

How Long Will It Take?

A Guide to Software Estimation

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HMB



About me



Characters

The Team

The Perfectionists

Magical resistant to deadlines
+5 adding too much value



Software Development

So I have
this idea.
<details>

Inventory Item

Item #	Item Name	Actual #	System #
111	Silk T-Shirt	30	30
125	Red Cotton Dress	5	10

Update History

5/5/2014 - 8:00pm - Update by
Sam S.
5/4/2014 - 6:00pm - Update by
Amanda J.

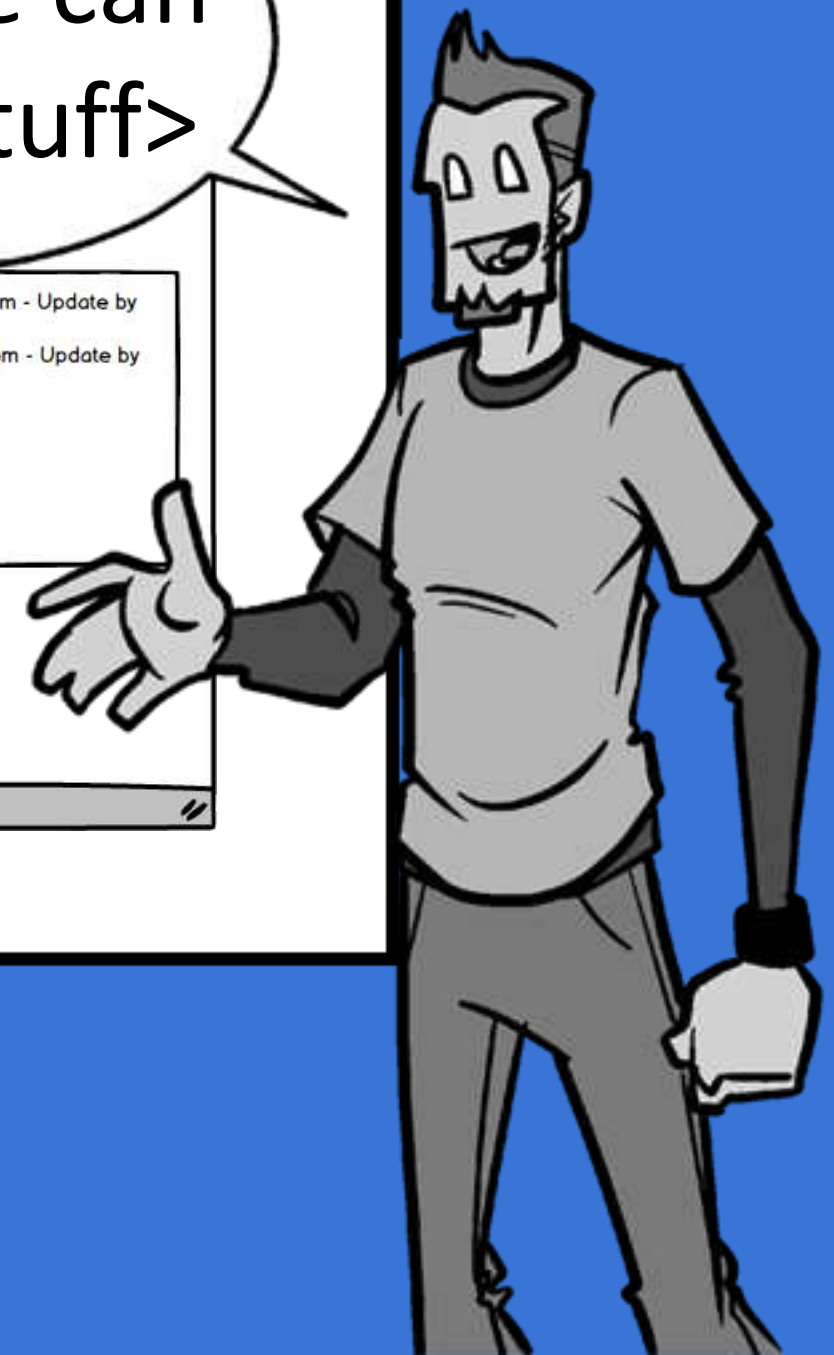
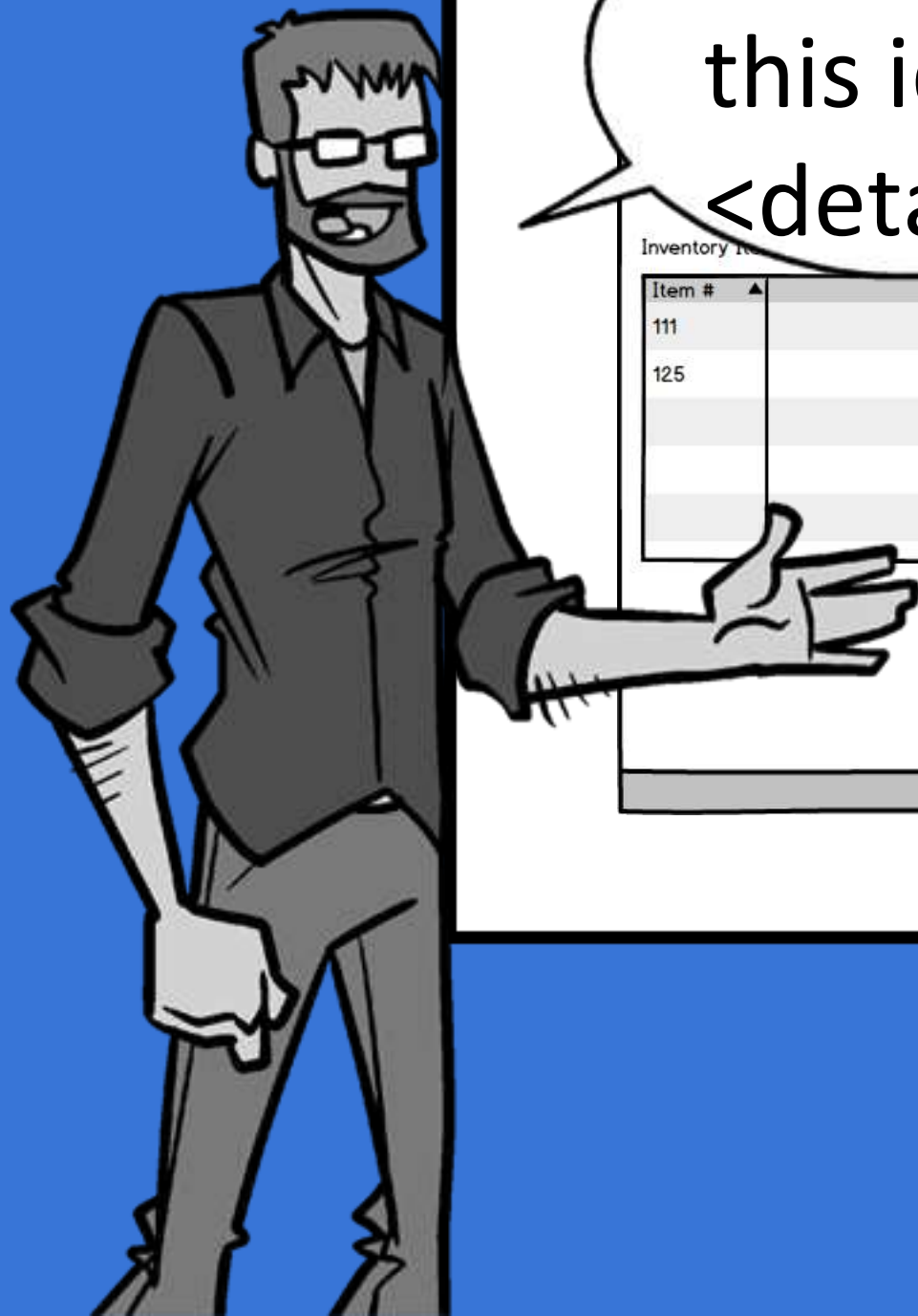
So I have
this idea.
<details>

Ooh, we can
add <stuff>

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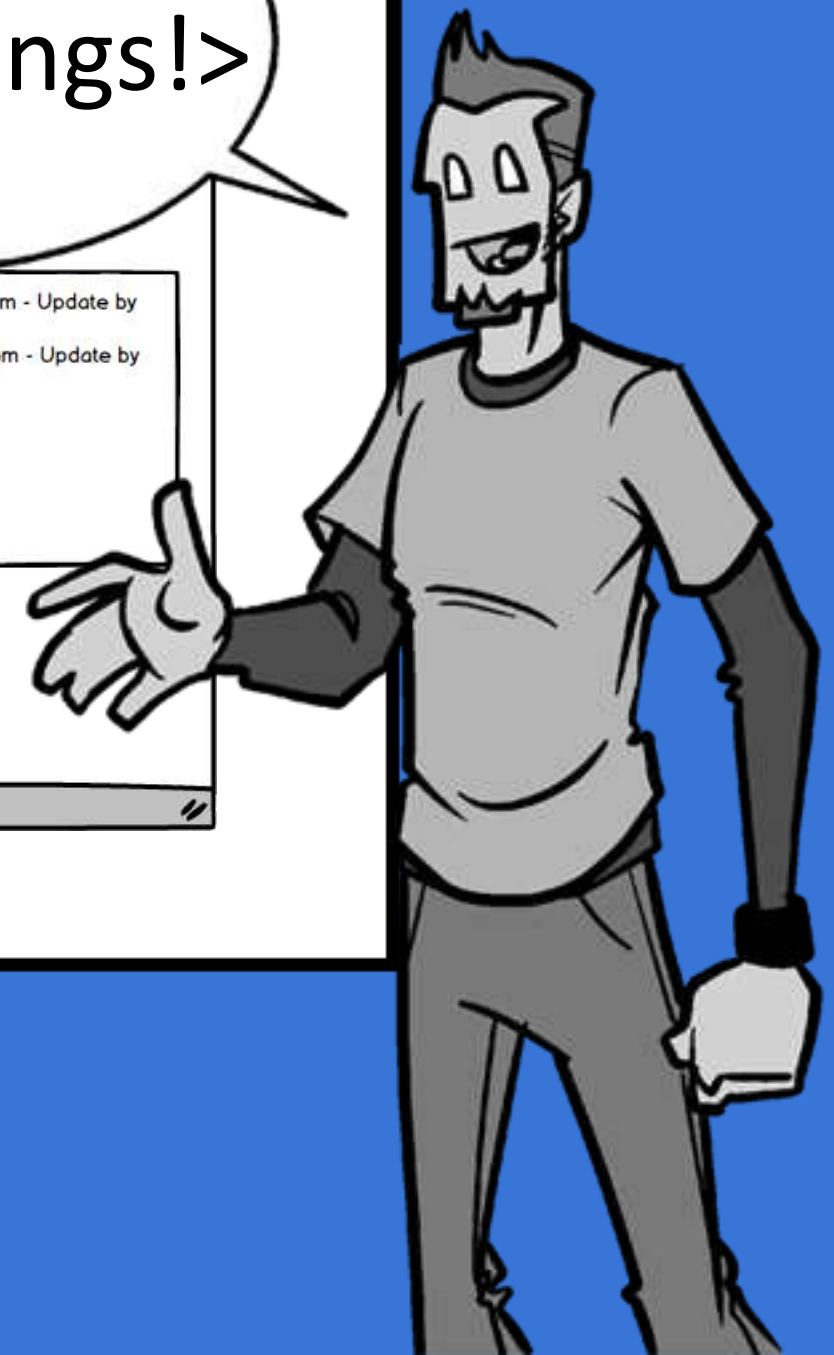
<more stuff>

<and things!>

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A New Character Appears!



THE BOSS

Product Owner
Talks to Customers
Signs Paychecks

That's great
team, but...

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How long
will it take?

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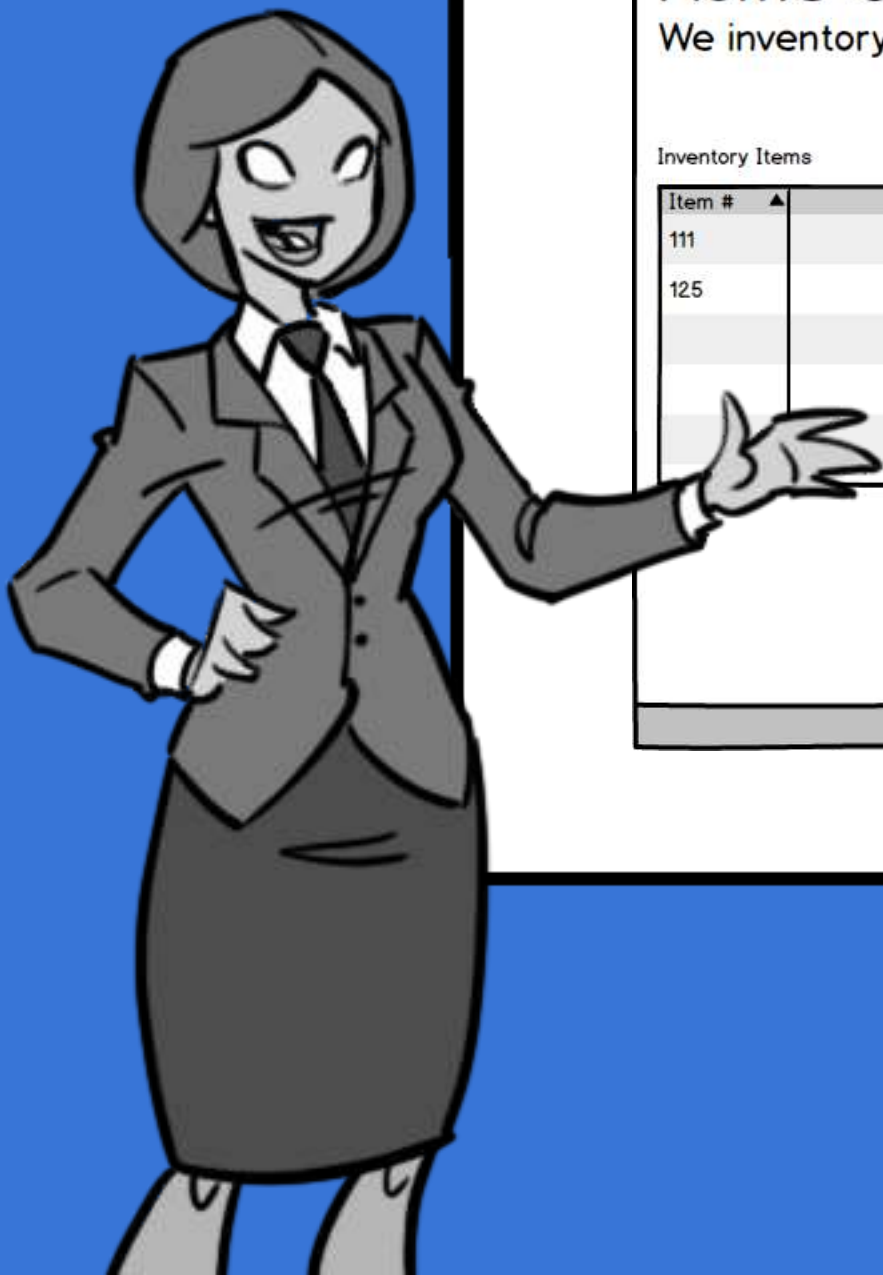


How Long Will It Take?

Why Does It Matter?

- Software isn't built in a vacuum
- If a project has no ROI, why do it?
- You can't prioritize without data

Real World Examples



A Web Page

← → × ↗ http://

[Current Inventory](#) | [Data Entry](#)

Acme Co

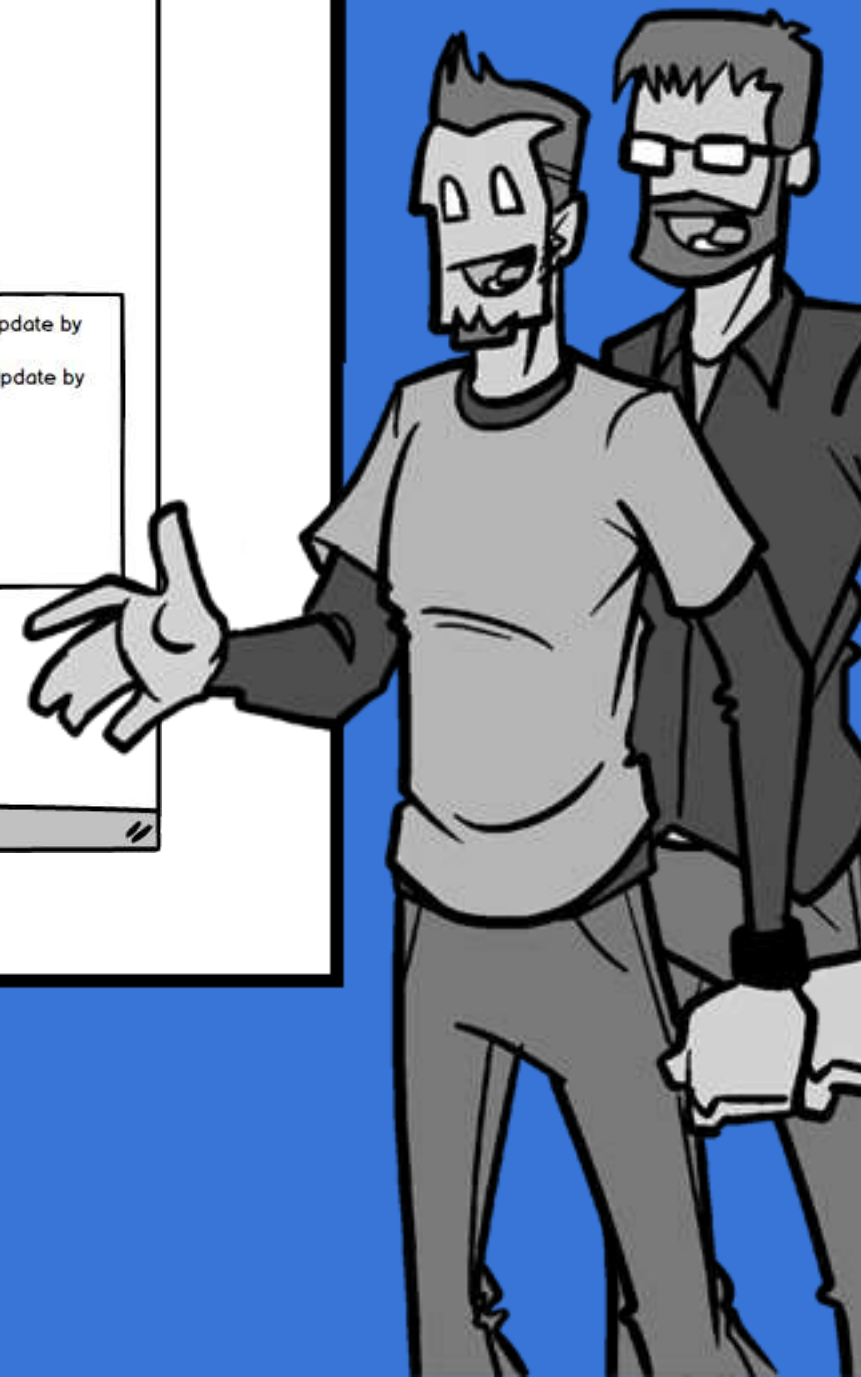
We inventory your stuff!

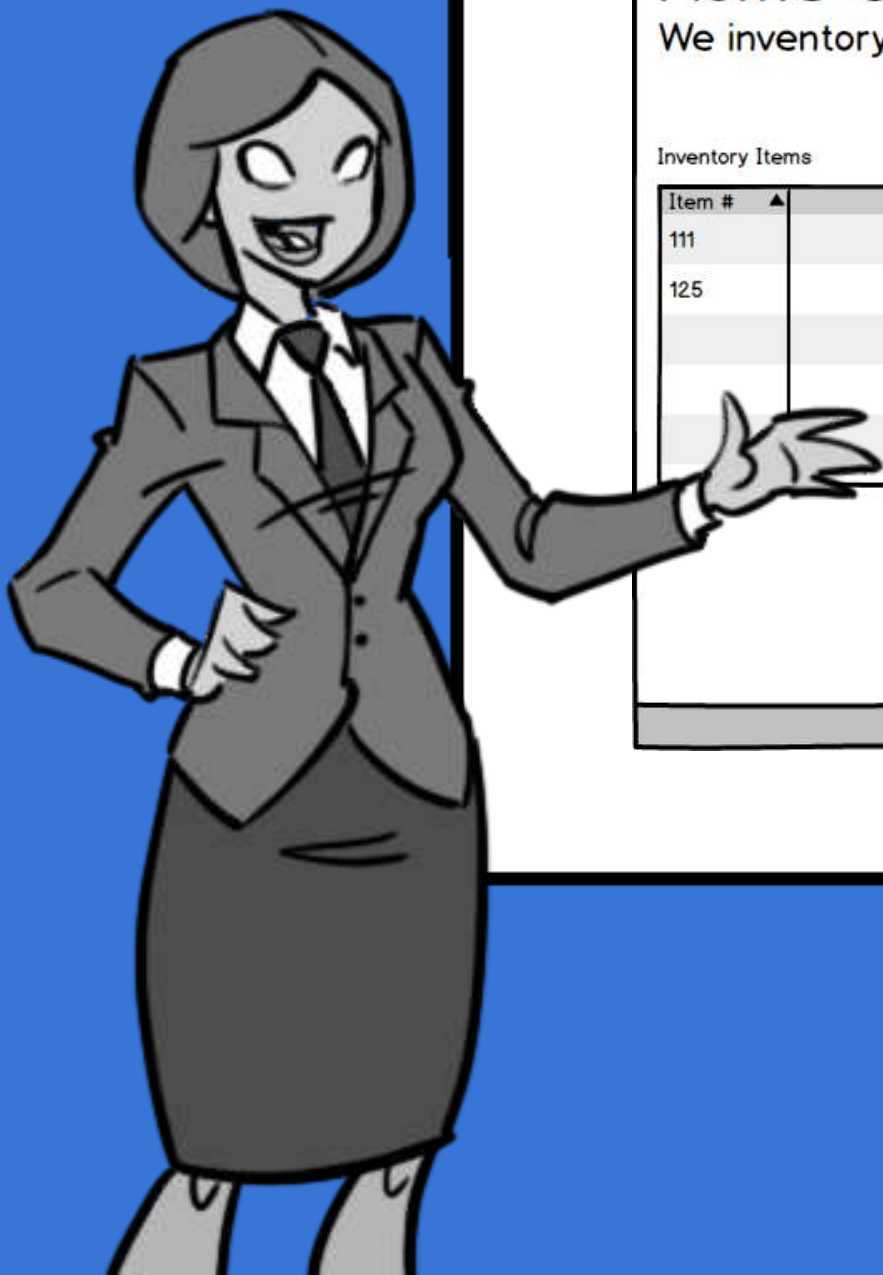
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A Web Page

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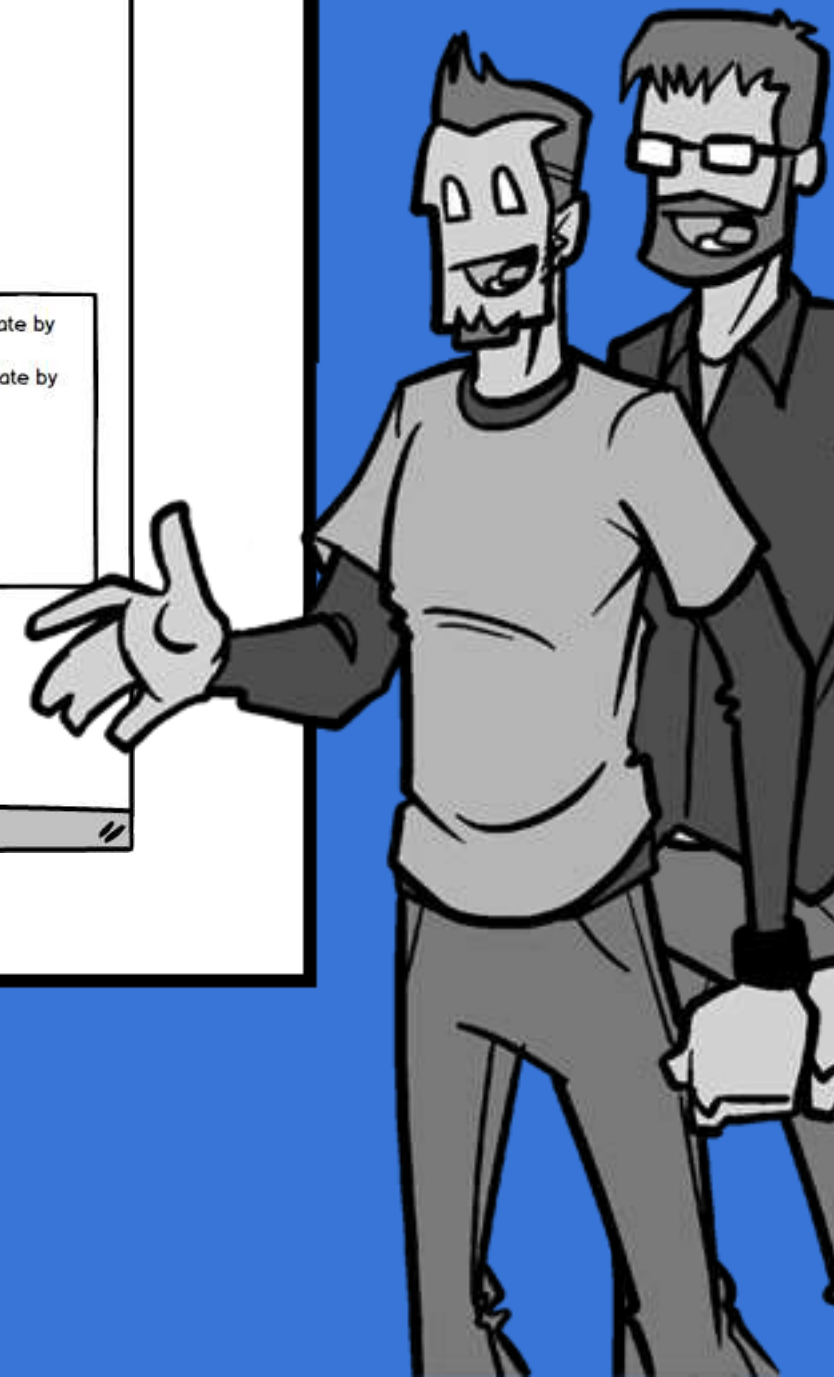
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A Web Page

http://

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Acme Co

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Inventory Items

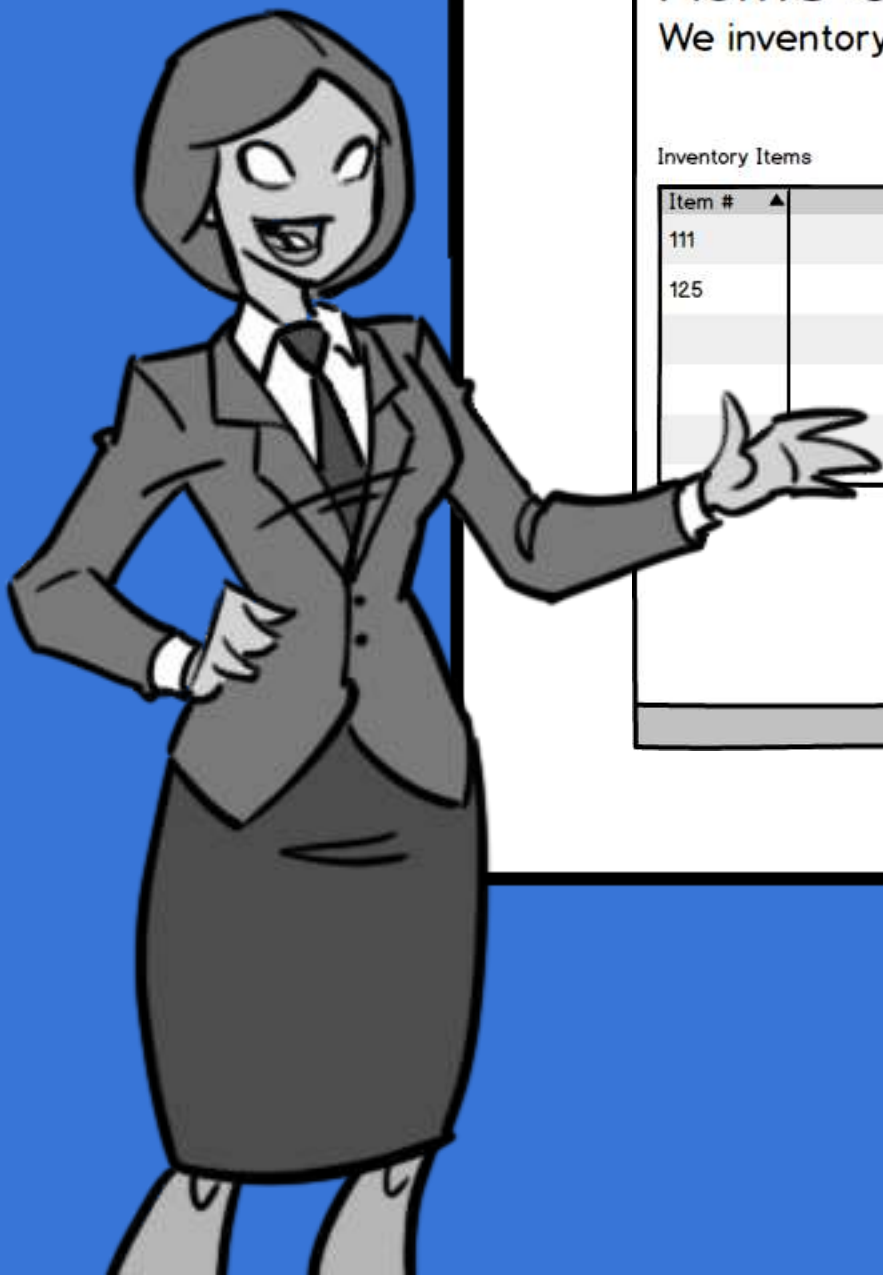
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RUN!!!!





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BIG or little

Today's Topics

- What are estimates?
- Why don't we like them?
- Pre-requisites to estimating
- Types of estimates and how to perform them
- How to communicate with estimates

So What Are These Estimates,
Really?

estimate

[v. **es-tuh-meyt**; n. **es-tuh-mit**, -meyt]

 **Spell**

 Syllables

[Synonyms](#)

[Examples](#)

[Word Origin](#)

verb (used with object), **estimated**, **estimating**.

1. to form an approximate judgment or opinion regarding the worth, amount, size, weight, etc., of; calculate approximately:
"to estimate the cost of a college education."

2. to form an opinion of; judge.

verb (used without object), **estimated**, **estimating**.

3. to make an estimate.

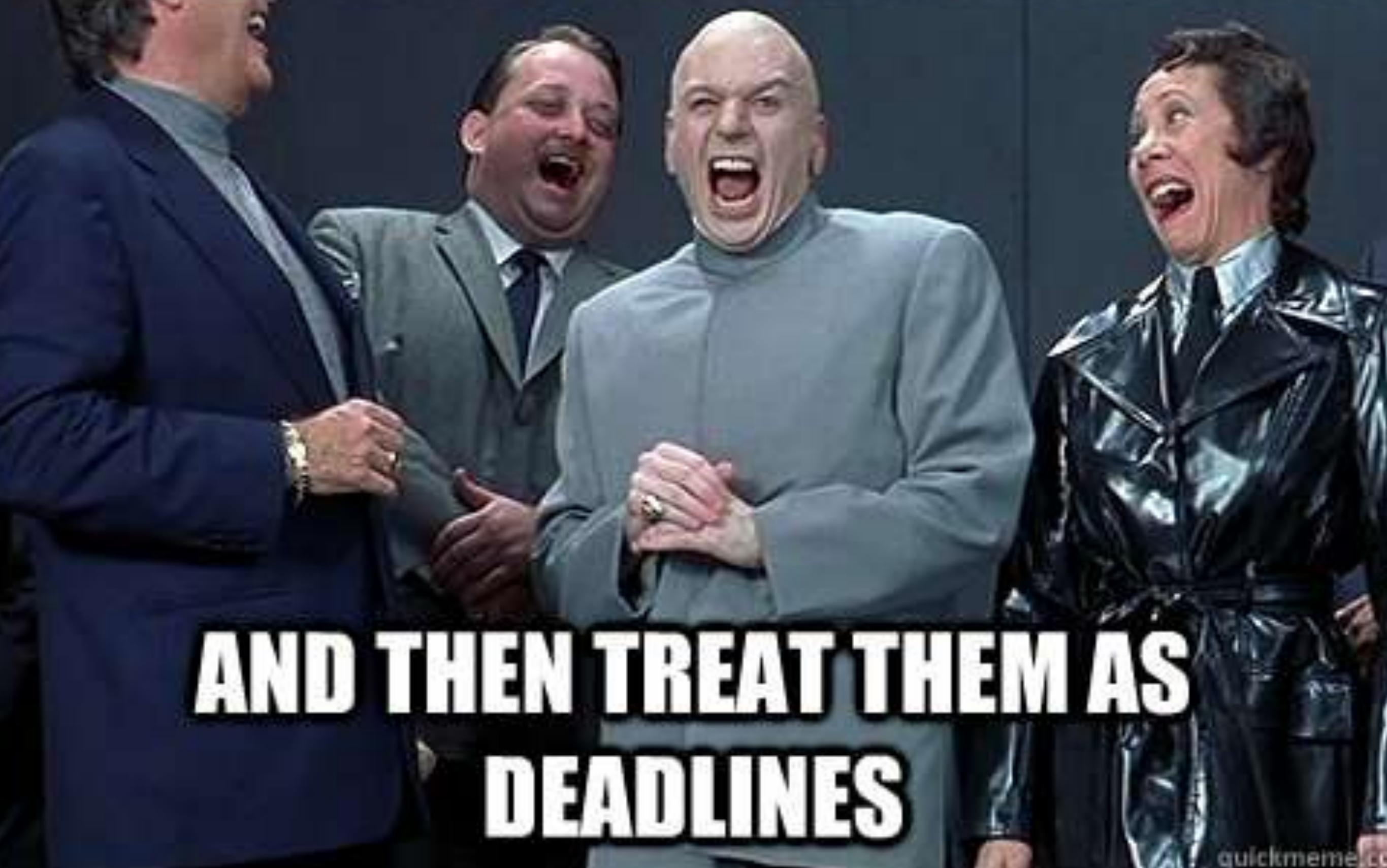


noun

4. an approximate judgment or calculation, as of the value, amount, time, size, or weight of something.
5. a judgment or opinion, as of the qualities of a person or thing.
6. a statement of the approximate charge for work to be done, submitted by a person or business firm ready to undertake the work.

How Are Estimates Perceived?

WE'LL ASK FOR ESTIMATES



**AND THEN TREAT THEM AS
DEADLINES**

That's not
funny...

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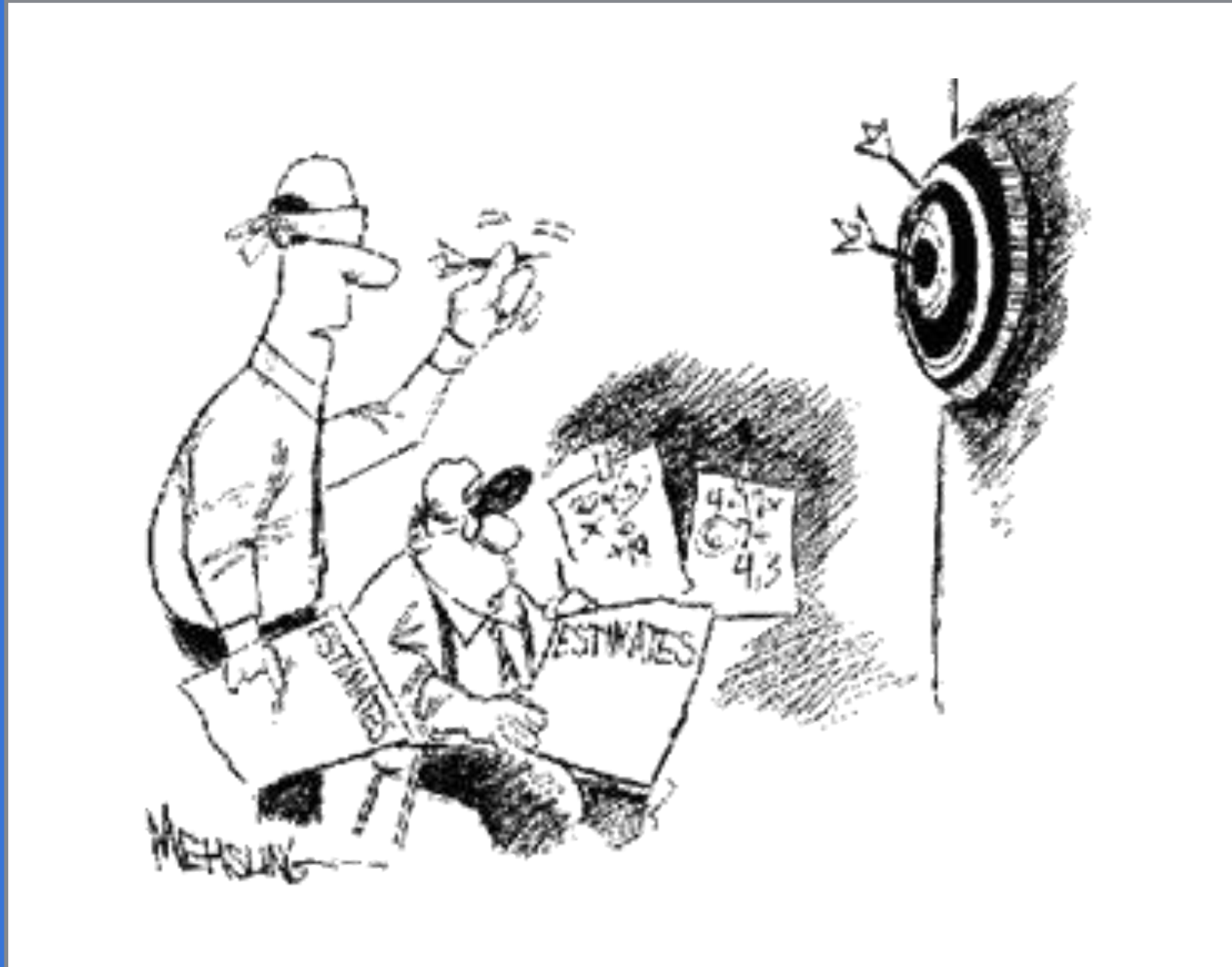
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Amanda J.

How Do We Make This Work?

We Need To

- Get better at estimating
- Get better at communicating

Can You Be Good At Estimating?



Objections

When will
this ship?

A Web Page

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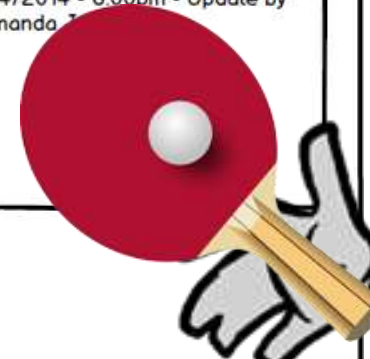
When will
this ship?


Who knows?

Inventory Item

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We don't do
estimates!

We don't want
to be held
accountable!

Requirements
change too
often!

This slide looked
unbalanced without
me!

We Don't Do Estimates
or
We Don't Estimate Hours



Jay Harris @jayharris · Feb 25



As a consultant, clients don't pay me to get started right away. Clients pay me to Make Awesome™. "How much do you bill per hour?" is a false flag to "What's this going to cost me?" "How soon can you start?" is a false flag to "How soon can this be completed?"



1



3



16



Jay Harris @jayharris · Feb 25



"Priority" is subjective based on too many factors, only one of which is perceived importance. Estimate—total cost—is one of these factors. You may prioritize new windows over replacing the furnace. You may prioritize a \$5,000 furnace over \$50,000 windows.



1



2



Jay Harris @jayharris · Feb 25



Though a client may perceive a feature as unimportant, it may be at the top of the list if it will only take you a day to build. An important feature may drop off the list if it will take you a month to build, cost prohibitive.



1



<http://bit.ly/FixedBidAgile>

We Can't Estimate Because
Requirements Change So Often



<https://ardalis.com/5-laws-of-software-estimates>

If We Don't Estimate, We Won't
Be Held Accountable

So how long
will it take?

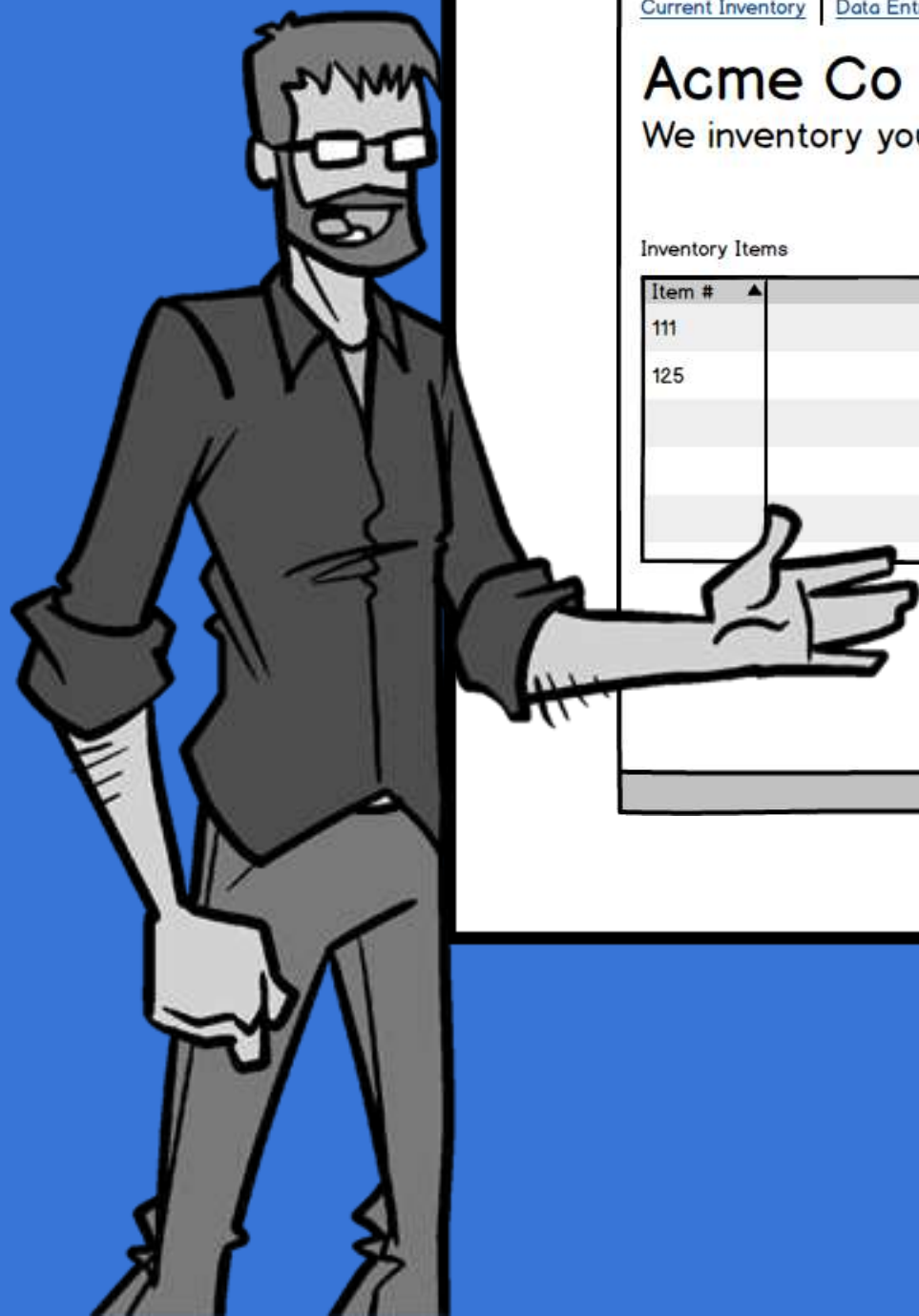
We'll figure
it out.

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[Current Inventory](#) | [Data Entry](#)

Acme Co

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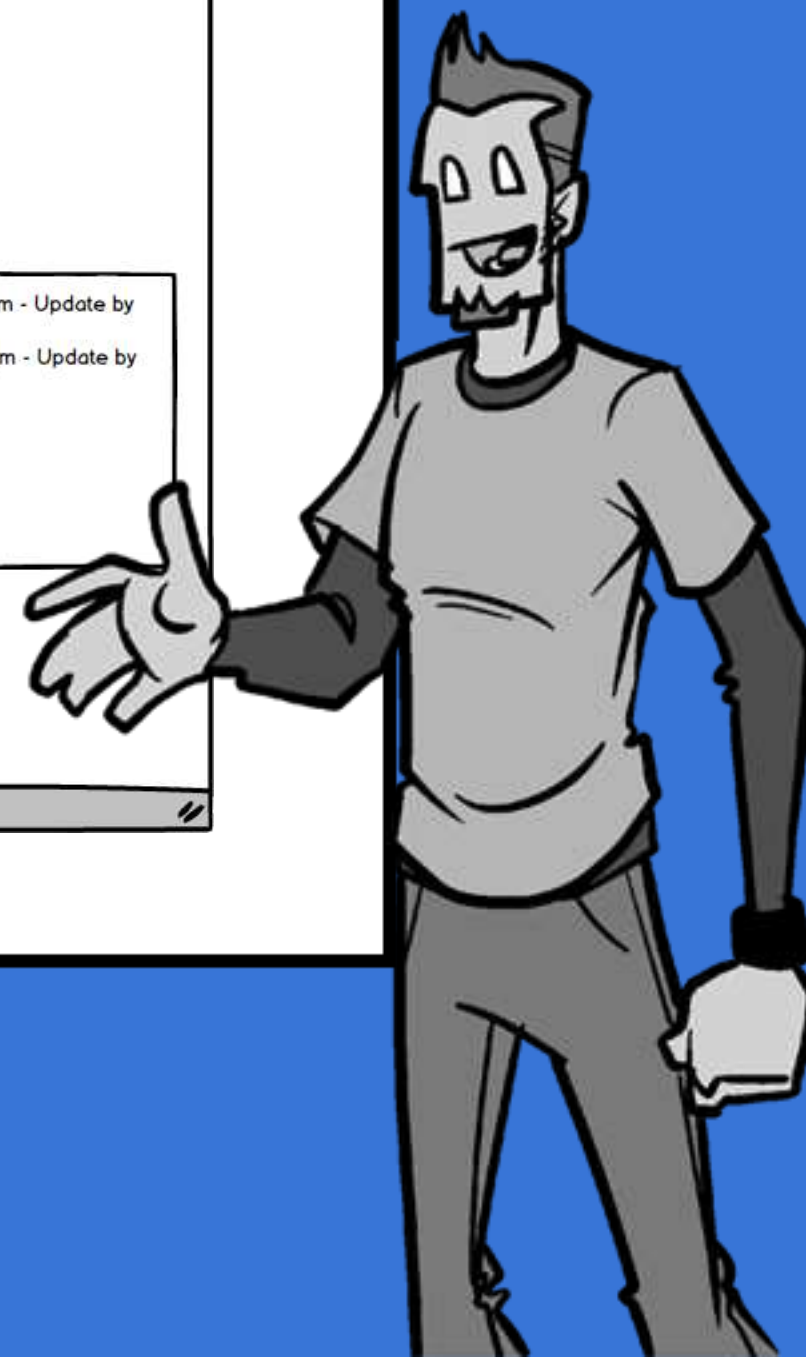
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Er...

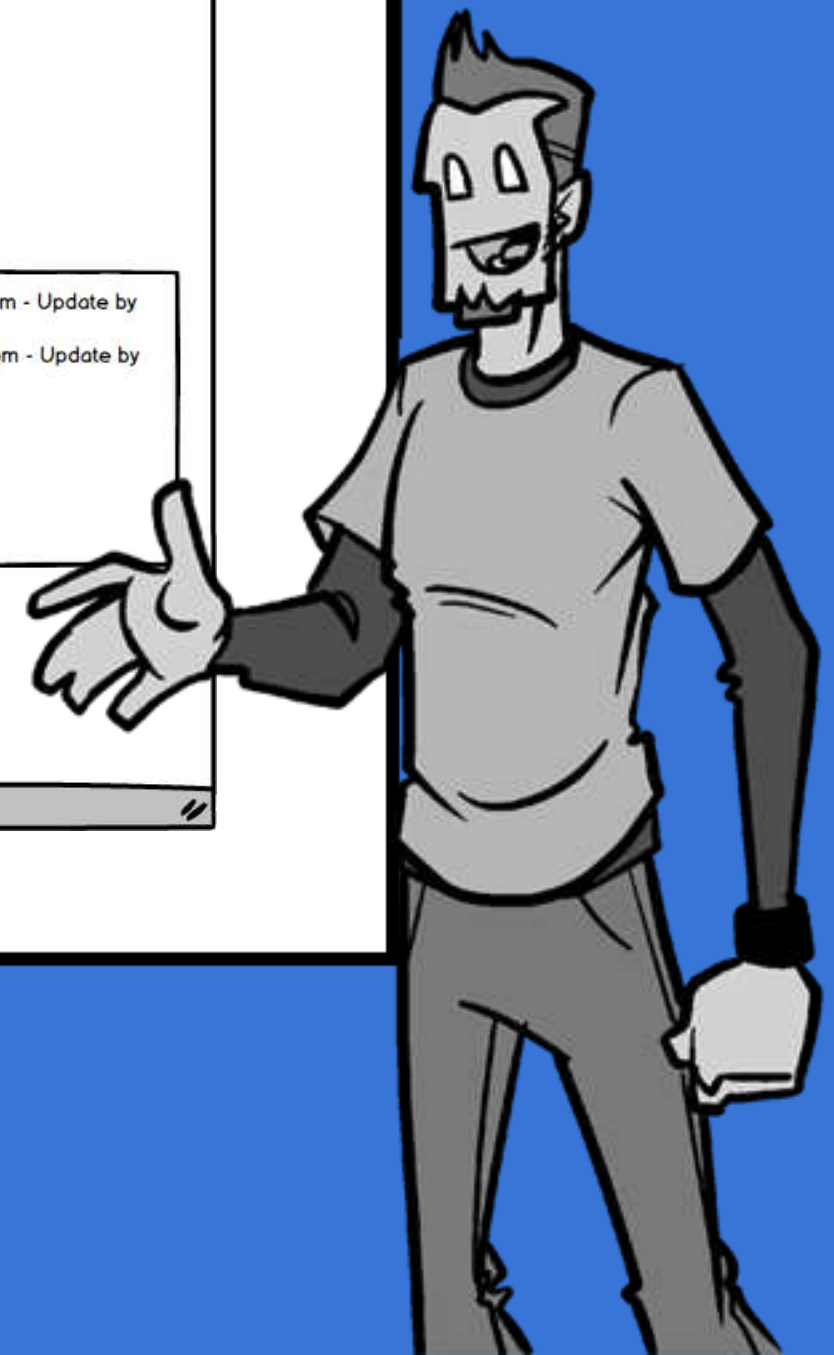
A Web Page

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So now
what?

A Web Page

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How Do We Get Started?

Prerequisites To Estimating

- Scope
- Constraints
- Assumptions

Types of Work

- Planning
- Requirements Gathering
- Designing
- Development
- Testing
- Documentation
- Training
- Deployment
- Etc

Estimation Methods

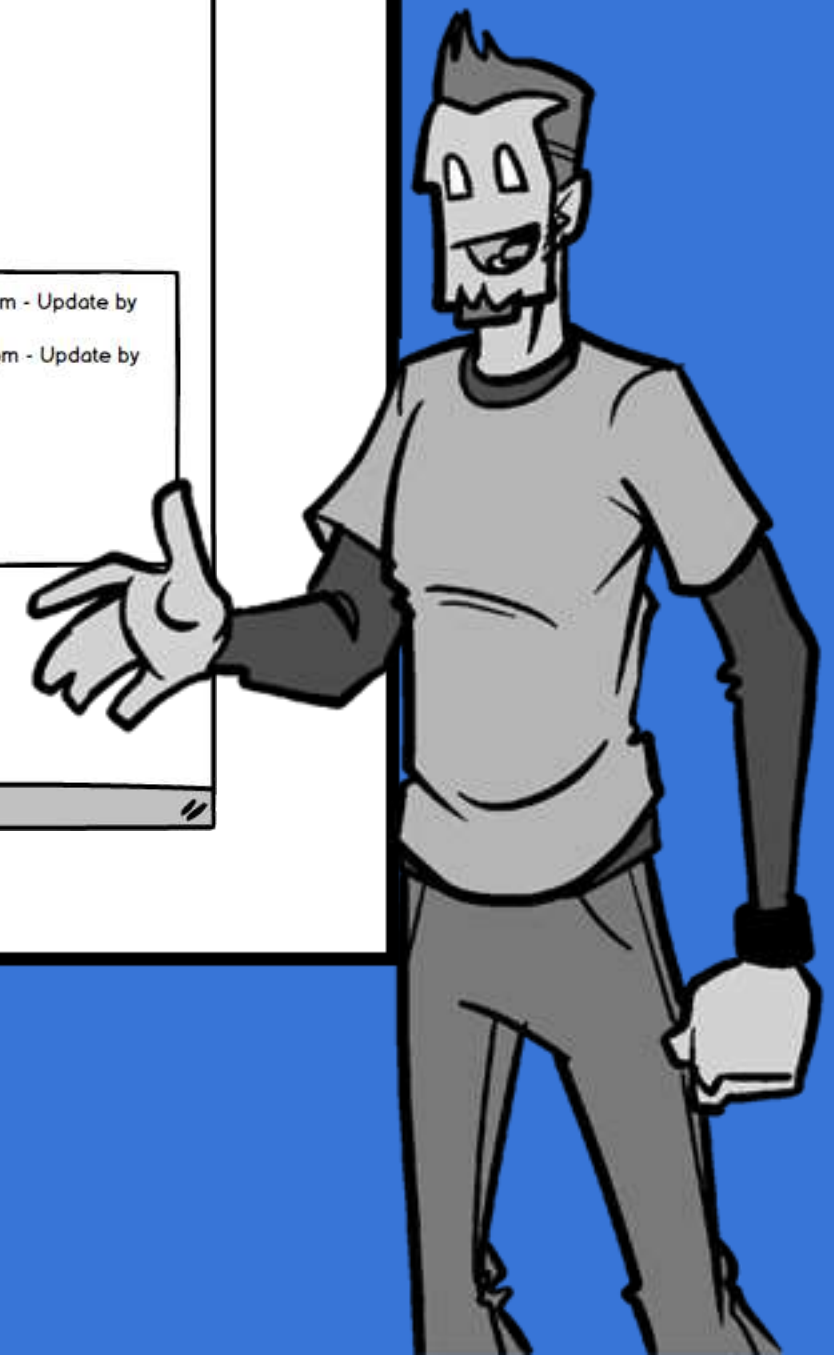
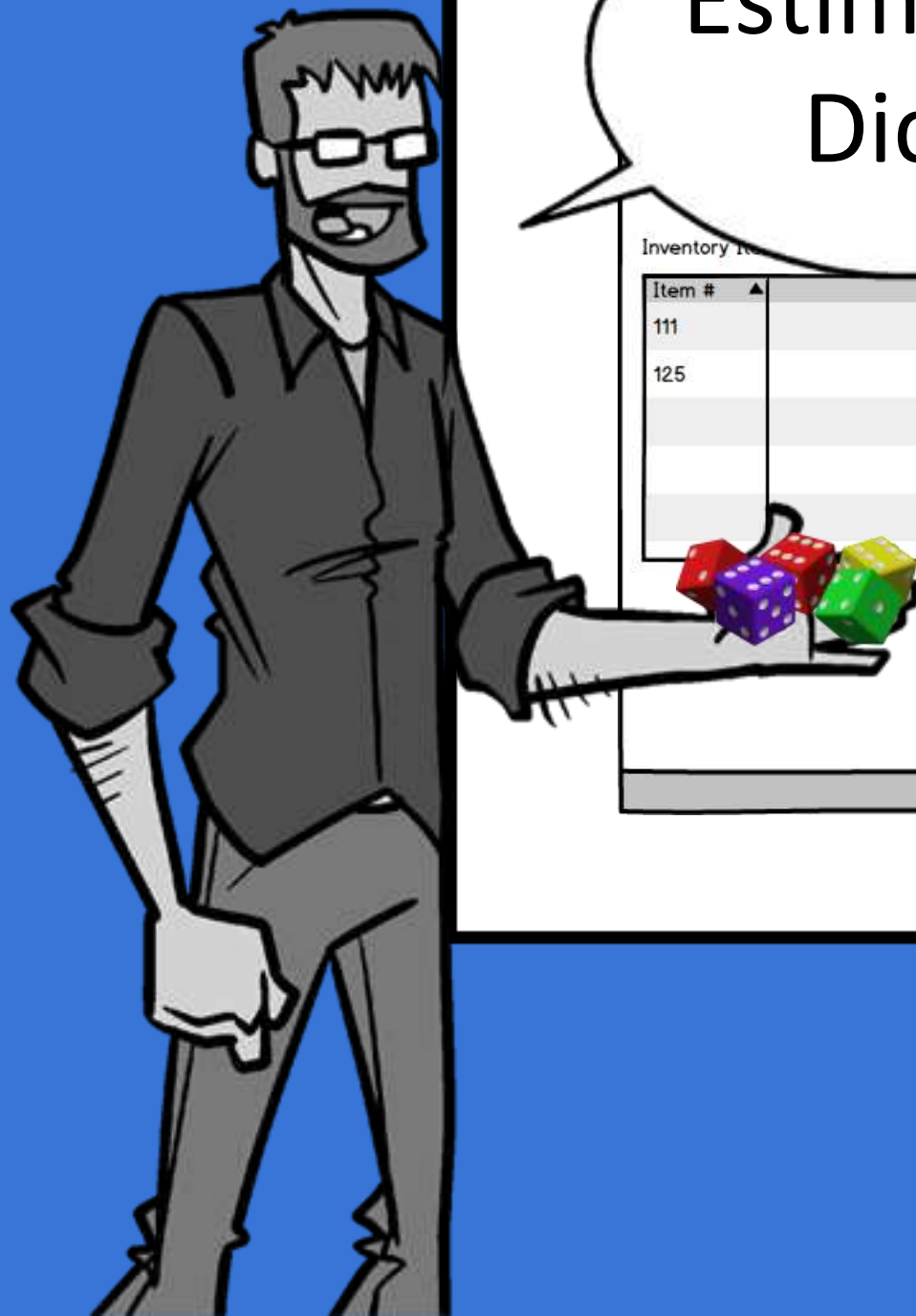
Estimation
Dice!

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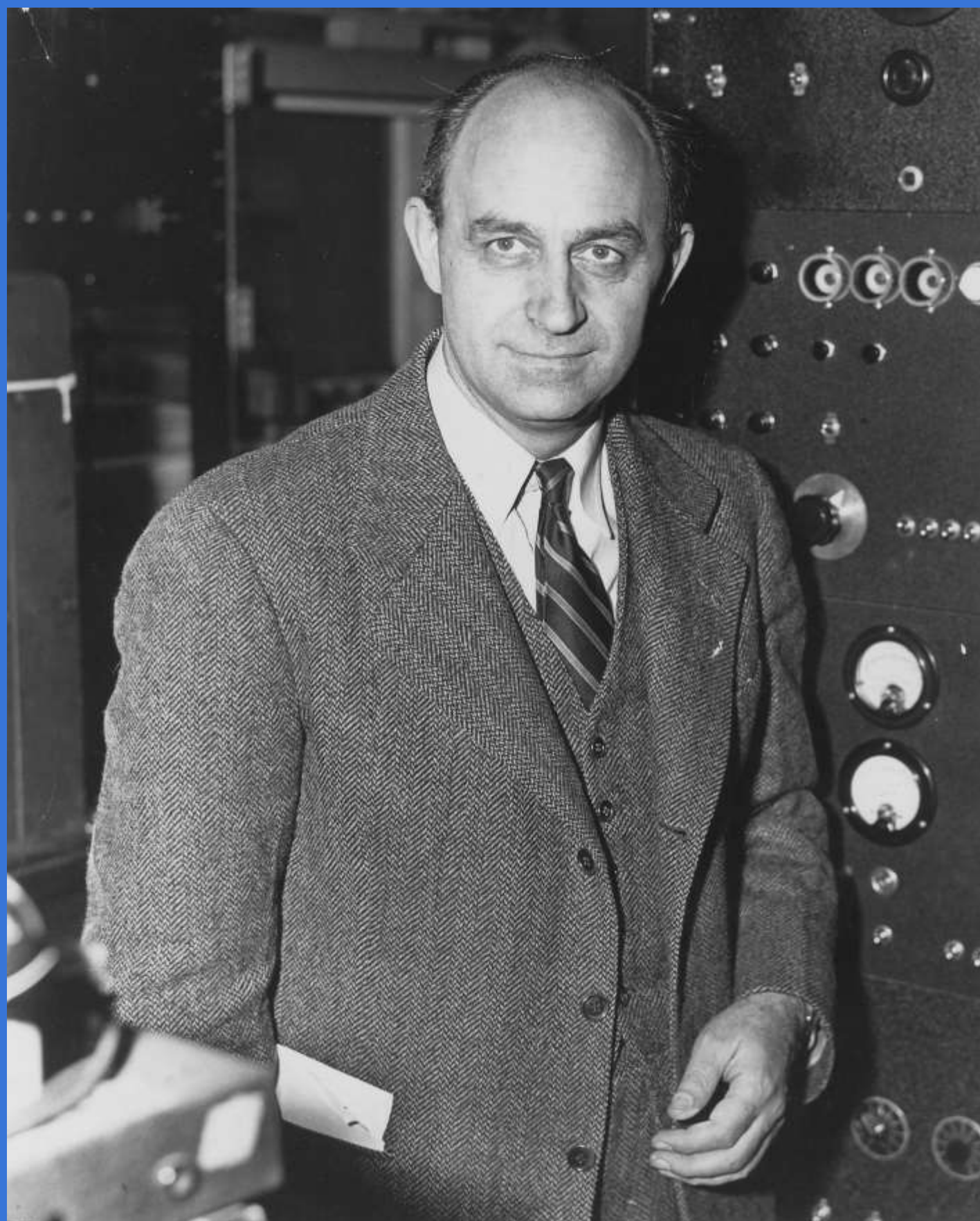
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Types of Estimates

- SWAGs
- Top-Down Estimates
- Bottom-Up Estimates

Fermi Estimation





What a nerd

Nobel
laureate
nerd

Inventory Items

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Fermi Estimation

- There are approximately 9,000,000 people living in Chicago.
- On average, there are two persons in each household in Chicago.
- Roughly one household in twenty has a piano that is tuned regularly.
- Pianos that are tuned regularly are tuned on average about once per year.
- It takes a piano tuner about two hours to tune a piano, including travel time.
- Each piano tuner works eight hours in a day, five days in a week, and 50 weeks in a year.

After all of these assumptions, it's just math.

How To Fermi Estimate

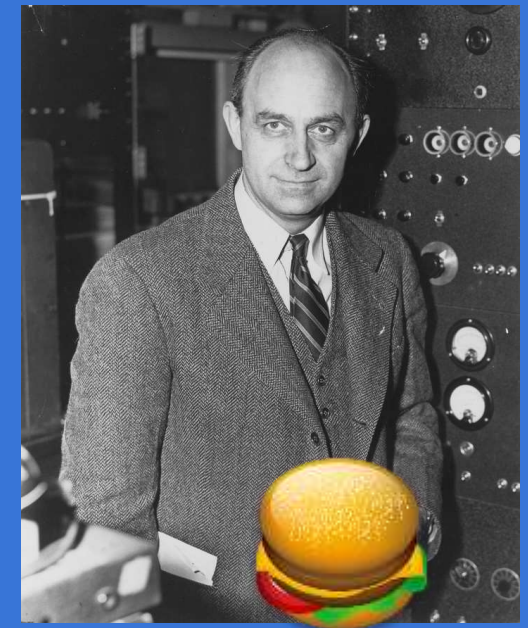
- Make high level assumptions
- Approximate everything
- Combine your assumptions and approximations
- Win a Nobel Prize

Applied Fermi Estimation

- There are approximately 20 stakeholders involved in this project
- Each stakeholder interview will take 30 minutes
- Documenting the outcome from each interview will take 2 hours
- We'll average 3 interviews a day
- 25% of our days won't have any interviews
- Minutes of work: $20 * (120 + 30) = \underline{3,000 \text{ minutes}}$
- Days of work: $3000 / (8 * 60) = \underline{6.25 \text{ days}}$
- Total days: $6.25 / .75 = \underline{8.3333 \text{ days}}$

Fermiburger

- I have 8 people coming over for dinner
- My grill can hold 4 burgers at a time
- Each burger takes 3 minutes to cook, per side
- Each person eats 2 burgers
- Assumption: Other people bring the sides and set them out
- Assumption: I'll only spend a minute between burger sprints
- $8 \text{ people} * 2 \text{ burgers each} = 16 \text{ burgers} \Rightarrow 4 \text{ burger sprints}$
- $4 \text{ sprints} * 7 \text{ minutes each} = 28$ 30 minutes of cooking (round)
- 15 minute grill heat + 30 minutes cooking = Dinner in 45 minutes



Source: Iconshock

Fermi Estimation Pros & Cons

Ok... and?

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Top-Down Estimates



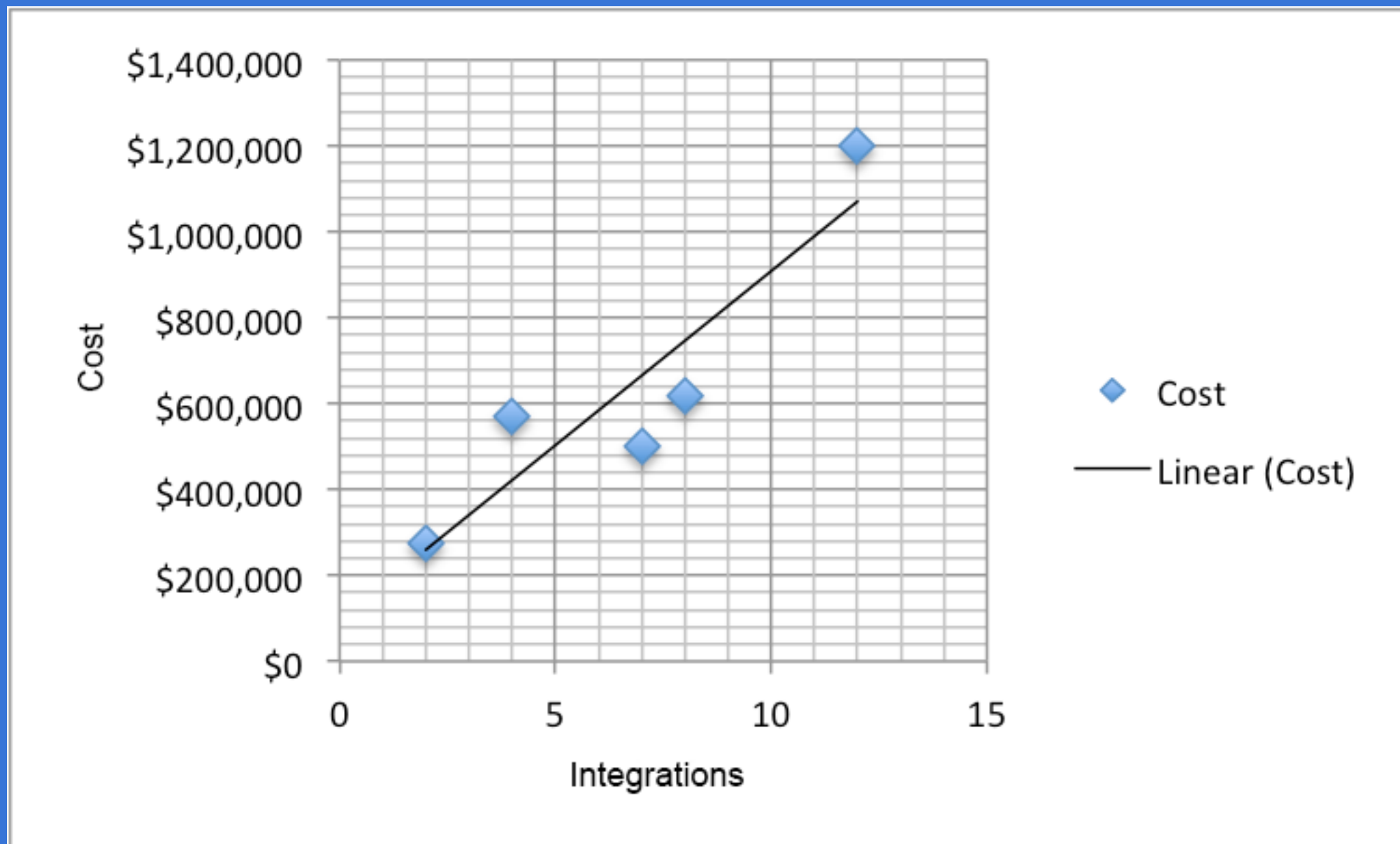
Top-Down Estimate Steps

- Identify the size and shape of a project
- Look for analogs
- Identify where they are like and unlike
- Size the new project relatively

Top-Down Example

Integrations	Cost
7	\$500,000
8	\$620,000
4	\$570,000
12	\$1,200,000
2	\$275,000

Top-Down Estimation (Cont)



Iteration Planning

Top-Down Pros & Cons



A Web Page

← → × ↩ http://

by | [Data Entry](#)

What's next?

Inventory your stuff!

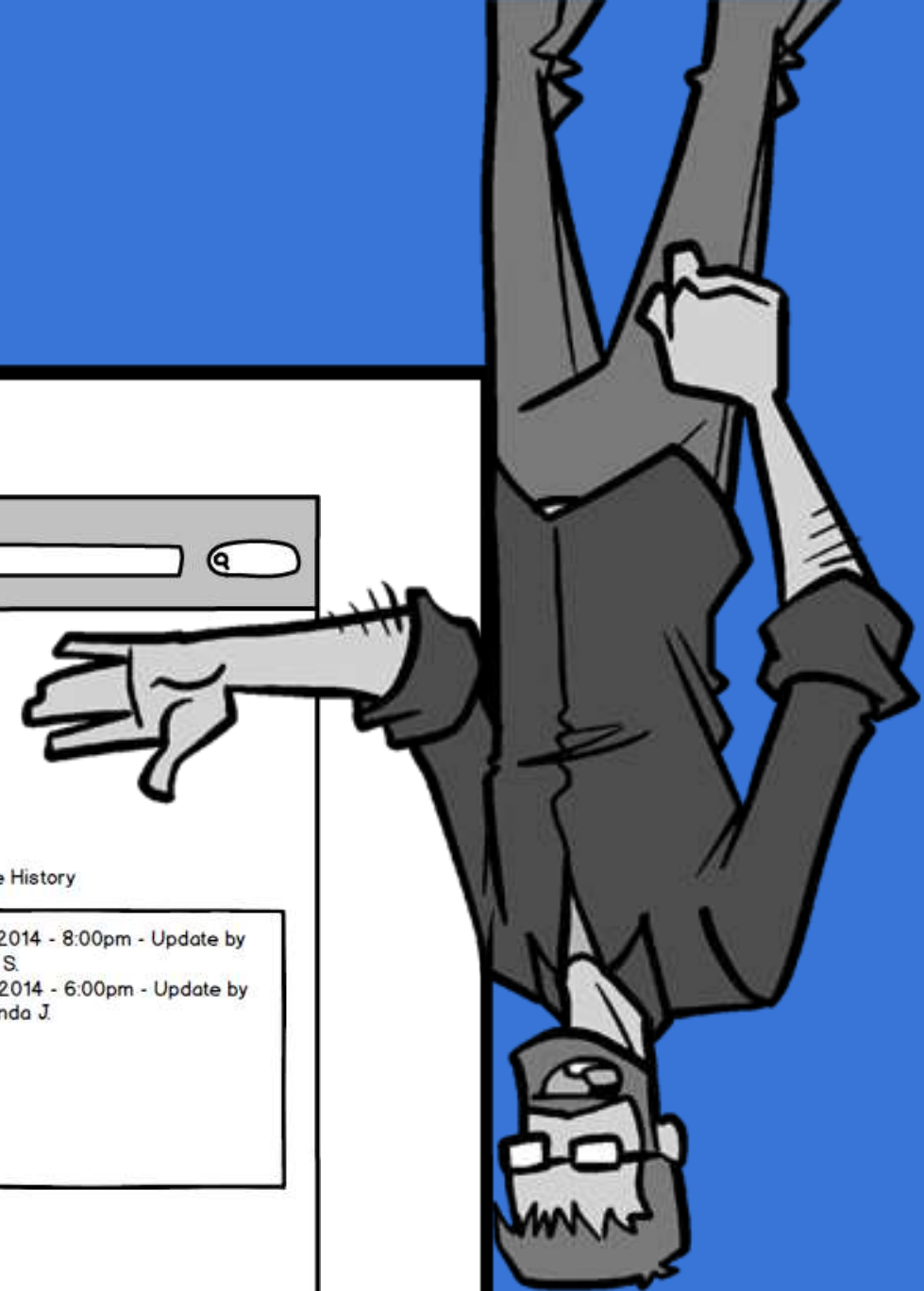
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Top-Down
makes sense.
What's next?

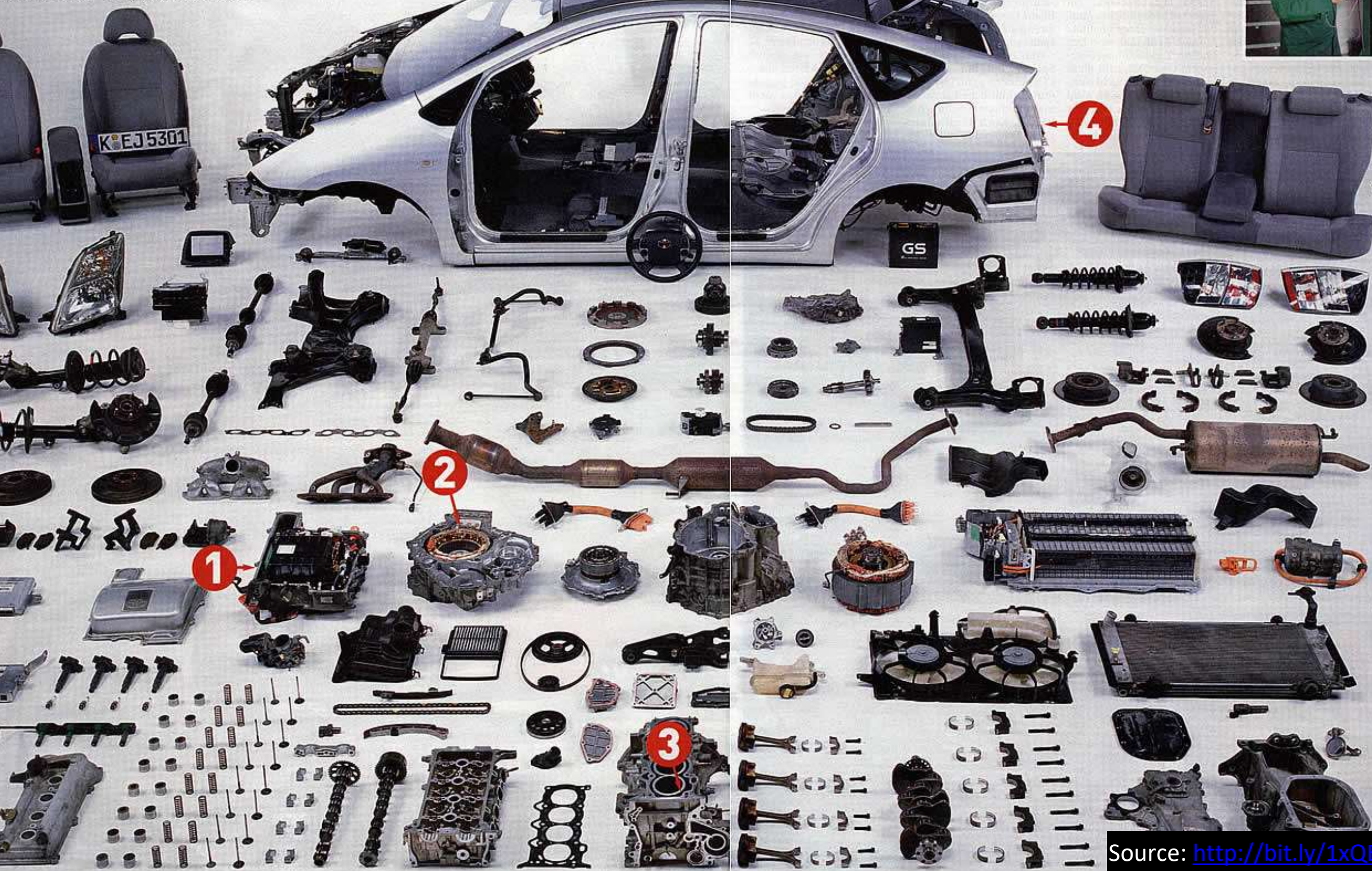


Bottom-Up Estimates

ist unmöglich: Rost am Toyota-Blech

Technology-Center in der Kältemittelfüllung. Eingeschränkte Kühlleistung, schlimmstenfalls ein Kompressorschaden hätte den nächsten Sommer getrübt. An den Nockenwellenrädern sind Laufspuren der Kette feststellbar, ein Folgeschaden ist aber nicht zu befürchten. Erstaunlich: ein völlig ver-

gammelter Blechhalter am Prius-Heck. Er trägt den Taster zur Heckklappenöffnung, der baldige Abfall des Elektrokontakts ist programmiert. Ebenso unfein: leichter Rostansatz unter der Dichtung im Rahmen der Fahrtür.



Geprüft und für den: DEKRA-Sachverständigen Günther Schlierbaum untersucht

1 Die Invertierung (oben) wie frisch aus der Keinerlei Schächtern und L

2 Der Elektroden-Einsatz bewältigt. Kein Spuren, Kontakt

3 Lediglich den Druck der Zylinder vom 100 000-K

Dieser Motor aus dem an den K... auf die K...

s ist unmöglich: Rost am Toyota-Blech

Technology-Center in
kten wir dem Prius tief
de. Resultat: Die eben-
e wie kompakte Hybrid-
t sich makellos. Also
? Nicht ganz. Es gibt
schungen. In der Klima-
sich nur noch ein Vier-

tel der Kältemittelfüllung. Eing-
schränkte Kühlleistung, schlimms-
tenfalls ein Kompressorschaden hät-
te den nächsten Sommer getrübt. An
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Geprüft und
den: DEKRA
Günther Sch
raumunters

1 Die In
einheit (obe
wie frisch



Geprüft und
den: DEKRA
Günther Sch
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wie frisch



2 Der Elek
den Einsa
bewältigt. Kein
Spuren, Kontak

3 Lediglich
den druck
Seiten der Zyl
vom 100 000-K

Dieser Ha
aus dem
an den K
schon auf die K

Bottom-Up Estimate Steps

- Break the project down into smaller components or “widgets”
- Estimate each widget
- Add up the estimates

Bottom-Up Example

Scope document:

1.0 Existing Application

This estimate doesn't include any changes internally in AcmeApp and will use its existing data services and other widgets that should refer to real things. This is an example. Why are you reading this?

2.0 Integration 1 - TrackingCo Logistics System

AcmeApp will be extended to support querying three existing TrackingCo services:

- All endpoints
 - All endpoints of the TrackingCo shipment service use SOAP and return an object as detailed in the [\[link to API guide\]](#)
 - All service integrations will be built using WCF.
 - The TrackingCo integration will implement the AcmeApp Tracking Contract to support these requests.
 - Existing data services inside of AcmeApp will be used to persist all results.
- GetAllShipments
 - This service returns a list of shipment objects. GetAllShipments will be called whenever a user in AcmeApp requests an update through the various UI elements.
 - This integration will not cache results and will use the existing error mechanism to notify AcmeApp if a request failed.
- GetShipmentDetails
 - This service sends a shipment ID and returns a detailed object describing an individual shipment.
 - This integration will cache results because the internal error mechanism doesn't support this for some reason that's relevant in the real world. This is an example.
 - If a cached results is returned, the original request date will be included

Widgets

- WCF service endpoint hosted in AcmeApp
- WCF call
- Tracking models
- AcmeApp Tracking Contract implementation
- AcmeApp Module creation
- Data-service call (to existing DS)
- Cache mechanism
- Error handling call
- TrackingCo API discovery/research

Complexity

Widget	S	M	L
WCF Service Endpoint	2	4	8
WCF Call	2	4	8
Tracking Model	1	2	4
AcmeApp Tracking Contract Impl	2	2	2
AcmeApp Module Creation	4	8	16
Data-Service Call	.5	1	2

Counts

2.0 Integration 1 - Tracking Co Logistics System

WCF Endpoint - 1 simple

WCF Calls - 2 simple, 1 complex (lots of parameters)

Tracking Models - 2 simple

AcmeApp Contract Implementation - 1 medium (this is non-trivial because it needs to incorporate various child contracts)

AcmeApp Module Creation - 1 simple (we've refined this to a science)

Data-Service Call - 3 simple, 2 complex (persisting the basic objects is easy but there are two complex types we have to construct and persist)

Multiply + Add

Rest of the Work

- Estimate it precisely based on specific work
- Estimate it roughly based on ratios

Ratio Estimations

Apportion Method of Allocating Project Costs Using the Work Breakdown Structure

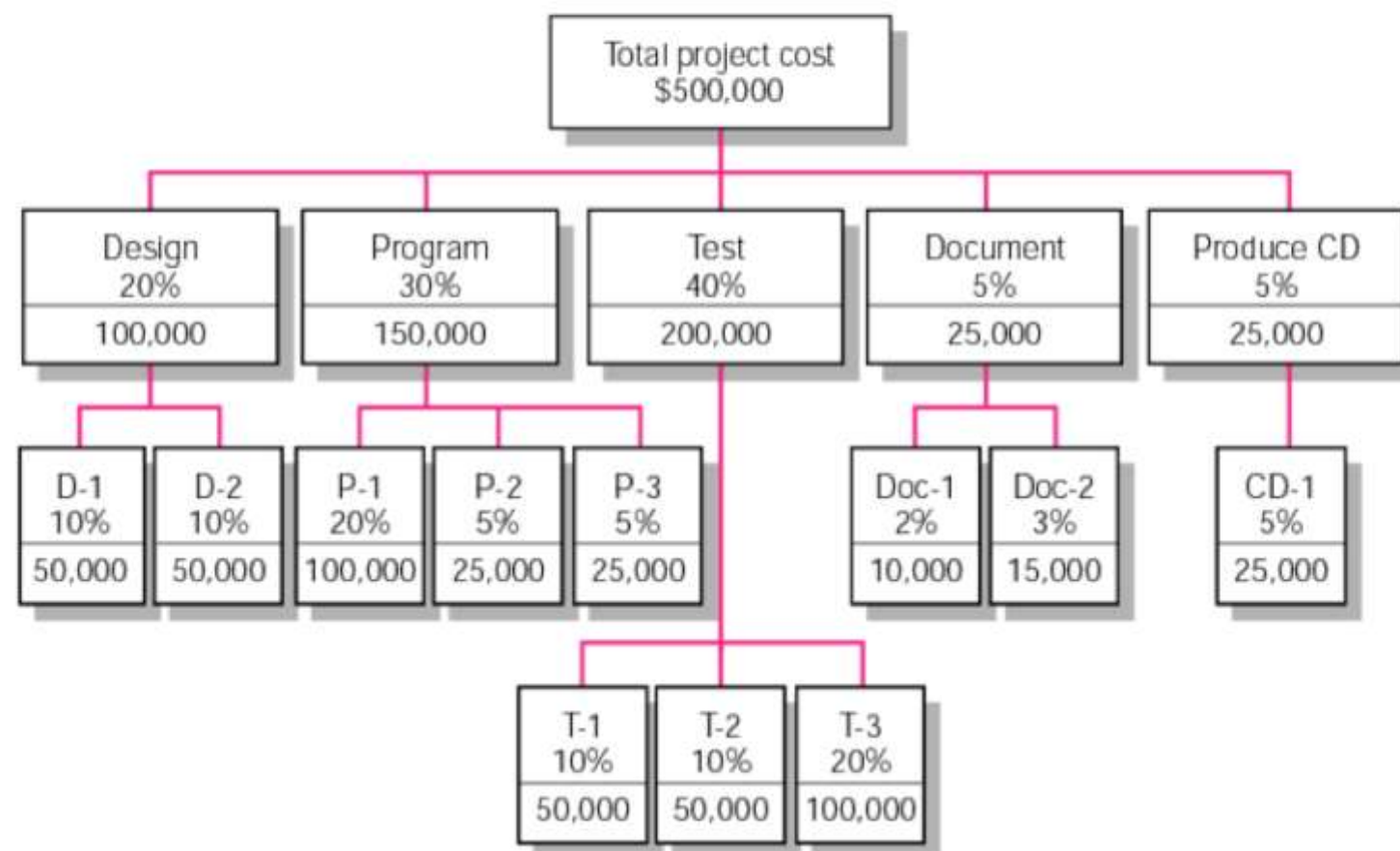
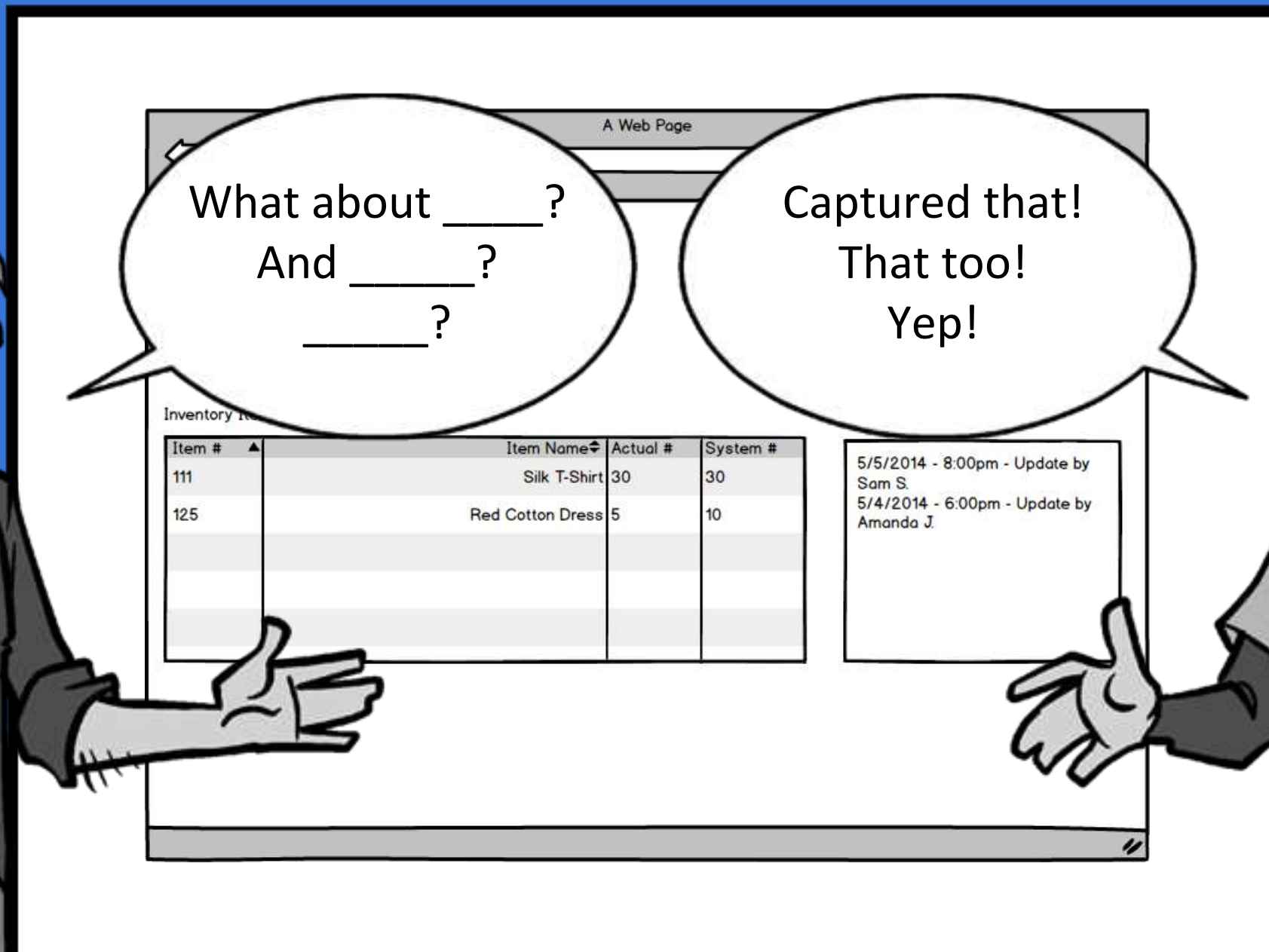


FIGURE 5.1

Capture Everything



Bottom-Up Pros & Cons

Burger Buffet Method



Already Doing This?

A Web Page

← → × ↗ http://

[Current Inventory](#) | [Data Entry](#)

Acme Co

We inventory your stuff!

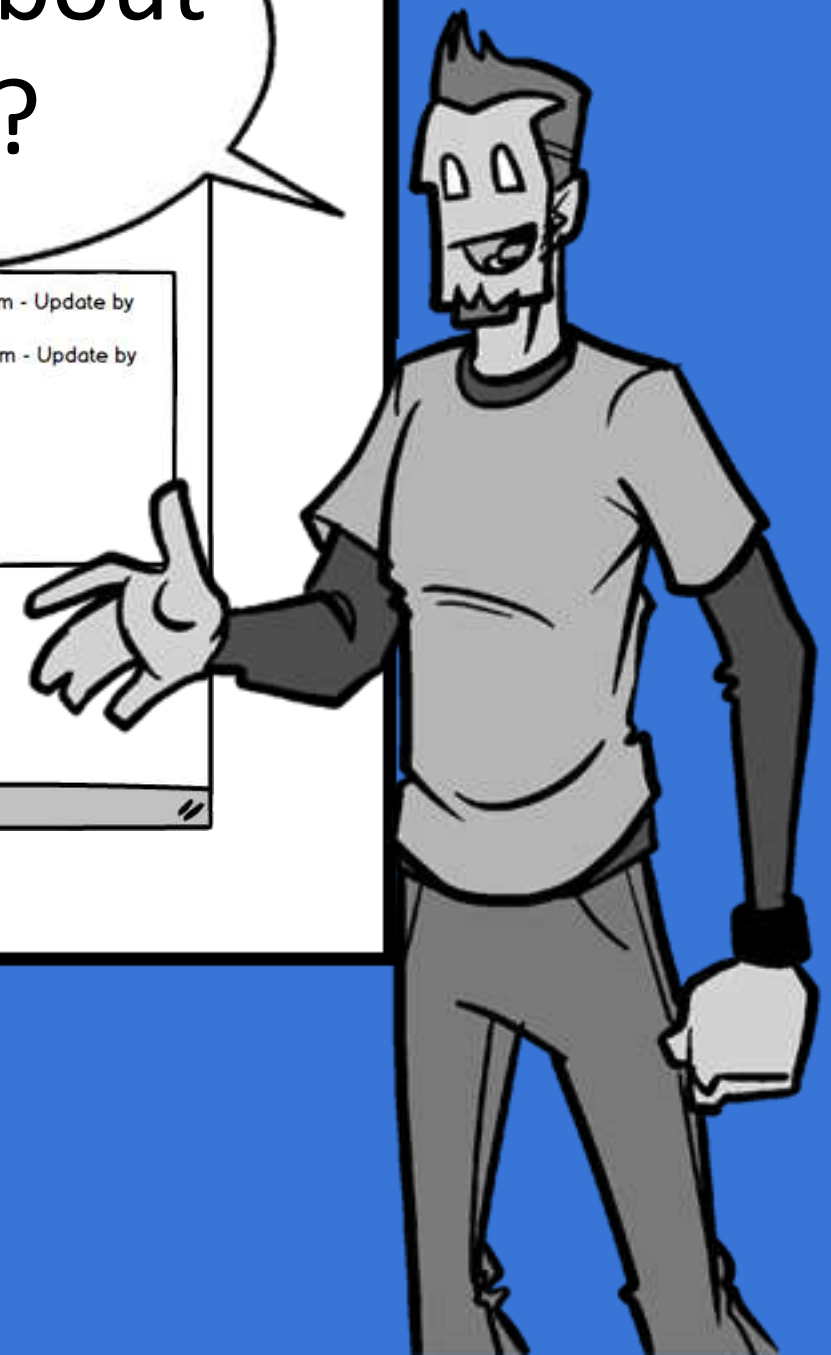
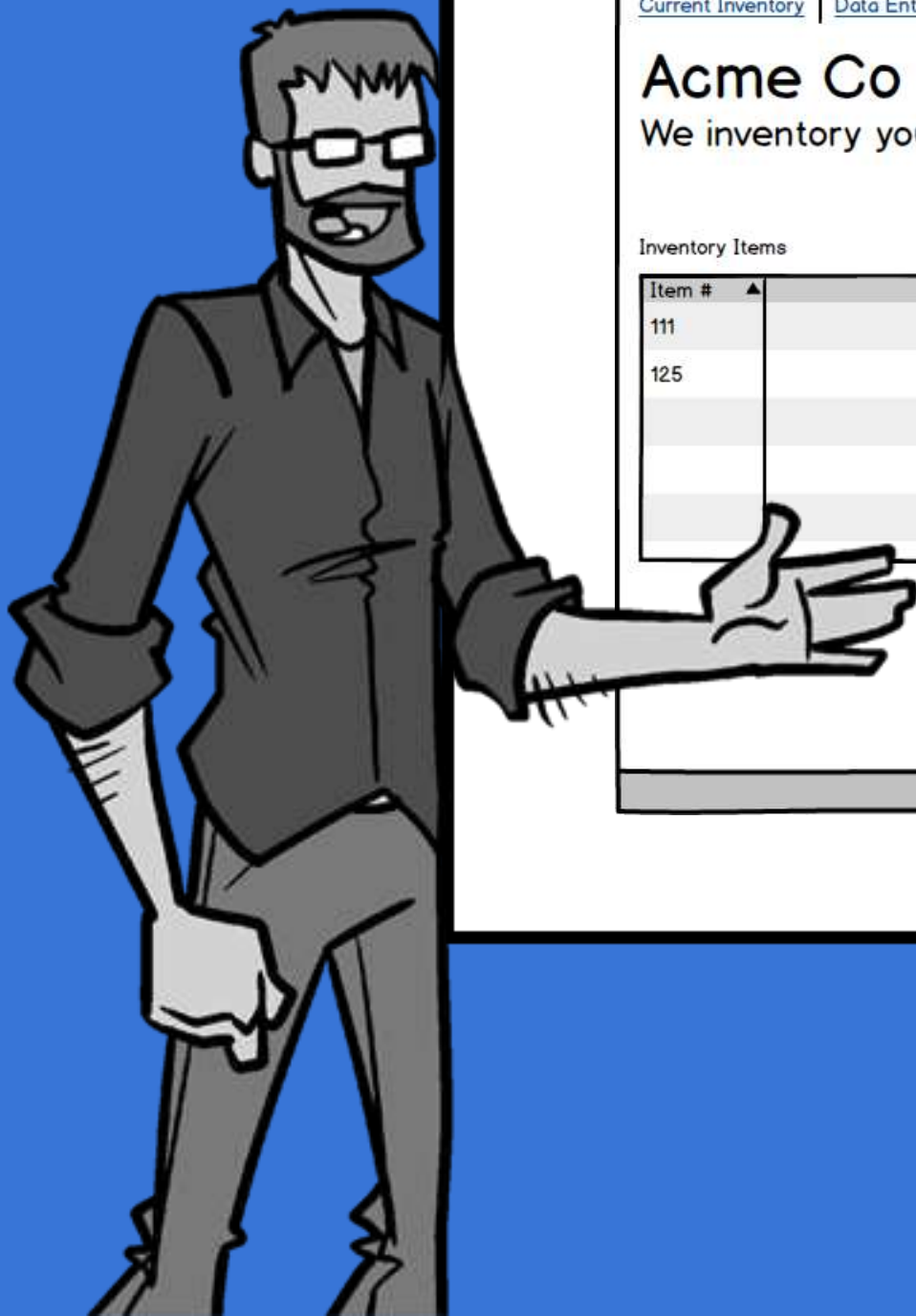
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What about risk?



We Aren't "Guessing"

Contingency

Estimating Contingency

- Look at your assumptions
- Determine which ones are internal
- Estimate likelihood and impact
- Determine your risk
- ~~• Go with 30%~~

The Risk Is The Risk

Let's go with
100% contingency

Ooooh
Good idea!

Inventory Item

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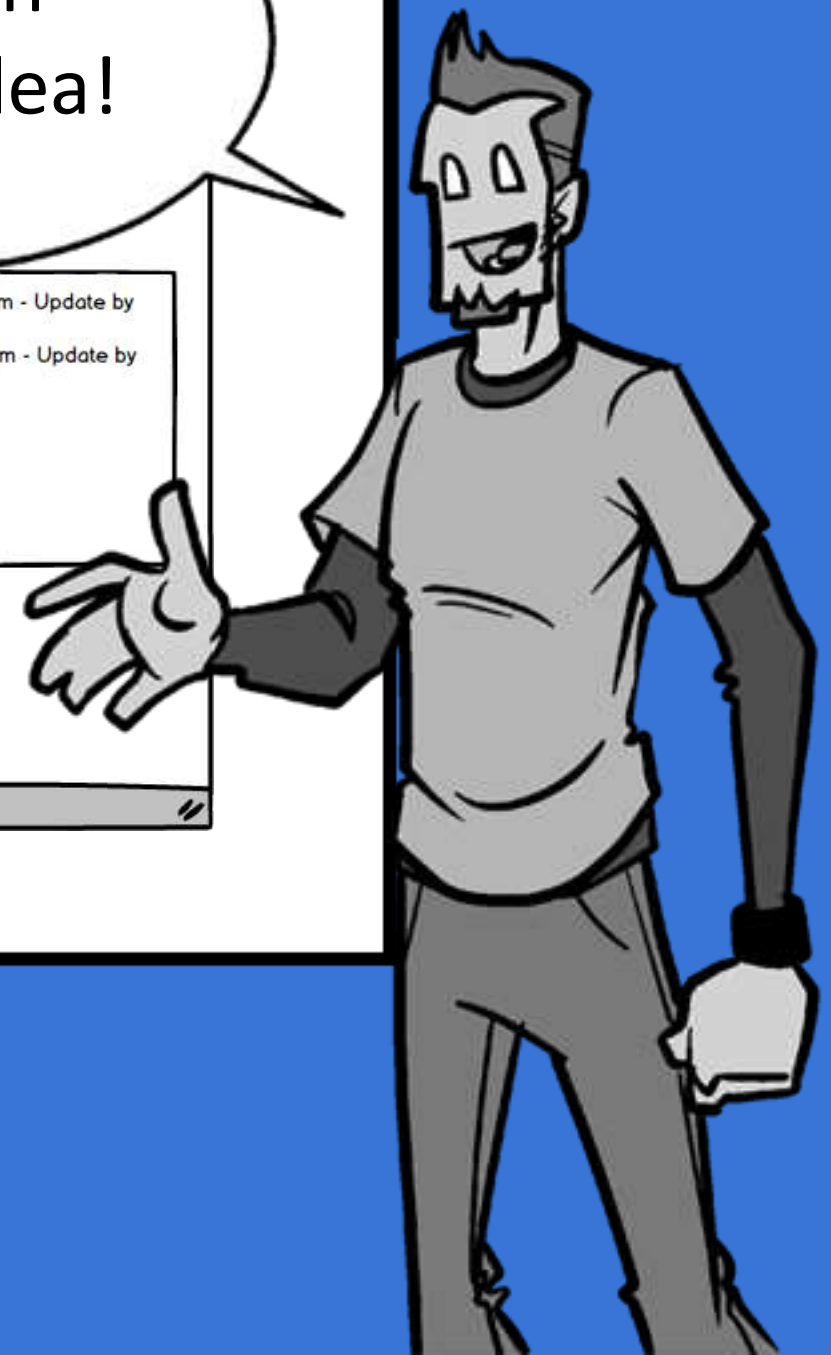
What's that?

... with
... contingency

Ooooh
Good idea!

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Estimates as Communication

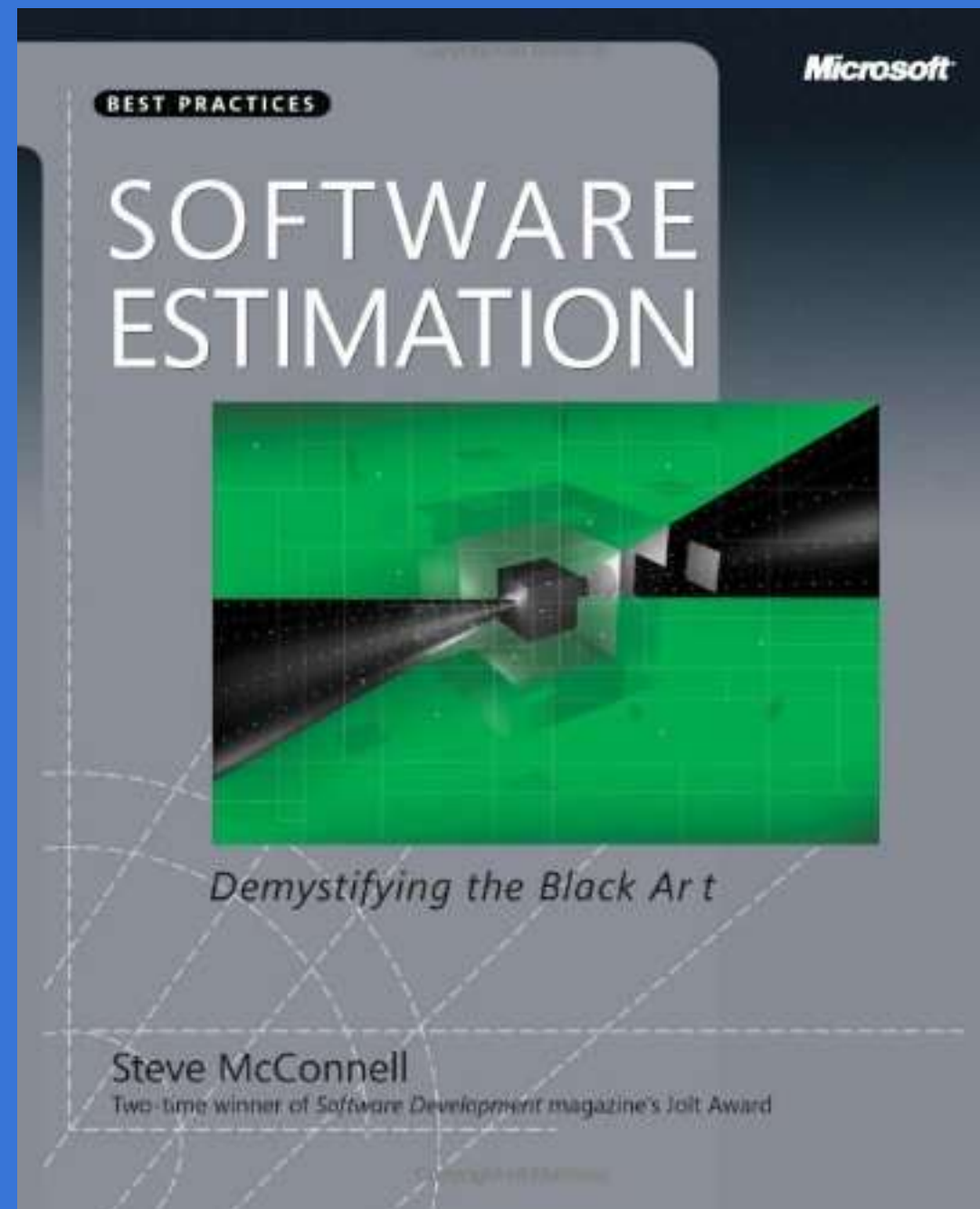
Estimates are useful for:

- Describing what is and isn't included
- Pushing back on unrealistic plans
- Communicating team needs to management
- Communicating business goals to teams
- Explaining the cost of change

You're Not Done Estimating

Summary

- Estimation is a skill
- Account for ALL of the work in a project
- Don't pad - calculate risk
- Communicate what you did and didn't estimate
- Don't panic, you can do this



Software Estimation - Demystifying the Black Art

Steve McConnell

Thank You!

by Jared Faris
@jaredthenerd
jaredthenerd.com