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Mike Cohn

- Founding member and director of Agile Alliance and Scrum Alliance
- Founder of Mountain Goat Software
- Doing Scrum since 1995
- Started my career as a programmer

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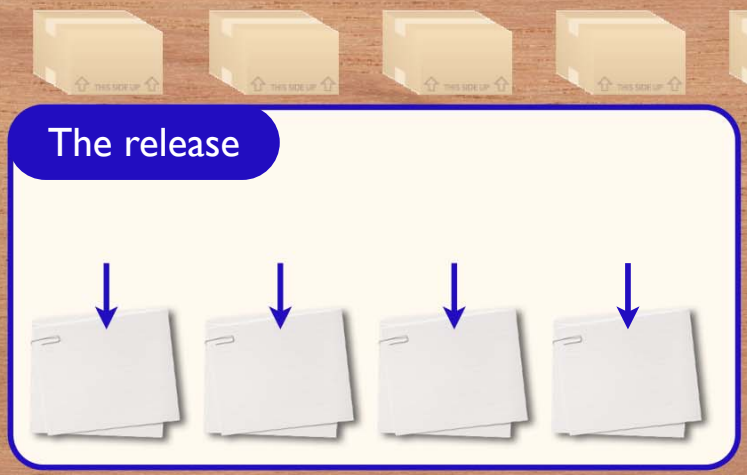
Combine formal & informal

- Formal prioritization approaches for
  - Choosing among projects
  - Choosing between "epics" or "big features"
- An informal approach (expert opinion)
  - Once you've selected the epics / big features

Why?

- Features that are too small cannot be effectively prioritized against each other
- What's more important in a word processor?
  - The A key or the E key?
  - Tables or undo?
- What's more important on a car?
  - The left front wheel or the right front wheel?
  - Increased leg room or a larger engine?

Prioritize epics then open them up to optimize release contents



Approaches to prioritizing

- Kano analysis
- Expert opinion
- Theme screening
- Theme scoring
- Relative weighting
- Financial analysis

Kano analysis

Mandatory / Baseline

- Must be present in order for users to be satisfied

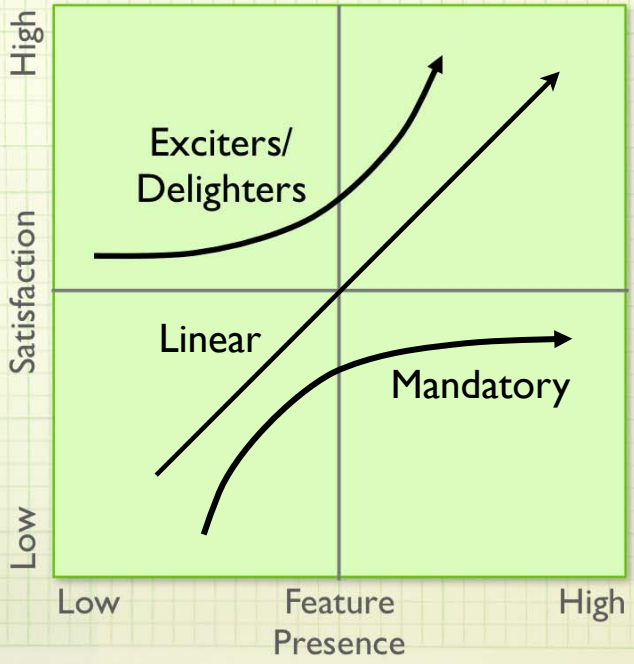
Linear

- The more of it, the better

Exciters / Delighters

- Features a user doesn't know she wants, until she sees it

Impact on user satisfaction



Surveying users

- To assess whether a feature is baseline, linear, or exciting we can:
  - Sometimes guess
  - Or survey a small set of users (20-30)
- We ask two questions
  - A functional question
    - How do you feel if a feature is present?
  - And a dysfunctional question
    - How do you feel if that feature is absent?

Functional and dysfunctional forms

Functional form of question

If your hotel room includes a free bottle of water, how do you feel?		
	I like it that way.	✔
	I expect it to be that way.	
	I am neutral.	
	I can live with it that way.	
	I dislike it that way.	

Dysfunctional form of question

If your hotel room *does not* include a free bottle of water, how do you feel?		
	I like it that way.	
	I expect it to be that way.	✔
	I am neutral.	
	I can live with it that way.	
	I dislike it that way.	

Categorizing an answer pair

Functional Question \ Dysfunctional Question	Like	Expect	Neutral	Live with	Dislike
Like	Q	E	E	E	L
Expect	R	I	I	I	M
Neutral	R	I	I	I	M
Live with	R	I	I	I	M
Dislike	R	R	R	R	Q

Mandatory **Q**uestionable
Linear **R**everse
Exciter **I**ndifferent

Aggregating results

Themes	Exciter	Linear	Mandatory	Indifferent	Reverse	Questionable
Apply stylesheets	3	11	31	1	3	2
Automate report execution	4	22	20	4	1	0
Export reports to PowerPoint	21	9	14	5	1	1

What to include

- All of the baseline features
  - By definition, these must be present
- Some amount of linear features
- But leaving room for at least a few exciters

Your new car

You are thinking about buying a new eco-friendly car. Identify examples of:

- Mandatory features
- Linear features
- Exciters

2 Relative weighting

- Assess the impact of having a story/theme from 1-9
- Assess impact of NOT having it from 1-9
- Calculate the value of each story or theme relative to the entire product backlog
  - This gives you the relative value of that story or theme
- Estimate the cost of each story theme
- Calculate the cost of each story or theme relative to the entire product backlog
  - This gives the relative cost of that story or theme
- Priority is given by (Relative Value ÷ Relative Cost)

Relative weighting: an example

	Relative Benefit	Relative Penalty	Total Value	Value Percent	Estimate	Cost Percent	Priority
More investment choices	8	6	14	40	64	44	91
Portfolio rebalancing	9	2	11	31	40	27	115
Comply with new law	1	9	10	29	42	29	100
Total:			35	100	146	100	

Total Value = Relative Benefit + Relative Penalty
Value Percent = Total Value / ∑ (Total Value)
Cost Percent = Estimate / ∑ (Estimate)

Prioritizing MyCookSpace.com

- You are the VP of Product Development at MyCookSpace.com, a social networking site
- You have a minimally functional site up with 4,000 registered cooks
- You are trying to grow that to 400,000 as quickly as possible before you run out of money
- You are also interested in other features that result in revenue
- Identify 4-5 epics or big features to develop
- Complete a relative weighting worksheet
  - Make reasonable but wild guesses at development effort estimates

Relative Weighting Worksheet

Themes	Relative Benefit	Relative Penalty	Total Value	Value Percent	Estimate	Cost Percent	Priority
						100	
				100			
Total:							

Total Value = Relative Benefit + Relative Penalty (× weights if used)
Value Percent = Total Value ÷ ∑(Total Value)
Cost Percent = Estimate ÷ ∑Estimate
Priority = Value Percent / Cost Percent (higher = higher priority)

MOUNTAIN GOAT SOFTWARE

3 Expert opinion

- Focus needs to be on delivering value to the customer
- But consider these four factors
  1. Delivery of new capabilities
  2. Development of new knowledge
  3. Mitigation of risk
  4. Changes in relative cost

4 Theme screening

- Identify around 5-9 selection criteria for what is important in the next release
- Select a baseline theme
  - Likely to be included in the next release
  - Understood by most team members
- Assess each candidate theme relative to the baseline theme

Theme screening: an example

+ = better than
0 = same as
− = worse than

		Themes						
		Theme A	Theme B	Epic C	Baseline Theme	Theme D	Epic E	Epic F
Selection criteria	Importance to existing customers	+	+	−	0	−	+	0
	Competitiveness with ABC Corp.	+	−	0	0	0	0	0
	Starts us integrating product lines	+	0	0	0	+	−	+
	Generates revenue in Q2	0	0	0	0	+	0	+
	Net Score	+3	0	−1	0	+1	0	+2
	Rank	1	4	7	4	3	4	2
	Continue?	Y	N	N	Y	Y	N	Y

5 Theme scoring

- Like theme screening but selection criteria are weighted
- Need to select a baseline theme for each criteria
  - Avoids category compression
- Each theme is assessed against the baseline for each selection criteria

Much worse than reference	1
Worse than reference	2
Same as reference	3
Better than reference	4
Much better than reference	5

Theme scoring: an example

	Weight	Theme A		Epic B		Theme C	
		Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score
Importance to existing customers	25%	3	0.75	1	0.25	4	1.00
Competitiveness with ABC Corp.	10%	2	0.20	3	0.30	3	0.30
Starts us integrating product lines	15%	3	0.45	4	0.60	4	0.60
Generates revenue in Q2	50%	5	2.50	2	1.00	3	1.50
Net Score			3.90		2.15		3.40
Rank			1		3		2
Continue?			Yes		No		Yes

Theme screening or scoring

- Using the same themes identified for the relative weighting exercise, complete a theme screening or theme scoring worksheet for MyCookSpace.com

Theme Screening Worksheet

Selection Criteria	Themes						
Net score							
Rank							
Continue?							

+ = Better than 0 = Same as – = Worse than

Theme Scoring Worksheet

Selection Criteria	Weight	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score	Rating	Weighted Score
Net Score											
Rank											
Continue?											

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Three factors to consider

- All financial decisions involve three elements
  - How much?
  - How long?
  - At what interest rate?
- If you're buying a house:
  - It's a $220,000 loan
  - For 30 years
  - At 7% per year

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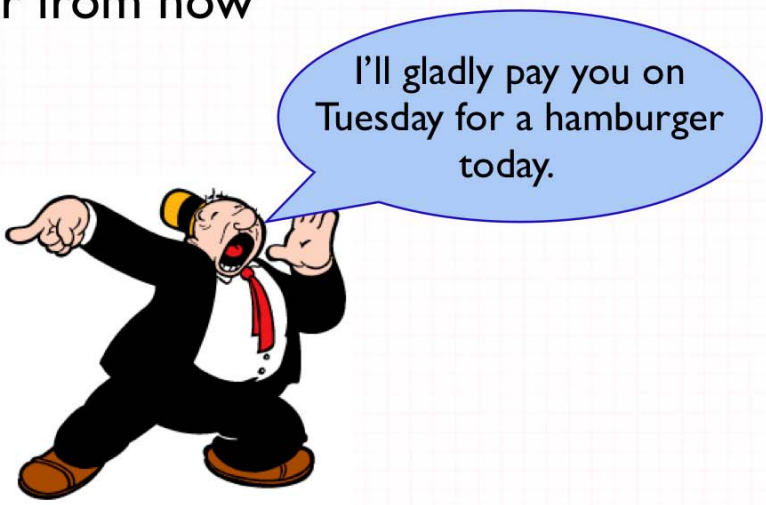
Which project would you prefer?

	Project A		Project B	
Year	Investment	Return	Investment	Return
0	$1,000		$1,000	
1		$200		$3,000
2		$300		$500
3		$500		$300
4		$3,000		$200
5		$0		$0

The time-value of money

- A dollar today is worth more than a dollar a year from now



Calculating the value of future dollars

To buy a $5 hamburger next Tuesday…

I would put around $4.99 in the bank today

To buy a $5 hamburger in a year, how much do I put in the bank today?

$$\frac{\$5.00}{1+0.10} = \frac{\$5.00}{1.10} = \$4.54$$

Assumes 10% interest rate

The present value of $5.00 a year from now

Present value of one future amount

$$\text{Present Value} = \frac{\text{Future Value}}{1+\text{interest rate}}$$

An example: $\frac{\$5.00}{1+0.10} = \$4.54$

Generalizing

$$PV = \frac{FV}{(1+i)^t}$$

Simplifying

$$PV = FV(1+i)^{-t}$$

Net present value (NPV)

- The present value of a stream of cash flows
- Measures the return on a theme or project as an amount of money

$$NPV(i) = \sum_{t=0}^{n} F_t(1+i)^{-t}$$

NPV example

- Assuming 12% annual discount rate (3% / quarter)

Quarter	Cash Flow	$(1+i)^{-t}$	Discounted Cash Flow	Running Total
0	-200	1.000	-200	-200
1	-600	0.971	-583	-783
2	100	0.943	94	-689
3	300	0.915	275	-414
4	500	0.888	444	30

Discount rate sensitivity

- NPV is highly sensitive to the chosen discount rate

Quarter	Cash Flow	Discounted Cash Flow (3%)	Discounted Cash Flow (6%)
0	–200	–200	–200
1	–600	–583	–783
2	100	94	–689
3	300	275	–414
4	500	444	30
Total	100	30	–29

Do the project under these circumstances

But not under these

Comparing NPVs

- Highest NPV brings the most present-value dollars to the company

Theme	NPV
Scalability	$2,100
Gift registry	$1,253
Ad hoc reporting	$784
Pay by invoice	$385

Comparing NPVs can be misleading. What if:
- "Pay by invoice" requires a $5 investment
- "Scalability" requires $50,000?

Technique #2

Internal Rate of Return (IRR)

Return as a percentage

- Rather than expressing returns in dollars, we'd like to express return as a percentage
  - Allows for direct comparisons
- NPV = how much money a project will return
- ROI = how quickly an investment will grow

Internal rate of return (IRR) and ROI

- IRR = Internal Rate of Return
  - Often called Return On Investment (ROI)
- The interest rate at which NPV is 0

$$0 = PV(i^*) = \sum_{t=0}^{n} F_t(1+i)^{-t}$$

Remember this table?

Quarter	Cash Flow	Discounted Cash Flow (3%)	Discounted Cash Flow (6%)
0	–200	–200	–200
1	–600	–583	–783
2	100	94	–689
3	300	275	–414
4	500	444	30
Total	100	30	–29

- IRR gives us the discount rate at which we don't care whether or not we do the project
  - We don't make $30; we don't lose $29; we break even

How to calculate ROI or IRR

- Use Excel's irr function

+irr({−200, −600, 100, 300, 500})

An investment made on the first day of the project

Cash flows for remainder of project (4 quarters)

Advantages and disadvantages

- Advantages
  - You don't need to guess at a discount rate like with NPV
  - Can be used to directly compare projects
- Disadvantages
  - Calculation is hard to do by hand (but easy in Excel); may lead to numbers being distrusted
  - Cannot use in all circumstances
    - e.g., once cash flow turns positive, it stays positive

Payback period

- The amount of time before an initial investment is paid back
  - I loan you $5. You pay me back $1/week. The payback period is 5 weeks.

Quarter	Cash Flow	Running Total
0	-200	-200
1	-200	-400
2	100	-300
3	300	0
4	500	500

Payback period is 3 quarters.

Advantages and disadvantages

- Advantages
  - Calculation is very easy
  - Measures the duration of financial risk
    - Longer payback period = greater risk
- Disadvantages
  - Doesn't consider the time-value of money
  - Doesn't measure profitability at all

Discounted payback period

- Discount future cash flows and determine when the investment is paid back

Quarter	Cash Flow	$(1+i)^{-t}$ i=3%	Discounted Cash Flow	Running Total
0	-200	1.000	-200	-200
1	-200	0.971	-194	-394
2	100	0.943	94	-300
3	300	0.915	275	-25
4	500	0.888	444	419

Discounted payback period = 4 quarters

Financial analysis recap

- Net Present Value (NPV)
  - Sum of discounted future cash flows
  - Expresses return as an amount of money
- Return on Investment (ROI) / Internal Rate of Return
  - The interest rate at which NPV = 0
    - That is, at which you'd be indifferent to the investment
  - Expresses return as a percentage
- Discounted payback period
  - Amount of time before discounted returns equal the investment
  - Expresses return as an amount of time

Comparison matrix

	Person Weeks	Cost	3-Year Return	NPV	IRR	D. Payback (Quarters)
Feature A	25	$150	$1,085	$448	133%	2
Feature B	32	192	$2,109	$940	172%	4
Feature C	90	$540	$2,537	$883	89%	2
Feature D	48	$288	$1,360	$443	76%	4
Feature E	55	$330	$900	$191	48%	2
Feature F	79	$474	$1,365	$331	56%	4
Feature G	90	$540	$5,964	$2,519	139%	5
Feature H	50	$300	$2,415	$1,023	146%	2
Feature I	15	90	$1,600	$747	221%	1
Feature J	30	$180	$640	$182	65%	2
Feature K	75	$450	$516	($104)	5%	NA
Feature L	40	$240	$171	($110)	(12%)	NA
Feature M	80	$480	$1,025	$142	36%	3
Feature N	18	$108	$185	$7	24%	2
Feature O	12	$72	$1,505	$748	355%	1

Upcoming public classes

Date	What	Where
July 19–20 July 21–22	Certified ScrumMaster Certified Scrum Product Owner	Orlando
August 23–24 August 25–26	Certified ScrumMaster Succeeding with Agile	Dallas
September 13–14 September 15–16	Certified ScrumMaster Certified Scrum Product Owner	Cupertino
October 11 October 12–13 October 14	User Stories for Agile Requirements Certified ScrumMaster Agile Estimating & Planning	Boulder
November 8–9 November 10–11	Certified ScrumMaster Succeeding with Agile	San Diego

See mountaingoatsoftware.com for details

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