





MANAGING THE DEVELOPMENT OF LARGE SOFTWARE SYSTEMS

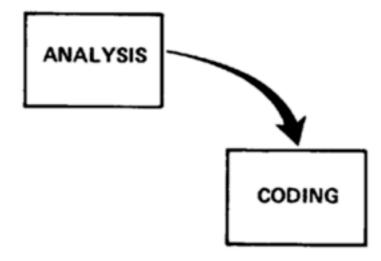
Dr. Winston W. Royce

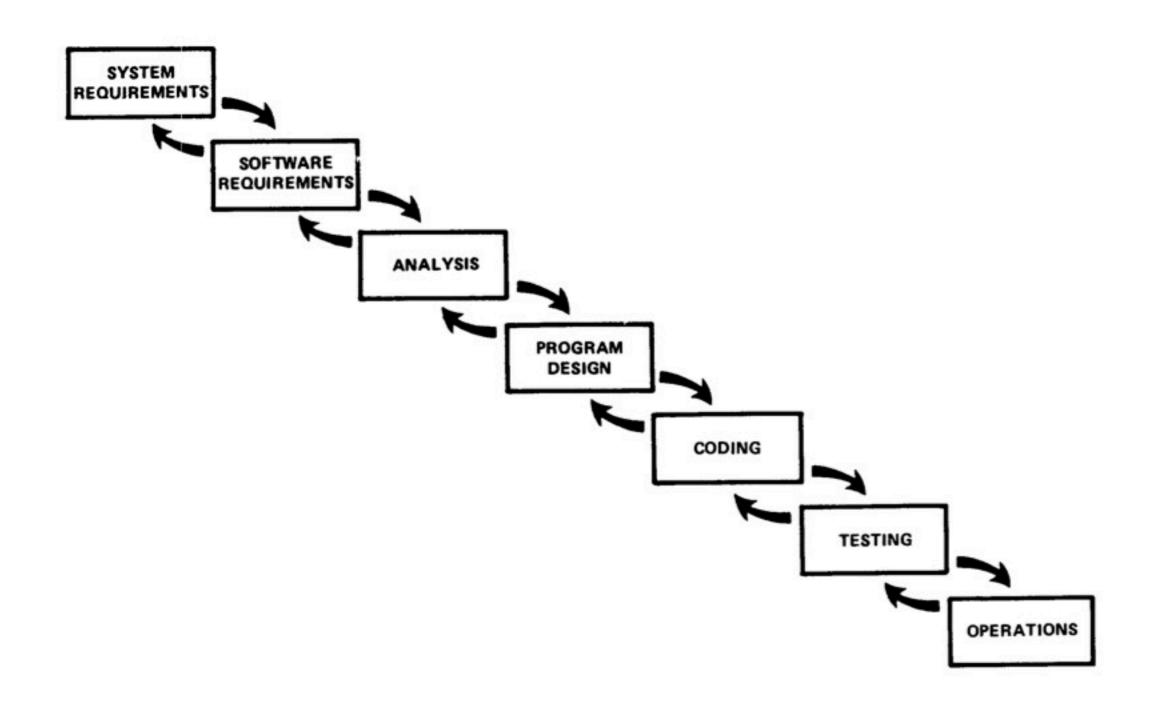
INTRODUCTION

I am going to describe my personal views about managing large software developments. I have had various assignments during the past nine years, mostly concerned with the development of software packages for spacecraft mission planning, commanding and post-flight analysis. In these assignments I have experienced different degrees of success with respect to arriving at an operational state, on-time, and within costs. I have become prejudiced by my experiences and I am going to relate some of these prejudices in this presentation.

COMPUTER PROGRAM DEVELOPMENT FUNCTIONS

There are two essential steps common to all computer program developments, regardless of size or complexity. There is first an analysis step, followed second by a coding step as depicted in Figure 1. This sort of very simple implementation concept is in fact all that is required if the effort is sufficiently small and if the final product is to be operated by those who built it — as is typically done with computer programs for internal use. It is also the kind of development effort for which most customers are happy to pay, since both steps involve genuinely creative work which directly contributes to the usefulness of the final product. An implementation plan to manufacture larger software systems, and keyed only to these steps, however, is doomed to failure. Many additional development steps are required, none contribute as directly to the final product as analysis and coding, and all drive up the development costs. Customer personnel typically would rather not pay for them, and development personnel would rather not implement them. The prime function of management is to sell these concepts to both groups and then enforce compliance on the part of development personnel.







Cynefin Framework

Complex

Probe Sense Respond

Emergent

Complicated

Sense Analyze Respond

Good Practice

Disorder

Chaotic

Act Sense Respond

Novel

Simple

Sense Categorize Respond Best Practice









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Probe Sense Respond

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Simple

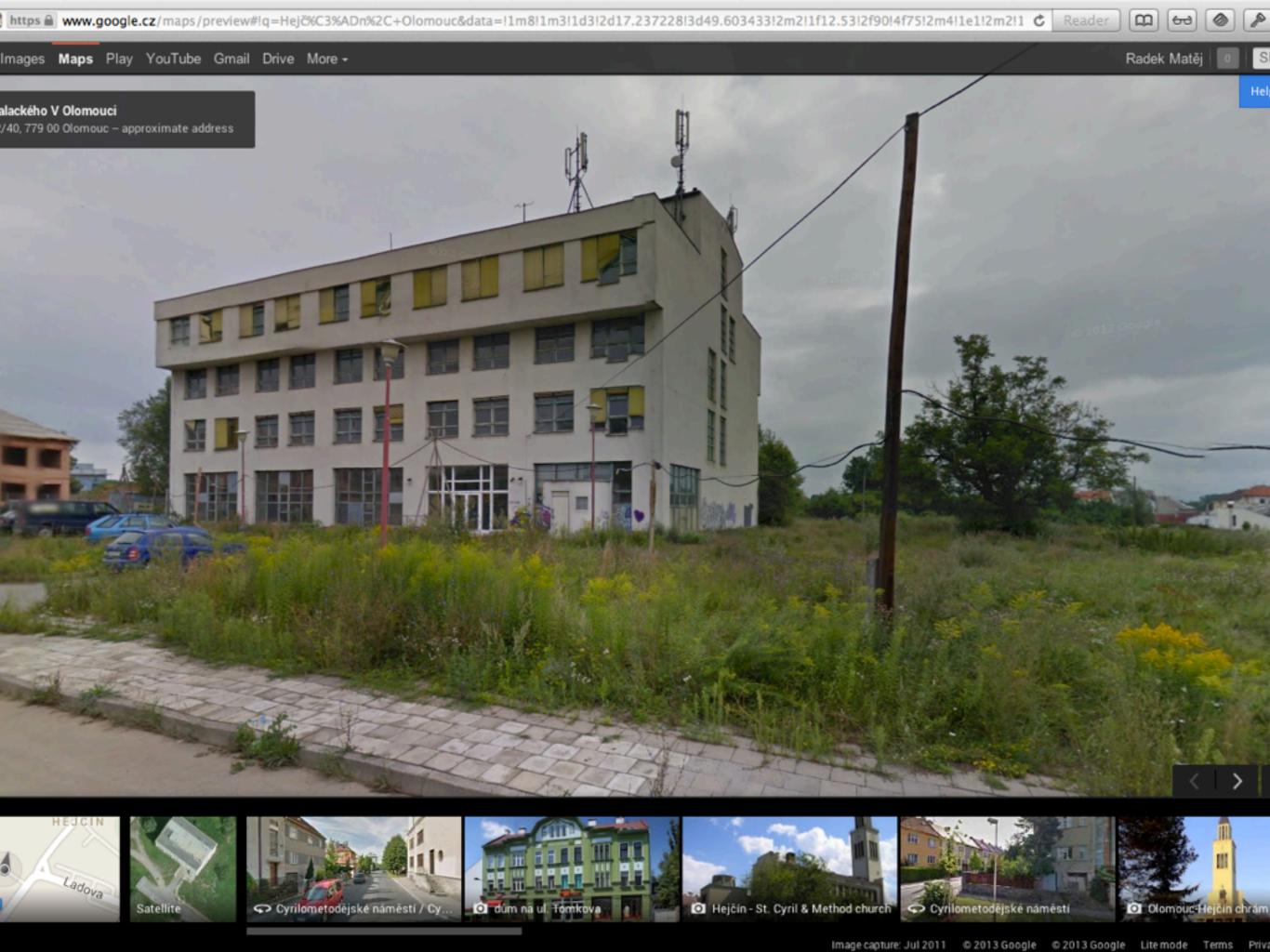
Sense Categorize Respond Best Practice















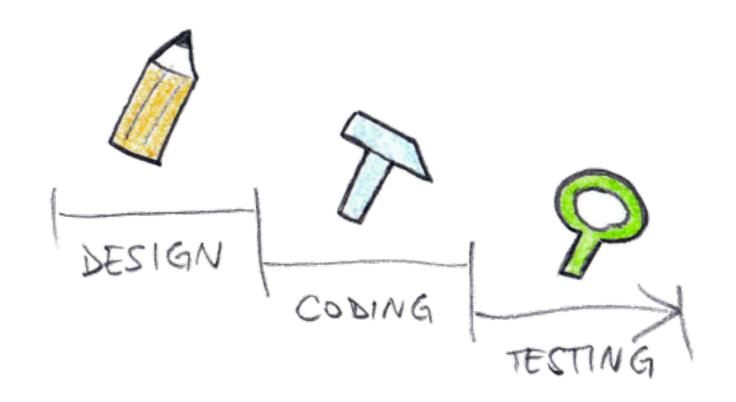
RESPONDING TO CHANGE CUSTONER COLLABORATION OF WORKING SOFTWARE OVER OVER PROCESSES AND TOOL CONTRACT NEGOTIATION

Manifesto for Agile Software Dev. Manifesto for Agile Software Dev. INDIVIDUALS AND INTERACTIONS OVER PROCESSES AND TOOLS

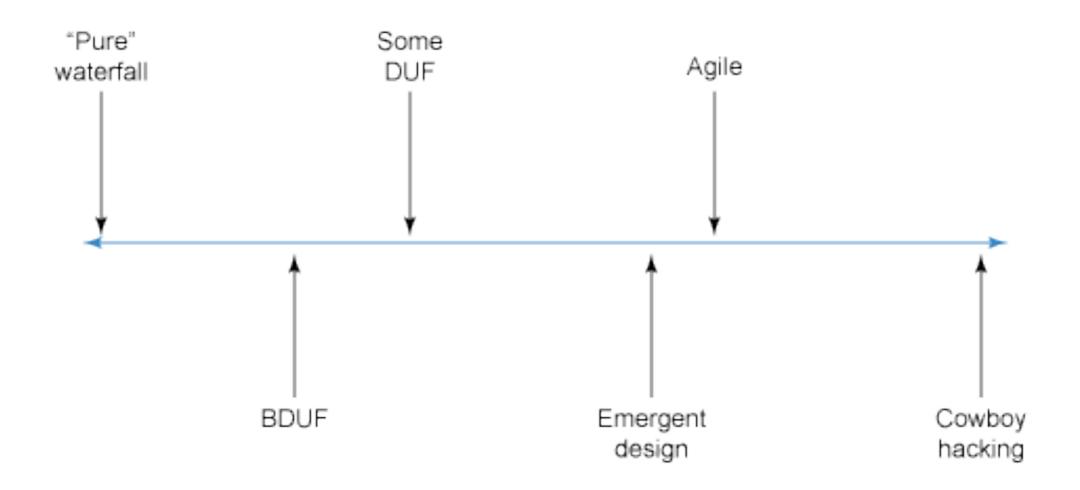
- WORKING SOFTWARE OVER COMPREHENSIVE DOCUMENTION
- CUSTOMER COLLABORATION OVER CONTRACT NEGOTIATION
- RESPONDING TO CHANGE OVER FOLLOWING A PLAN



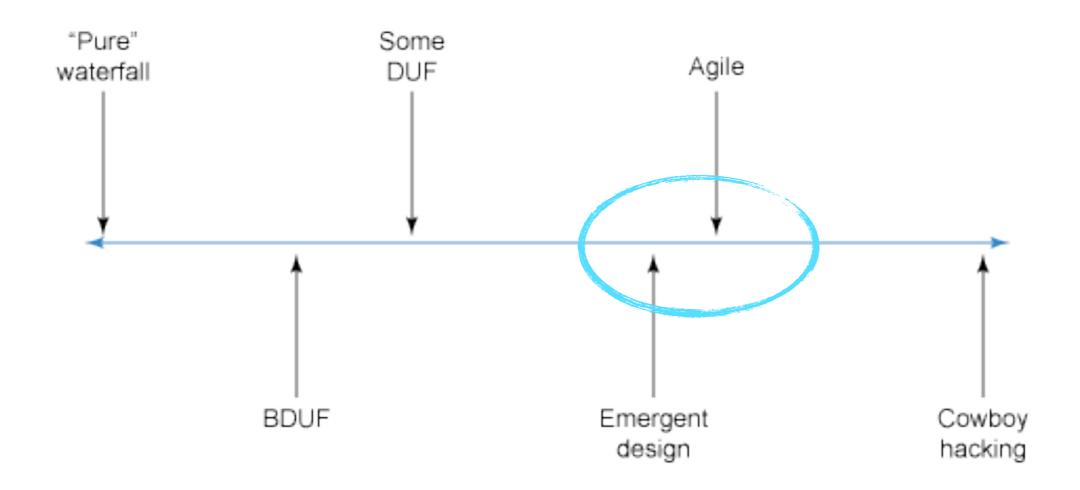




Spectrum of a Design



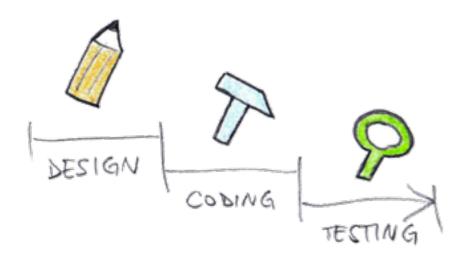
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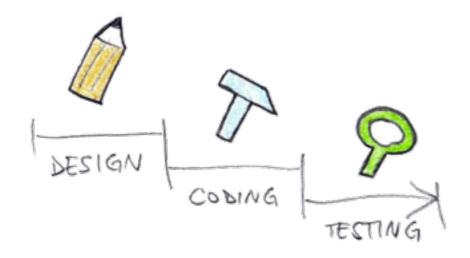




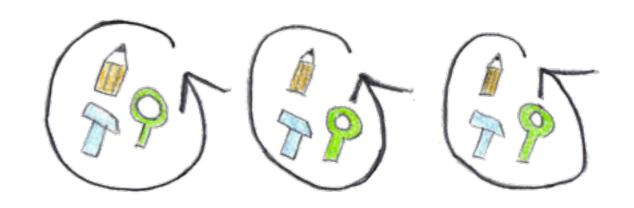


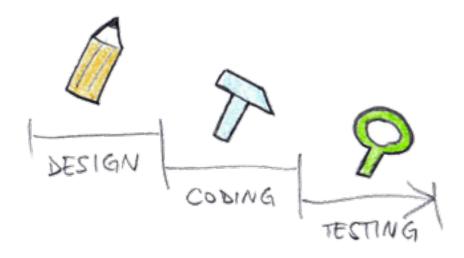




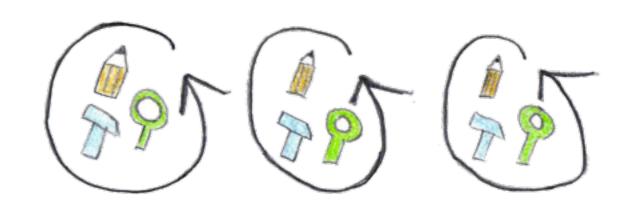


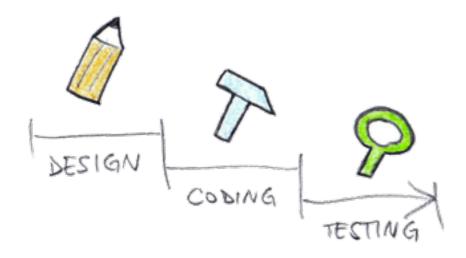
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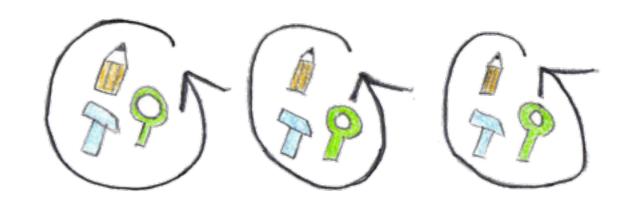


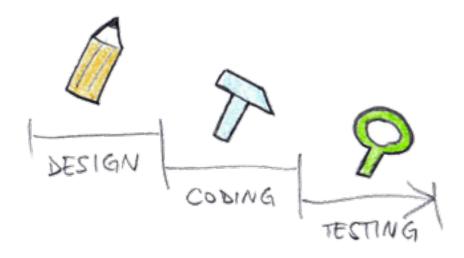
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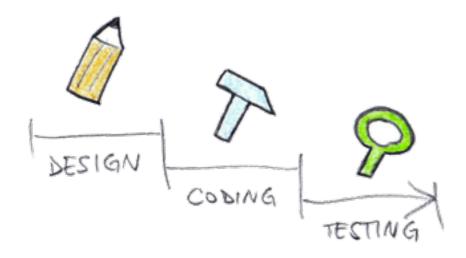
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- + suited for projects, where certificate is needed





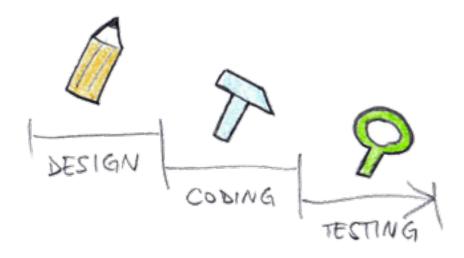
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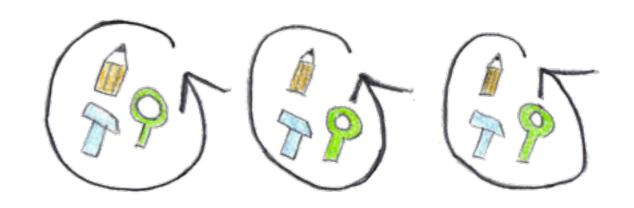


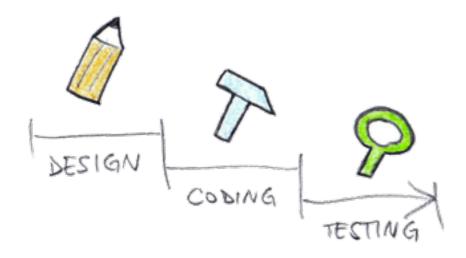
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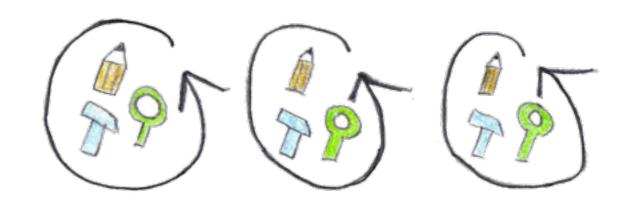


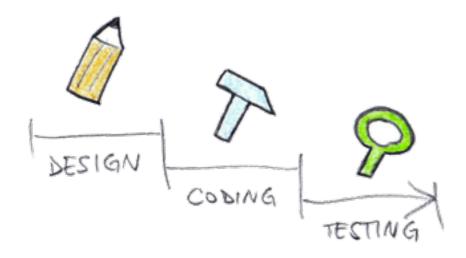
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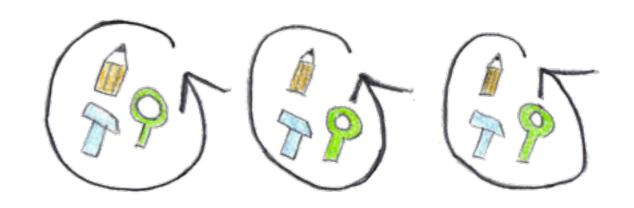


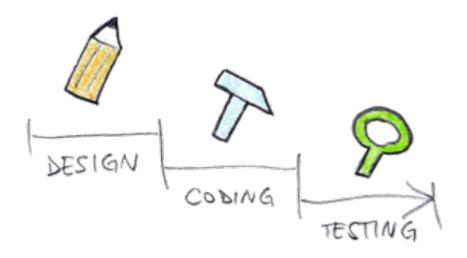
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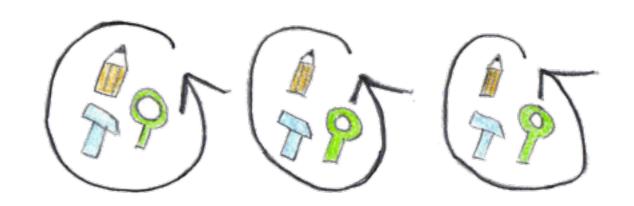


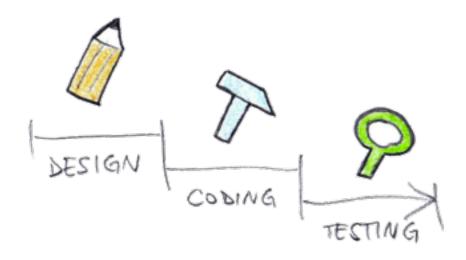
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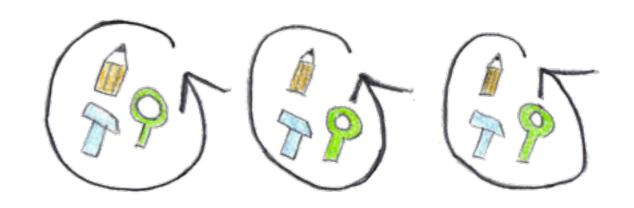


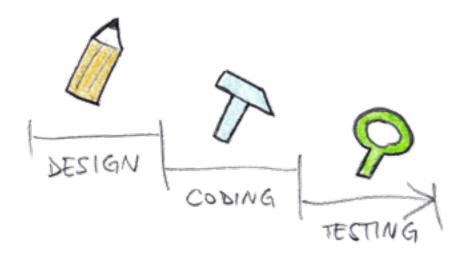
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- + focus on controlling

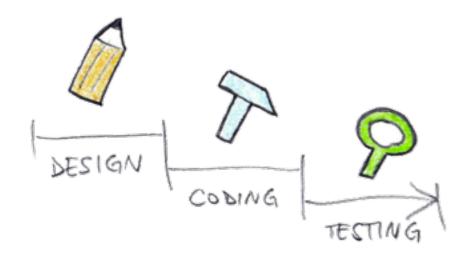




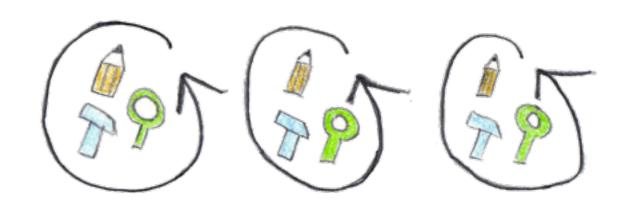
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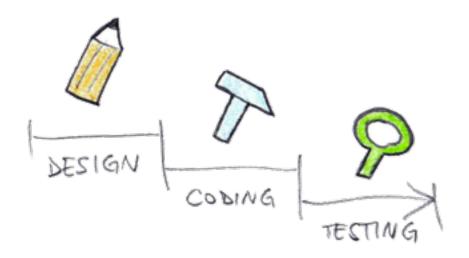
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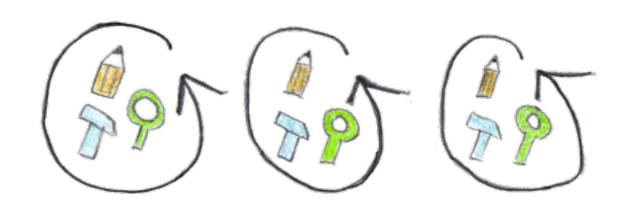
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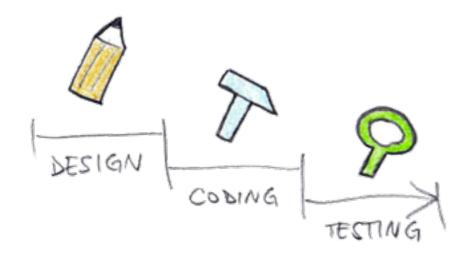
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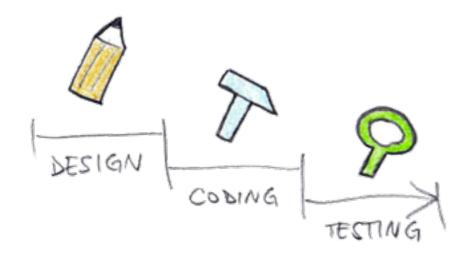
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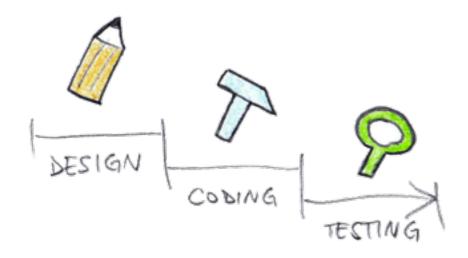
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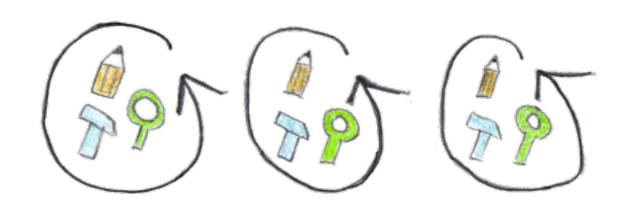
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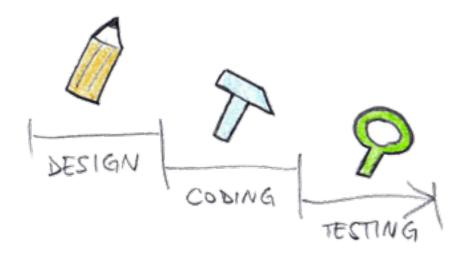
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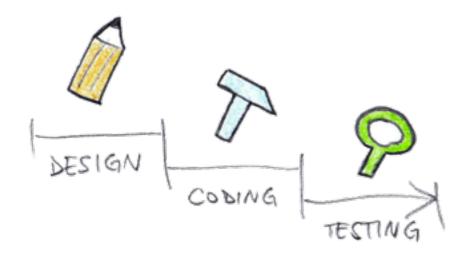
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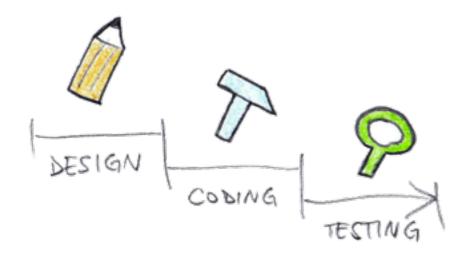
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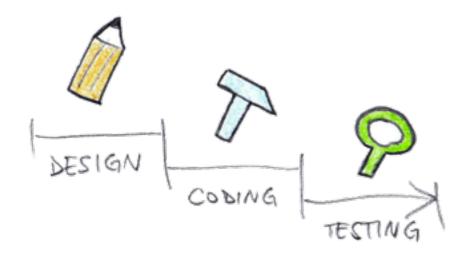
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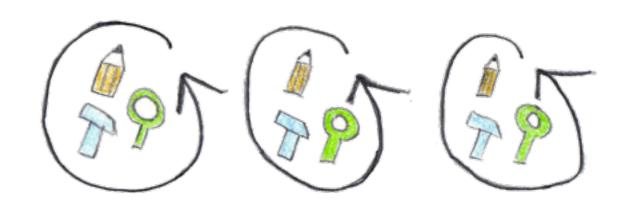
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- + focus on empowerment



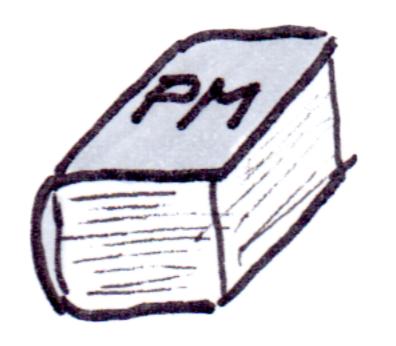
Product Owner



E 68%

1. Lack of User Input	12.8%
2. Incomplete Requirements & Specifications	12.3%
3. Changing Requirements & Specifications	11.8%
4. Lack of Executive Support	7.5%
5. Technology Incompetence	7.0%
6. Lack of Resources	6.4%
7. Unrealistic Expectations	5.9%
8. Unclear Objectives	5.3%
9. Unrealistic Time Frames	4.3%
10. New Technology	3.7%
Other	23.0%







AMAMANA TA



PM

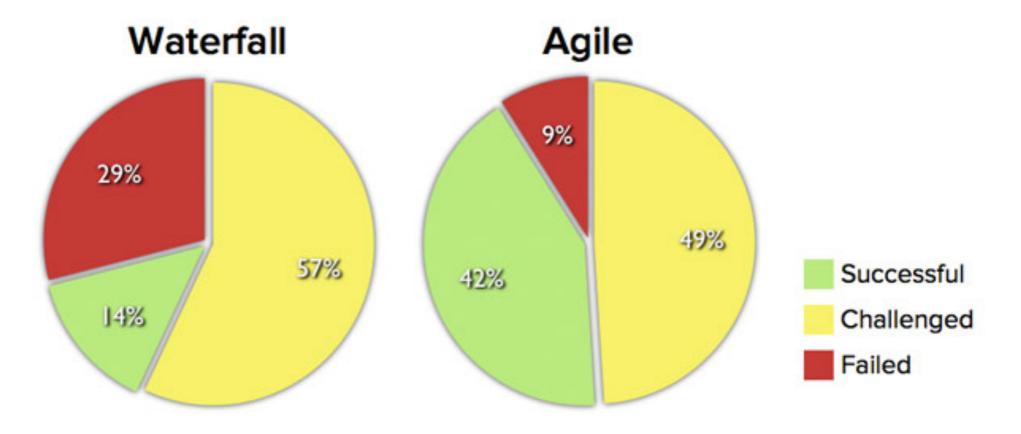
PM + Lean



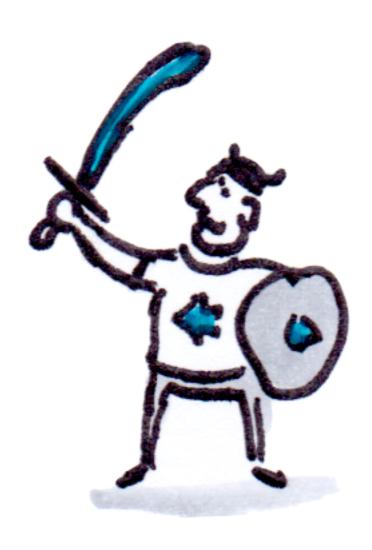
PM + Lean = PO

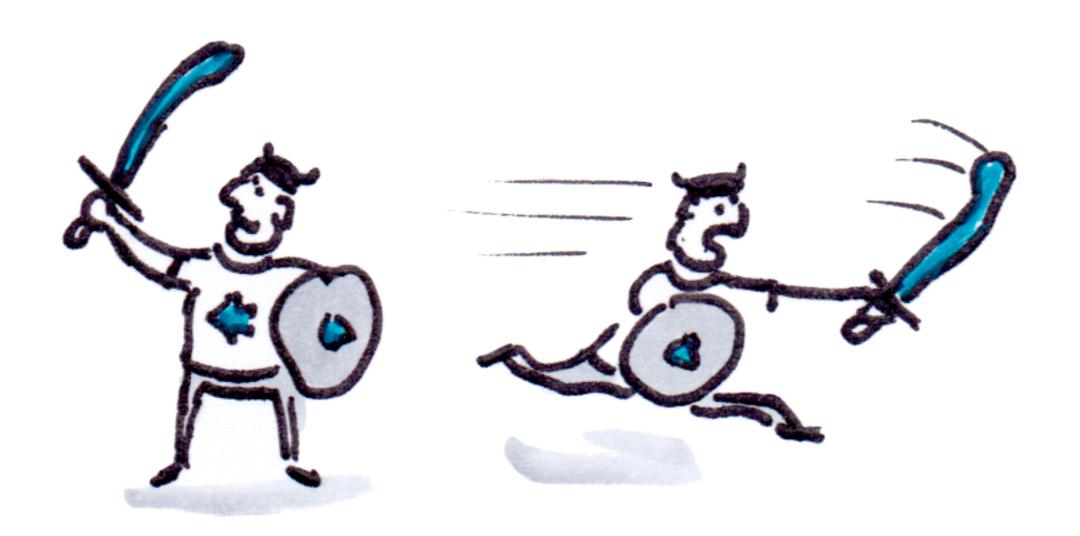


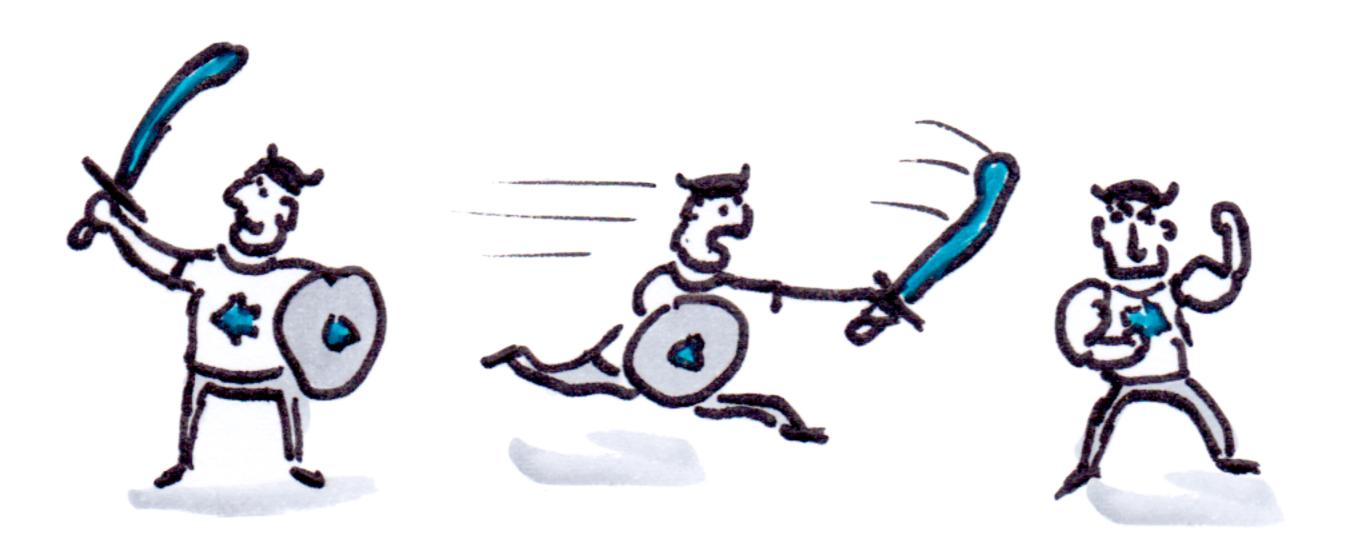
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Source: The CHAOS Manifesto, The Standish Group, 2012.



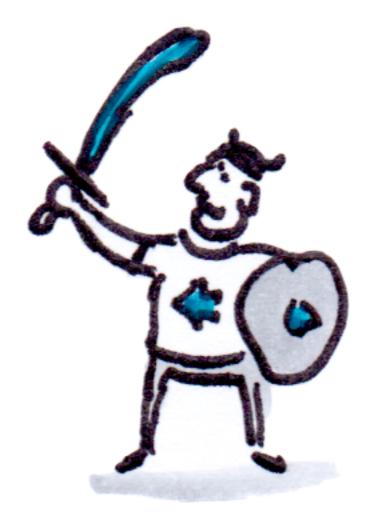




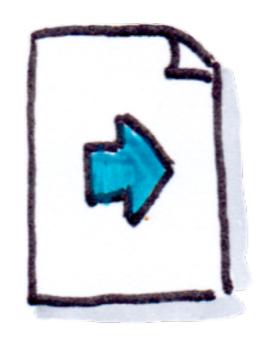








Tools



Vision Board

Vision Statement 65



Develop a digital product canvas to help teams create great products and to grow Pichler Consulting.

Target group



users: Product managers and product owners

Customers: Mid-size to large enterprises

Needs



Have an effective tool for creating new products while taking advantage of GreenHooper features

Leverage the existing investment; minimise the cost of acquiring a new tool

Product



Tablet app; data is held in GreenHopper

Looks like a physical canvas; intuitive to use

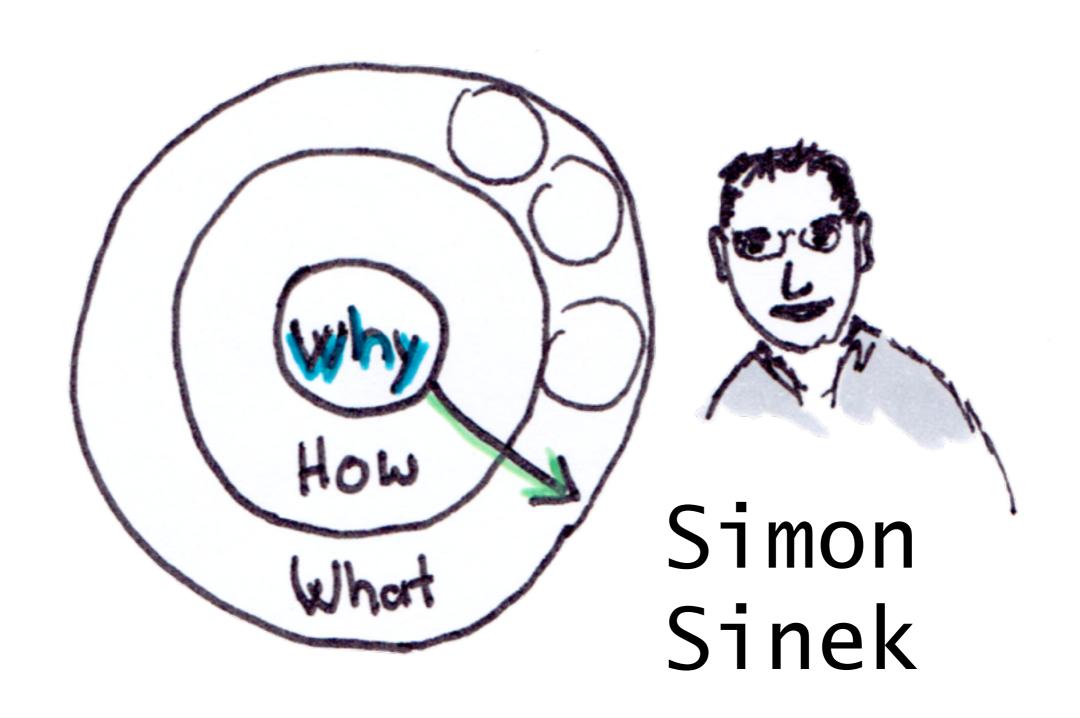
Provides templates for personas, stories, scenarios

Value



Open up a new revenue stream

Develop our brands / reputation



 ${
m I}$ $foldsymbol{\circ}$ the sport.

stogz cquipm.

I like the Community of friendly people.

There is a wall.

lt's hard to access the Community knowledge



I can break

I want to help. I know technology

I am building a spot atles & community senier



#1 page for every Wind Freak

SIB-TIES

B TARGET GROUP

♥ NEEDS

PRODUCT

\$ VALUE

Users a customers:

- · windsurfers
- · kiters

(ustomers:

advertisers

(equipment sellers;

wind (enters;...)

Have a place to find 2 share locations & tips for the sport.

* For communicating there is FB

Webt mobile spot atlas & community Saver.

- o above average usability
- o rool & playful

advertisements advantions

ocun business starter

gain experience

SUCCESS METRICS

09/13 all C2 surfers know brand 11/13 >200 active users 01/14 >20k C2K monthly income

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Personas

AMAMANA TA





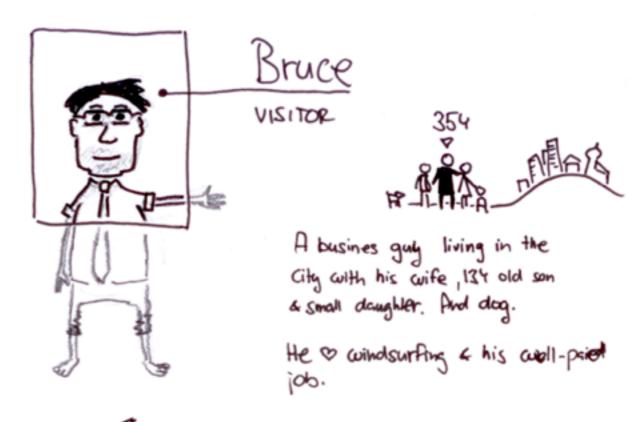




Max is almost peofi-hiter. He likes jumping, freestyle tricks a freeride. He loves aunter a Summer equally. New teaches mostly beginners in the school a his girlfriends.

A fast van from his kite-school takes him quickly to his 2 summer 8 1 avinter spot. In free time he takes flight with his gang to some spot on the world.

Laptup bornowed from hite school 8 his oan Androld Town of phone — he uses that to arrange courses, deck the weather 8 he spends a lot of time on FB. Max also curites reports a articles to the kile-goldol web.



Bruce is advanced windsurfer. He likes freeride & bit of jumping. He teaches his aire & son.

Windowshing it his possion, so almost every possion was almost every was the autor with their avell-equipped camper. Sometimes he travels for a sunder to the nearest spot from the city. Alone.

Bruce take his Macbook air & iPhone alongs with him, so he can respond quickly to boss a customers. He is no geet, but he knows his software quite well. He is not so much to FB, but he likes to read interacting information on internet.





```
As a [role]
I want to [do some action]
so that [business value]
```

As an editor
I want to add a new spot
so that I can share info
about a new location

F.A.A.R.T.

A.A.R.T.

As an editor
I want to add a new spot
so that I can share info
about a new location

Max records his trip to share tips and inspire others.

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- visited spots on a timeline

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- visited spots on a timeline
- article about the trip

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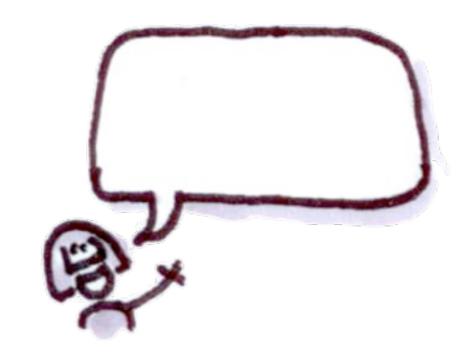
- visited spots on a timeline
- article about the trip
- integration with Trip Journal app





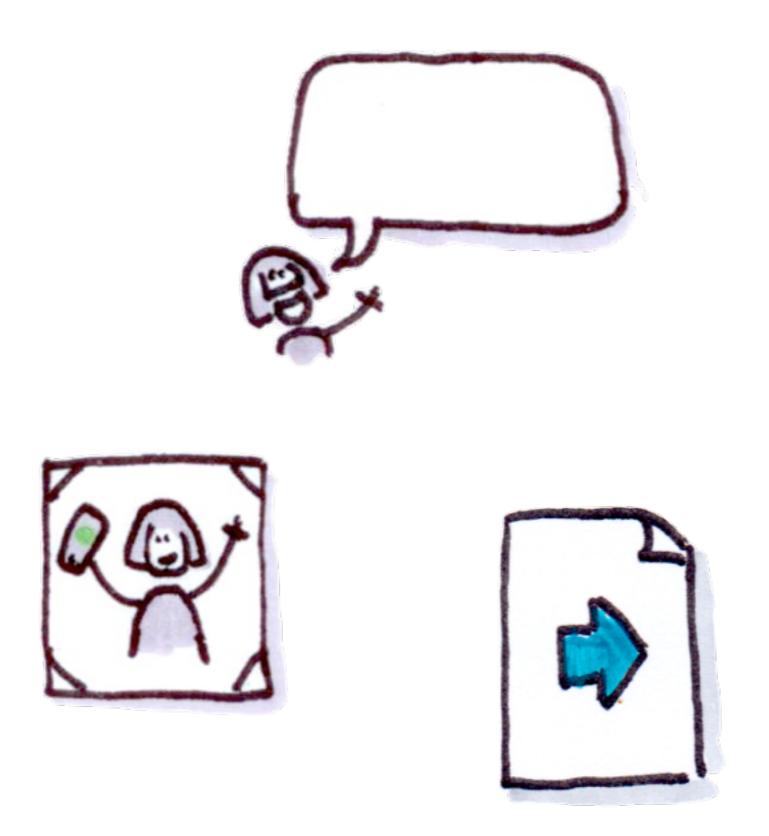




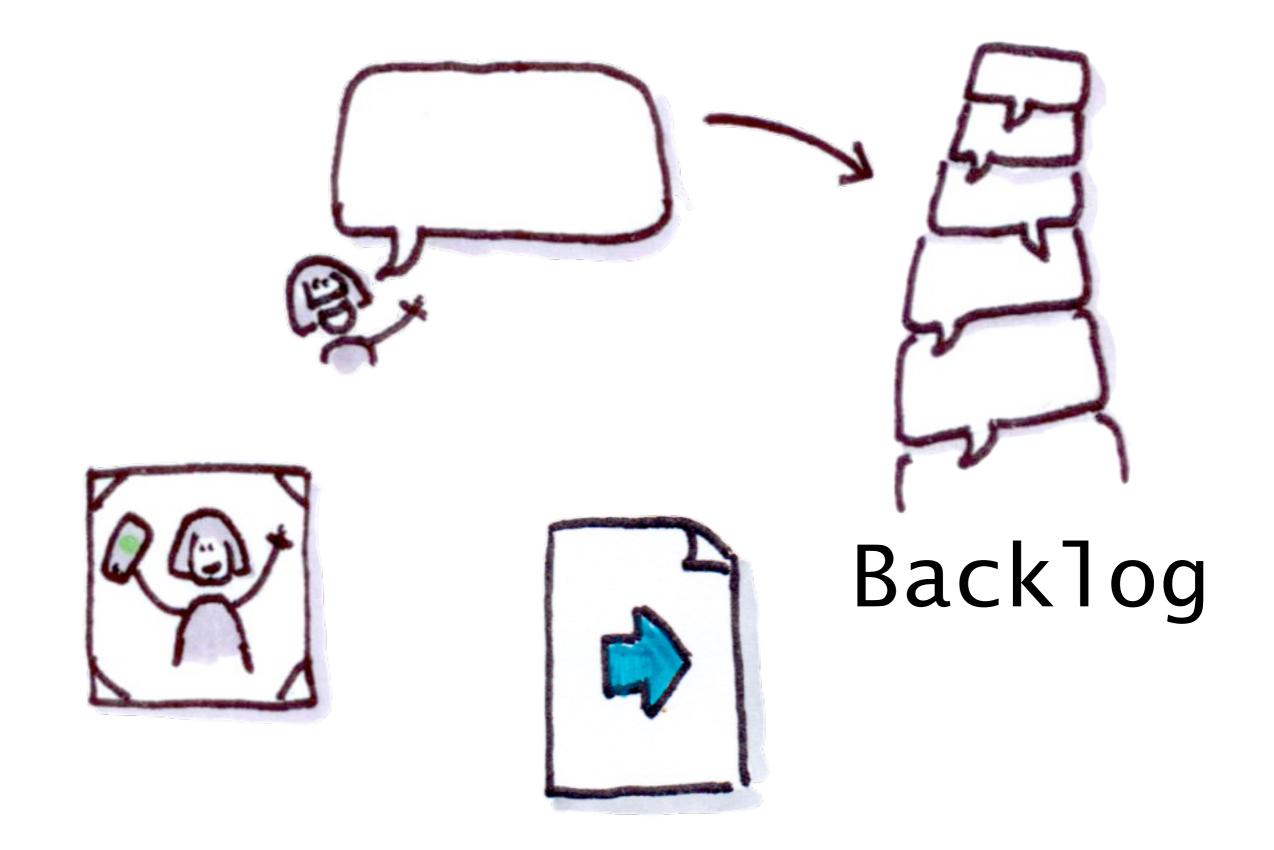














Max adds a new spot.

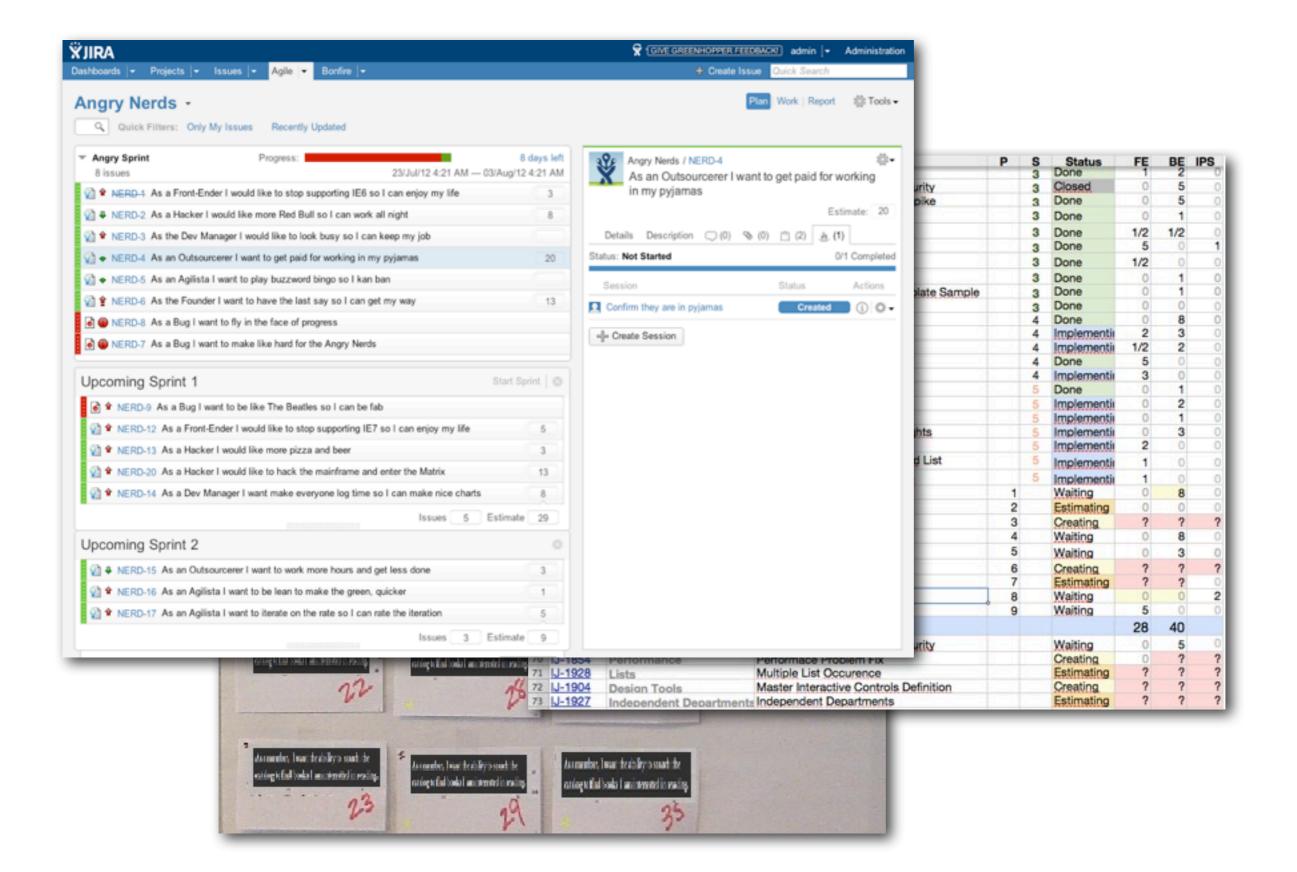


Max adds a new spot.

Max records his trip.



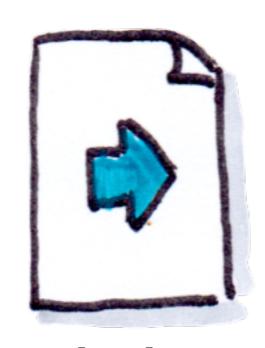
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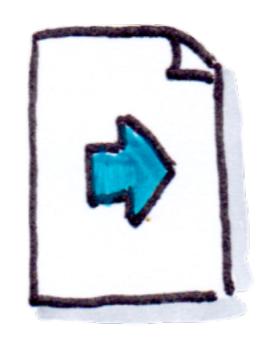


Vision Board





Personas



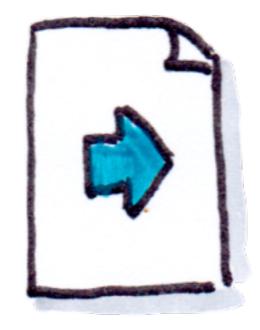
Vision Board





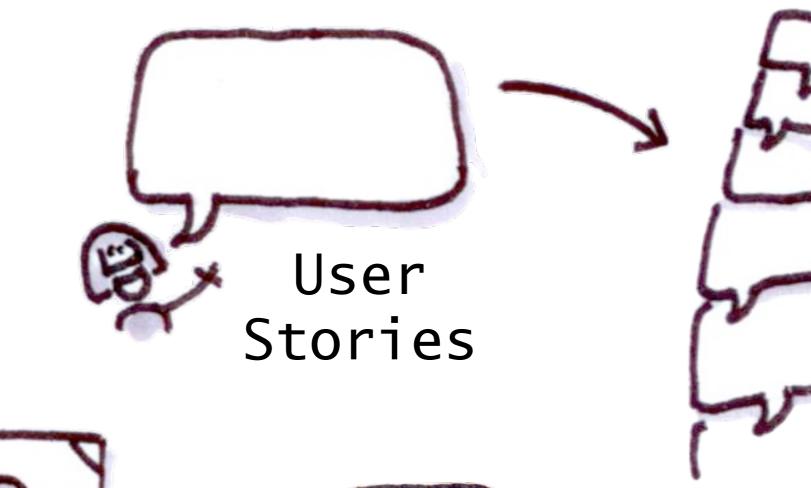


Personas



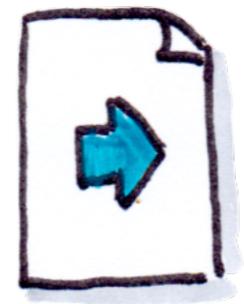
Vision Board







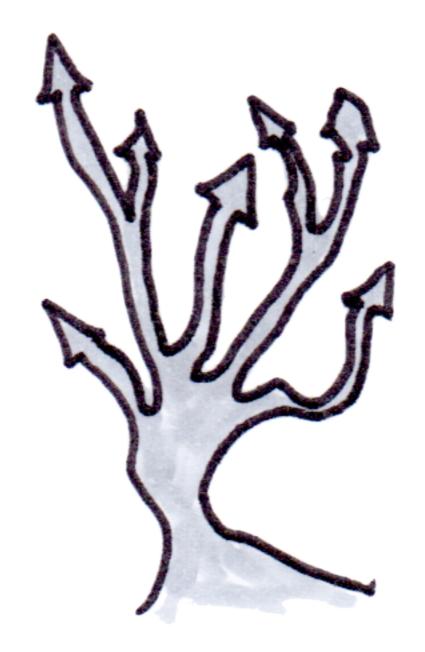
Personas



Vision Board







Emergent

























Activities





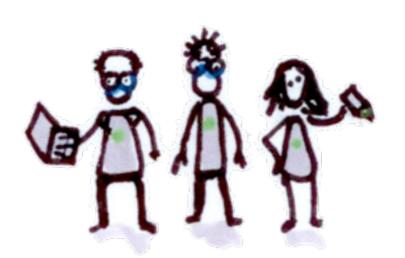




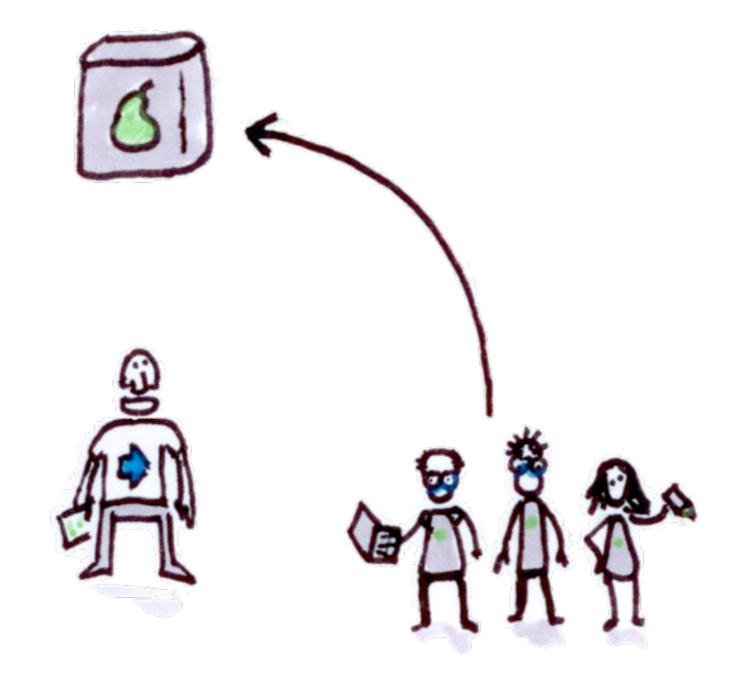


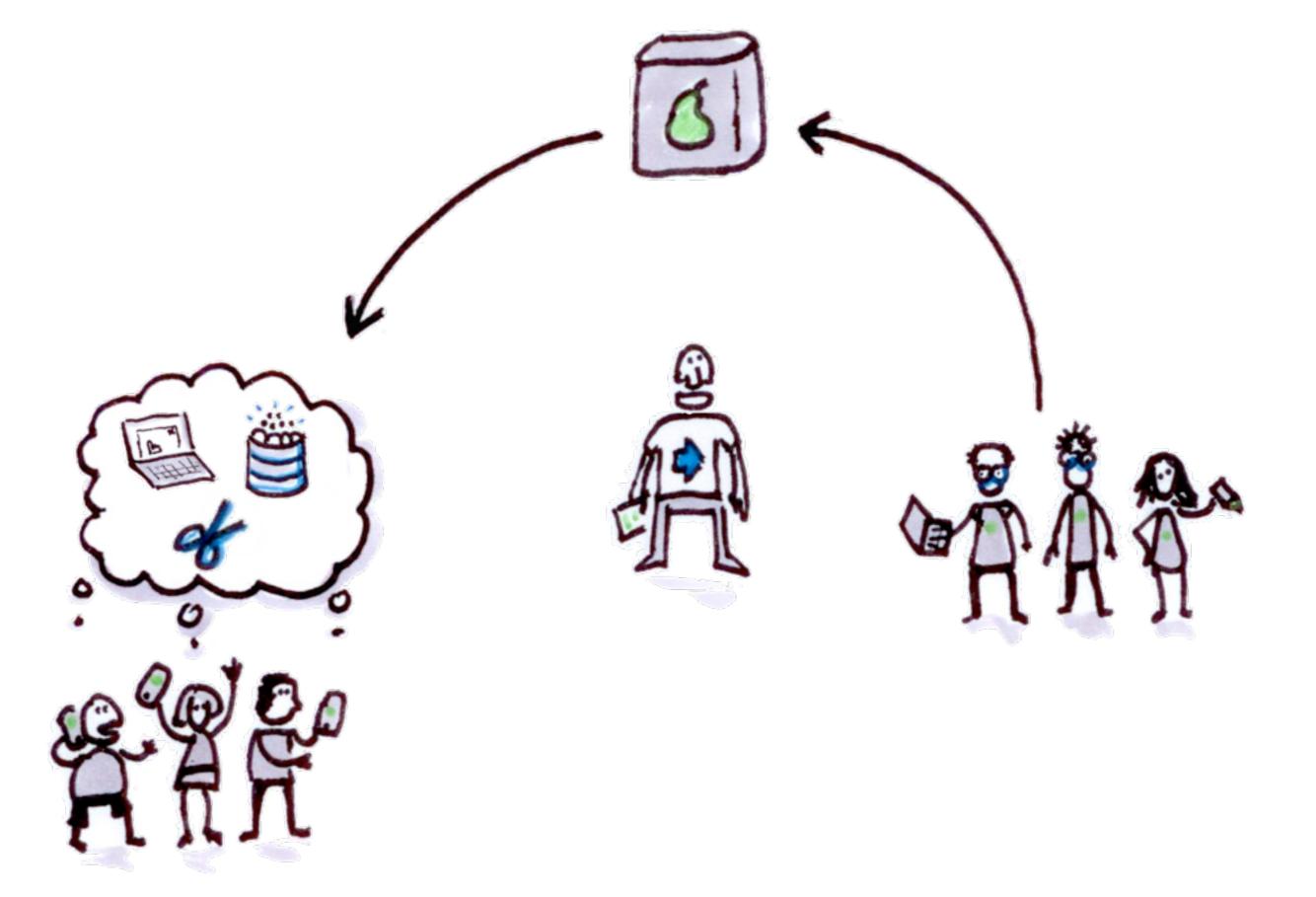


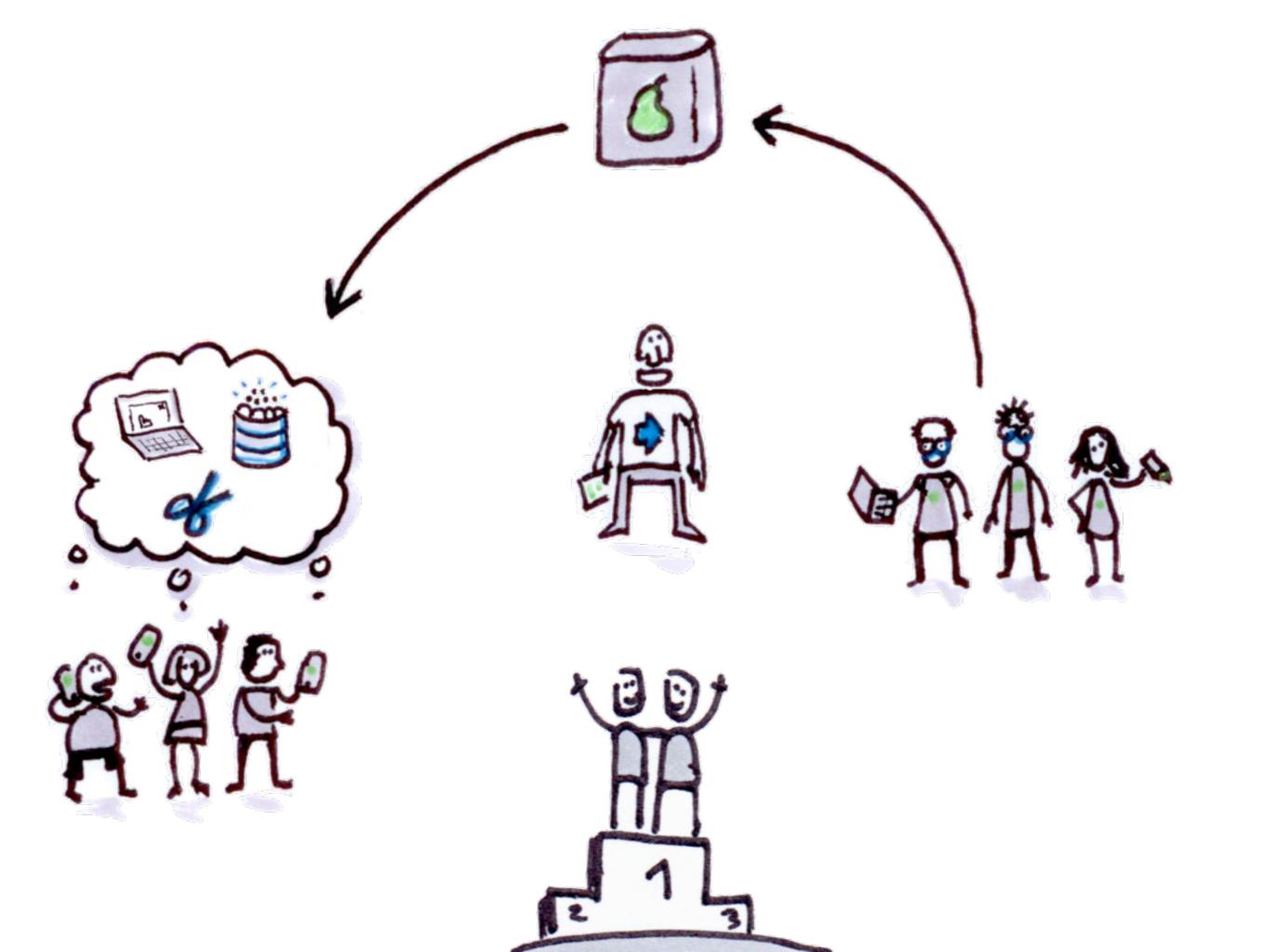


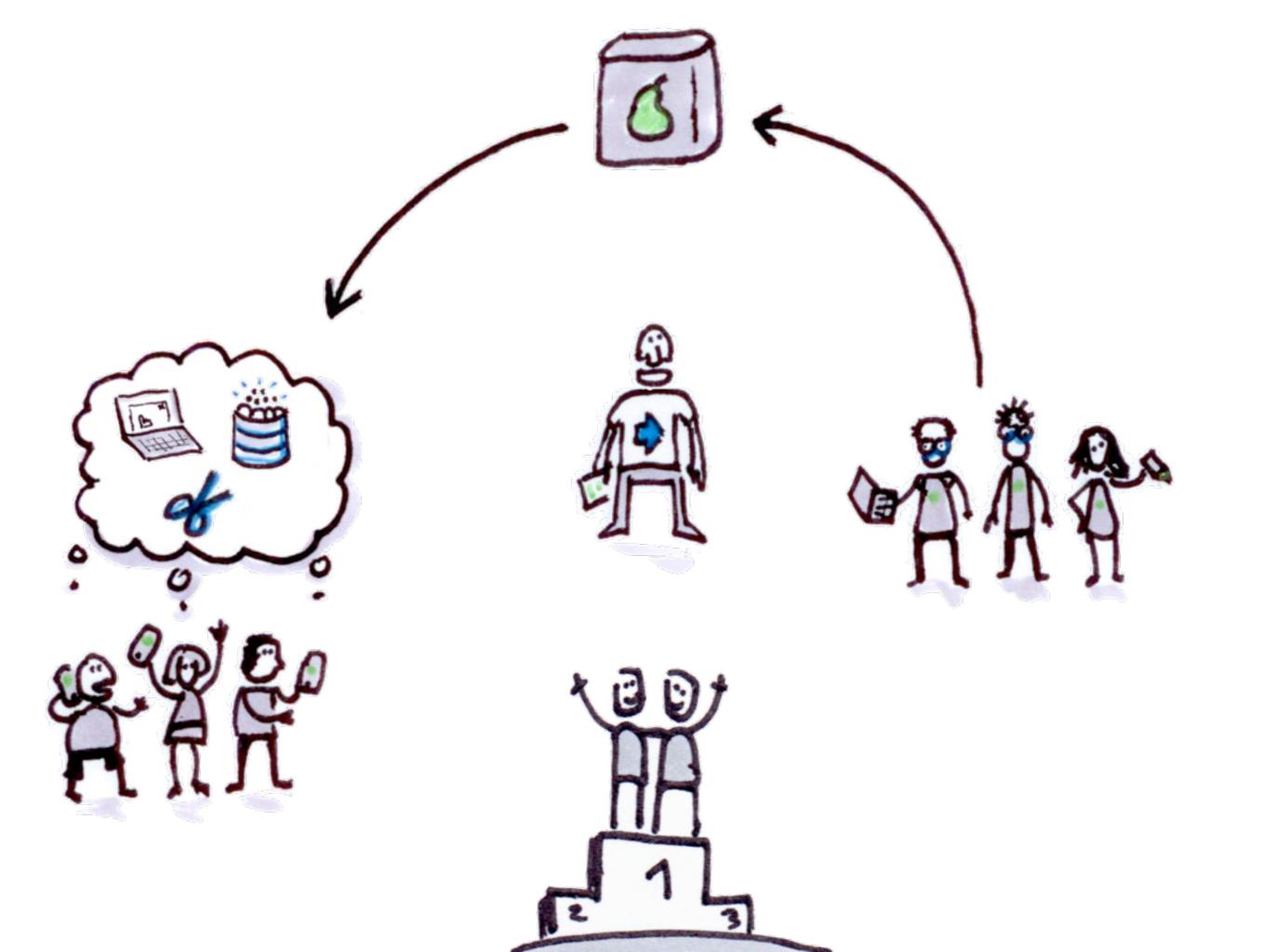


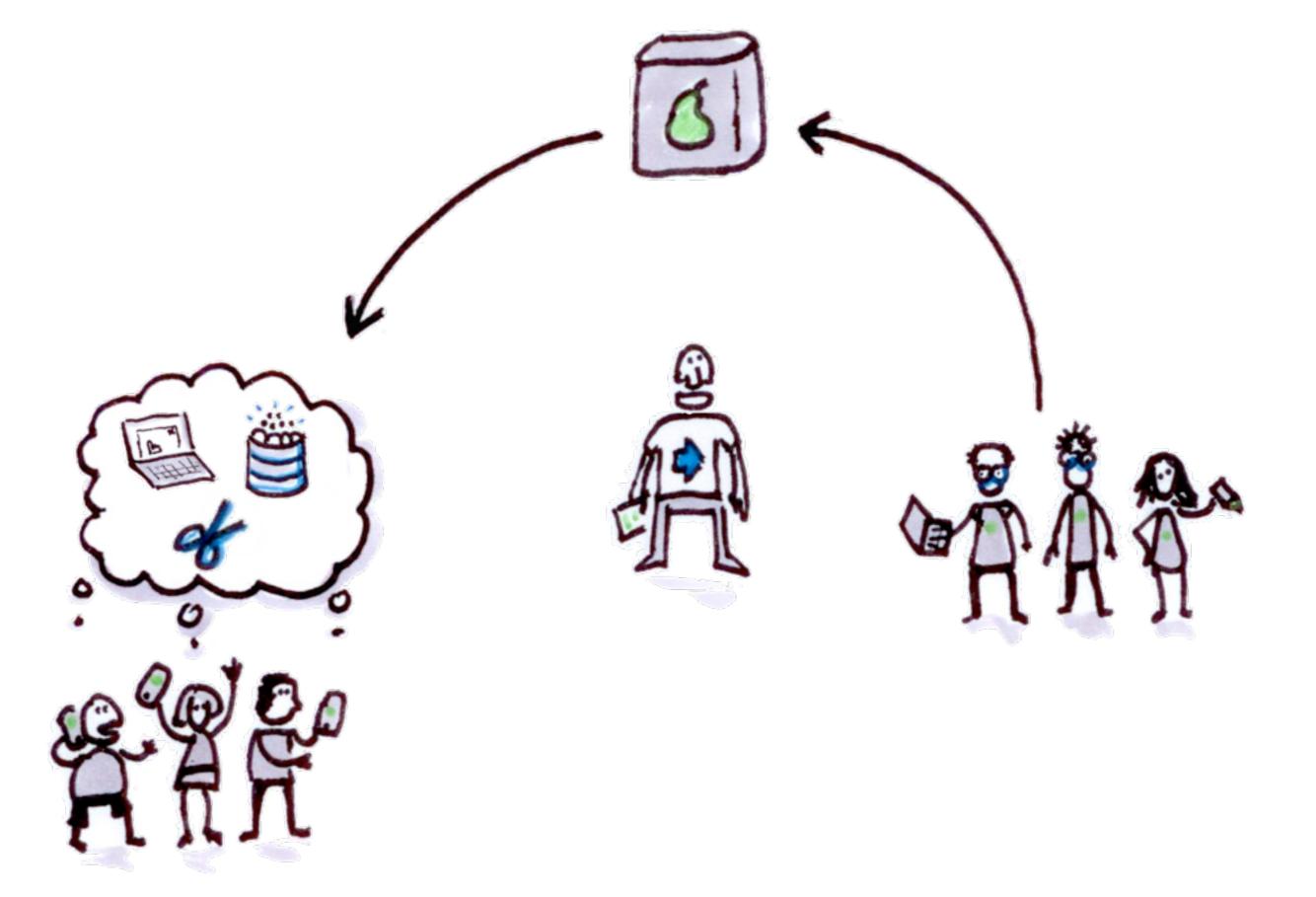


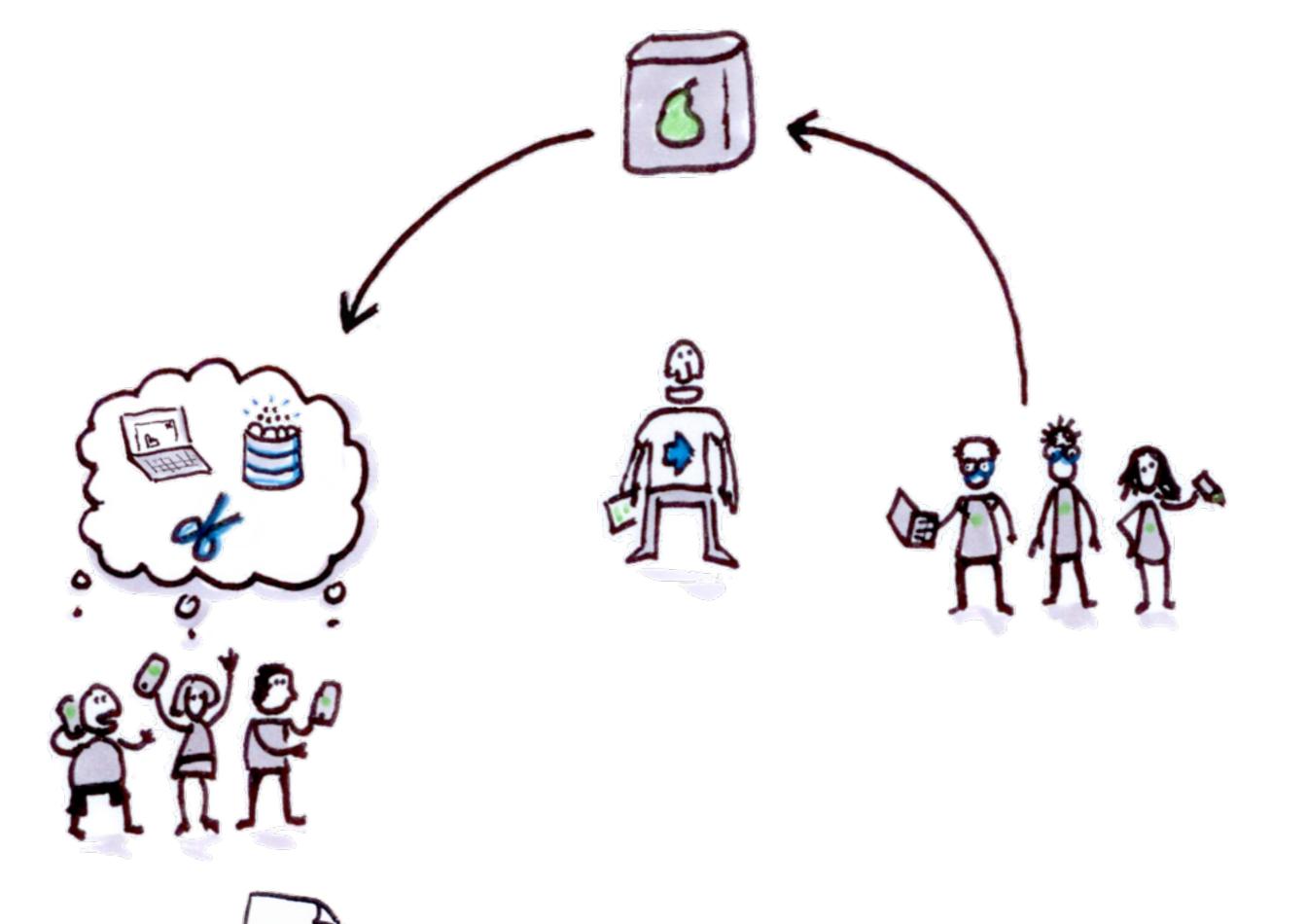


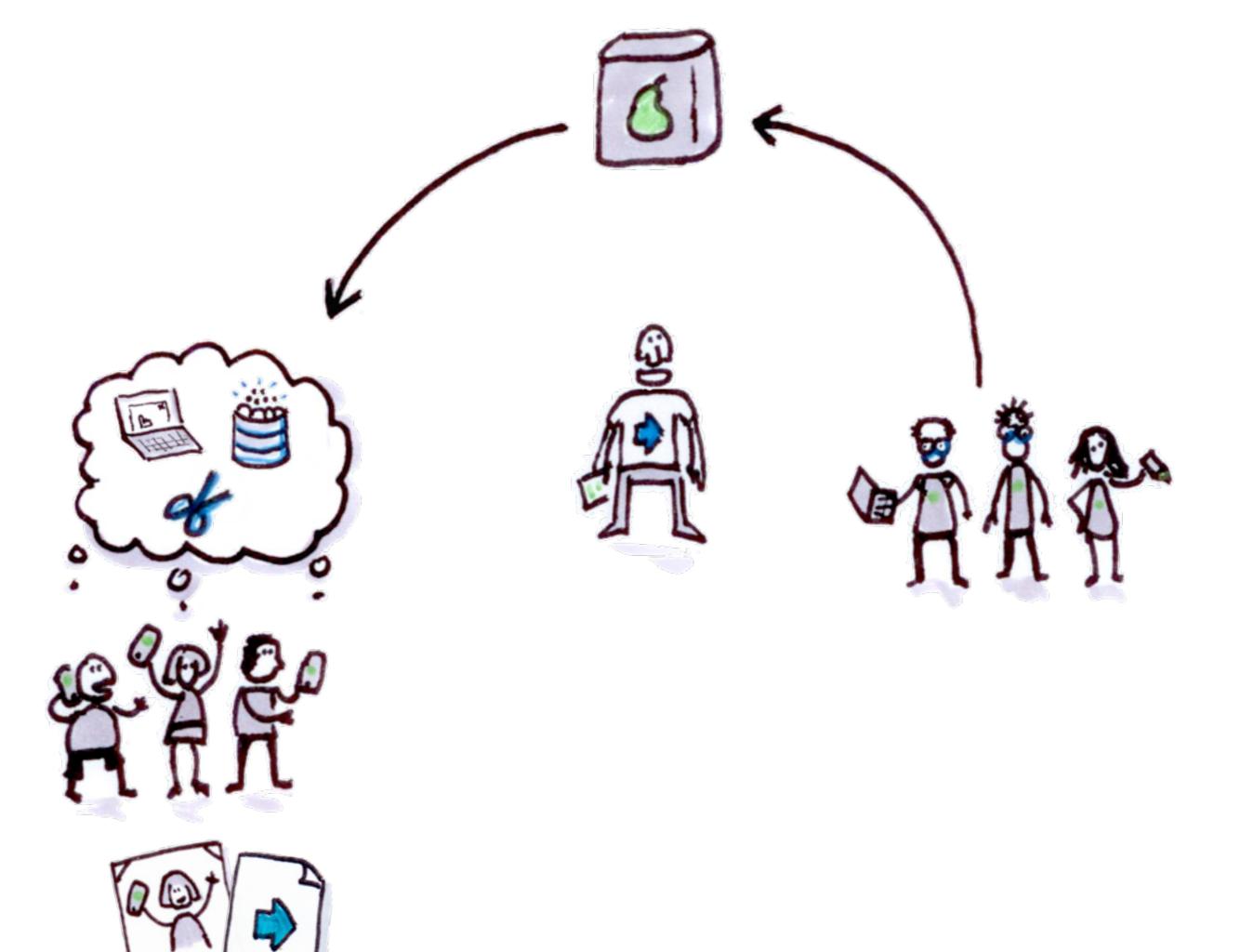


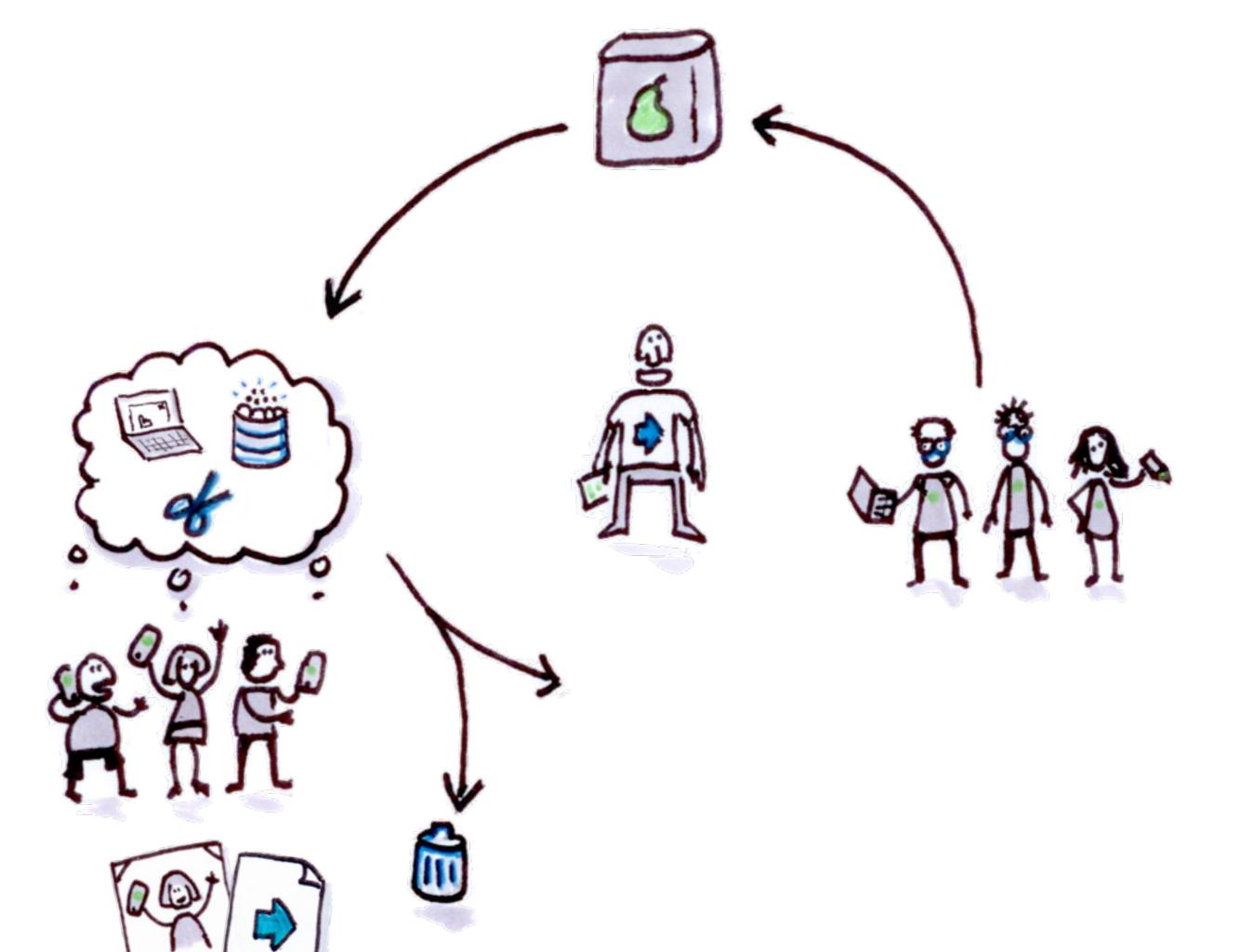


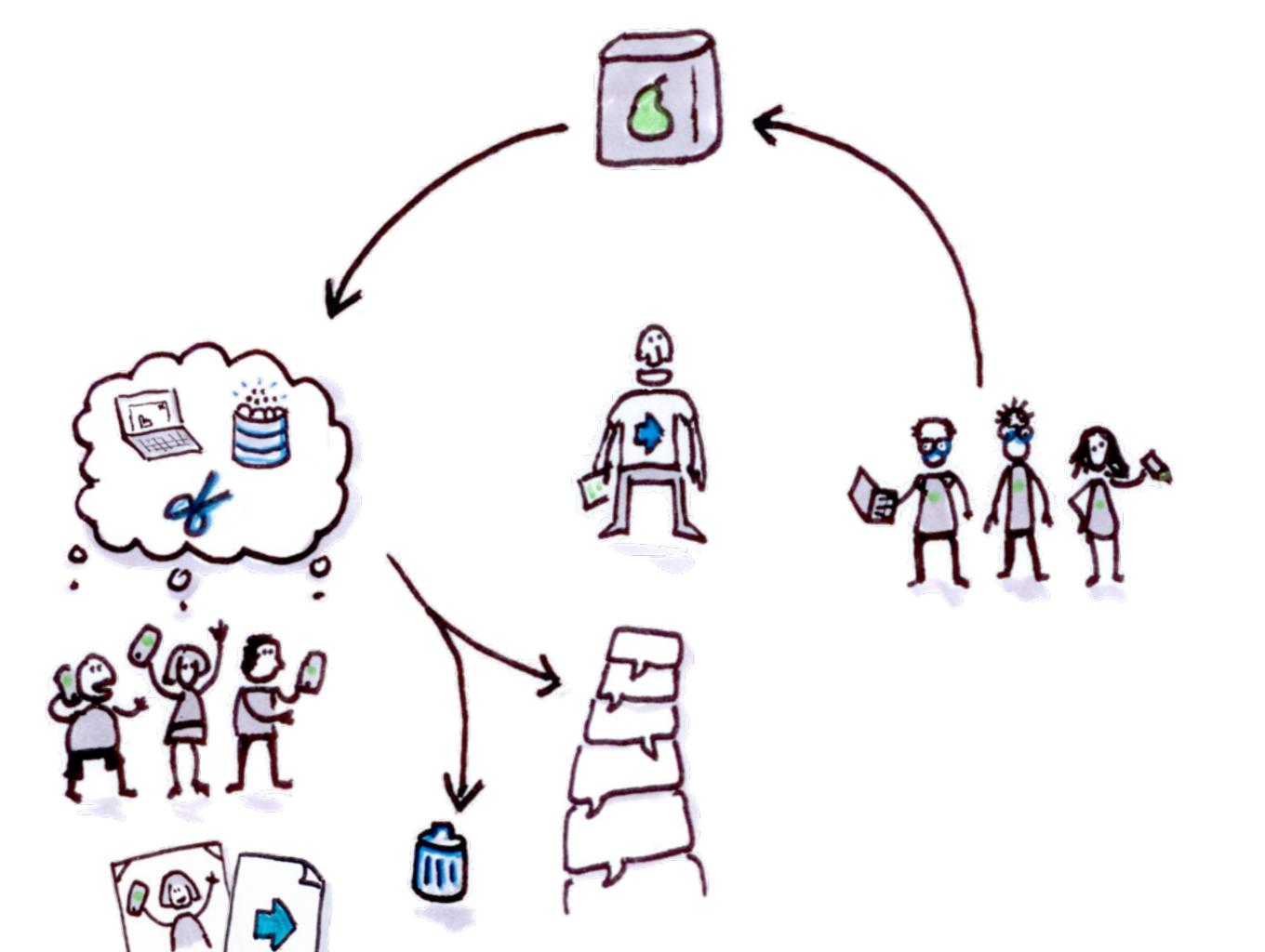


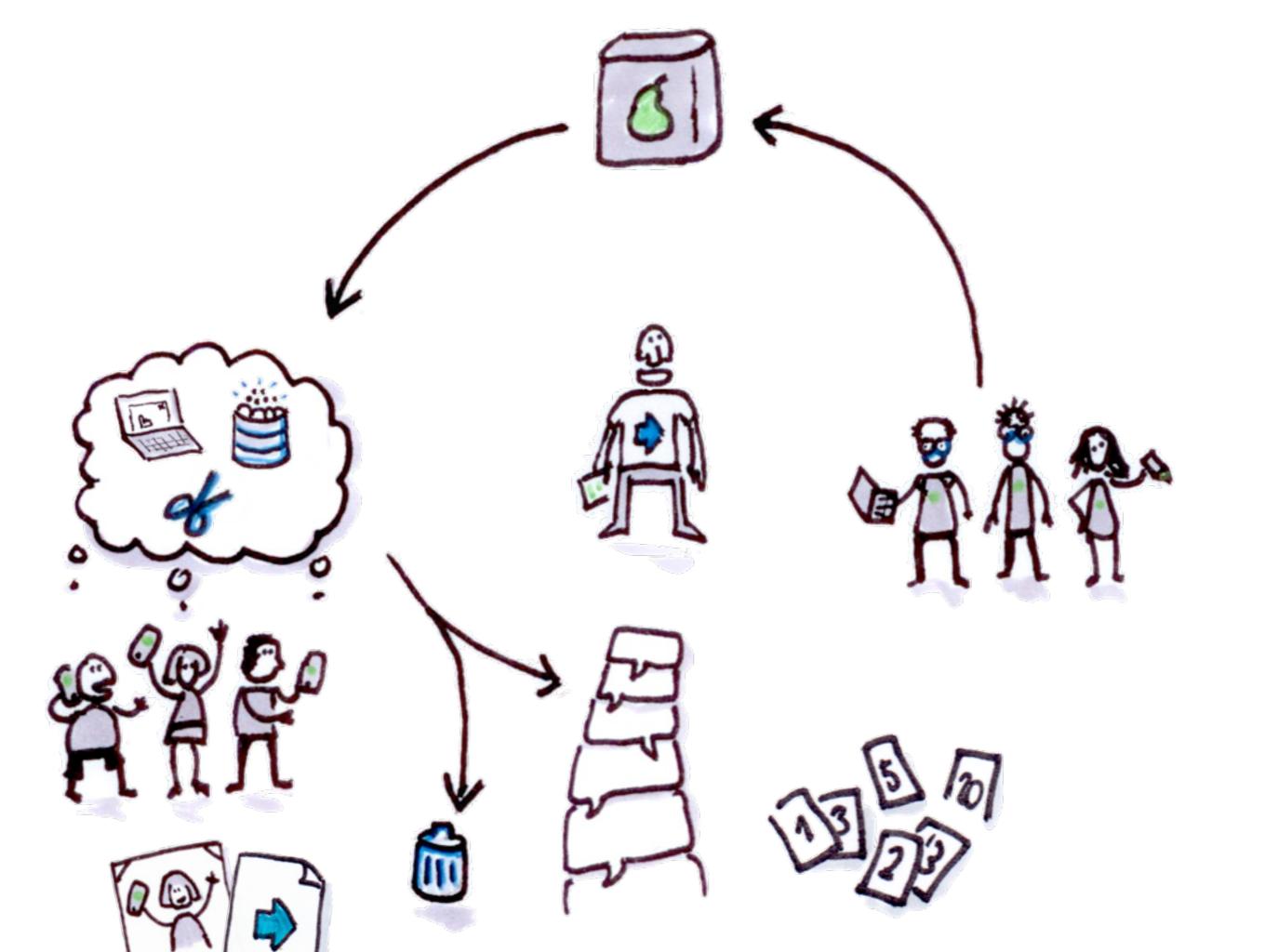


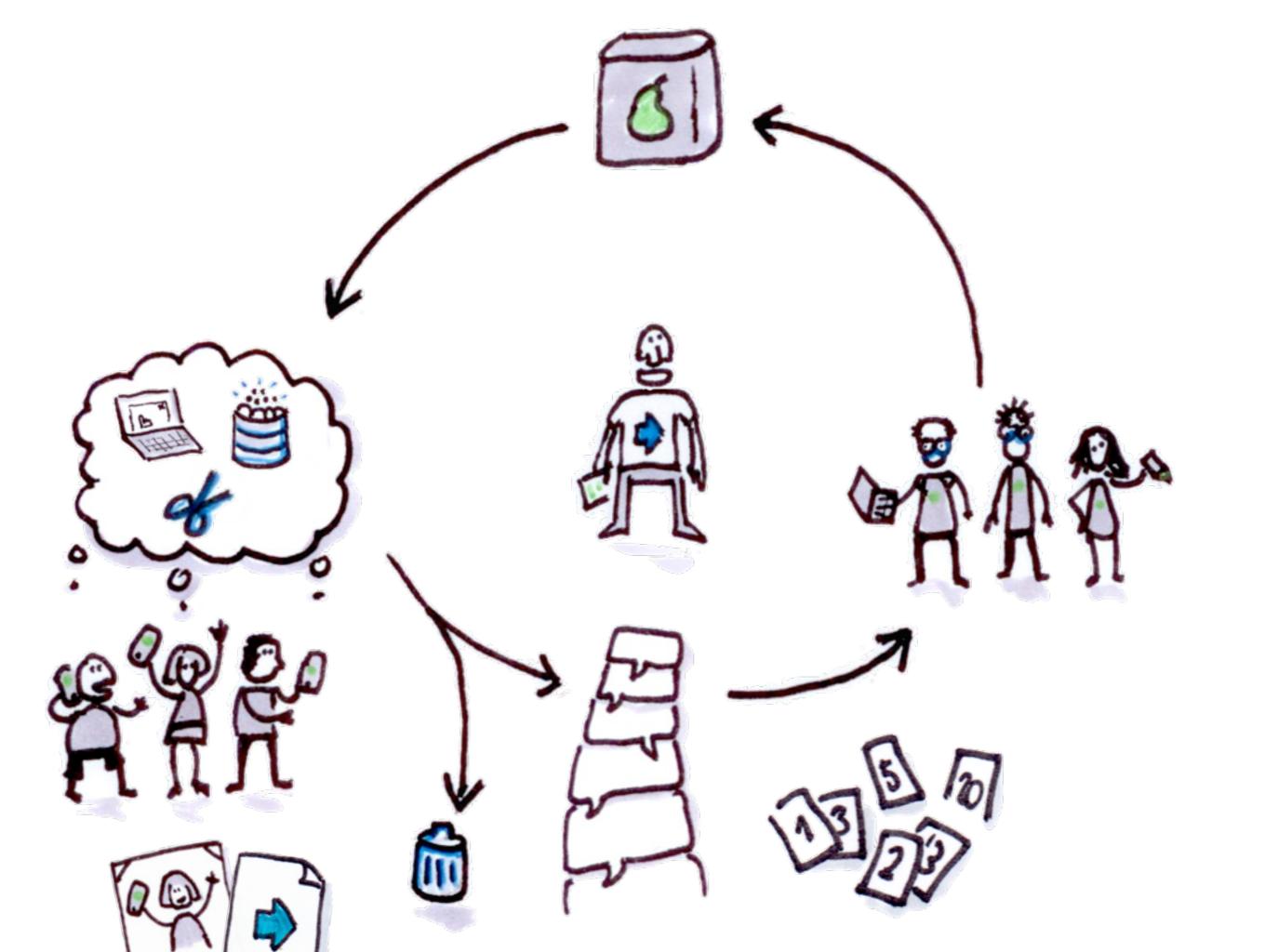


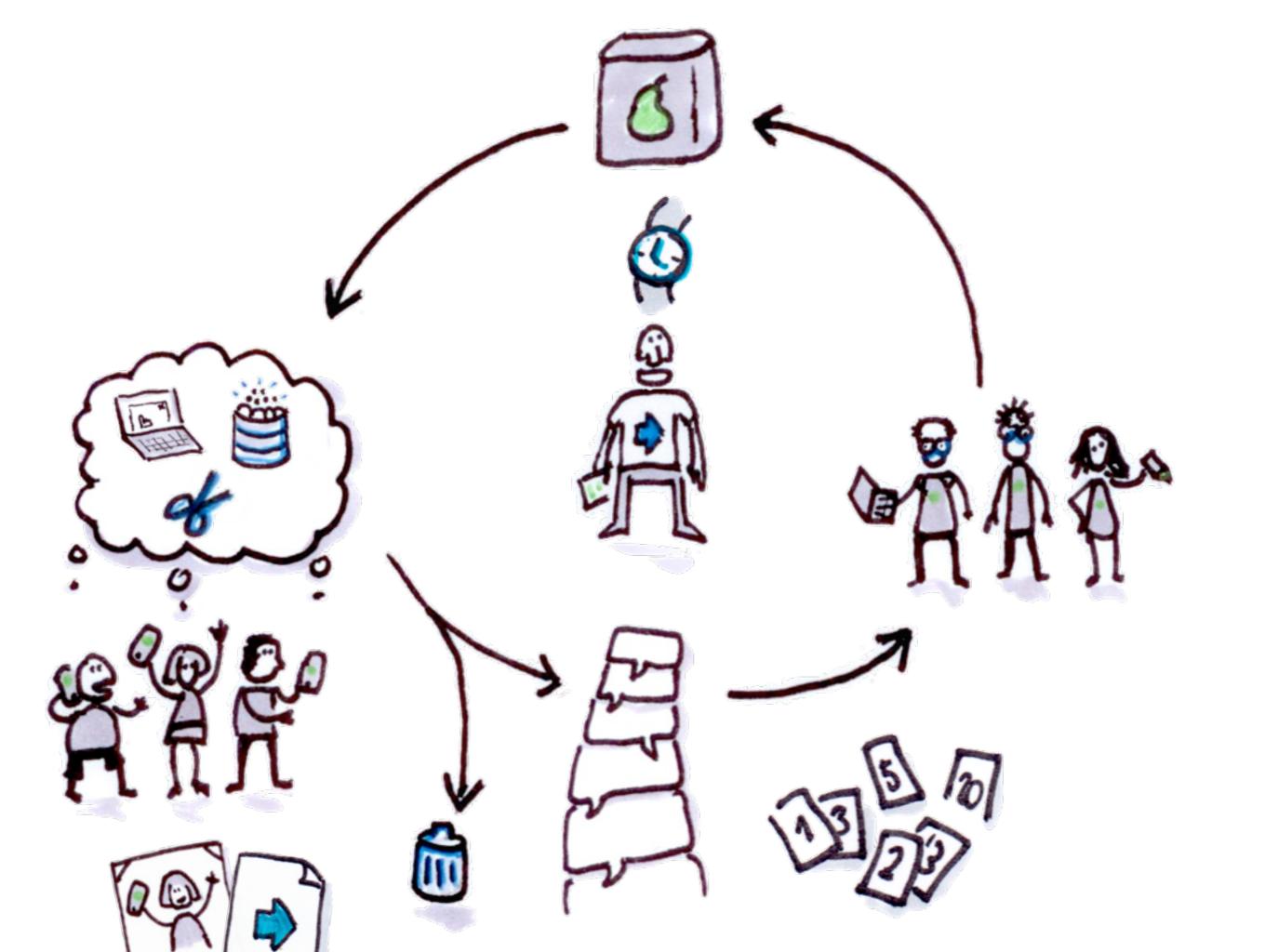


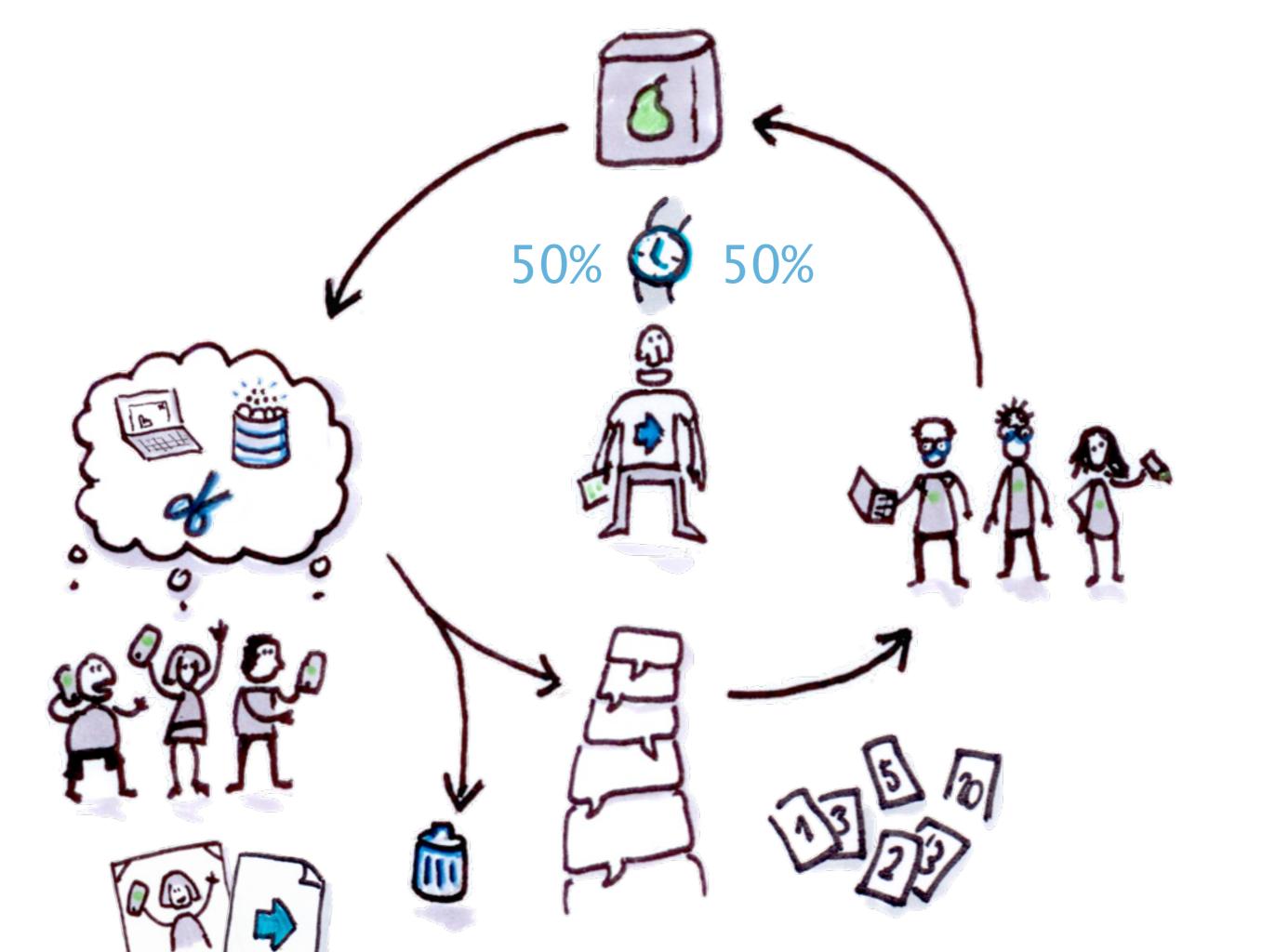


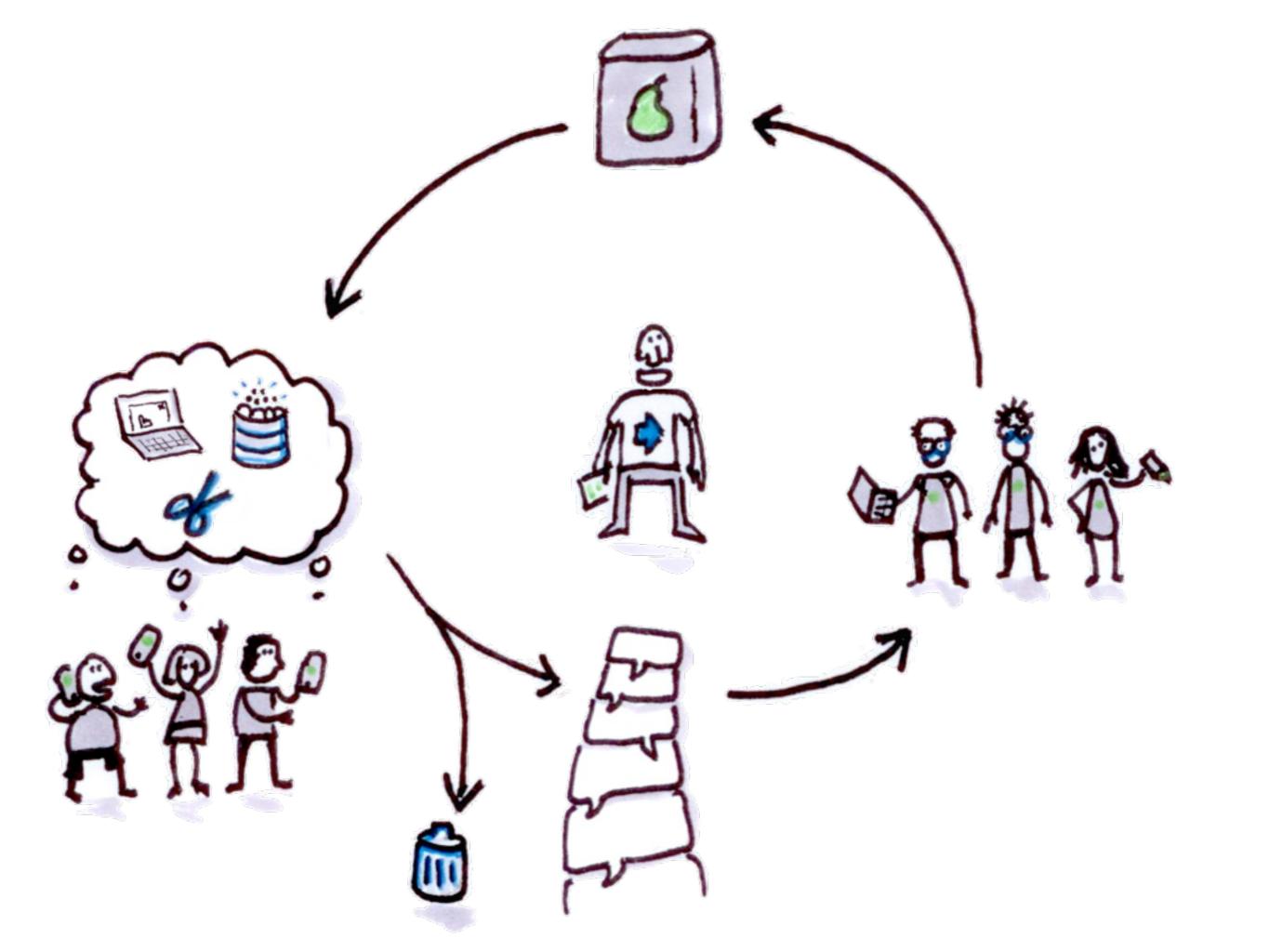


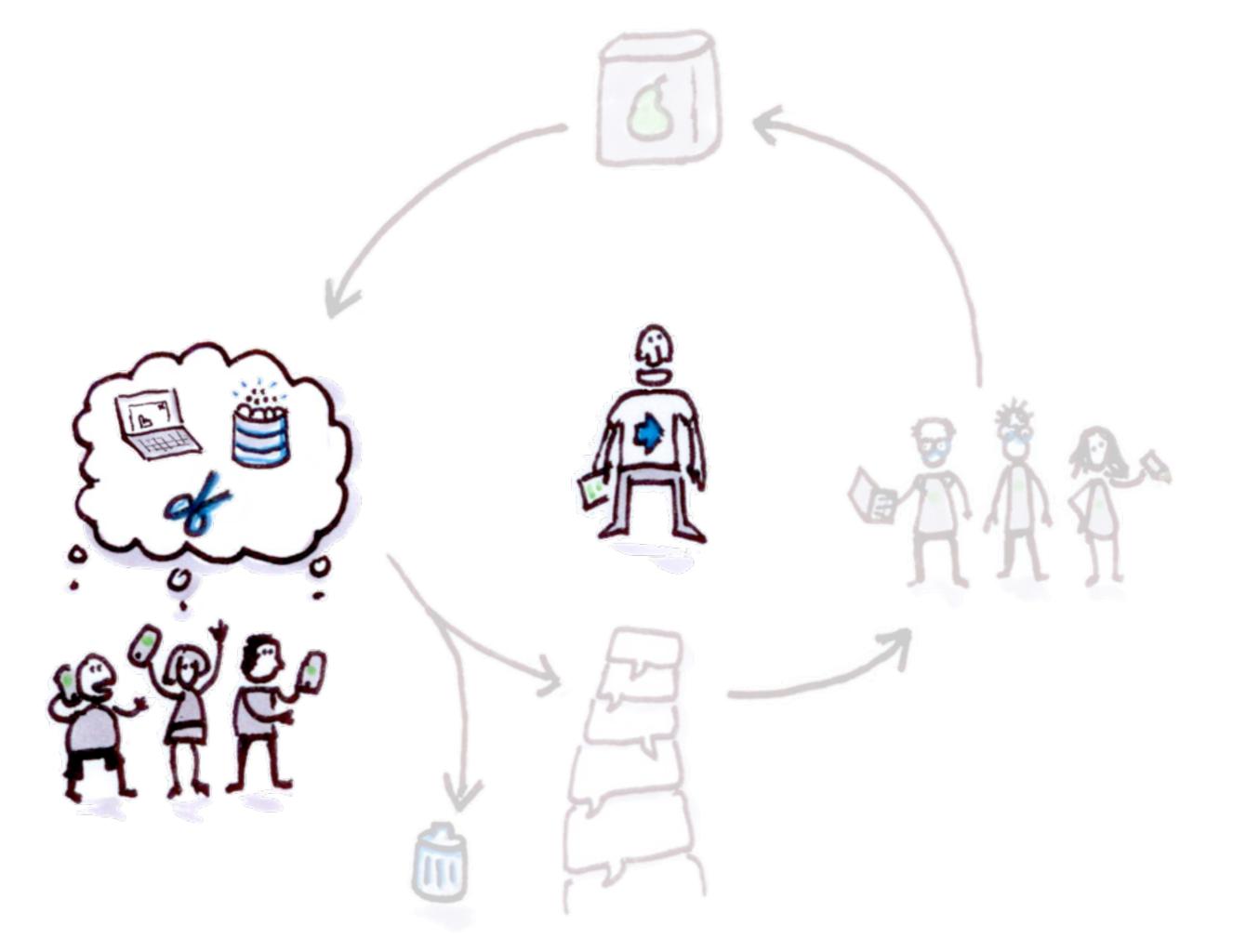


















Customers



Users



Stakeholders

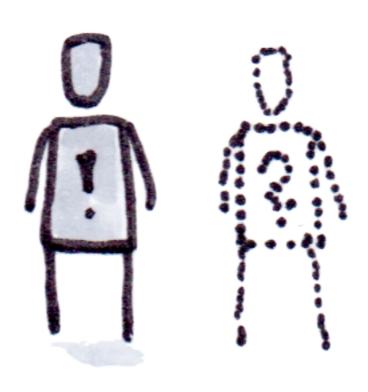


Customers



Users

































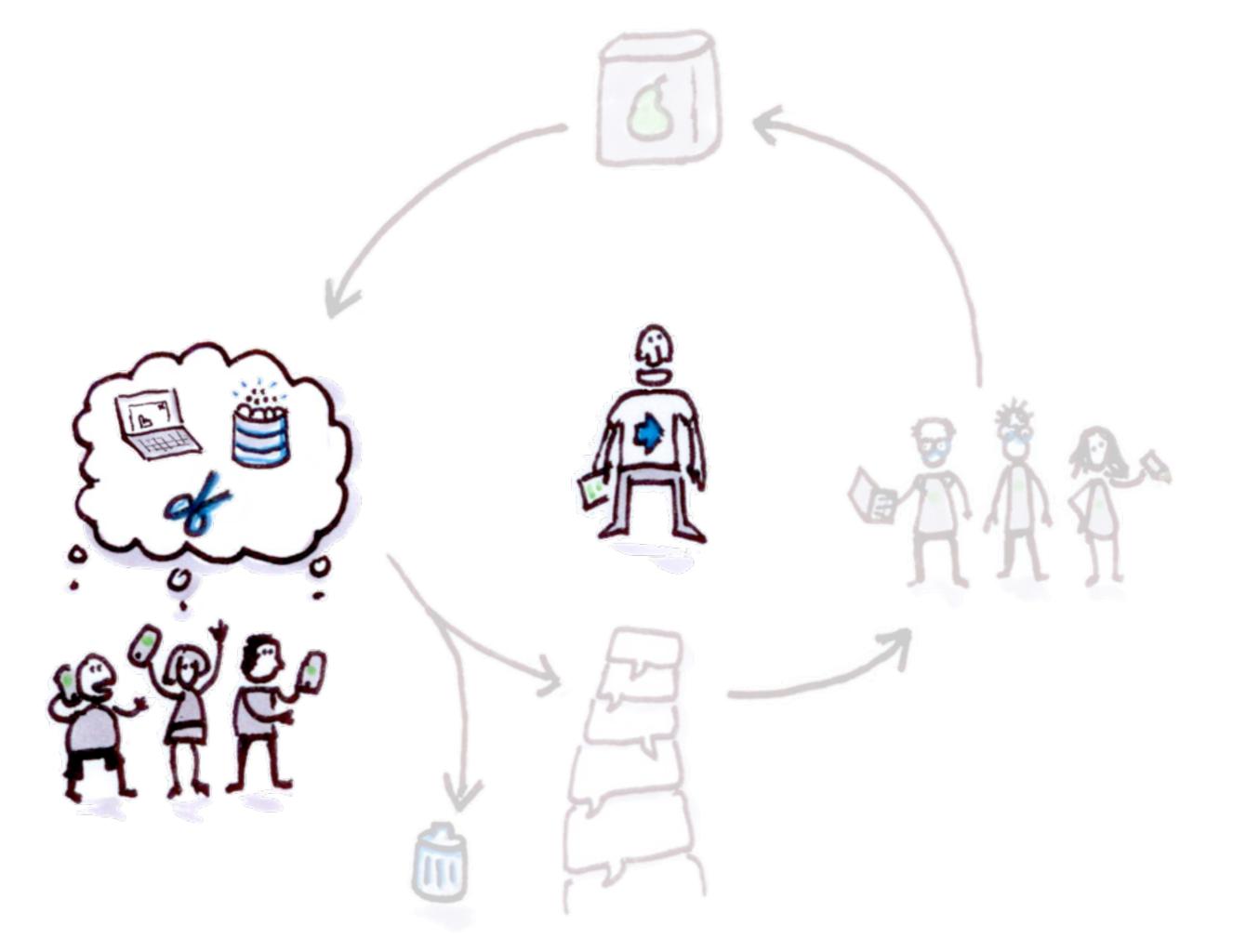


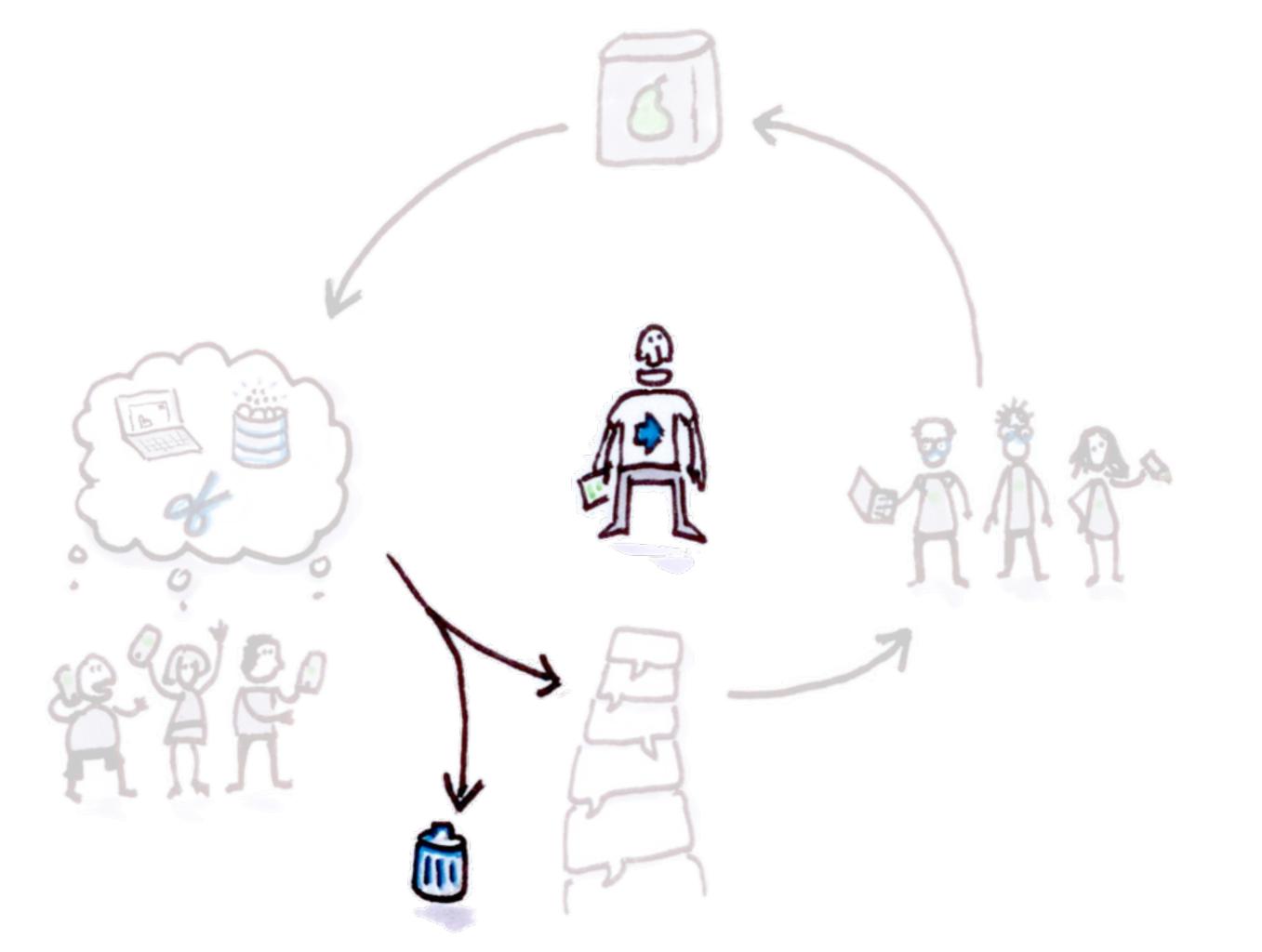


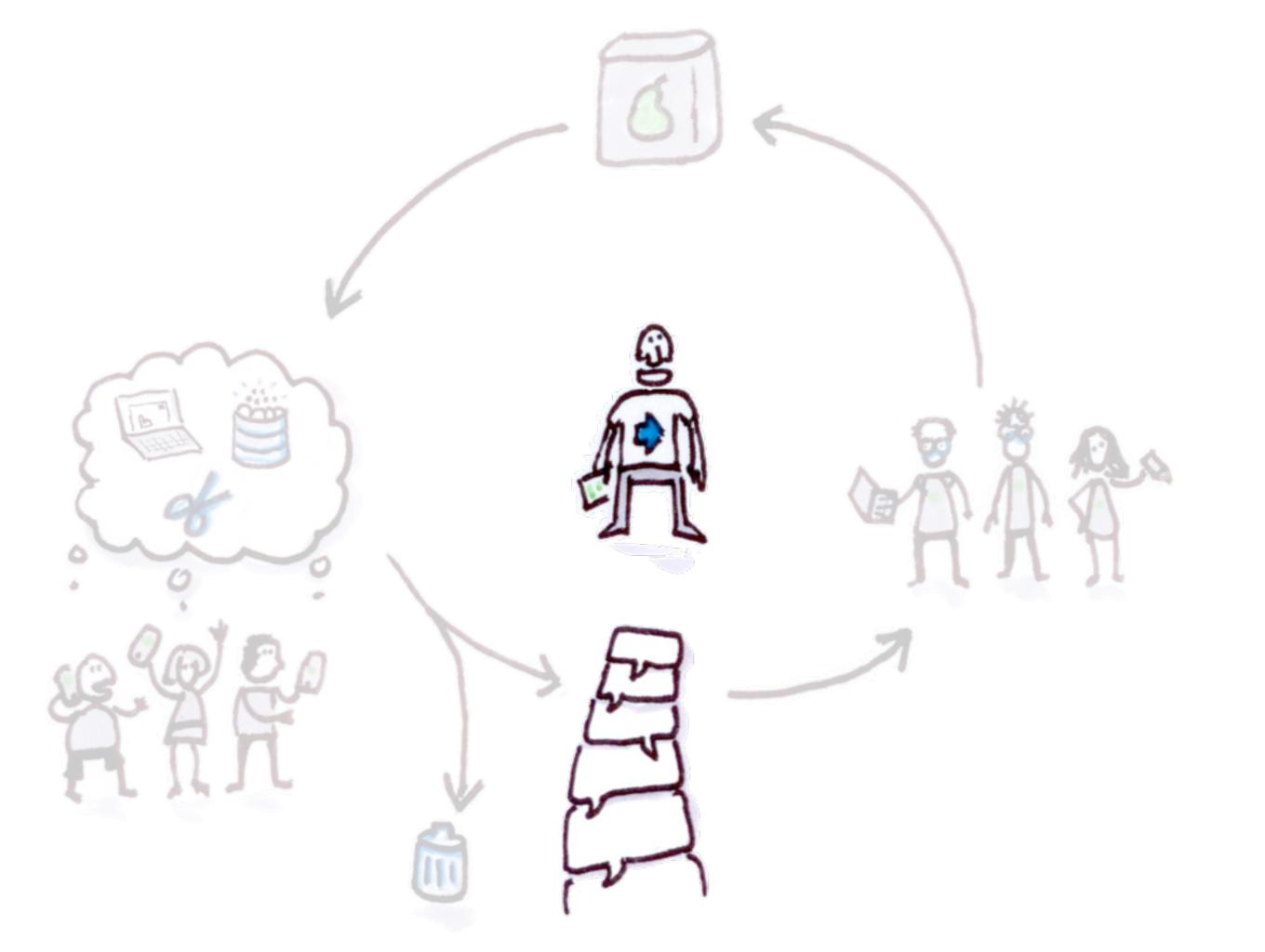


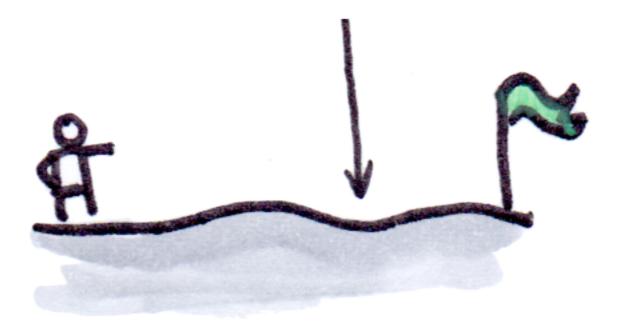


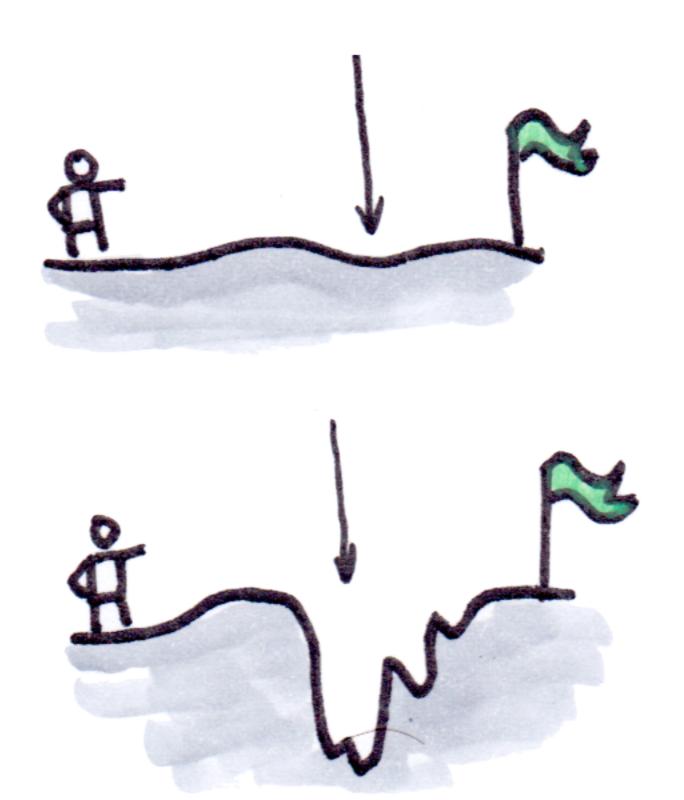




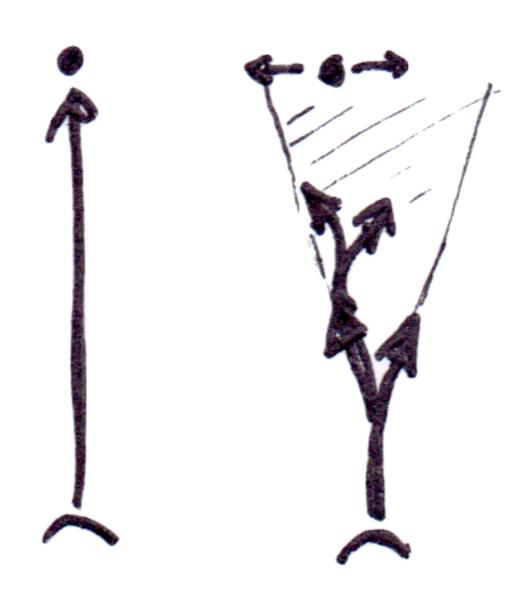


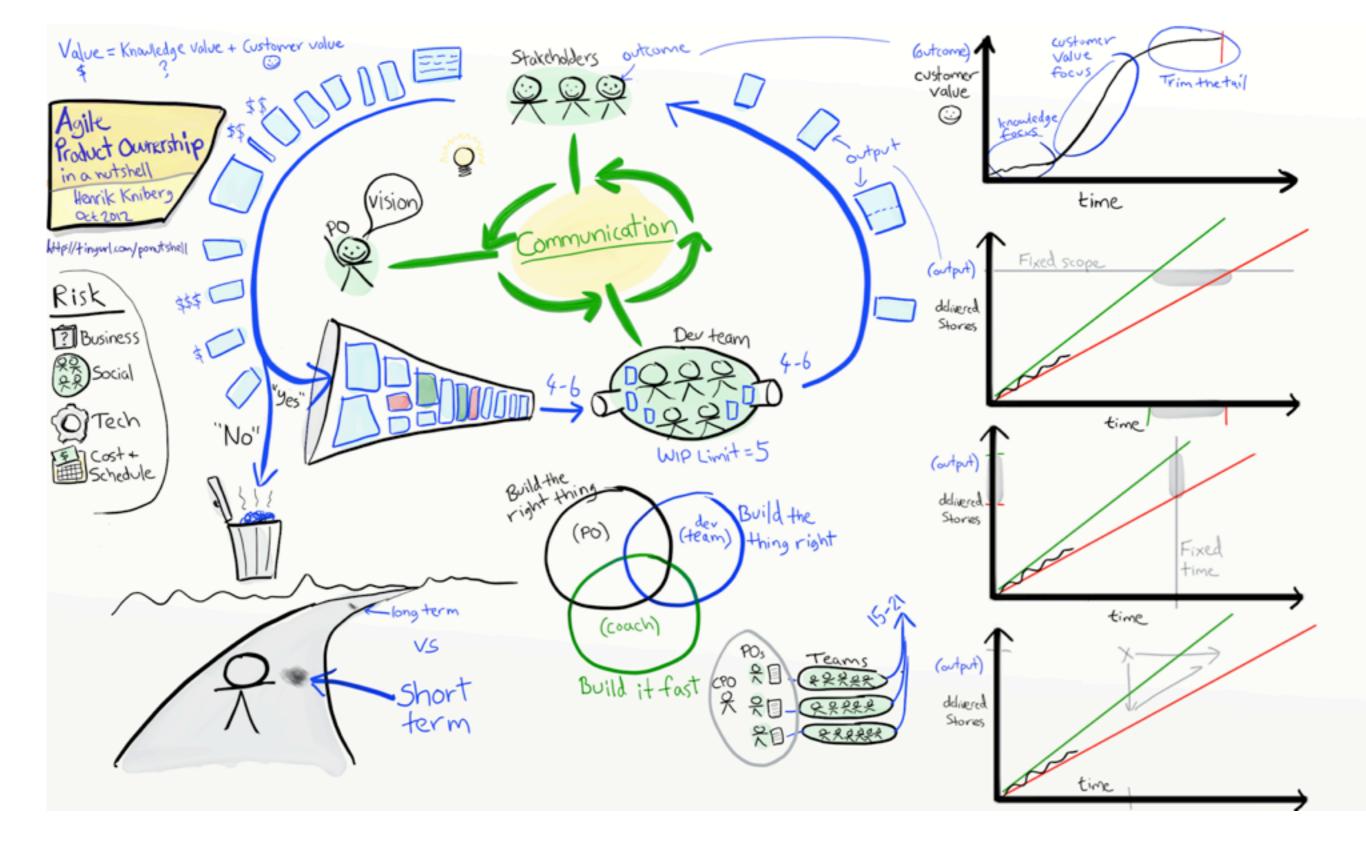




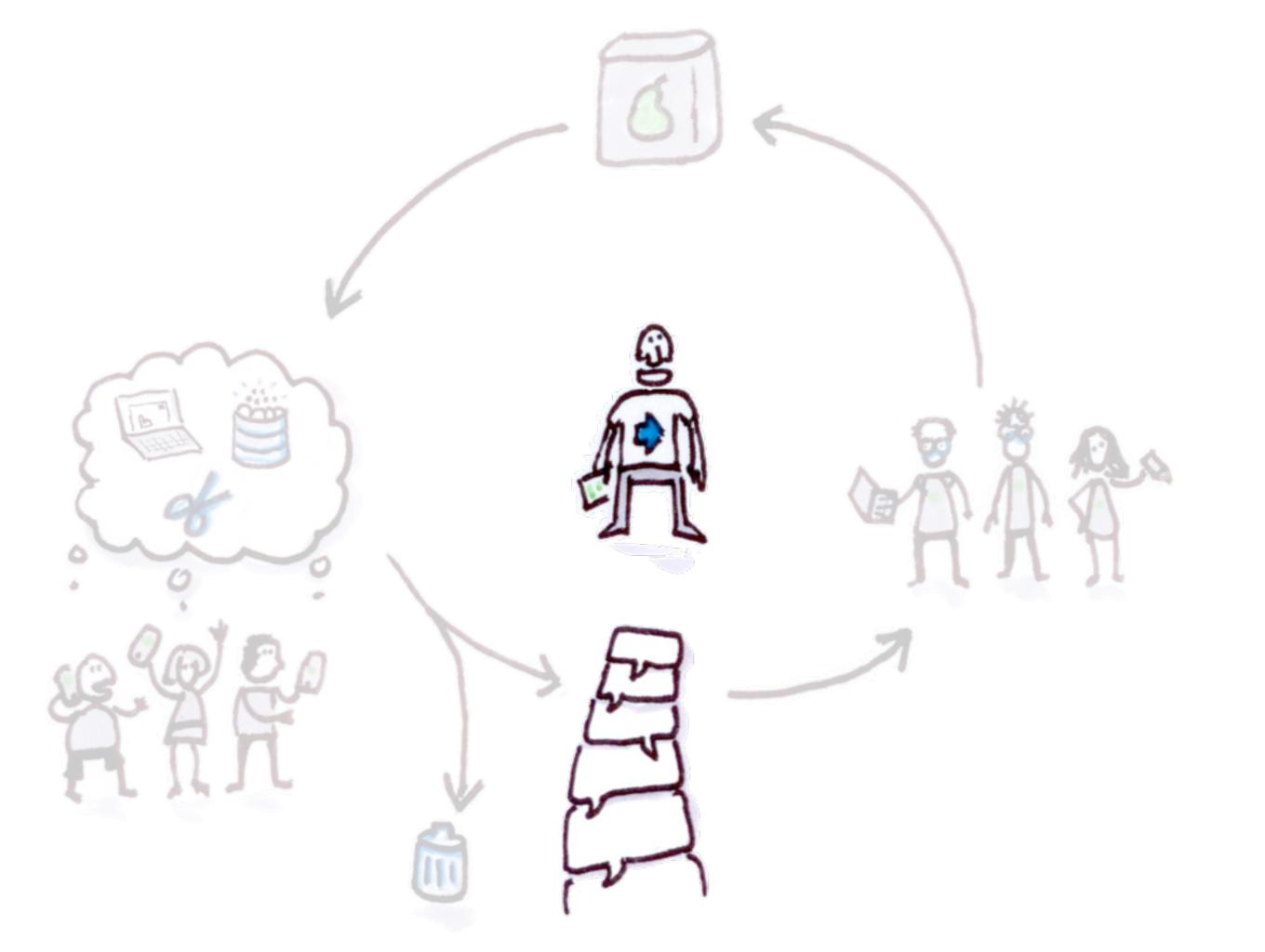


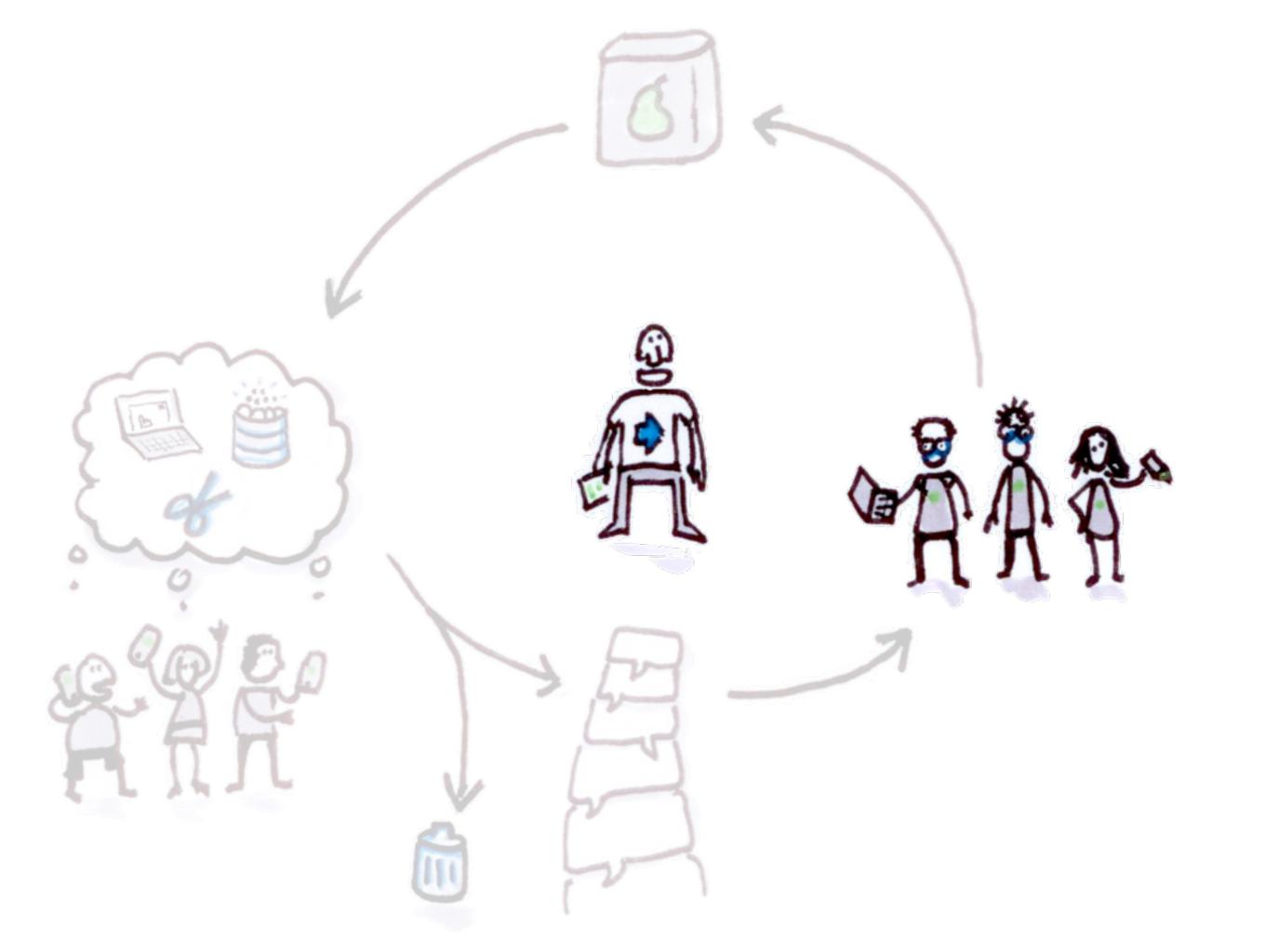
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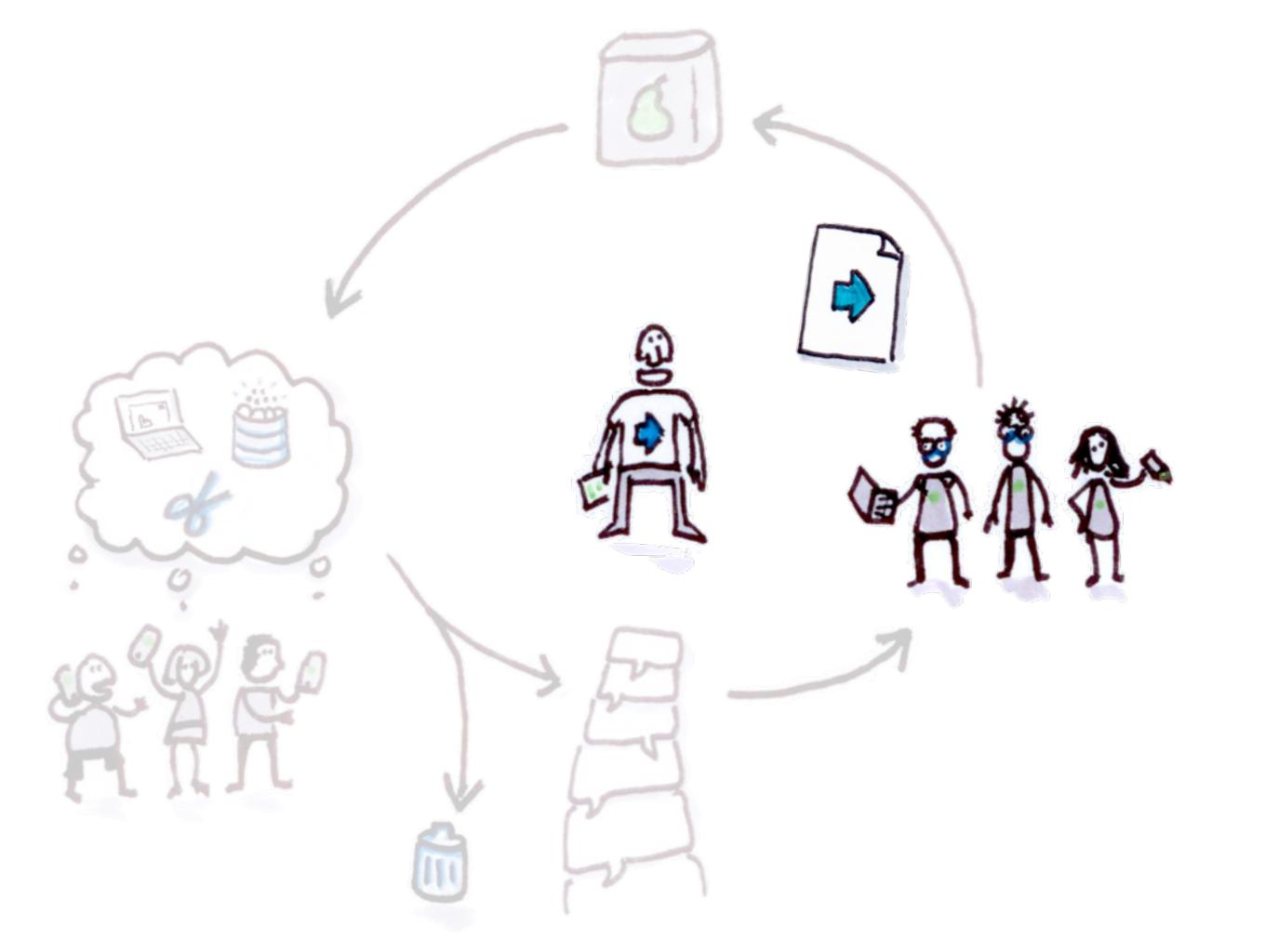


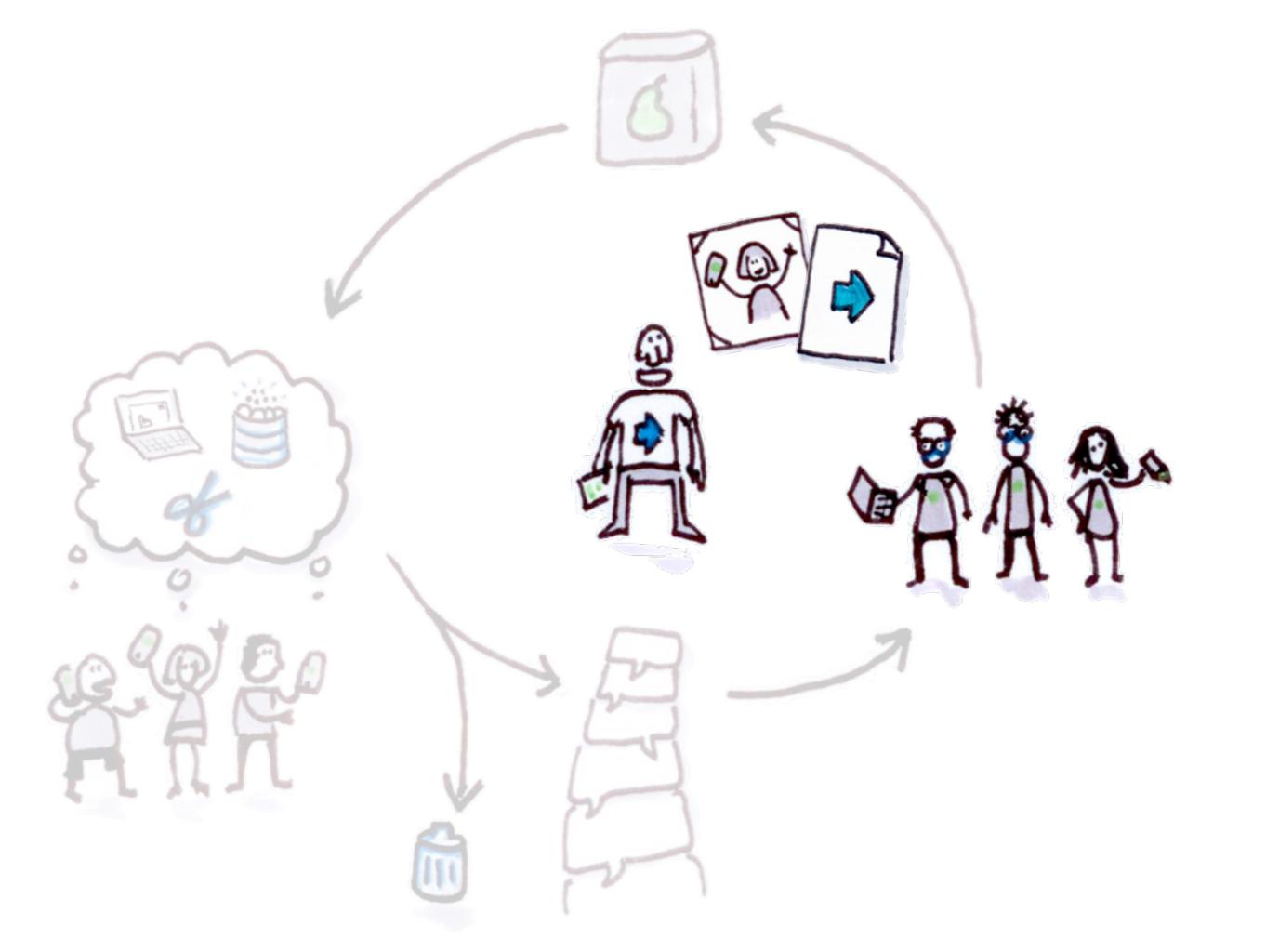


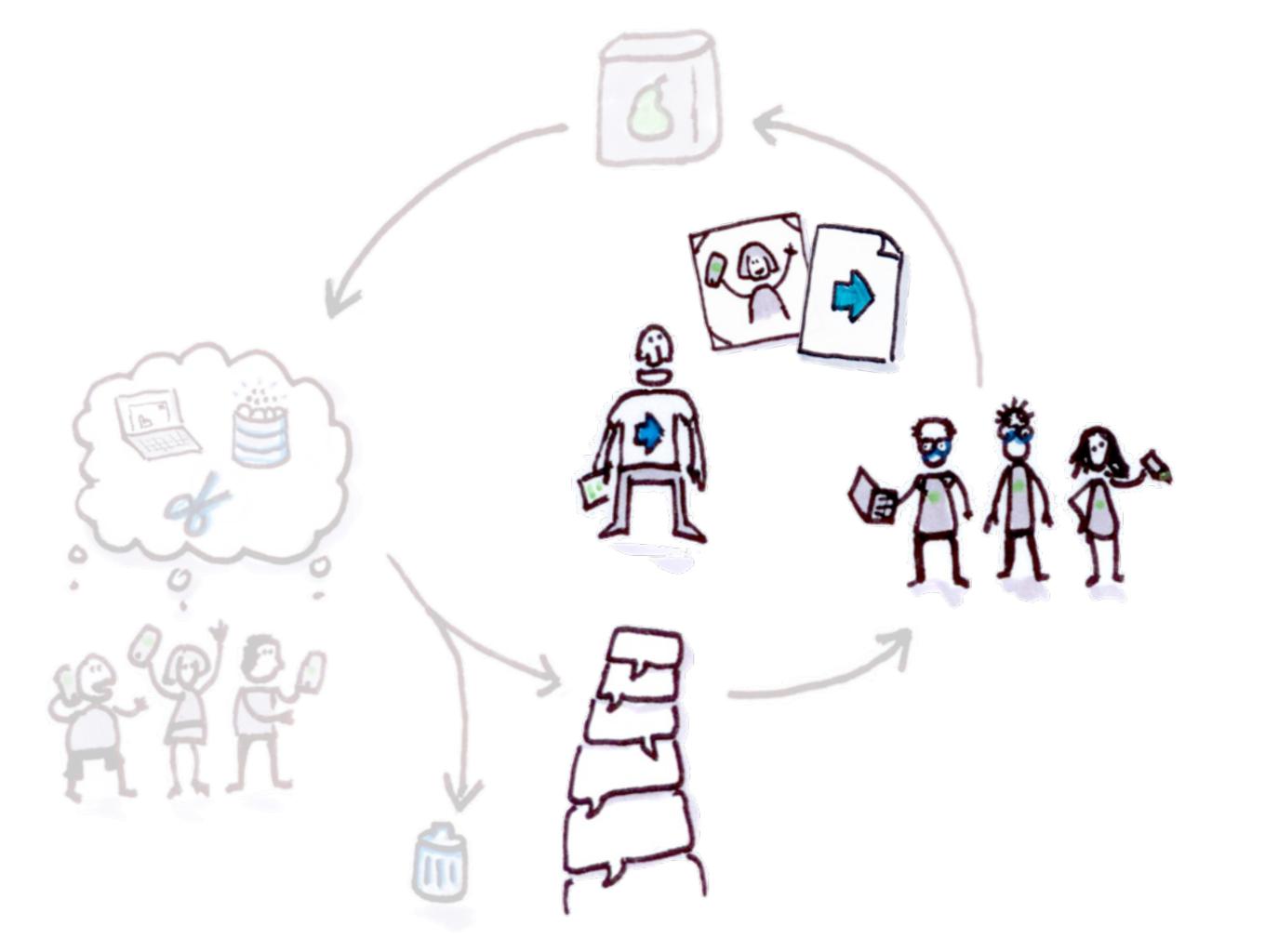
Product Ownership in a Nutshel

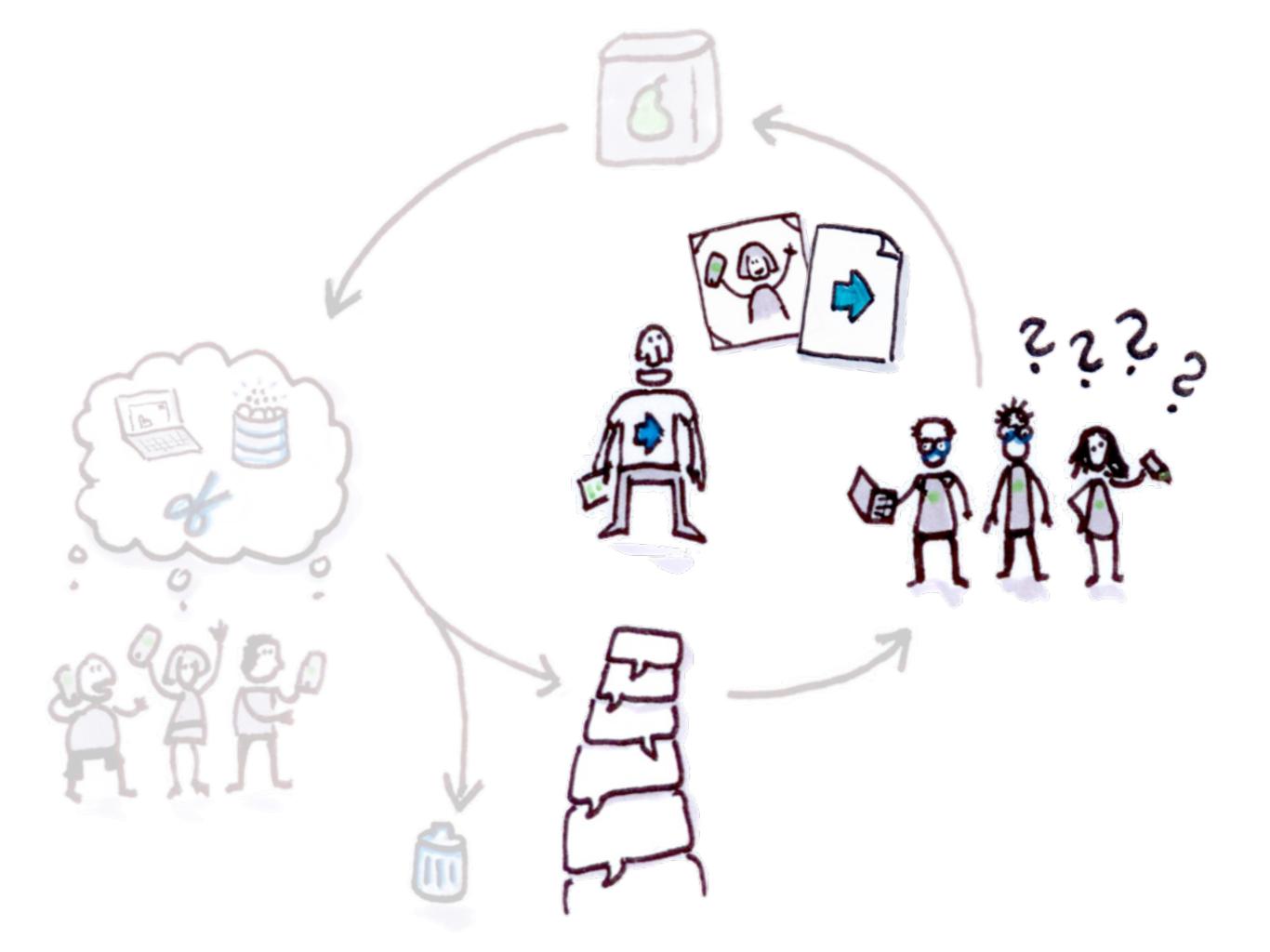


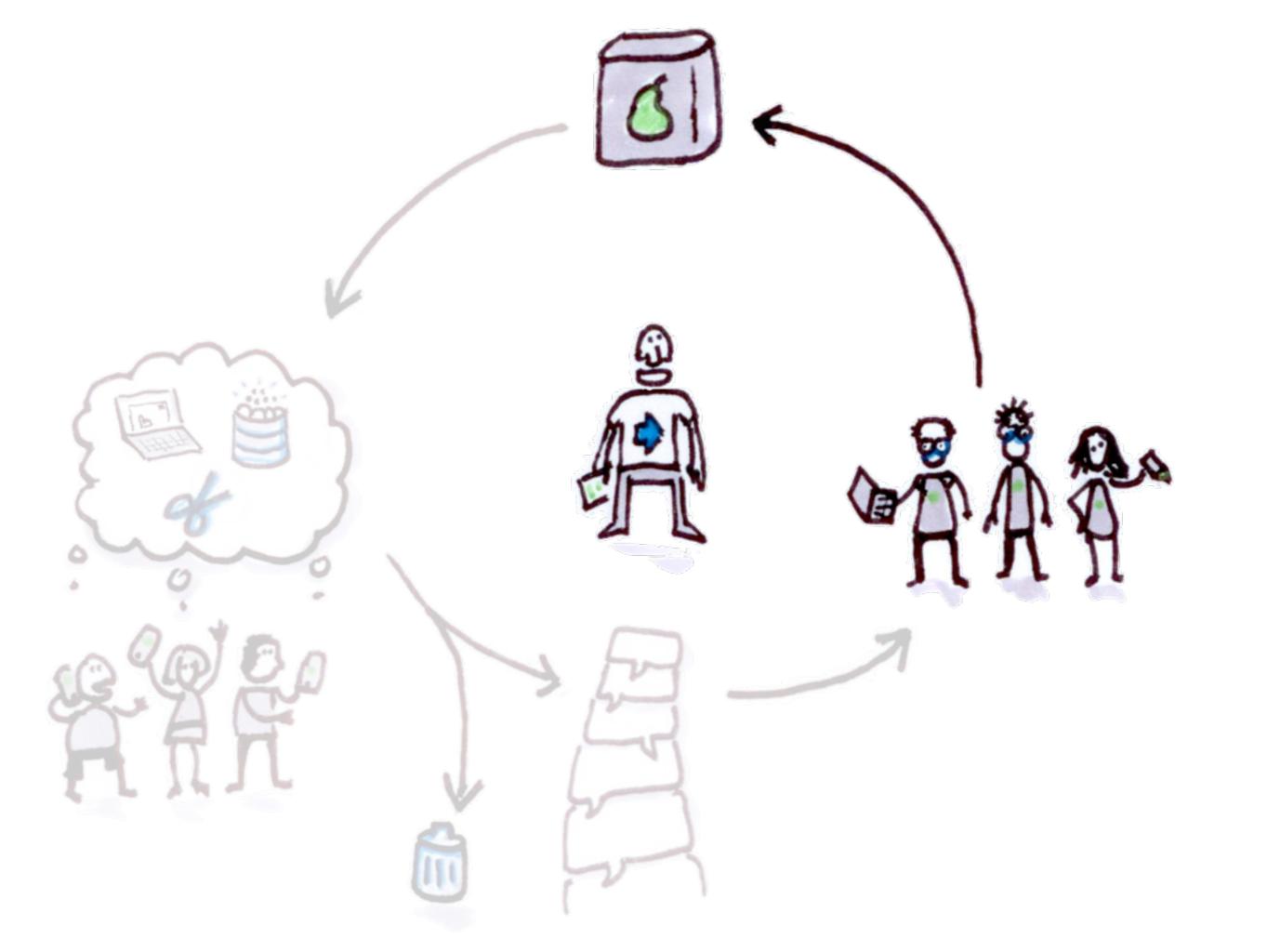




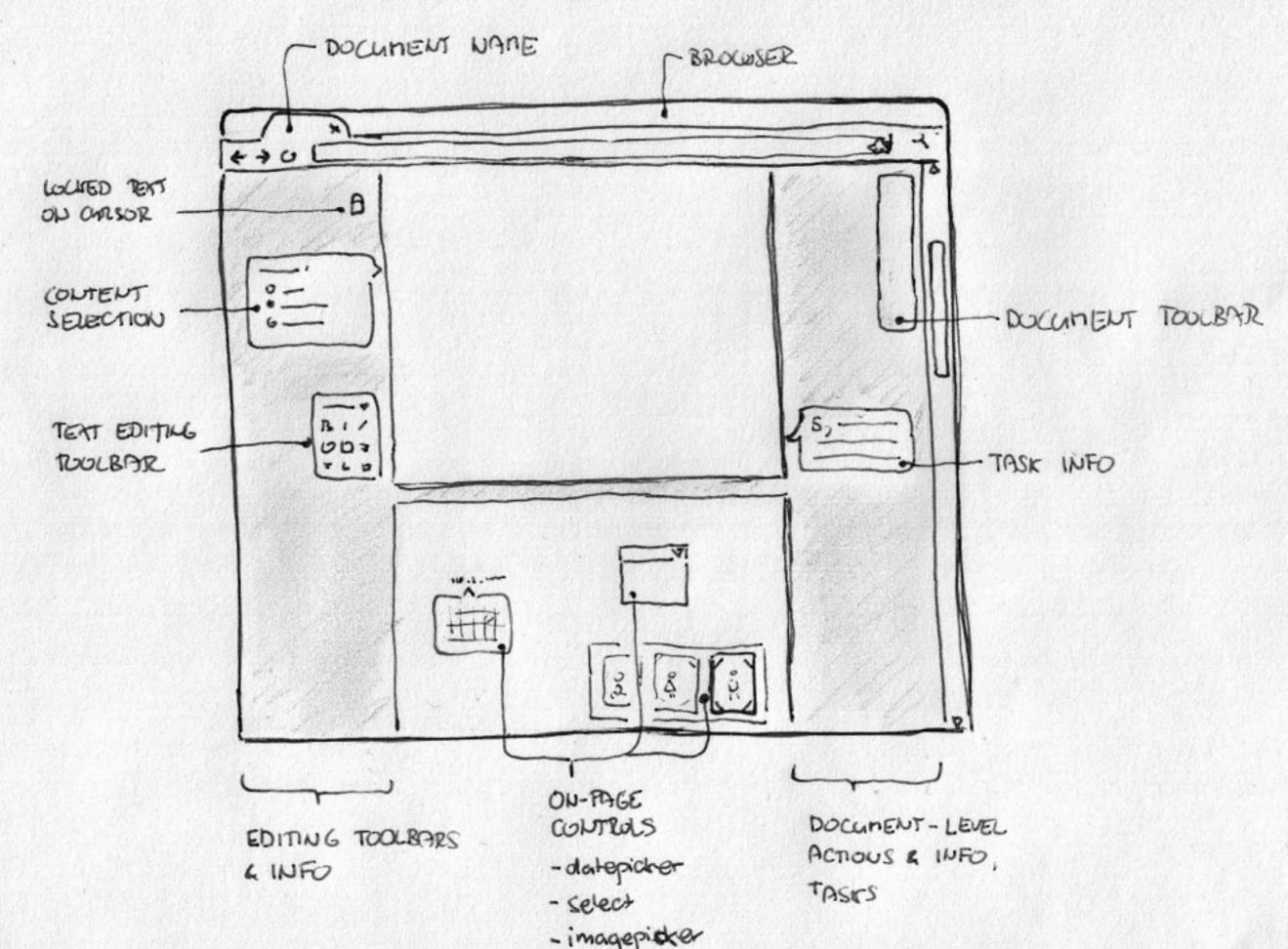


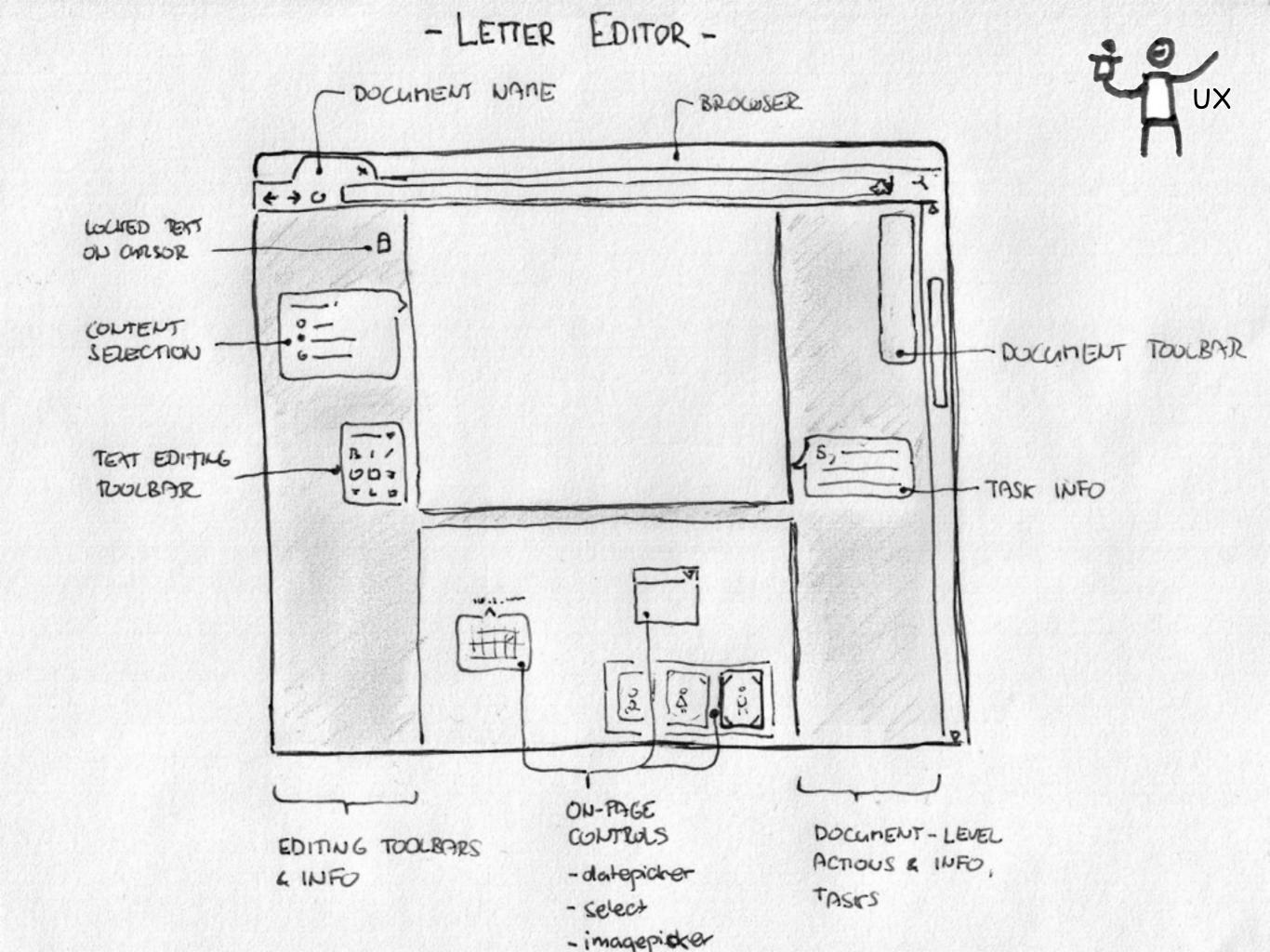






- LETTER EDITOR -

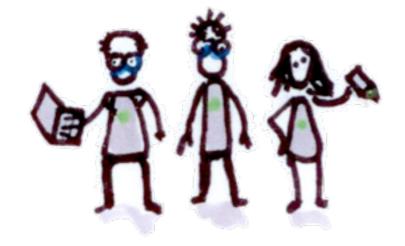


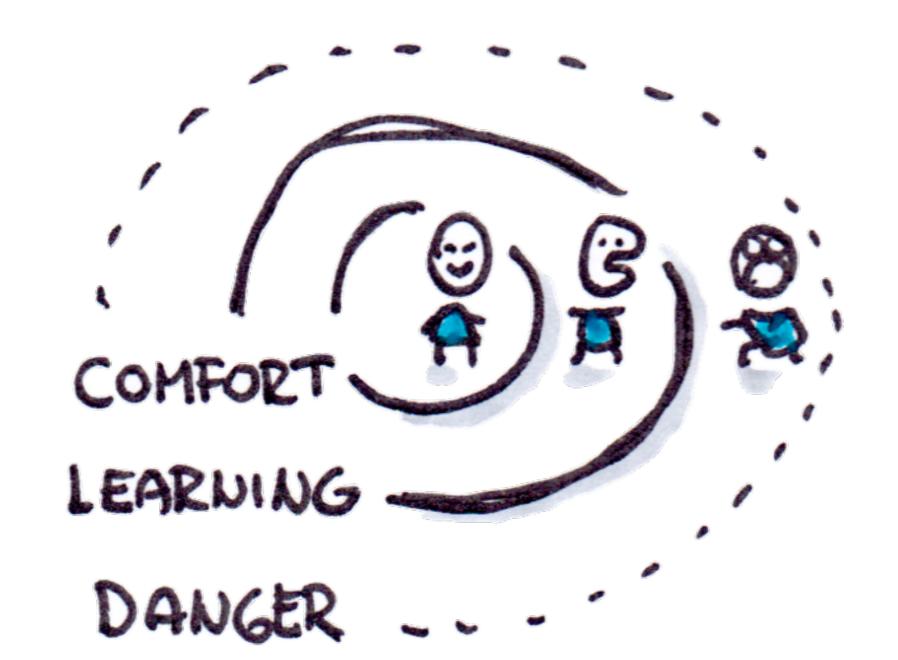


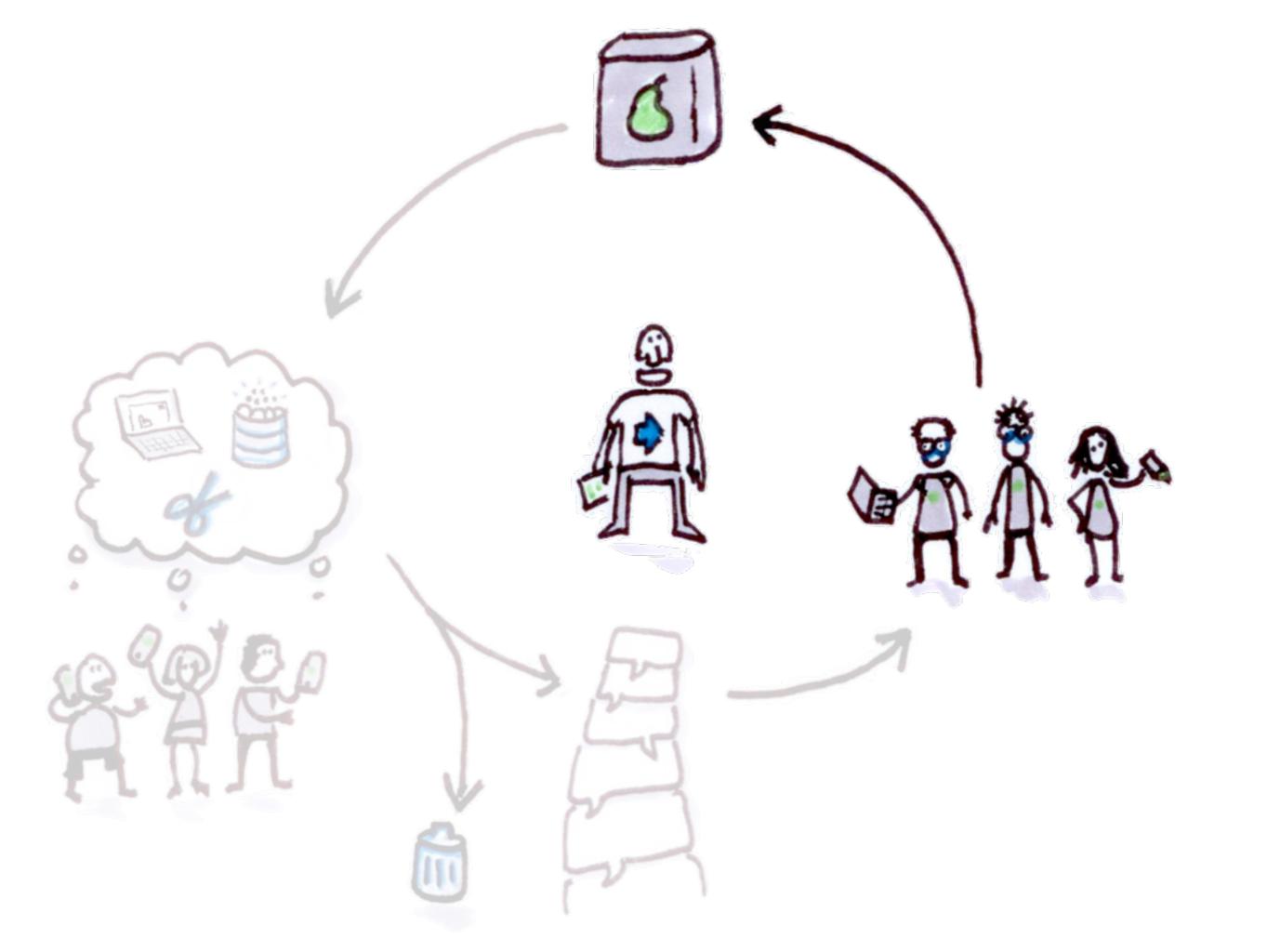


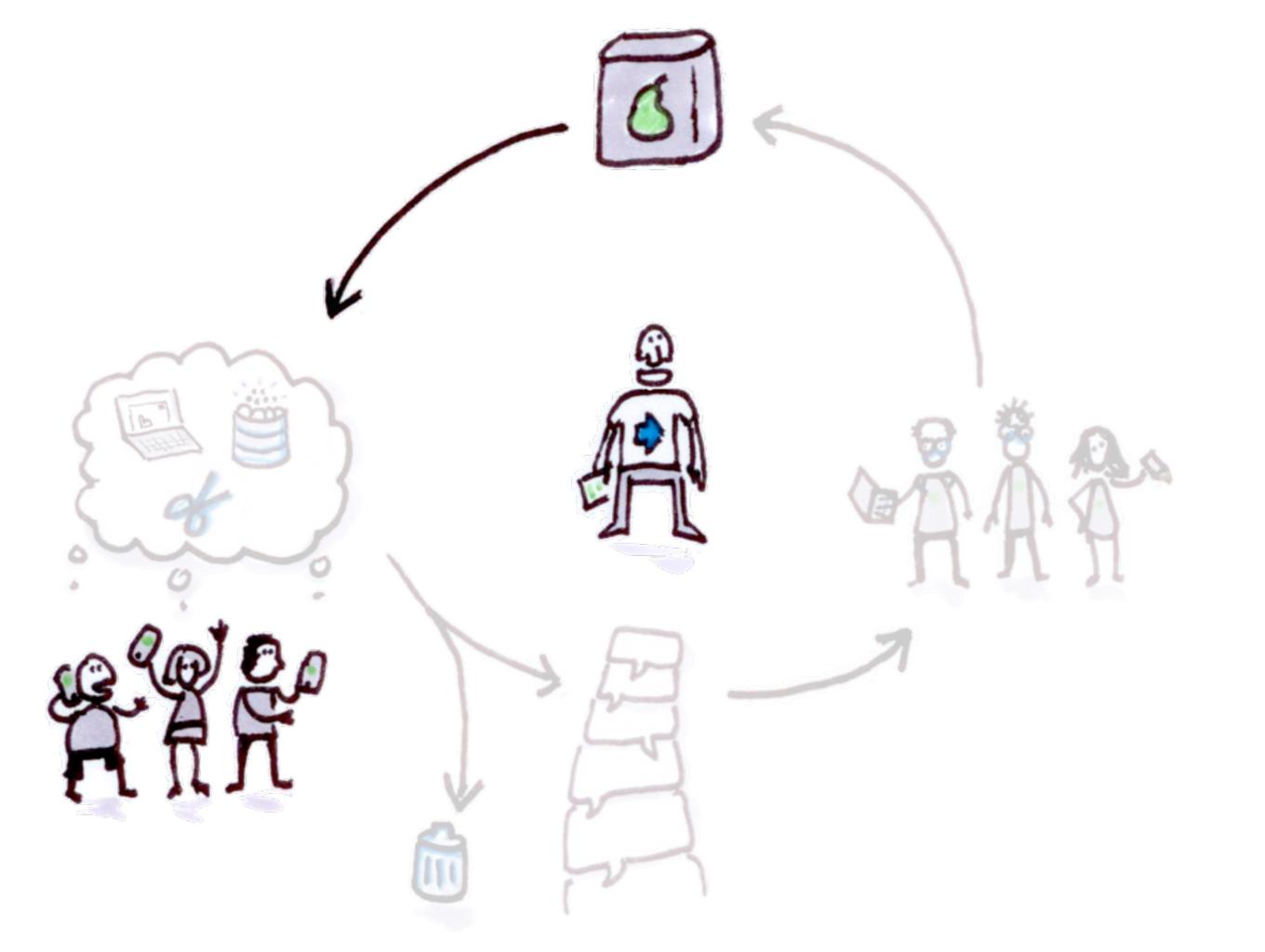












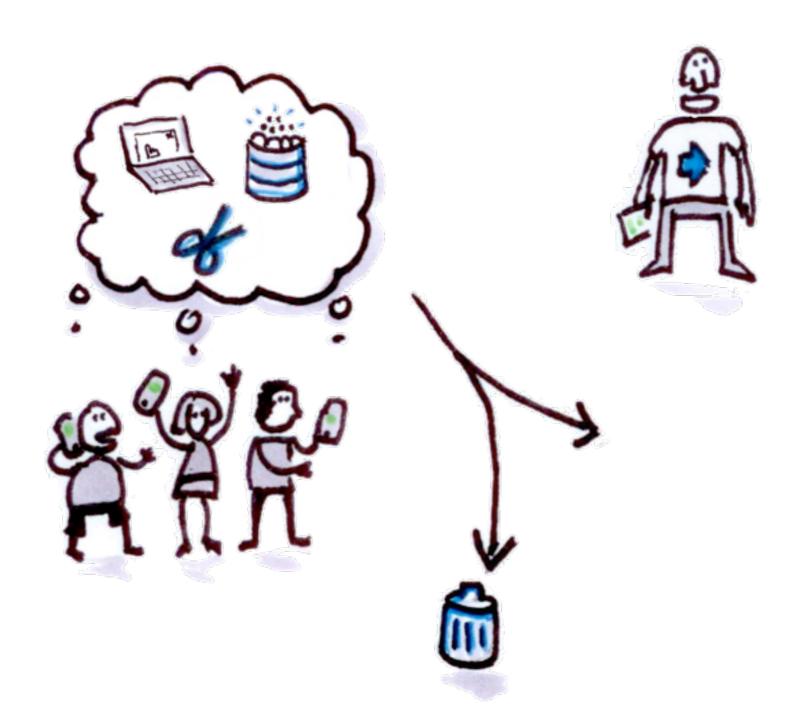


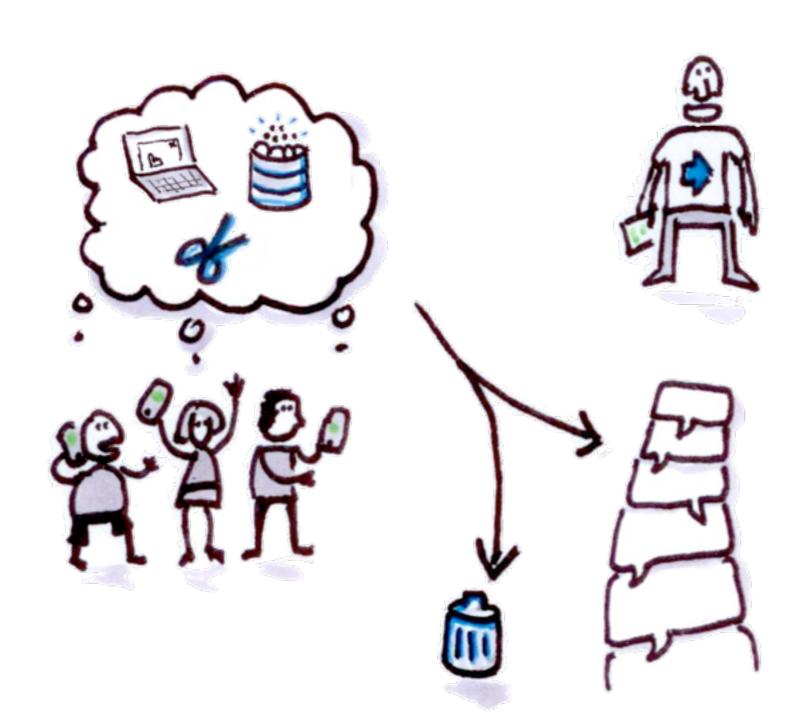


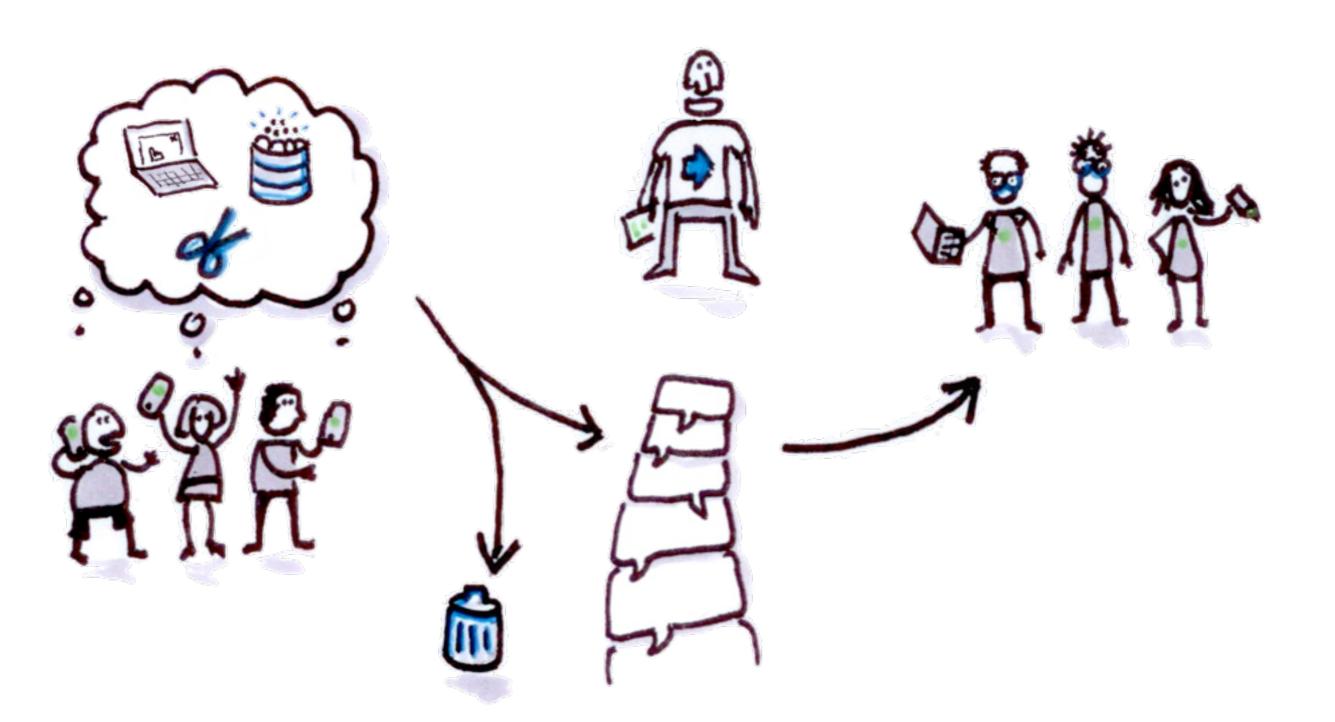


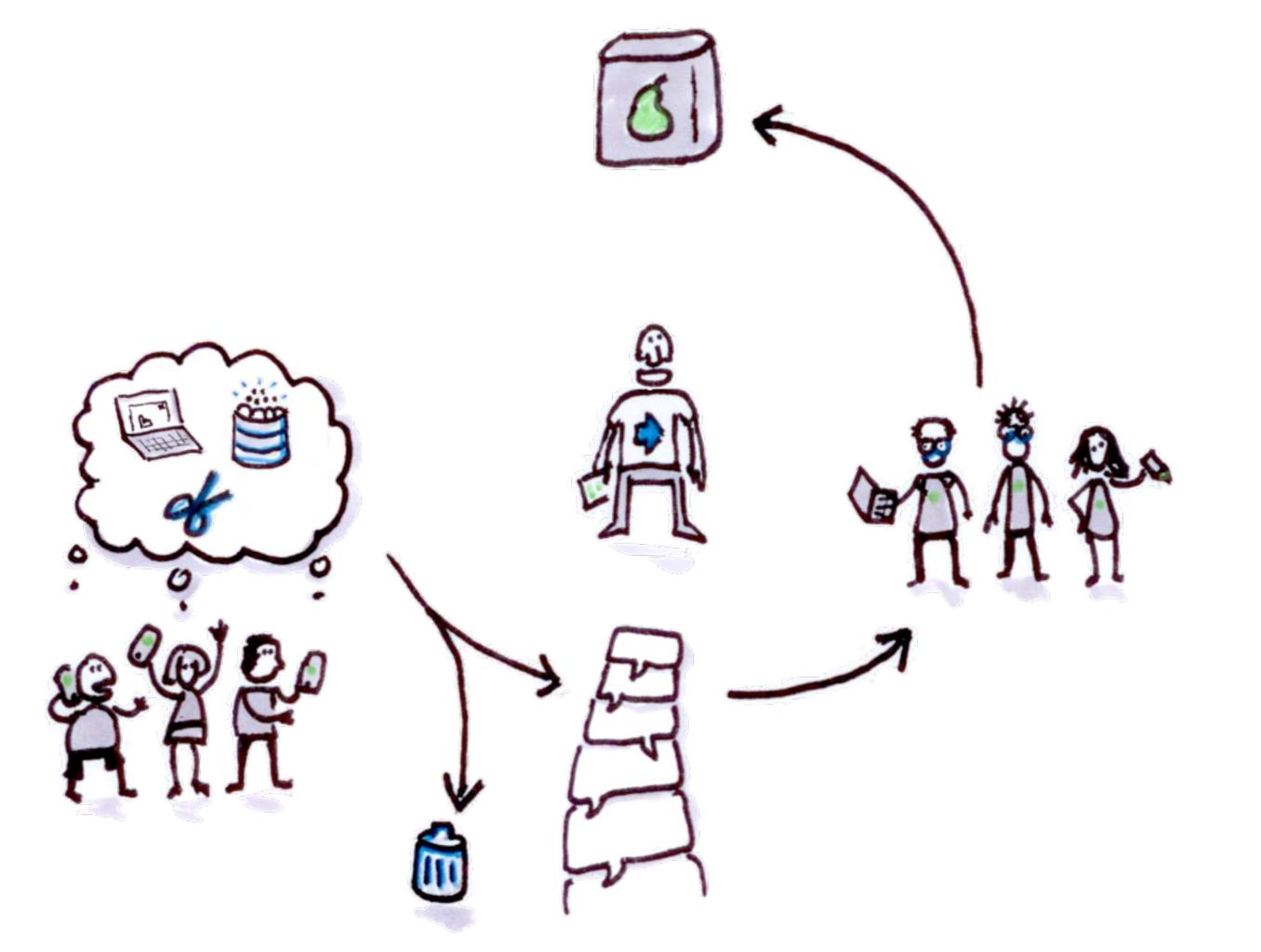


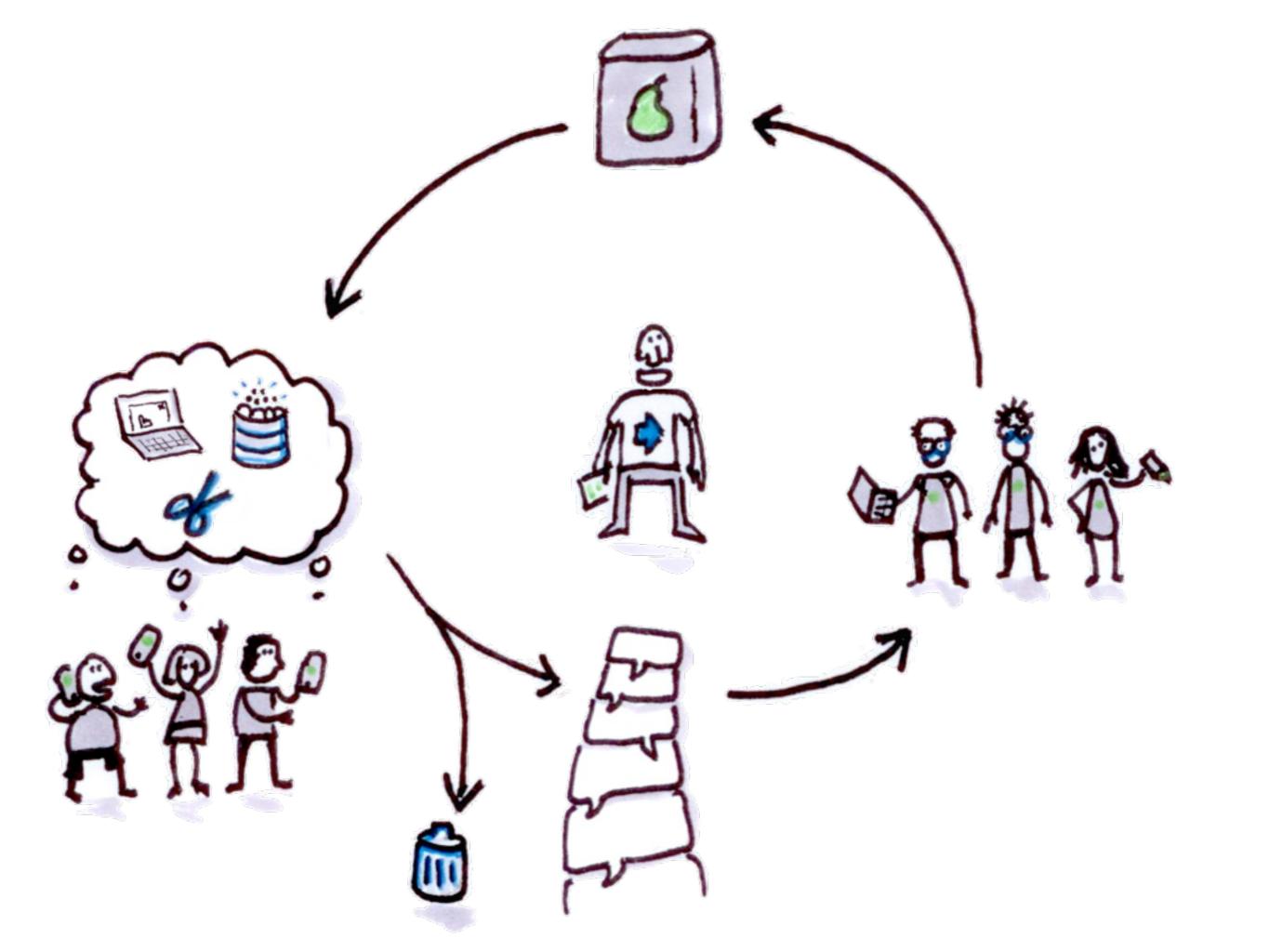










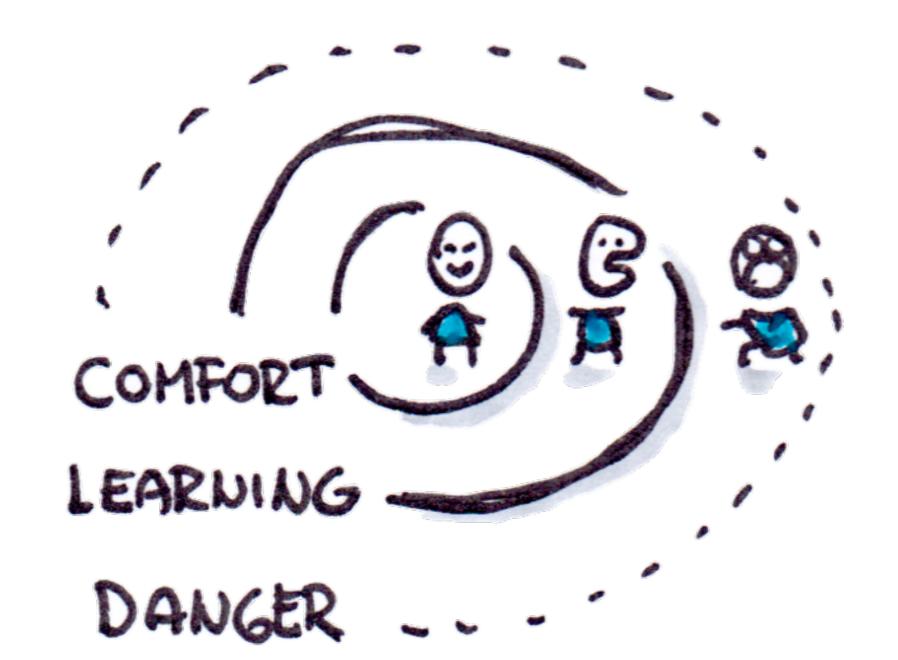








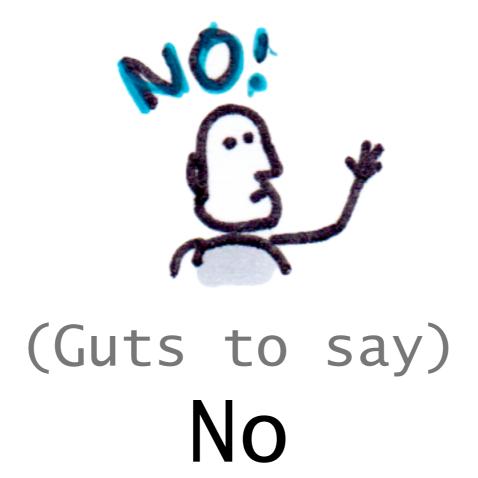
Communication

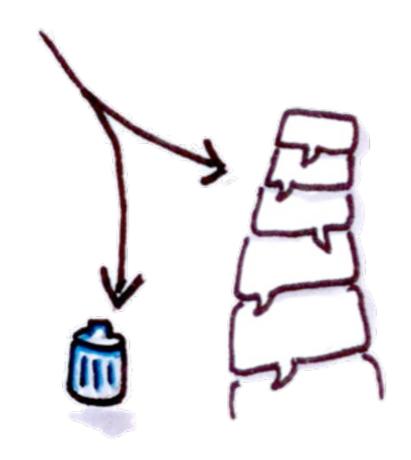








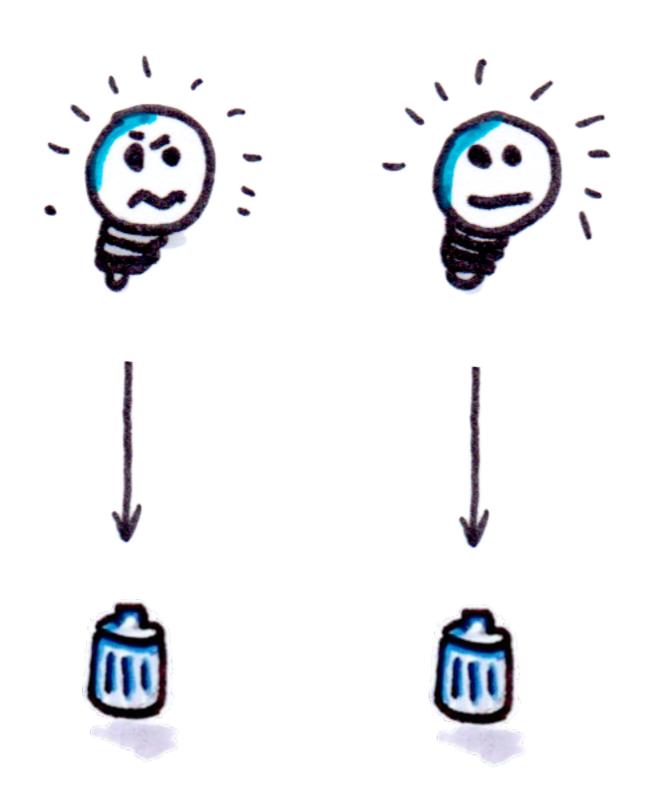


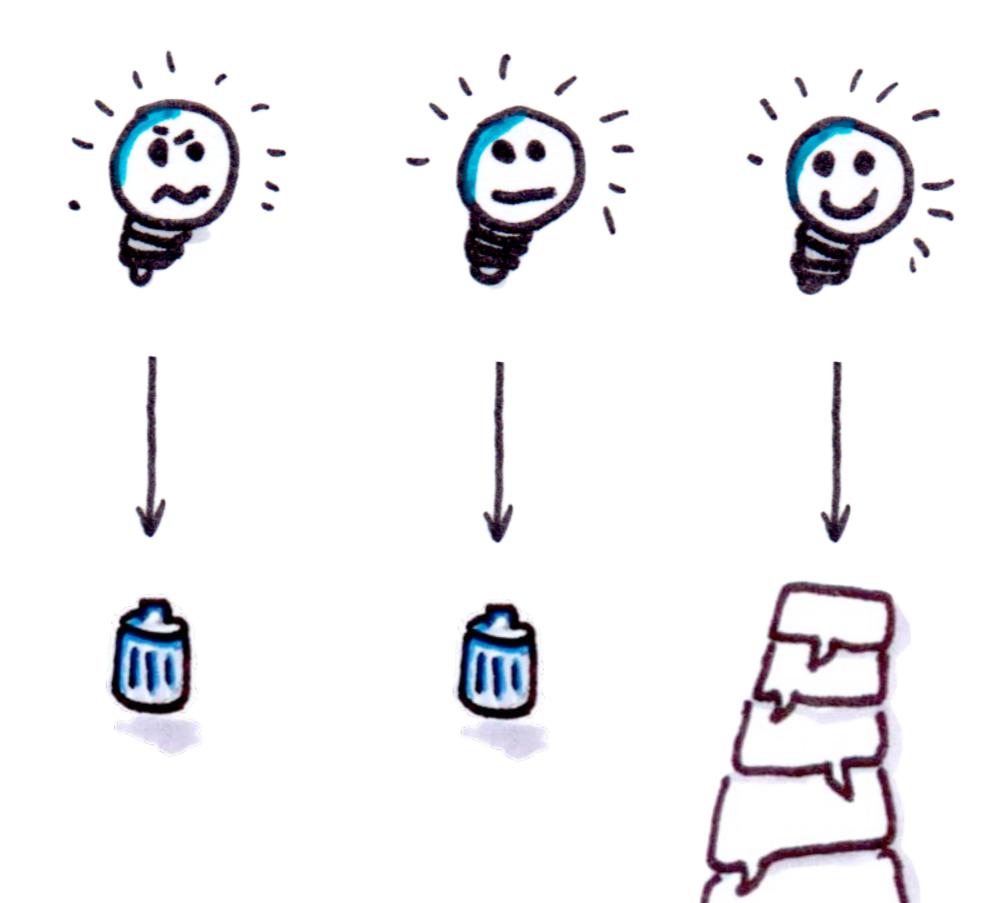




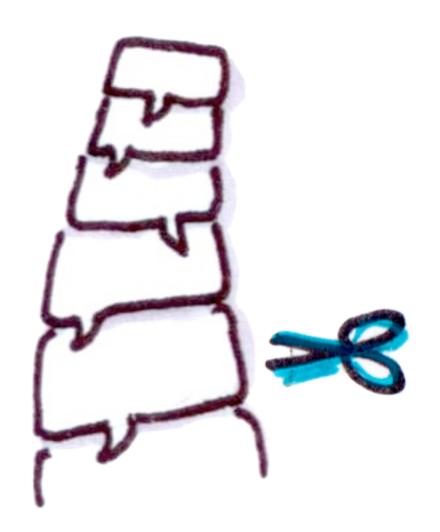
















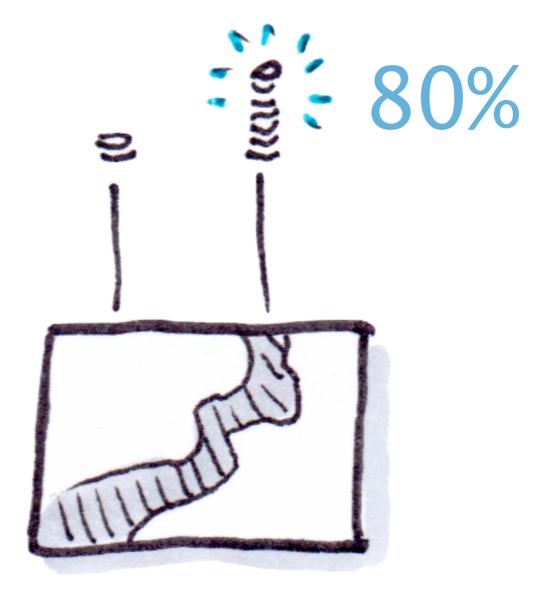


Incremental Thinking





Pareto



20%



- visited spots on a timeline
- article about the trip
- integration with Trip Journal app



- visited spots on a timeline
- article about the trip
- integration with Trip Journal app

Max writes article about his trip to inspire others.

- links to from spots to the article

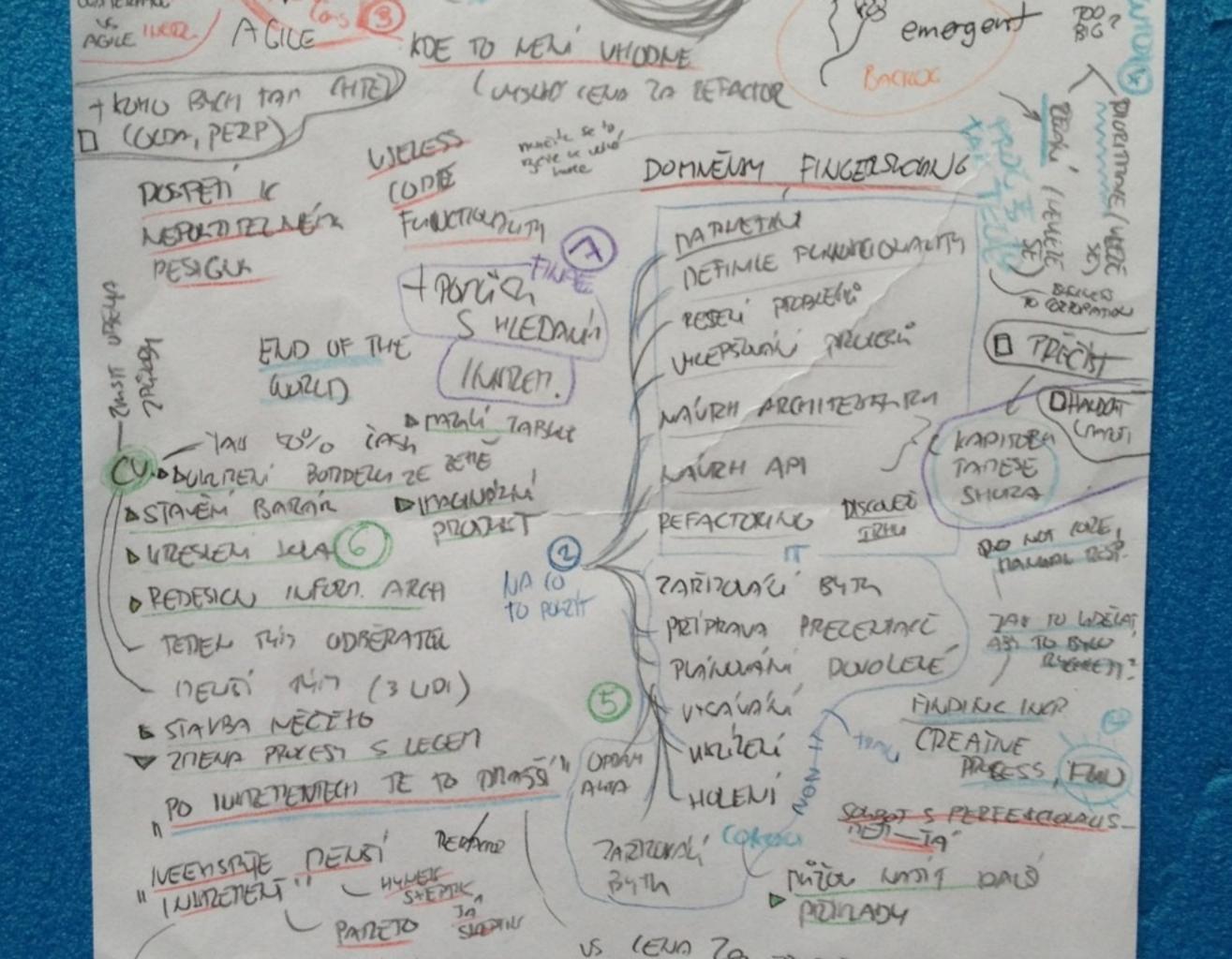


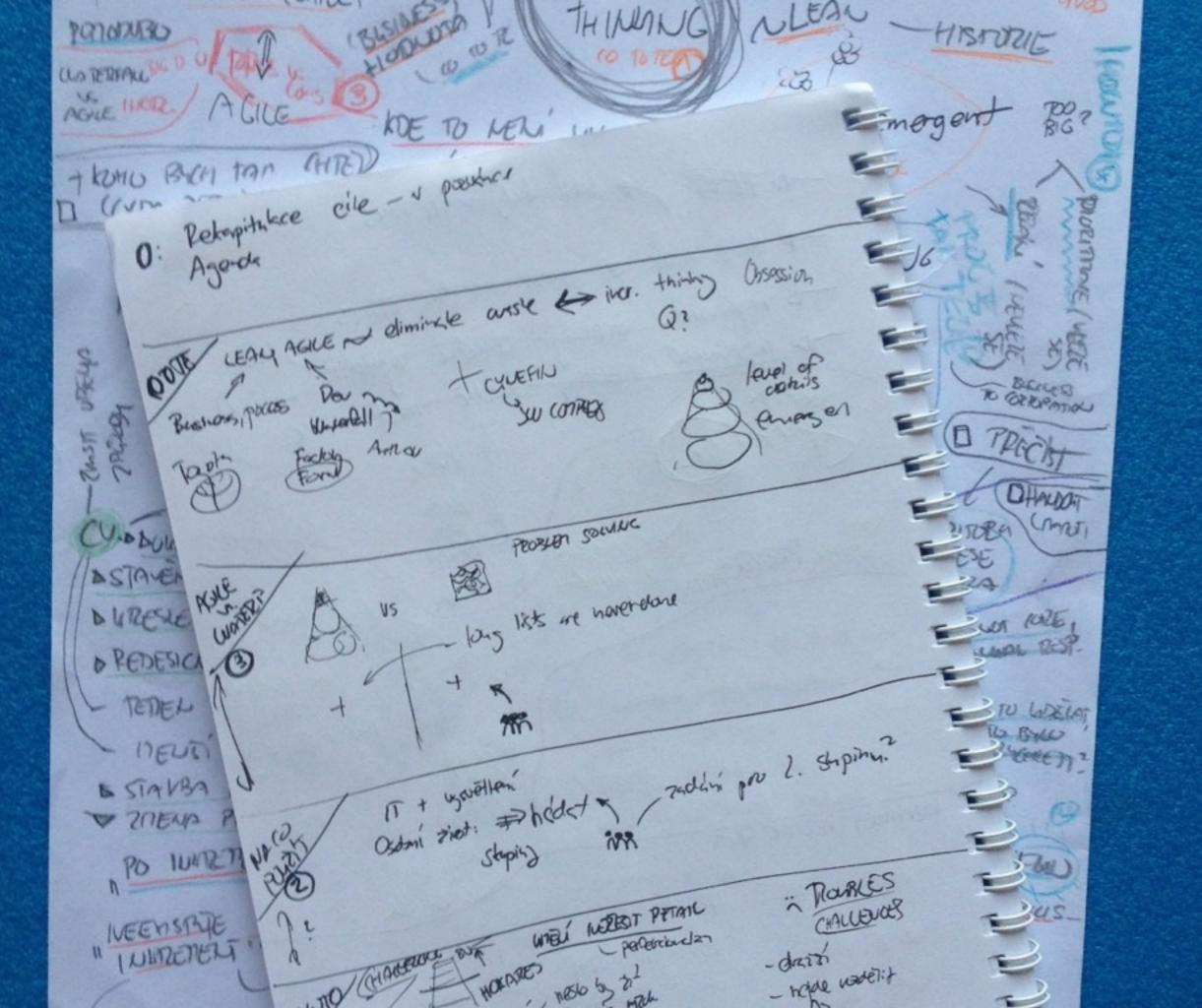
Spots ☆ ■

File Edit View Insert Format Data Tools Help Last edit was on August 5

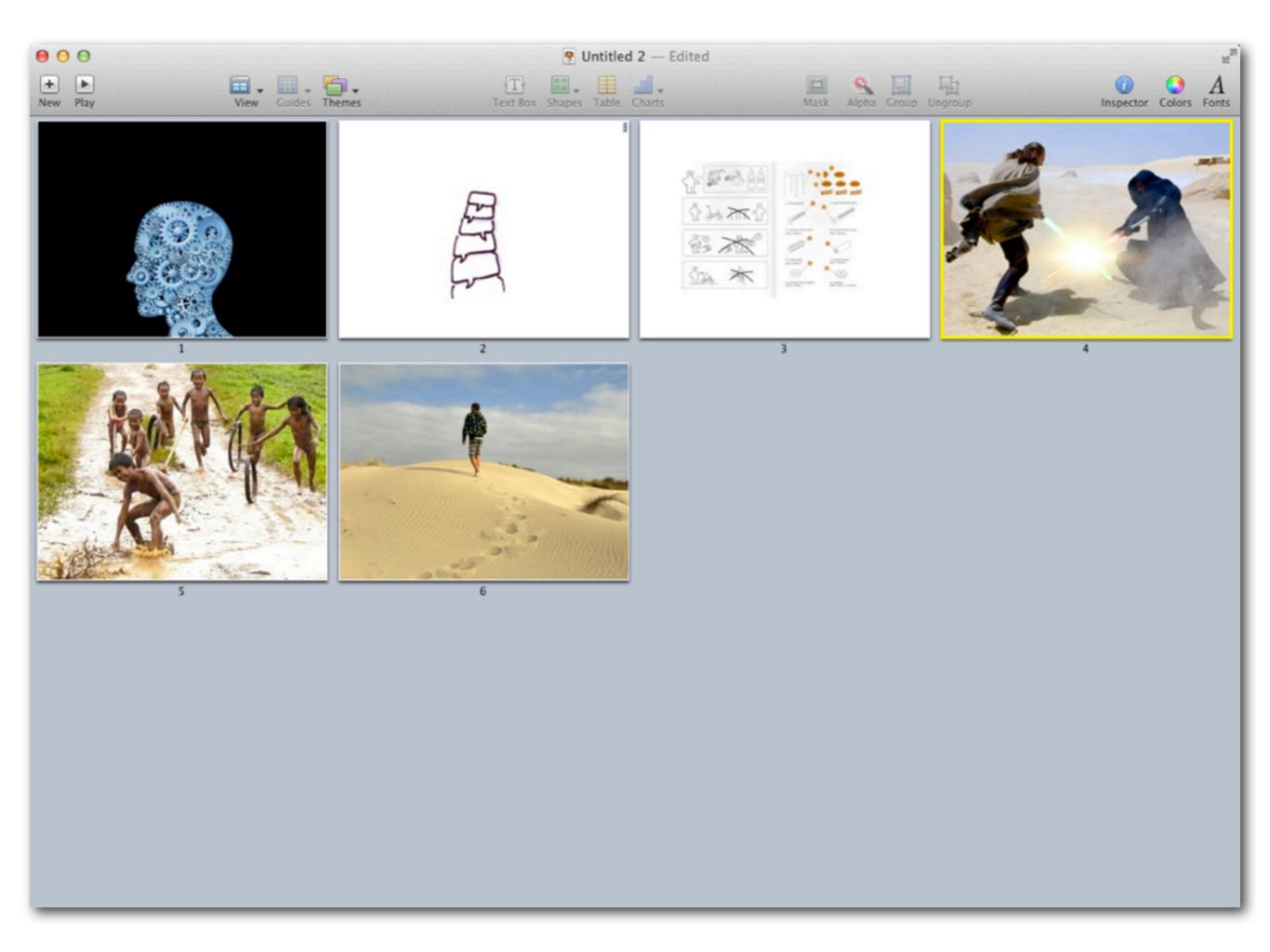
in in	Α	В	С	D	E	F			
1	name	headline	description	verified	lat	Ing			
2	Albegna		- 600m nad ústím řeky - železnice - wifi v baru v městě - 2 kempy přes železnici (Picolo Paradiso) (přes léto vyprodané) Wifi - 1 malý kemp přes cestu - přistav - oblázky / písek - místo hor planina - ostrůvek na obzoru		44.04928231317				
3	Andora		 surf obchod písečná pláž surfařský beach klub slunečník na slunečníku wifi v baru Luca 	0	43.94943824673	8.150280023158			
4	Arma		 - žádný kemp - vlnolamy chrání pláž - písčitá pláž - údajně mělko 	0	43.830555	7.85347			
5	Baie de Quiberon			0	47.548492	-3.112907			
6	Basin D'Arcachon			0	44.695019	-1.121979			
7	Beauduc / Jih	Na jedné straně písečné duny a saliniště, na druhé nekonečná mělčina. Takhle vypadá přírodní spot, jen se nenech odfouknout moc od břehu.	Jídlo a vodu s sebou Obecne nadherne misto, jen pozor na prilivy aby jsme rano nemeli vodu do pul auta. A nenechat se vyvest z miry tim ze navigace bude ukazovat, ze jsme v mori :) Odsolovaci nadrze a mraky plamenaku.	1	43.397095	4.575634			
8	Beauduc / Sever	Na obrovské planině se dá skoušet landiting, pláž vede až bůhvíkam, takže místa na start je tu dost. Duny jsou zaneřáděné toaleťákem.	http://www.windfinder.com/forecast/beauduc http://www.windguru.cz/int/index.php?sc=48606	1	43.406544	4.589882			
9	Bol		http://www.croatia- beaches.com/windsurfing/brac_bol_beach.htm	0	43.256142	16.636391			
10			Radek: tohle je pro mě určitě number 1. Krásné prostředí, mělká voda. Jen se bojím ceny. http://www.jibe.cz/69-karibik/668-bonaire/ Popis spotu http://www.google.cz/images? q=bonaire+windsurfing&oe=utf-8&rls=org.mozilla:en-US:official&client=firefox-a&um=1&ie=UTF-						

How 23 emergent AGILE KOE TO MELLI UHODNE + KUMU BYCH TON ALTER (USUN TO REFACTOR (CXDs, PEZP) WELESS DOMNEUM FINCERSCONNG COPE DOSTED K MATHETINE MERUTITELLEN FUNCTIONIN DEFINIE PLYWROUNDING PESIGU + Porcia THEPS WANT TRUES S MEDAUN END OF THE MAREN will MAURH ARCHITESTA PEN - YAU 50% CASh MALL TARKET CU. DUILITELI BOTTOETLI TE BEME HAURH API TAMESE ASTAVEM BARA'R - MAGNOZLA SHURA DO NOT WIE. PRUDUCT REFACTORING DURESEM LUA namor Risp. O PEDESICU INFORM. ARCH PARITUAL BYTH PETPRAVA PRECEDIACE JAN TO WELAT - TETIEL THIS ODBERATEL 939 TO BYCO PLYNUAM DOVOLETE) RYCHETY? - DEUTI AYO (3 UDI) - utca'ua'u FINDING INGR - STAVBA MECETO - THEMA PRICEST S LEGET CREATIVE unitai . PO IUNZEMENTECH) TE TO DINASSI'N OPPAR PROGESS, FOW HOLENI School & PERFERCIONAUS-INTERISTY PELST TAZITOVOL! MICH WITH WIND 34th PIDINADY 100000 CUEPTIL

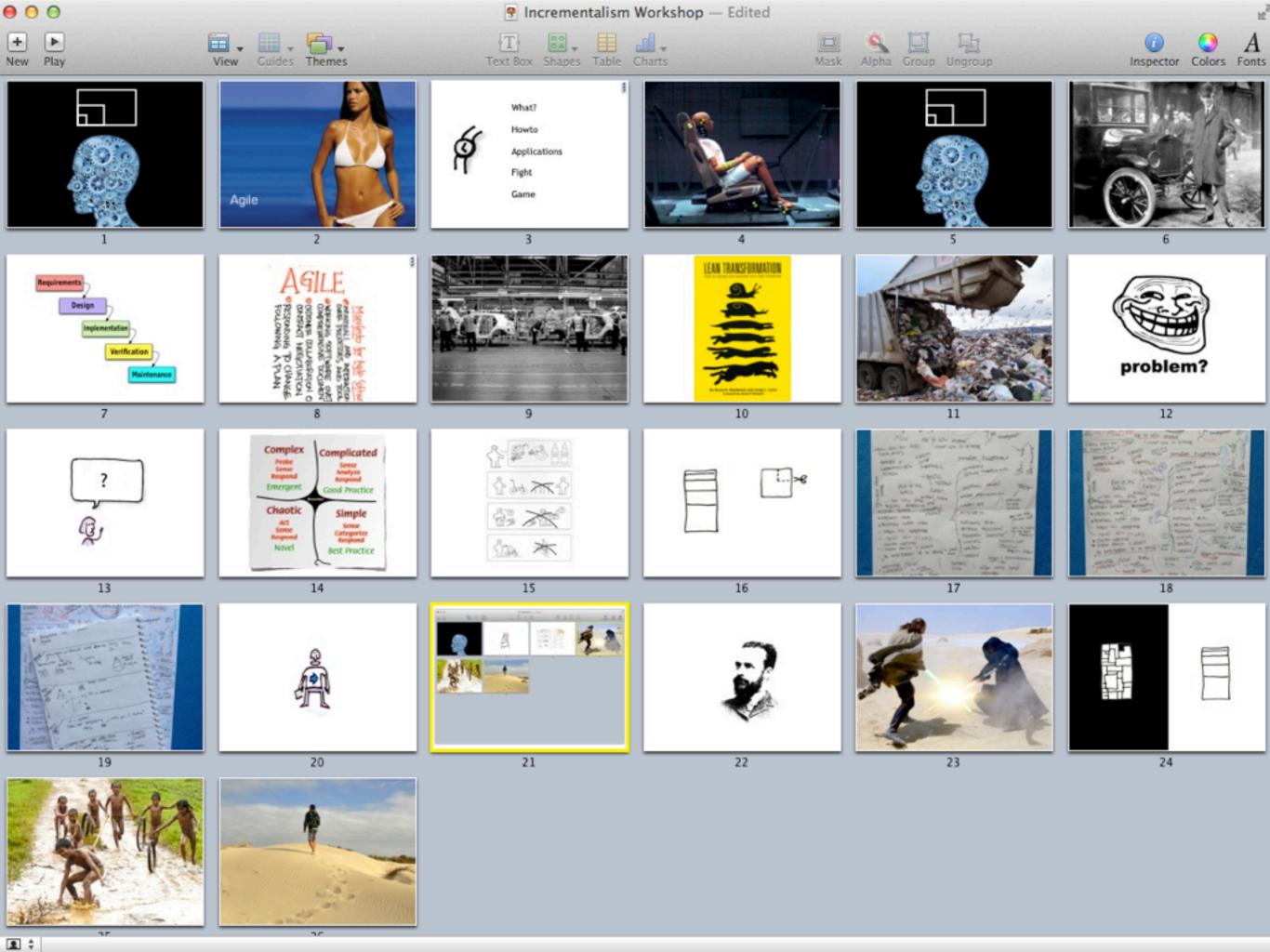








SMPILY: 4 po trec) noto 3 poly DLADIT PROBLEH - MY 5 MM "VETSI'= hutry copolatit us vice with - BURDEL WENDE - PROLUMINATION, OF - PARTITELY CONTURN - PRECIONAL - STAURA BURG - STAURA DUTY -> BOULDELY KTERYELY D BORTELT WO WHOLY Lintranatin' (go ? wilder lover) Level of askil \$ min Problet 10mil WATERSON - DOK THONK ?



Any intelligent fool can make things bigger, more complex and more violent. It takes a touch of genius and a lot of courage to move in the opposite direction.























