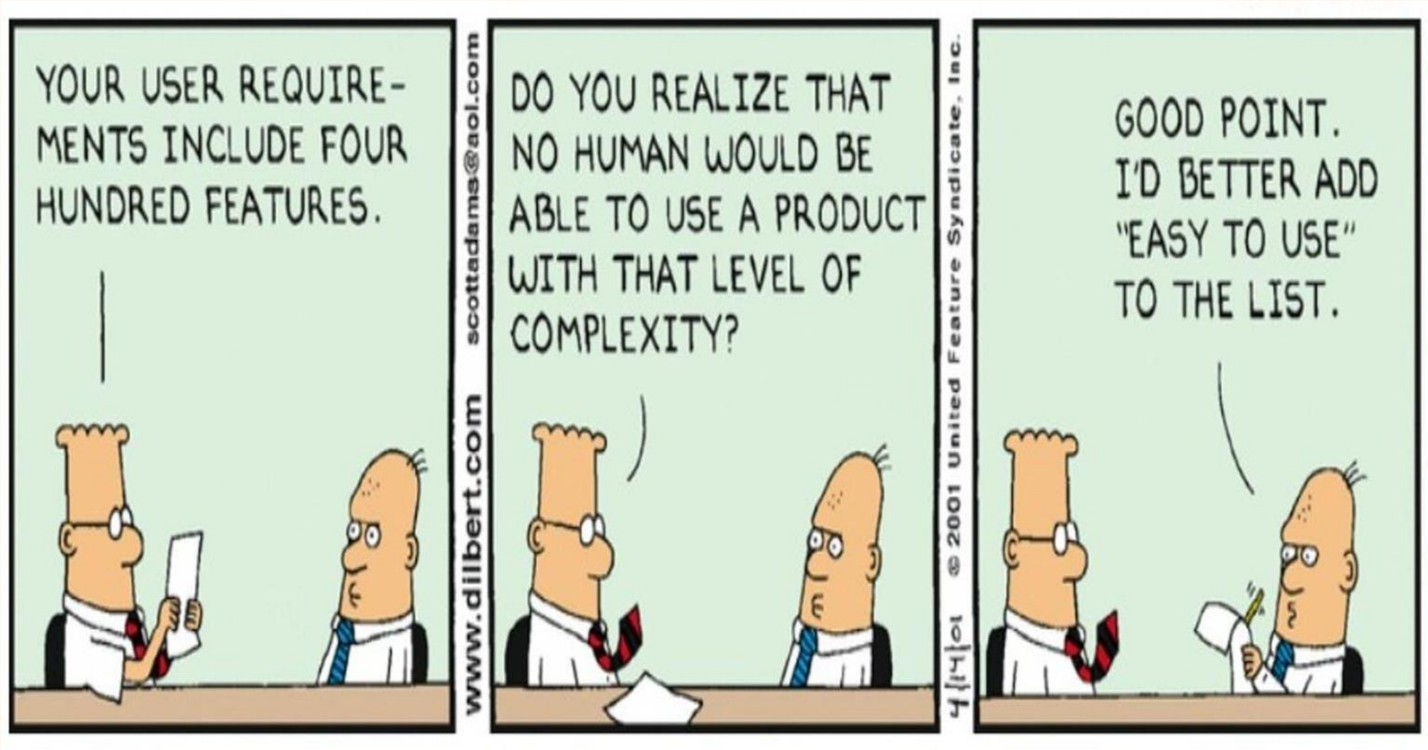
What is a "requirement"?

It describes what a software does as well as its limitations.

Requirements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What’s the goal when making a requirement?

What do we want the system to do?

What are the needs of the users?

What does the system need to do in order to achieve those needs?

Requirements

Requirements can be split into two categories: functional and nonfunctional requirements

HOW LONG WILL IT TAKE TO WRITE THE SOFTWARE?
THAT DEPENDS.
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WHAT DO YOU WANT THE SOFT-WARE TO DO?
I DON'T KNOW YET.
11-21-19 ©2019 Scott Adams, Inc./Dist. by Andrews McMeel
DO YOU SEE THE PROBLEM HERE?
IS IT YOU?

Functional Requirement

Functional requirement: describes what the software does

Express in terms of: data storage, any process that transforms data, and any outputs that it produces

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DO YOU SEE THE PROBLEM HERE?
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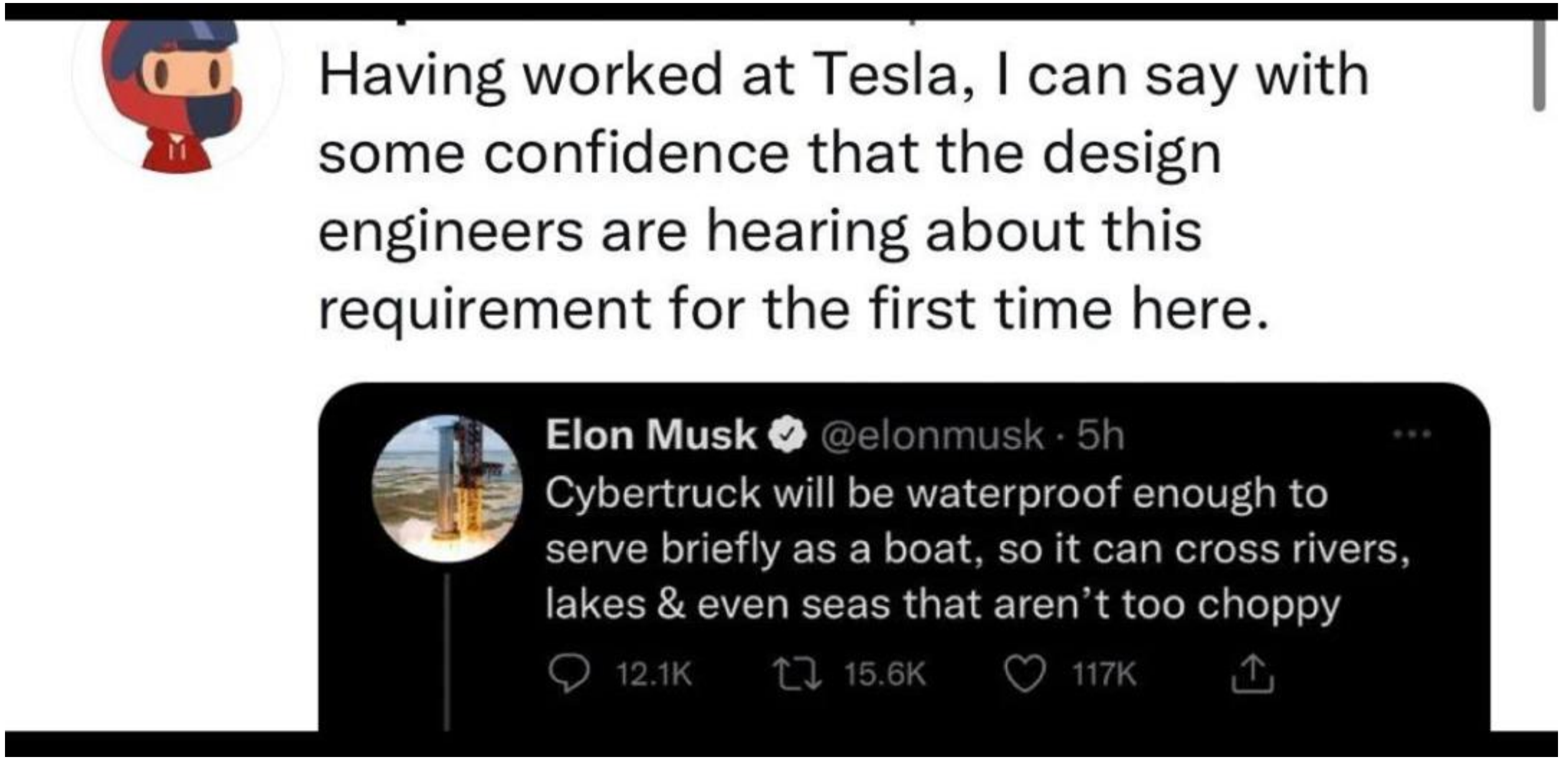
Non-functional Requirement

Non-functional requirement: defines limitations that the software has

Express in terms of: performance, security and access, technical constraint, project constraint, organizational constraint, usability and reliability issues

OUR INTERNAL PROCESSES ARE SO INEFFICIENT THAT WE CAN'T GET PRODUCTS TO MARKET BEFORE THEY ARE OBSOLETE.
DILBERT.COM @SCOTTADAMSSAYS
I'LL CREATE A MULTIDISCIPLINARY TASK FORCE TO LOOK INTO IT.
1-2-20 2020 Scott Adams, Inc./Dist. by Andrews McMeel
YOU WANT TO USE AN INEFFICIENT SYSTEM TO FIX AN INEFFICIENT SYSTEM?
IT'S CALLED FIGHTING FIRE WITH FIRE.

Requirement Analysis / Engineering



Having worked at Tesla, I can say with some confidence that the design engineers are hearing about this requirement for the first time here.

Elon Musk @elonmusk · 5h

Cybertruck will be waterproof enough to serve briefly as a boat, so it can cross rivers, lakes & even seas that aren't too choppy

I don't know if this is real*

Requirement Analysis / Engineering

Requirements engineering (RE) is the process of defining, documenting, and maintaining requirements in the engineering design process. It is a common role in systems engineering and software engineering.

- Wikipedia

Requirement Analysis / Engineering

What’s the output of requirements analysis?

Create a document that describes the software to be built.

Requirements Specification Document

THIS ISN'T WHAT I WANTED.
IT IS, UNLESS YOU GAVE ME THE WRONG SPECS.
I ASSUMED YOU WOULD USE YOUR COMMON SENSE TO KNOW WHAT I WANTED.
DID YOUR COMMON SENSE HELP YOU MAKE THAT ASSUMPTION?

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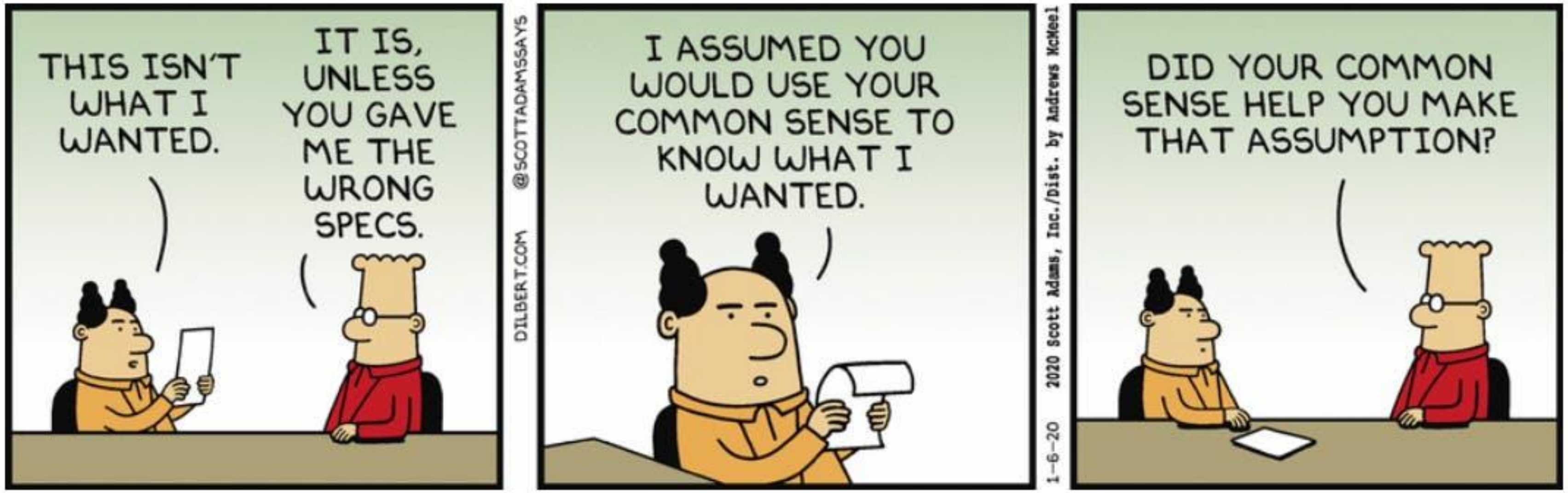
Requirements Specification Document

Contains: overview of what the system will do, description of all the requirements, and a list of the functional requirements

Doesn’t contain: any info about the algorithms or logic, UI discussion, details about data entities or types, technical specifications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Requirements

Poor requirements engineering is one of the reasons why a software engineering project can fail or produce a highly defective piece of software.

IF WE BUILD OUR SOFTWARE WITH NO BUGS, WE CAN MAKE A 10% RETURN ON OUR INVESTMENT.
10%
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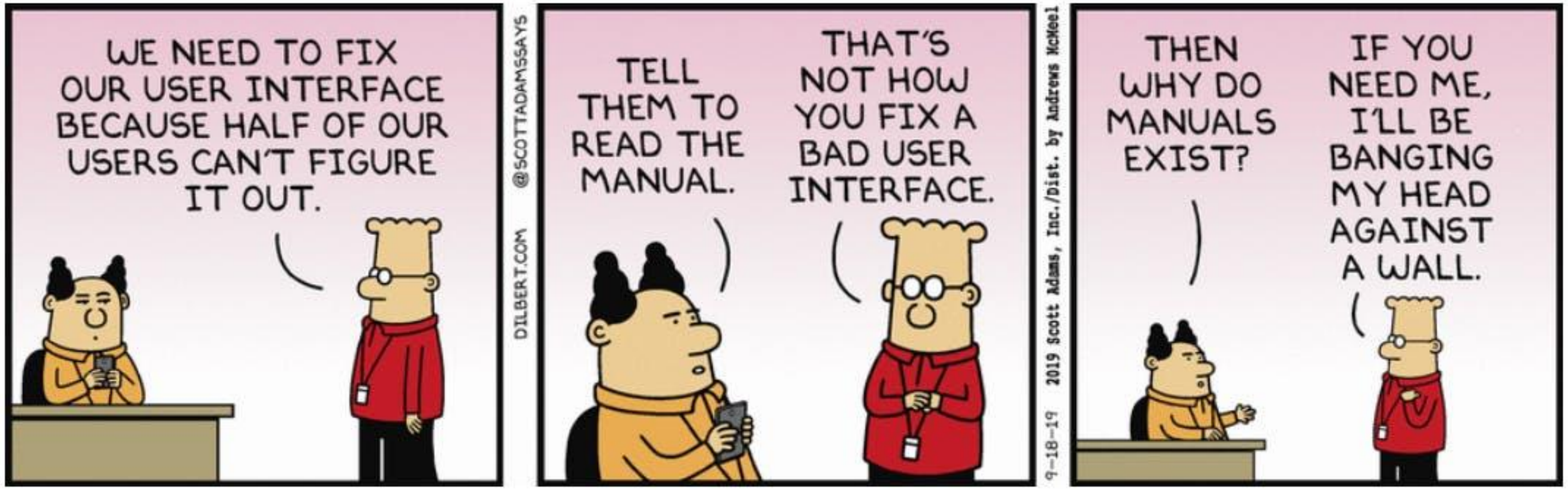
BUT IF WE DO A POOR JOB, WE CAN MAKE A 40% RETURN BY SELLING UPGRADES AND SERVICE.
2-3-11 ©2011 Scott Adams, Inc./Dist. by UFS, Inc.
BUT DON'T WORRY. WE ONLY HAVE THE BUDGET FOR A POOR JOB.
I CAN'T REMEMBER IF WE'RE CHEAP OR SMART.
PHEW!

Requirements

Many reasons for failure: miscommunication between management and developers, poor testing, poor user experience, unwillingness to pivot, complex to use


WE NEED TO FIX OUR USER INTERFACE BECAUSE HALF OF OUR USERS CAN'T FIGURE IT OUT.
@SCOTTADAMSSAYS
DILBERT.COM
TELL THEM TO READ THE MANUAL.
THAT'S NOT HOW YOU FIX A BAD USER INTERFACE.
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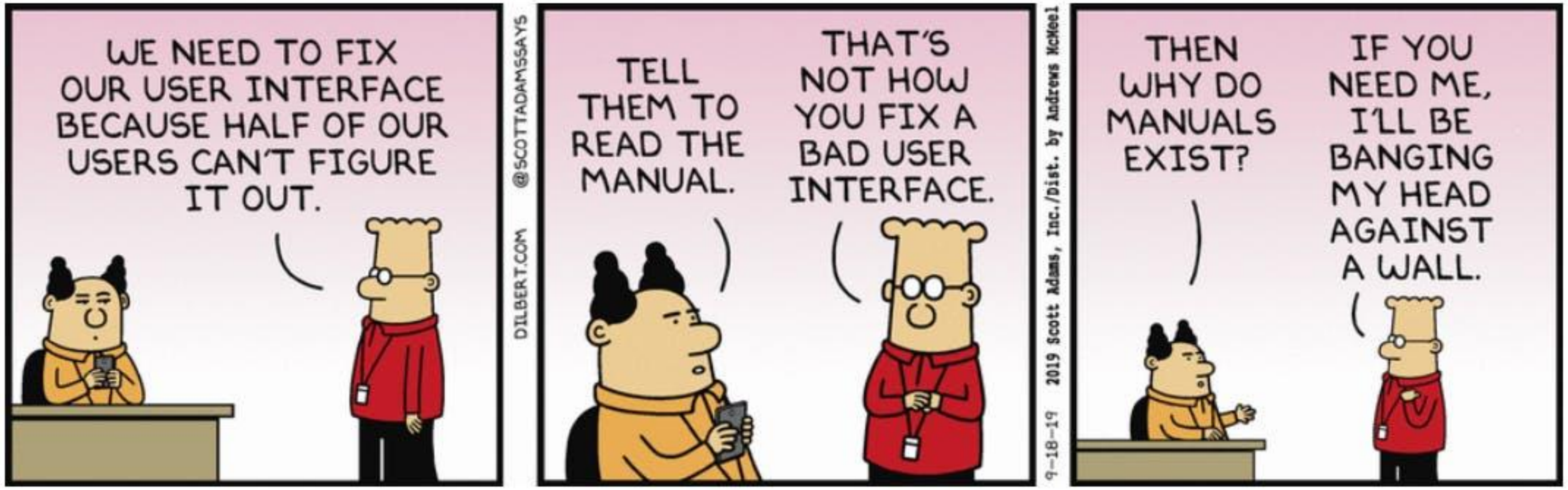
THEN WHY DO MANUALS EXIST?
IF YOU NEED ME, I'LL BE BANGING MY HEAD AGAINST A WALL.

IBM’s list of benefits of good requirements engineering

Lower cost of development, fewer defects, faster delivery, reusability, traceability, requirements get tied to test cases, global config management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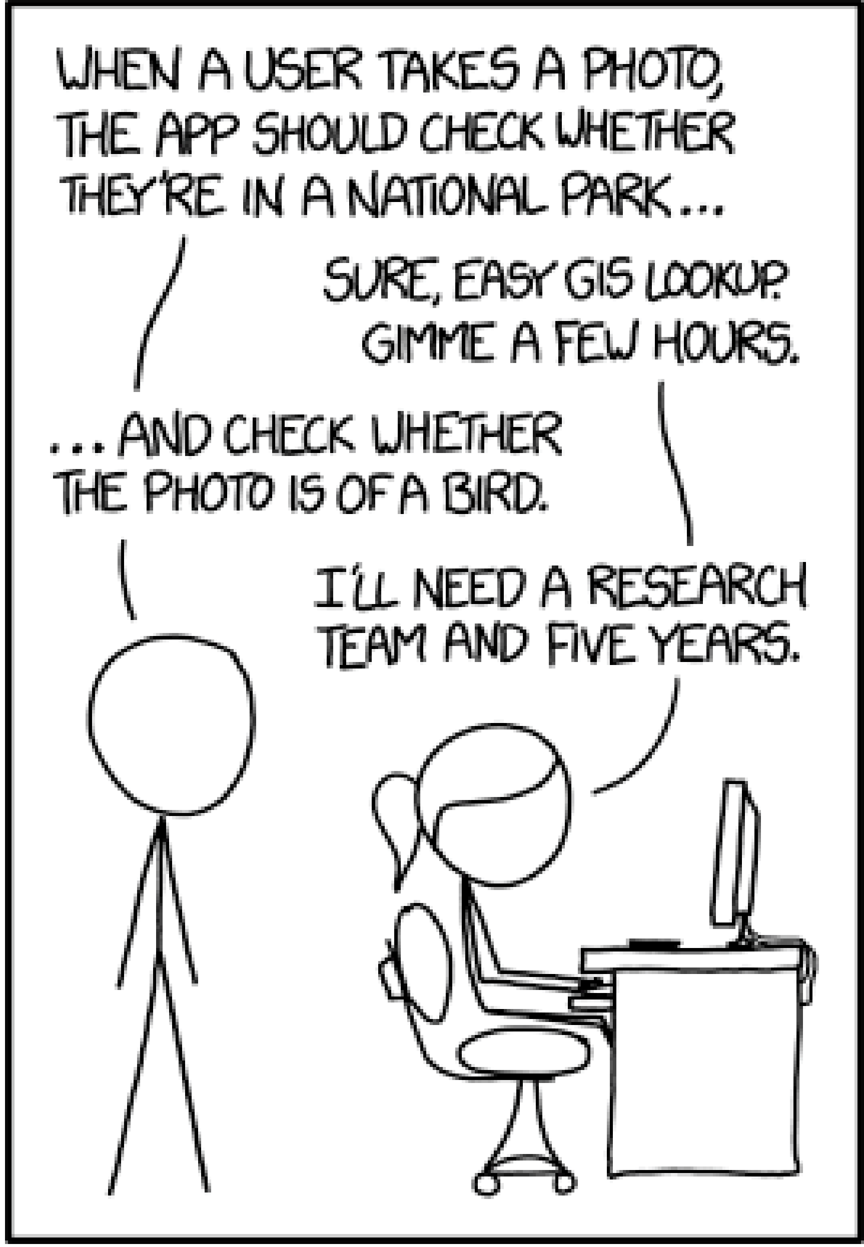
The disconnect

Spending large amounts of time on just requirements is crucial so that if this happens ->

everyone is prepared

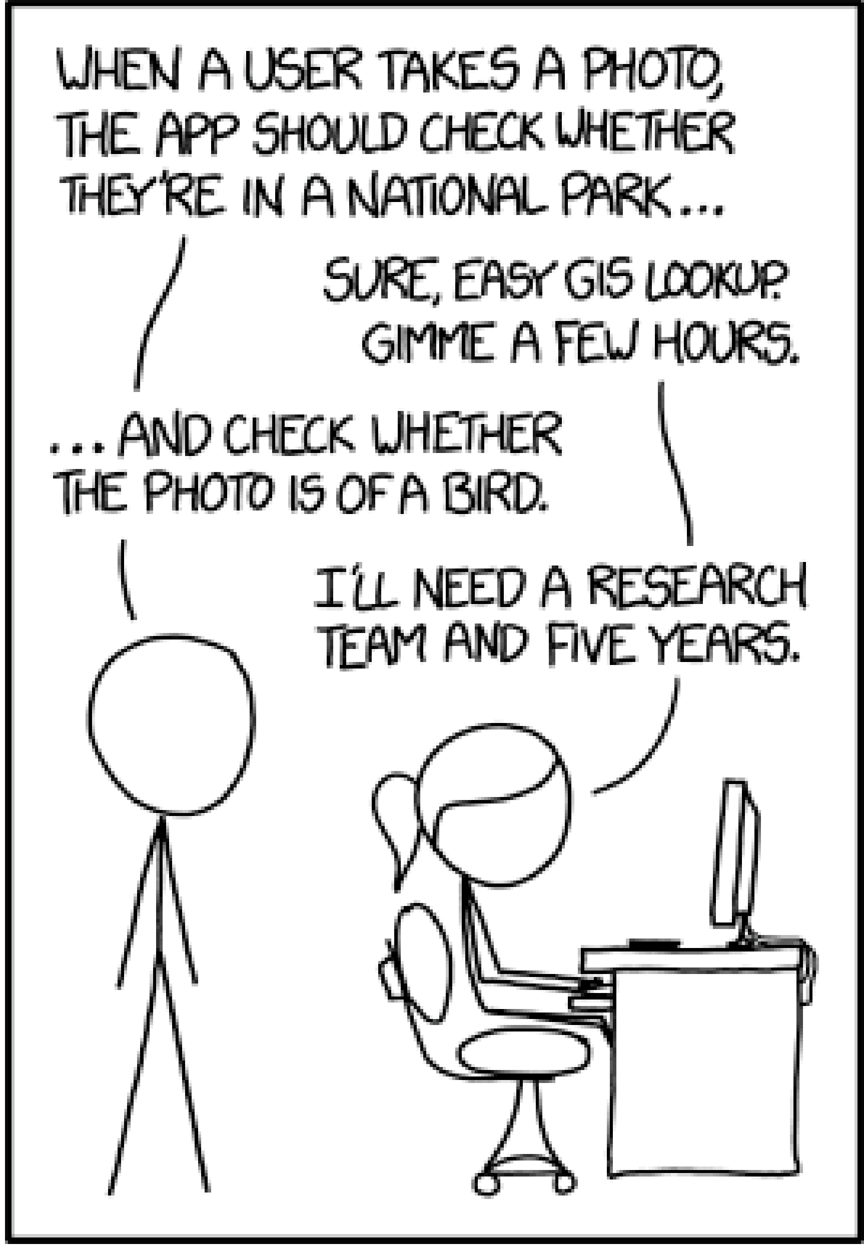

WHEN A USER TAKES A PHOTO, THE APP SHOULD CHECK WHETHER THEY'RE IN A NATIONAL PARK...
SURE, EASY GIS LOOKUP. GIMME A FEW HOURS.
...AND CHECK WHETHER THE PHOTO IS OF A BIRD.
I'LL NEED A RESEARCH TEAM AND FIVE YEARS.

IN CS, IT CAN BE HARD TO EXPLAIN THE DIFFERENCE BETWEEN THE EASY AND THE VIRTUALLY IMPOSSIBLE.

What we didn’t cover today

(we will eventually though)

- Specifications
- Resource Planning
- Design
- Development
- Testing
- Maintenance
- **Development processes**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Documentation in this course

We will not be making a requirements specification document in this course

Instead, we will document our project after the fact. After we finish coding and commenting, we will use a software called Doxygen.

Doxygen

Doxygen is the de facto standard tool for generating documentation from annotated C++ sources.

Generates an online documentation browser in HTML (or .tex) from documented source files

Can also visualize relations between entities via diagrams which are automatically generated

Doxygen example

Crypto++ - https://www.cryptopp.com/docs/ref/

Crypto++ is a free C++ class library of cryptographic schemes. One purpose of Crypto++ is to act as a repository of public domain (not copyrighted) source code.