

Don't make them guess

How to improve your
architecture visualizations

O'Reilly Software Architecture Conference

New York City, February 27, 2018

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@jschulklopper



Don't make them guess

How to improve your architecture visualizations

Communicating (about) architecture to non-IT and business stakeholders is a valuable skill for architects. After all, many architectural-relevant decisions are made by others, so they need to be informed with clear, honest, intelligible and helpful information and advice. This presentation will show theory and practical tips on eight different facets of visual communication of architecture.

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Who's them?

And why can't we let them guess?

Software components

Services, modules, libraries

SOLID, GRASP, DRY, KISS

Integration

Performance, scalability

Consistency, availability, stability

Frameworks, languages, platforms



Costs, investments, revenue

Old-fashioned applications

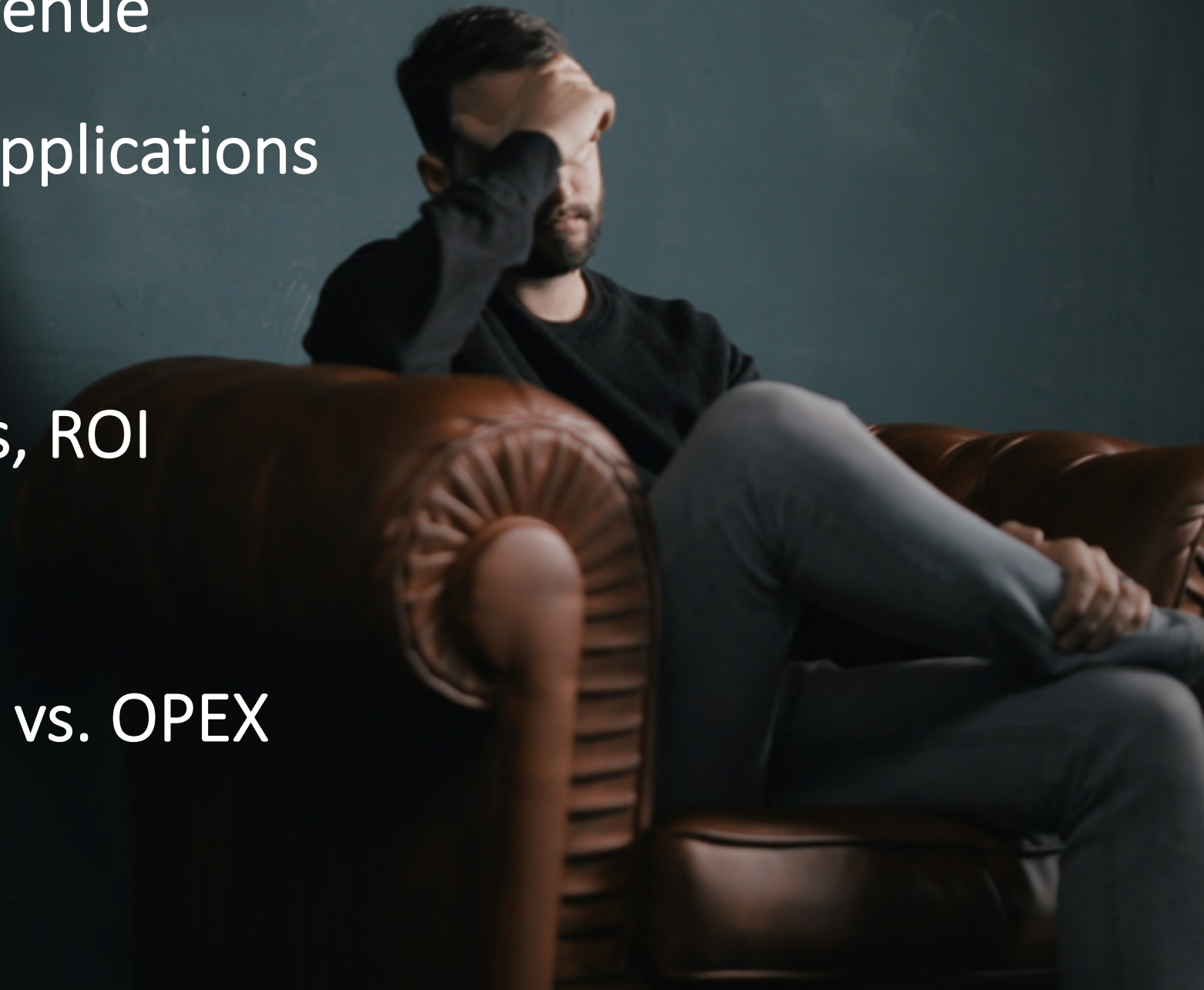
Issues, changes

Metrics, KPIs, ROI

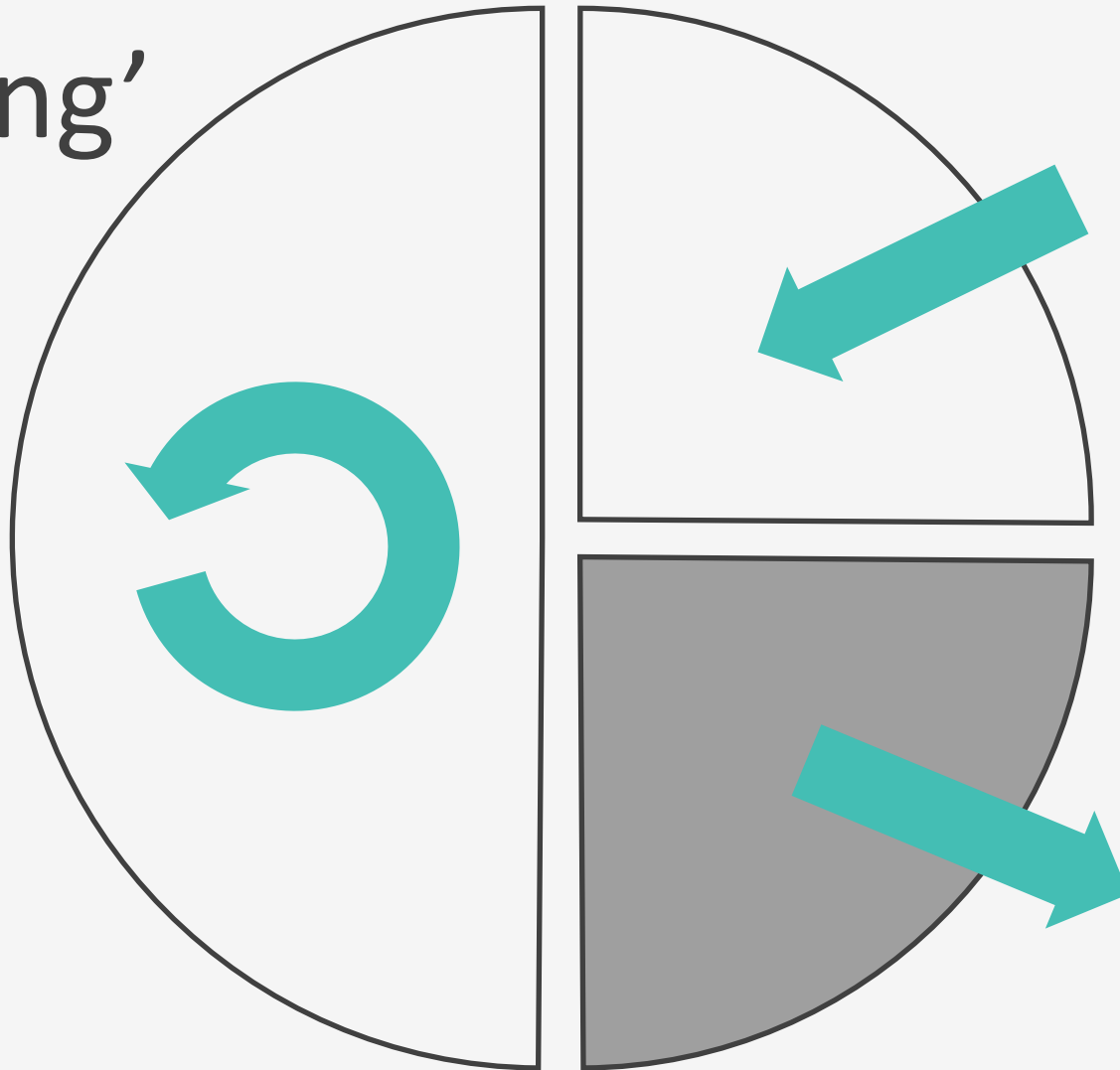
Opportunities, threats

CAPEX vs. OPEX

Vulnerabilities, risks



'Architecting'



Getting
input

Providing
information

Communication

\kə-,myü-nə-'kā-shən\

Using words, sounds, signs, or behaviors
to **express or exchange information**
or to convey ideas, thoughts, feelings,
... **to someone else**

Communication \kə-,myü-nə-'kā-shən\

Getting a message **across** *and* **understood**

Protip: it helps to use a language your audience understands

The 'other' architects use visualizations all the time



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<http://www.lego.com/en-us/architecture/products/new-york-city-21028>



Jochem

@jschulenklopper



rectangles, circles
and lines, glued together
following rules

- architecture visualizations, a sort-of-haiku

11:00 AM - Jan 30, 2018





Jochem

@jschulenklopper



Replying to @jschulenklopper
insights and some tips;
so architects will sketch, see
much smarter drawings

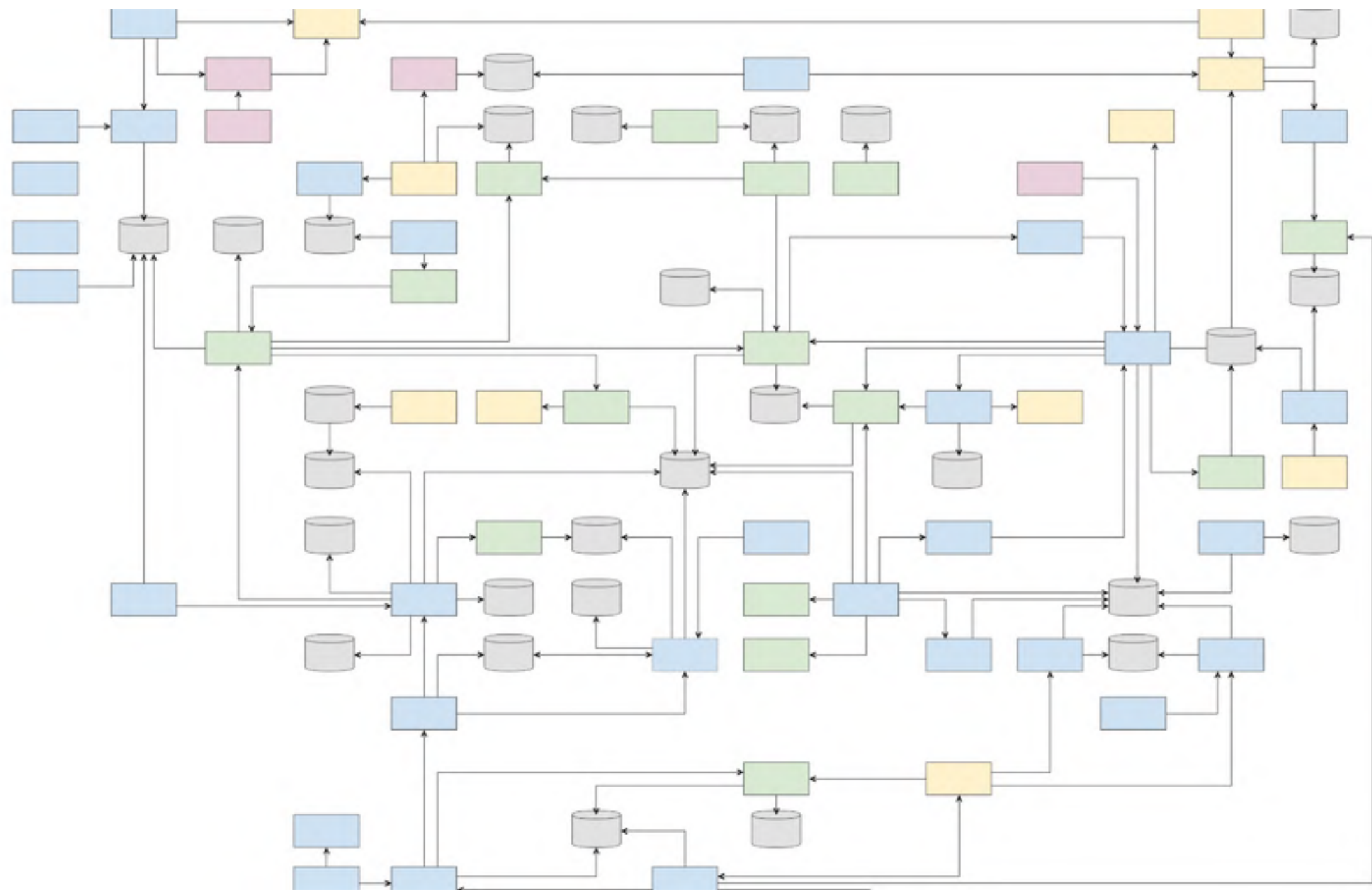
- haiku-ish summary of my talk at [#oreillysacon](#)

4:54 PM - Feb 19, 2018



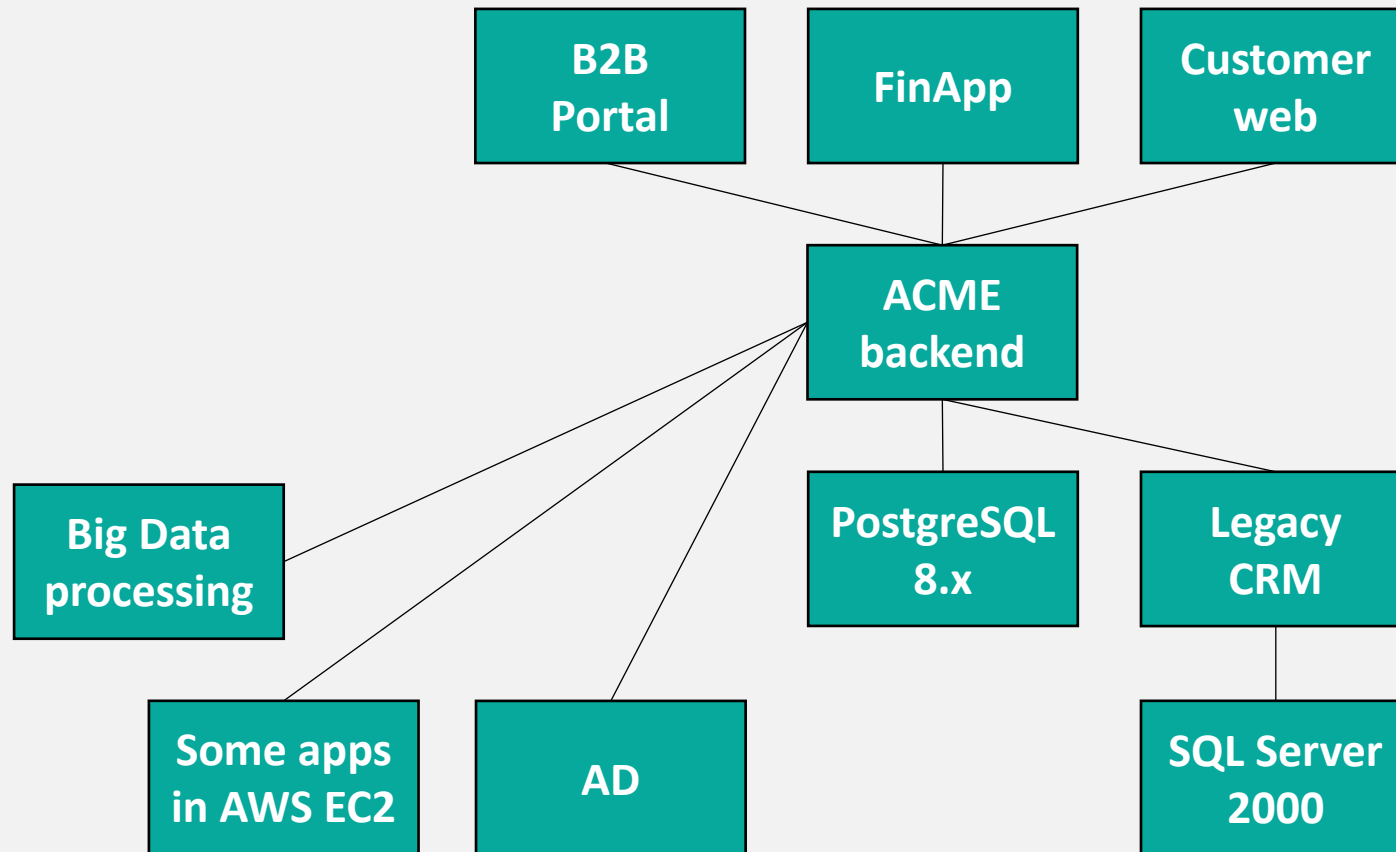
See Jochem's other Tweets





Simplified working **example** for today

(not far removed from many architecture visualizations we see)



Improve your architecture visualizations, using...

1. Pre-attentive processing
2. 'Gestalt' principles
3. Color
4. Text
5. Icons, images
6. Graphs and (interactive) data visualizations
7. Storytelling
8. Sketchnoting

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5 2 6 4 7 8 8 9 3 4 8 4 3 7 9 3 2 1 3 8

7 2 7 1 2 9 2 7 1 8 3 6 3 4 2 7 2 5 2 7

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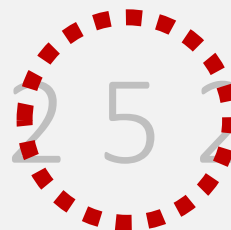
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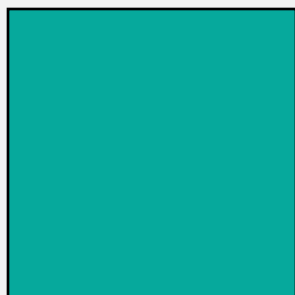
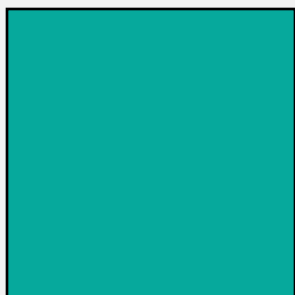
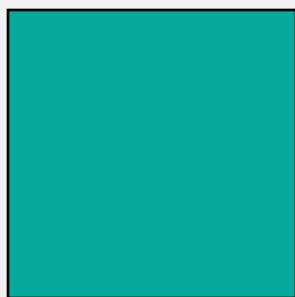
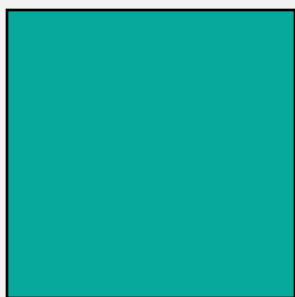
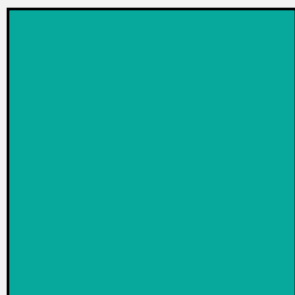
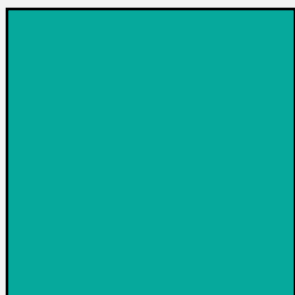
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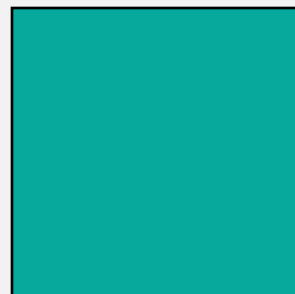
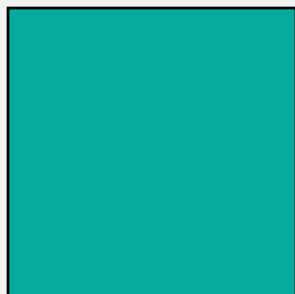
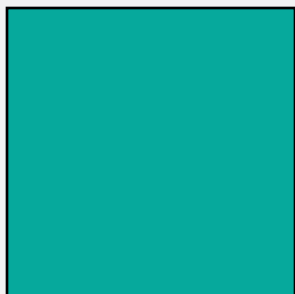
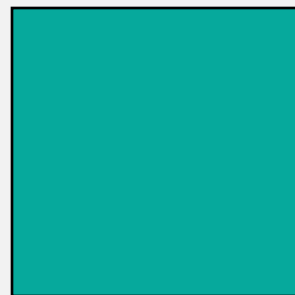
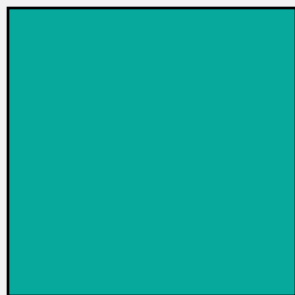
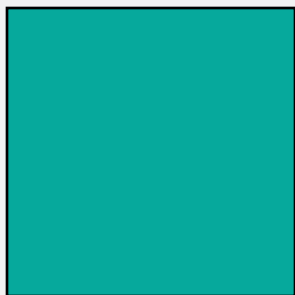
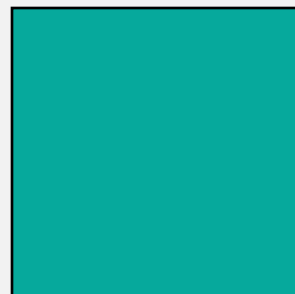
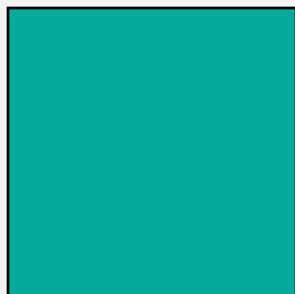
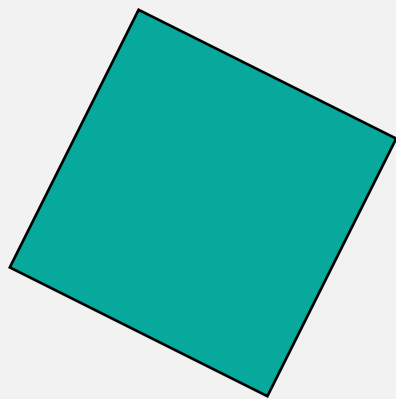
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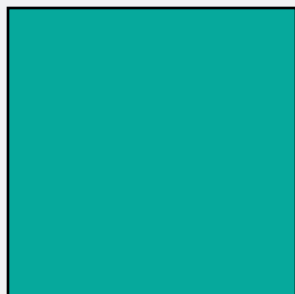
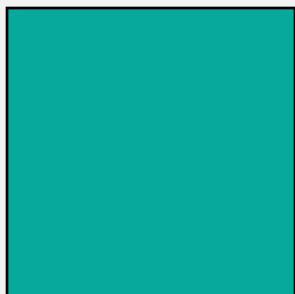
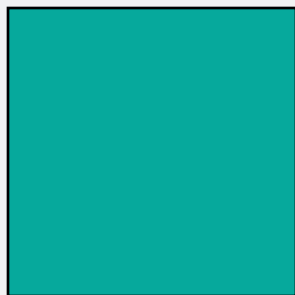
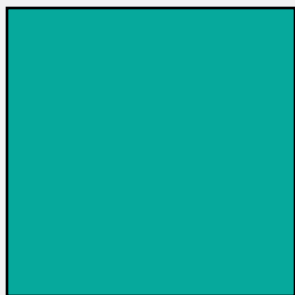
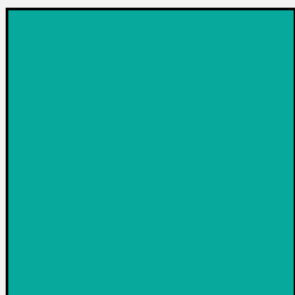
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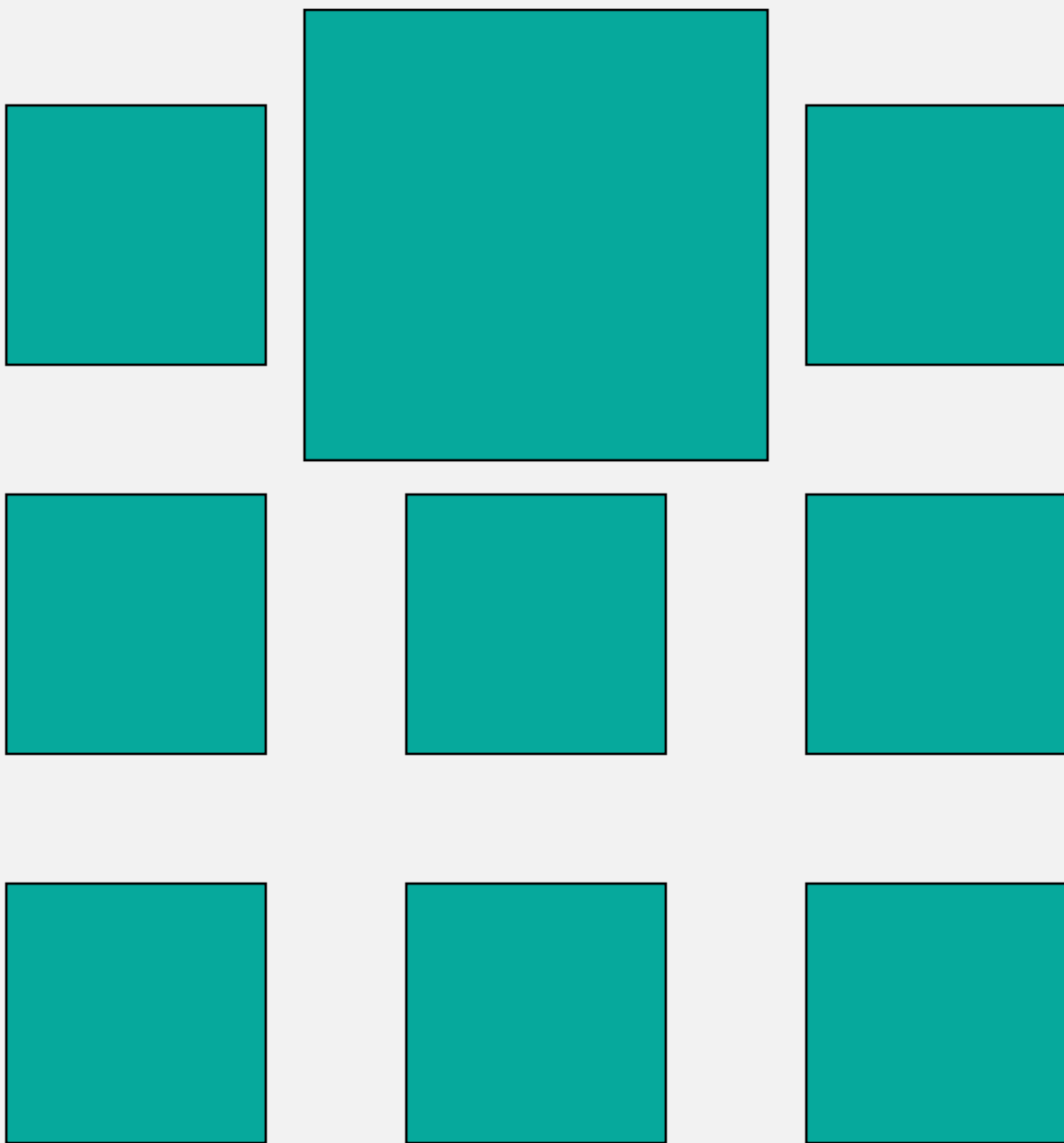


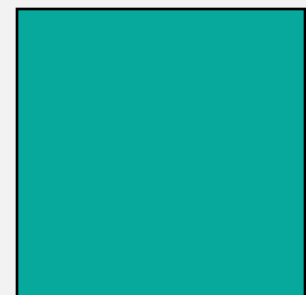
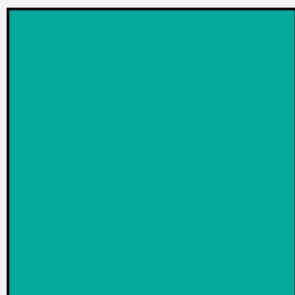
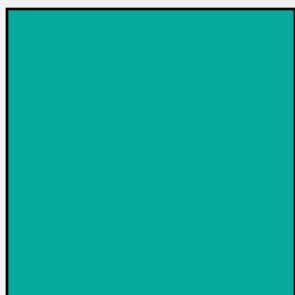
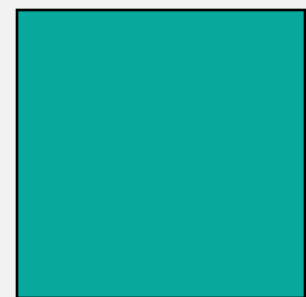
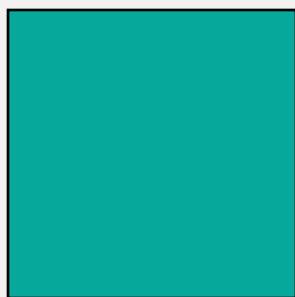
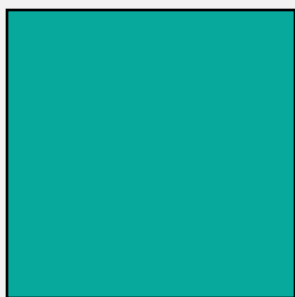
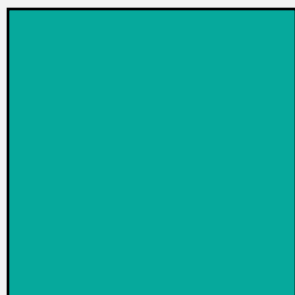
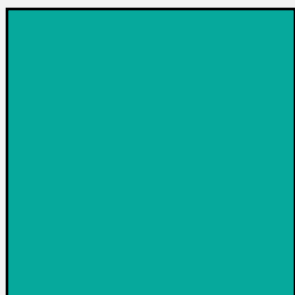
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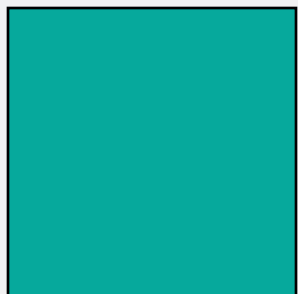
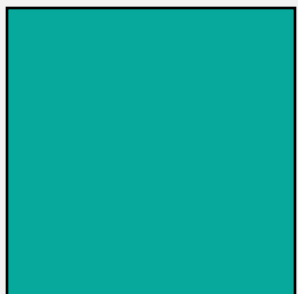
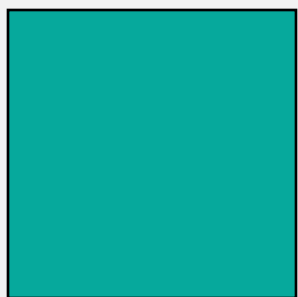
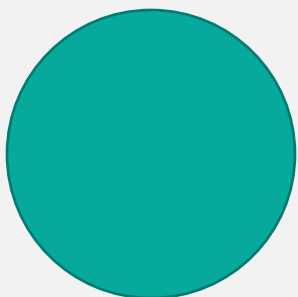
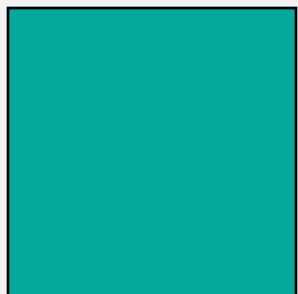
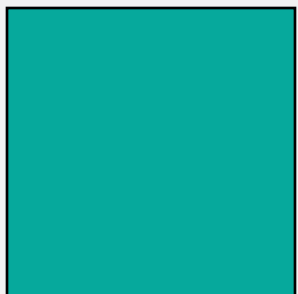


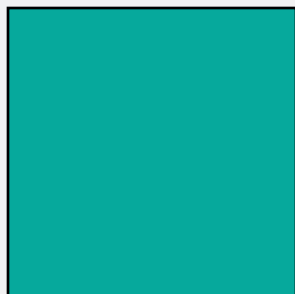
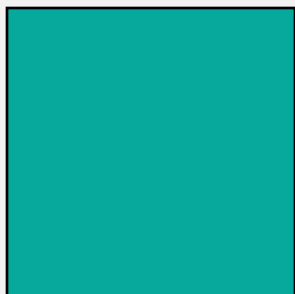
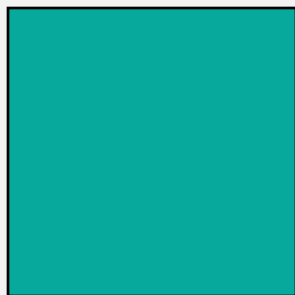
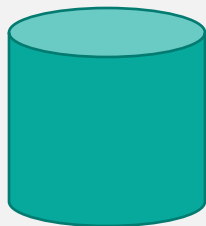
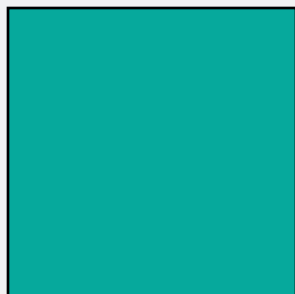
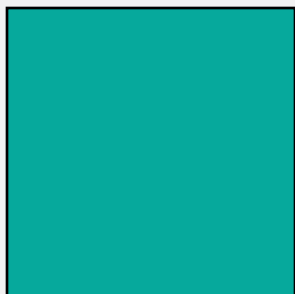


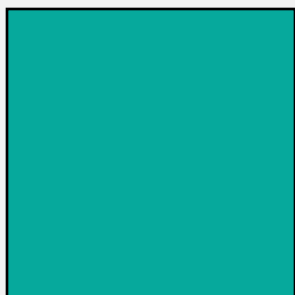
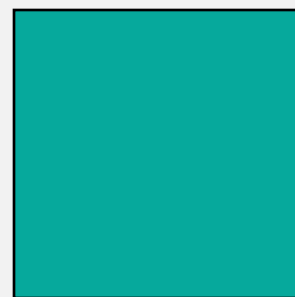
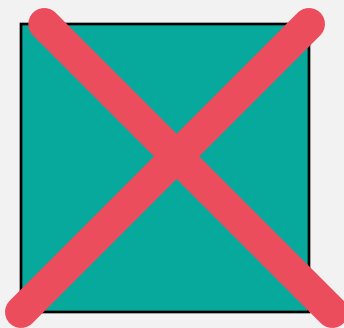
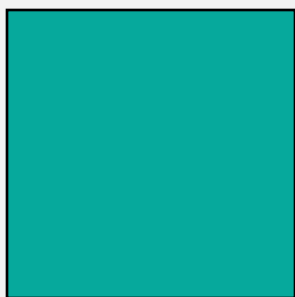
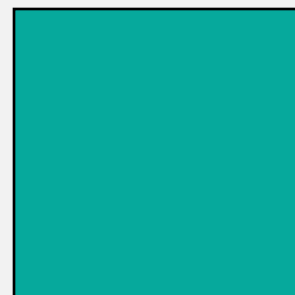
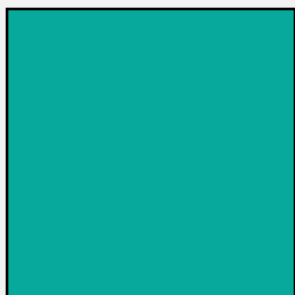


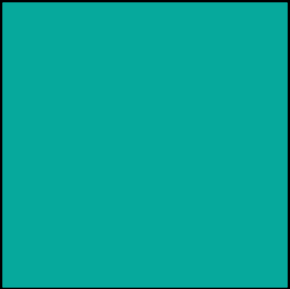
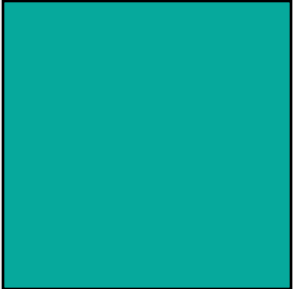
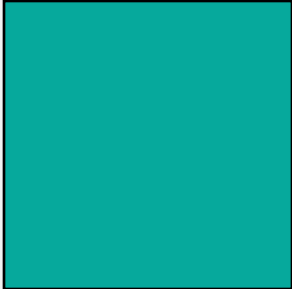
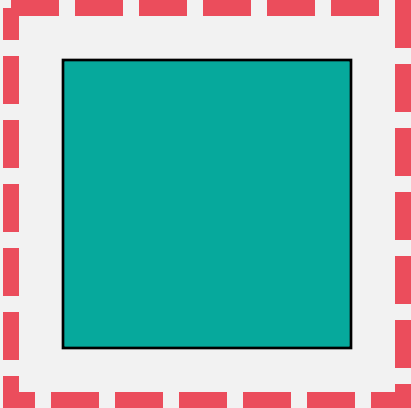
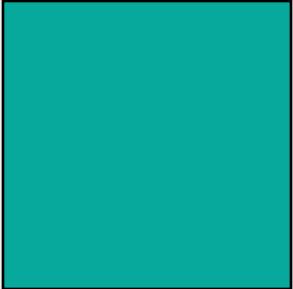
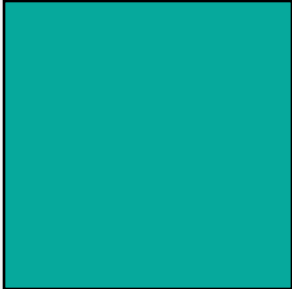
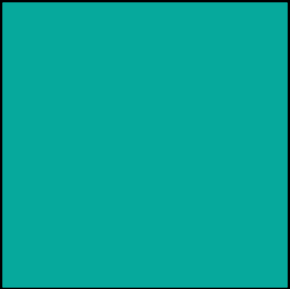
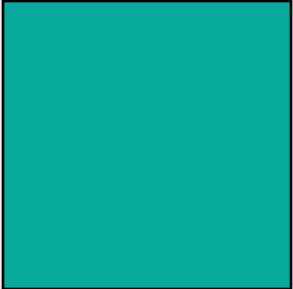
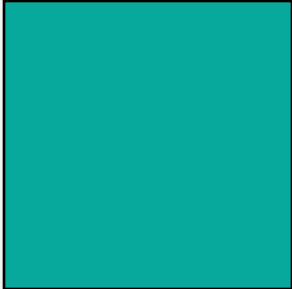


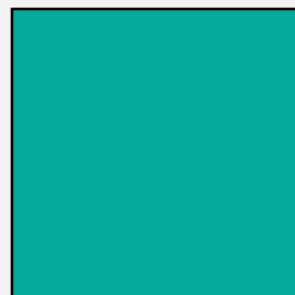
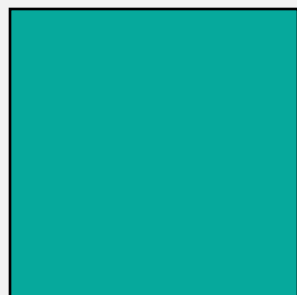
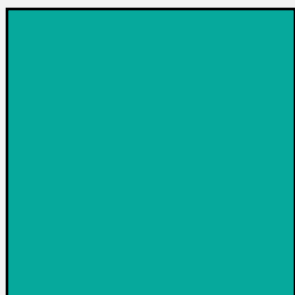
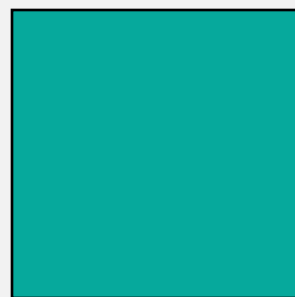
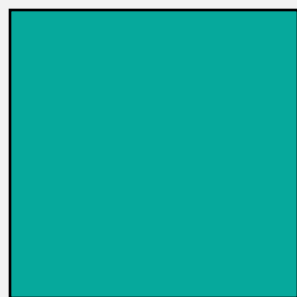
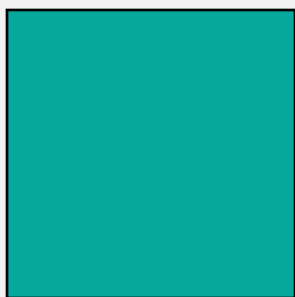
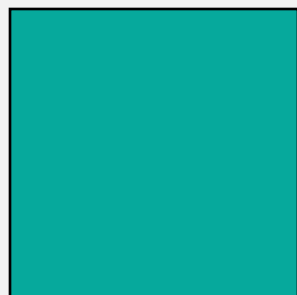
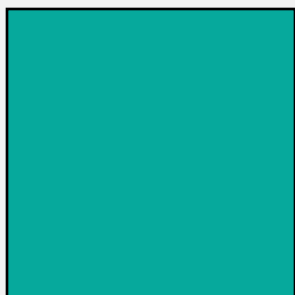


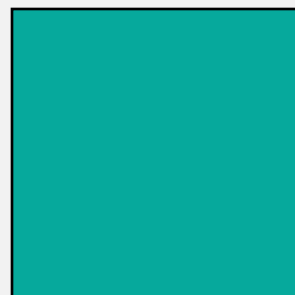
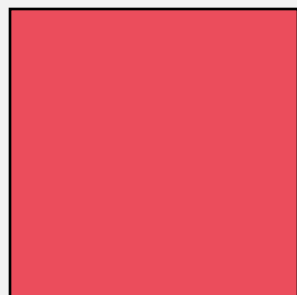
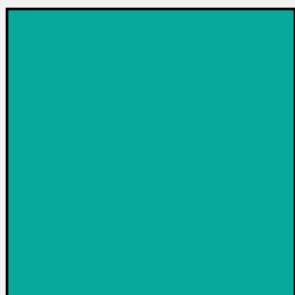
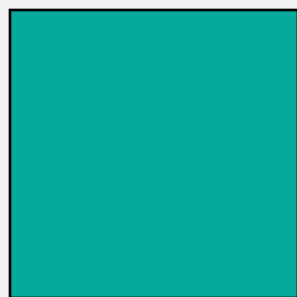
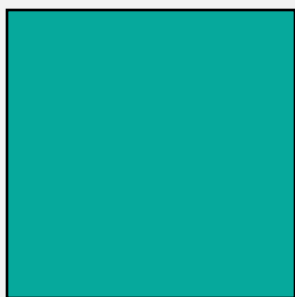
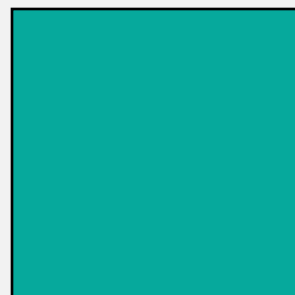
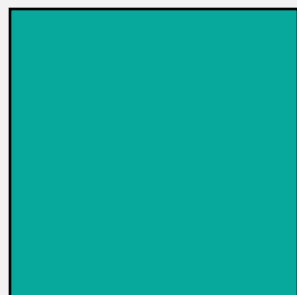
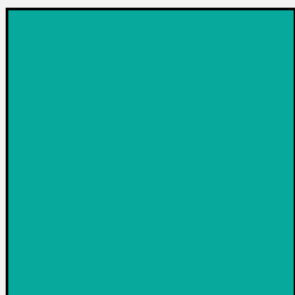


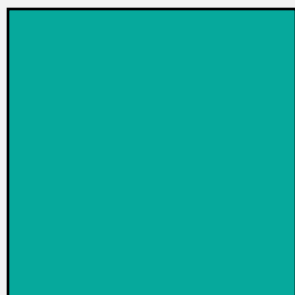
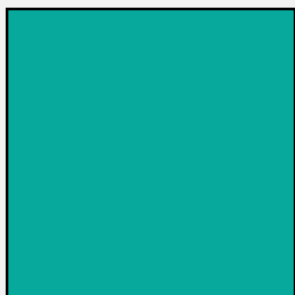
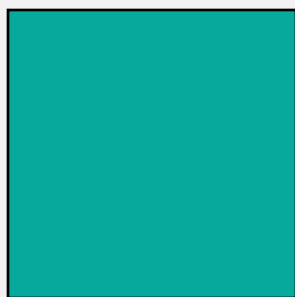
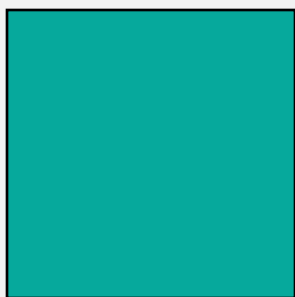
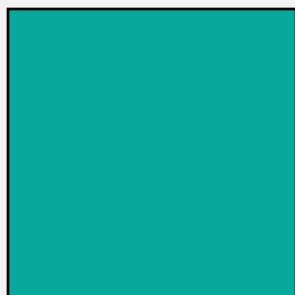
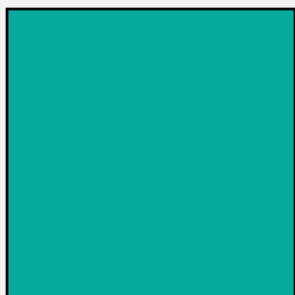




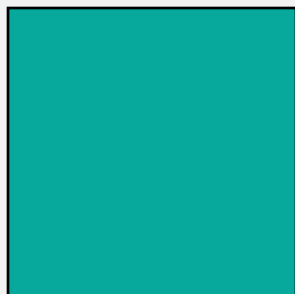
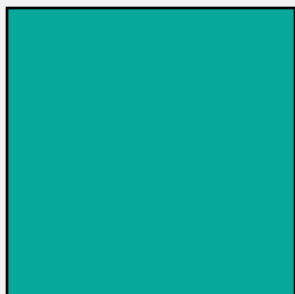
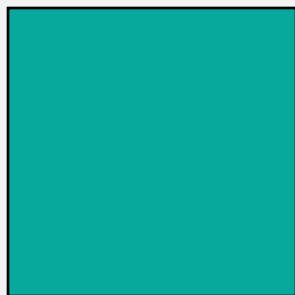
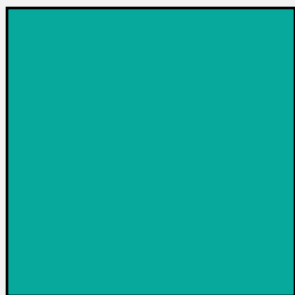
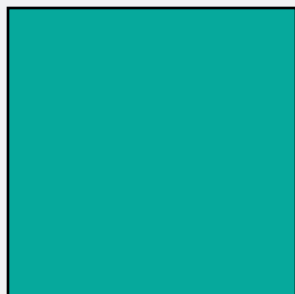
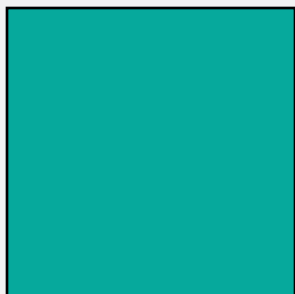


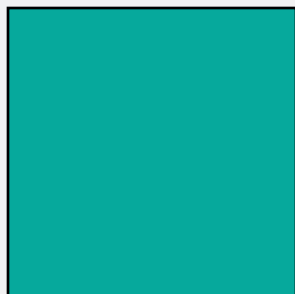
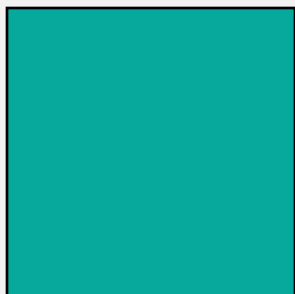
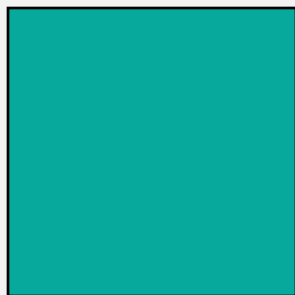
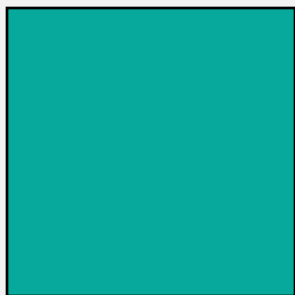
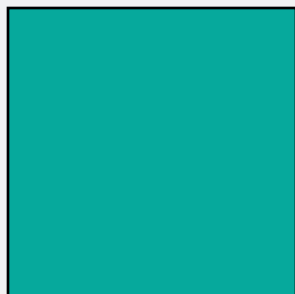
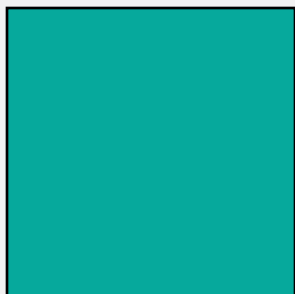


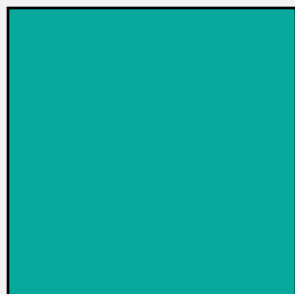
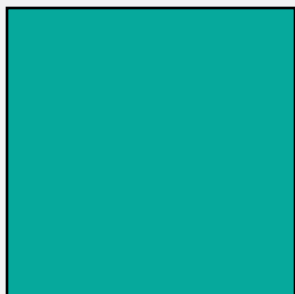
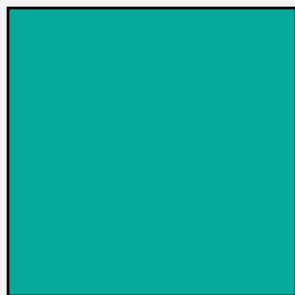
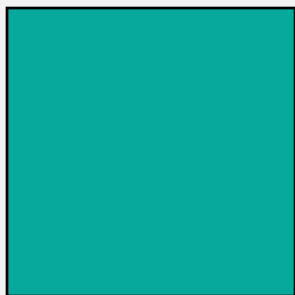
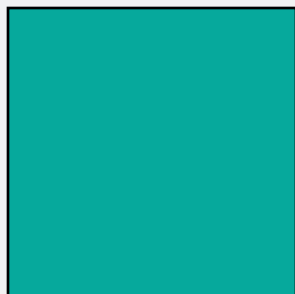
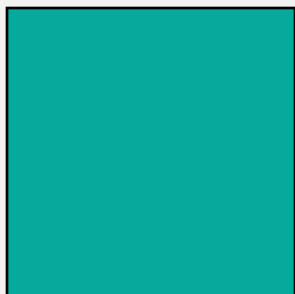




Warning: close your eyes if you've
got photosensitive epilepsy :-)

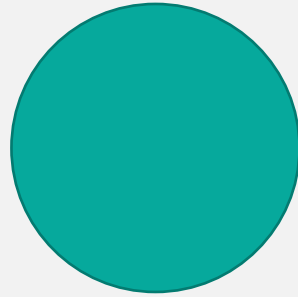
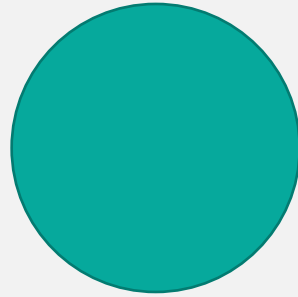
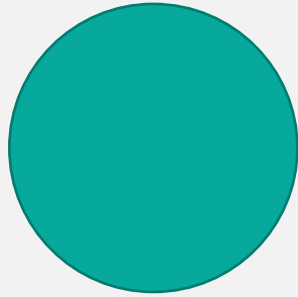
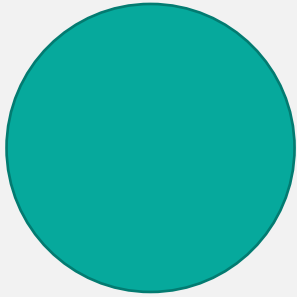
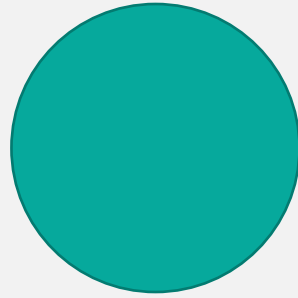
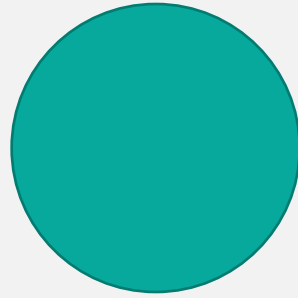
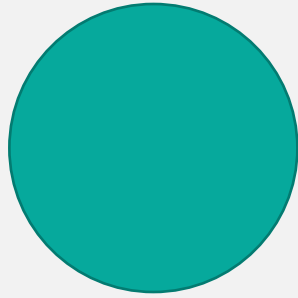
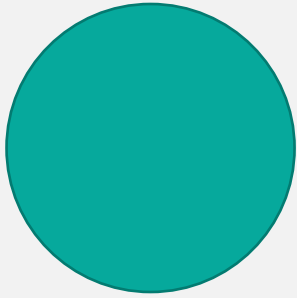
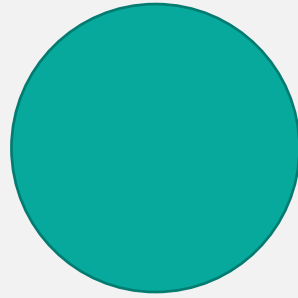
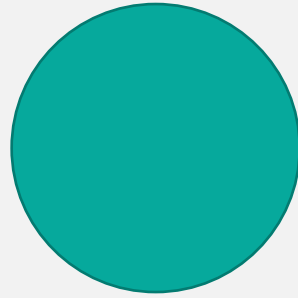
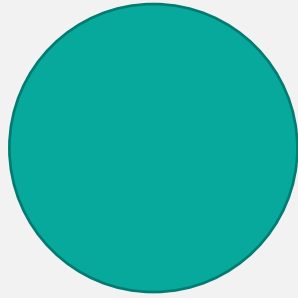
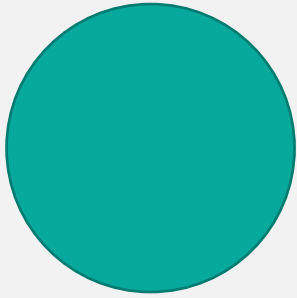


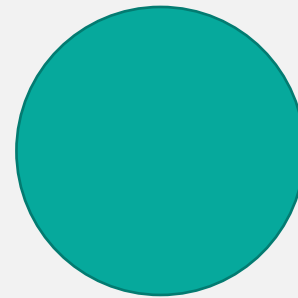
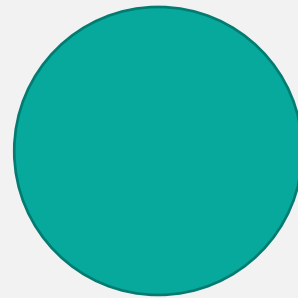
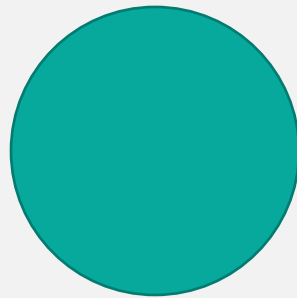
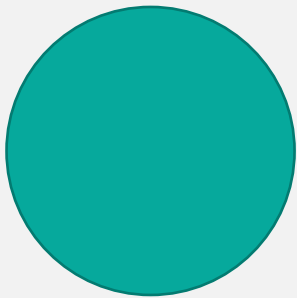
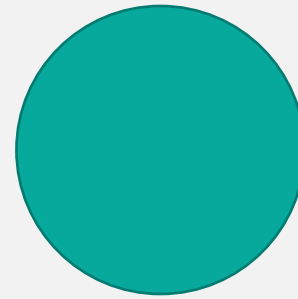
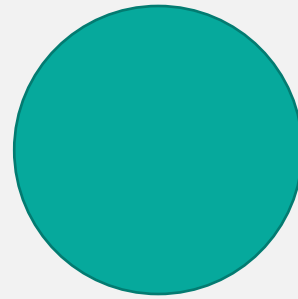
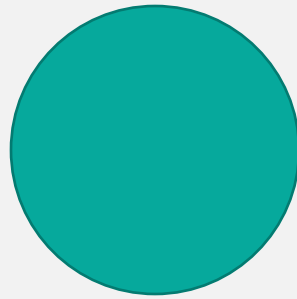
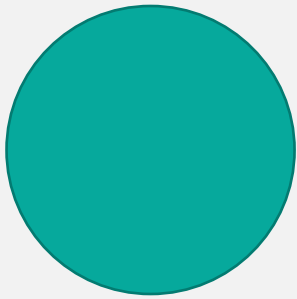
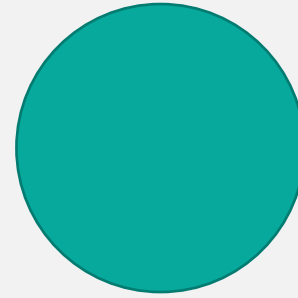
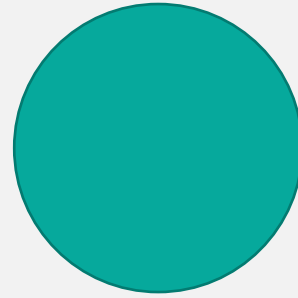
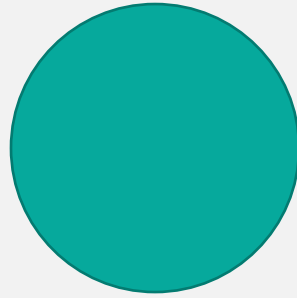
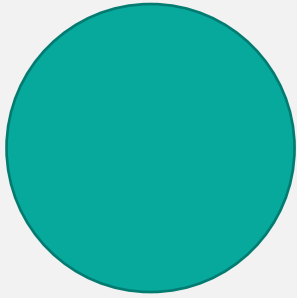


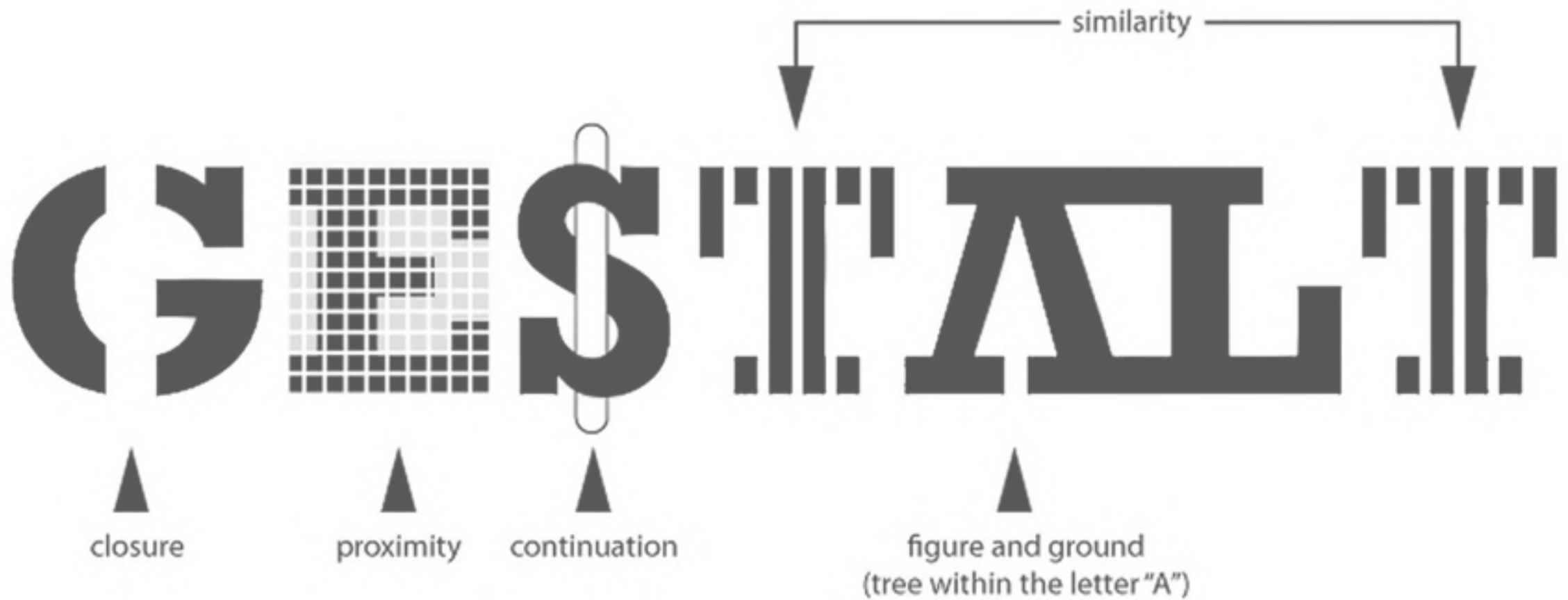


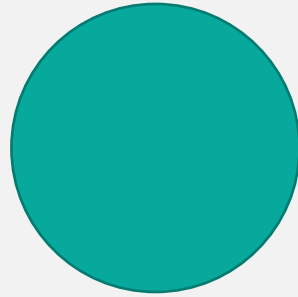
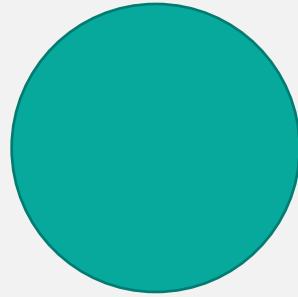
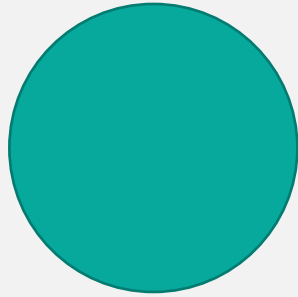
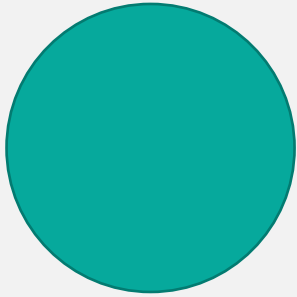
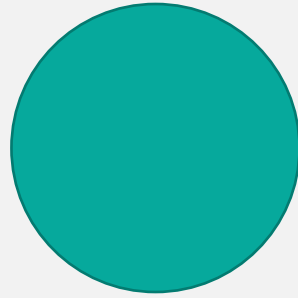
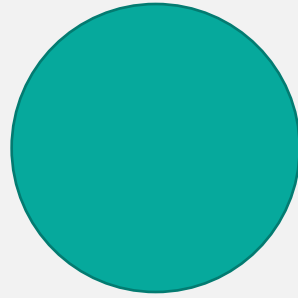
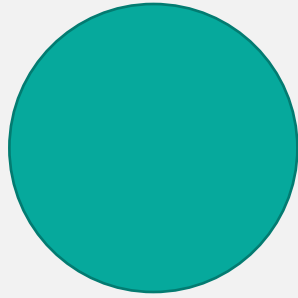
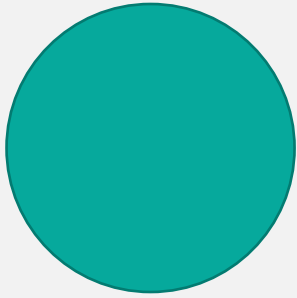
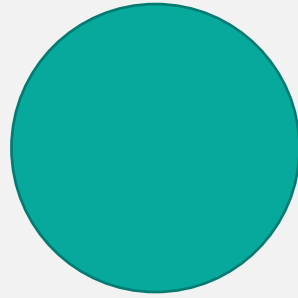
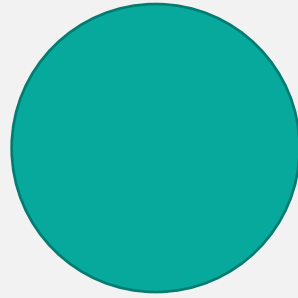
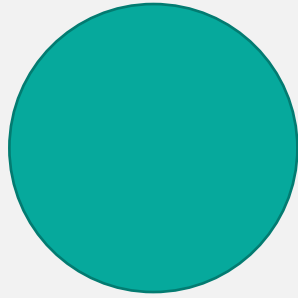
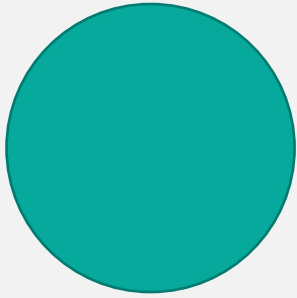
Protip: don't make objects equal
if the **objects aren't equal**
(according to some measure)

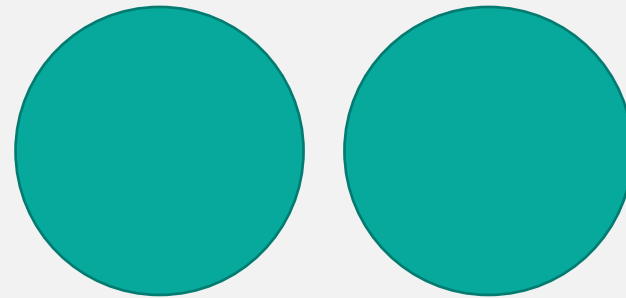
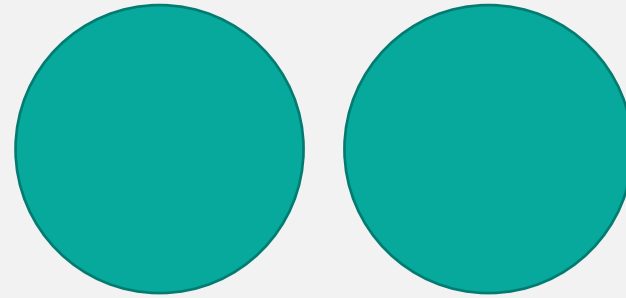
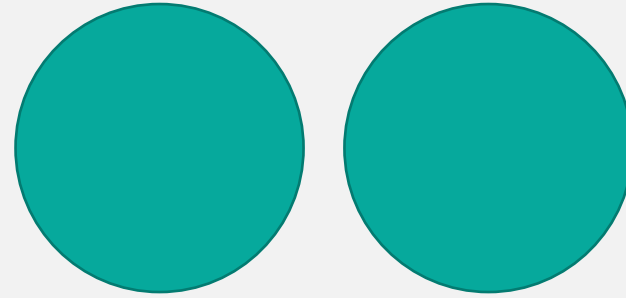
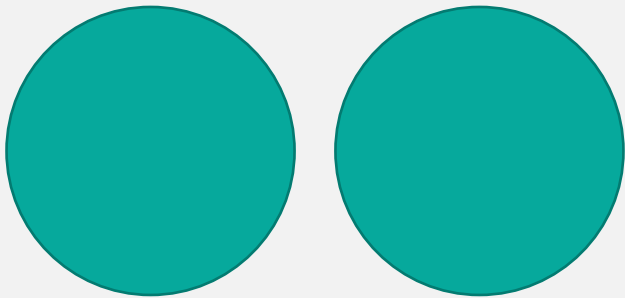
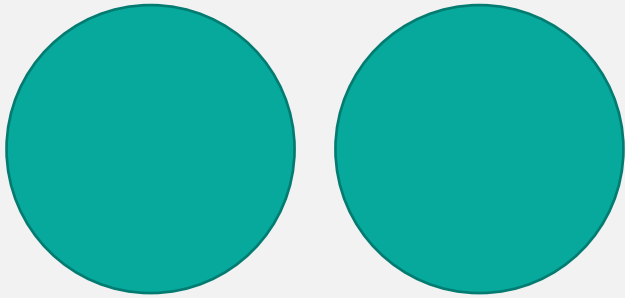
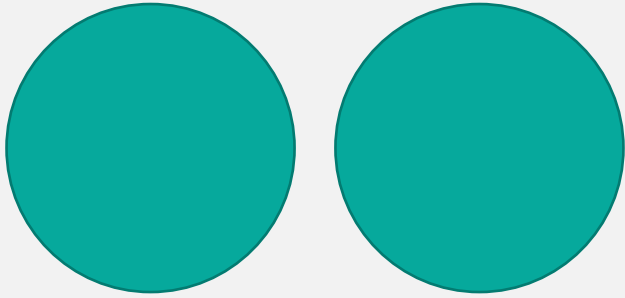
And since not everybody is here:
don't assume that objects
are equal if they look equal

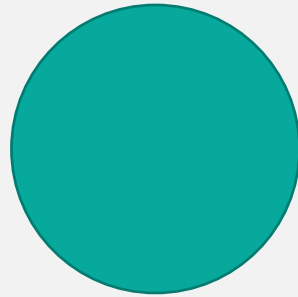
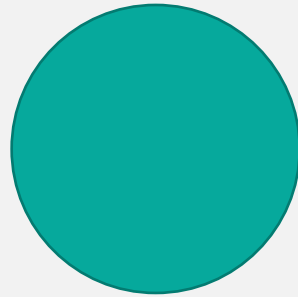
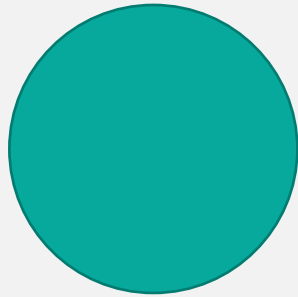
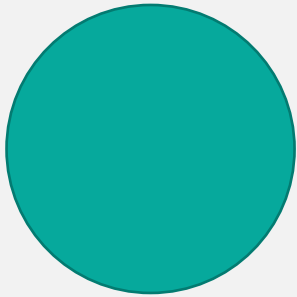
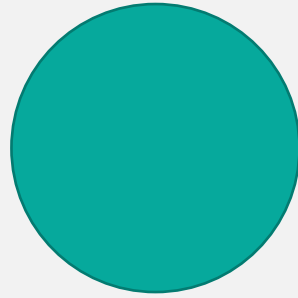
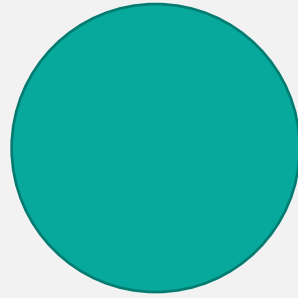
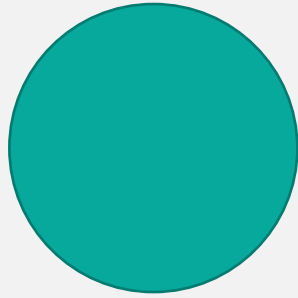
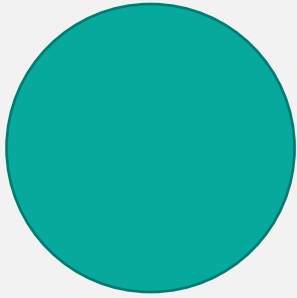


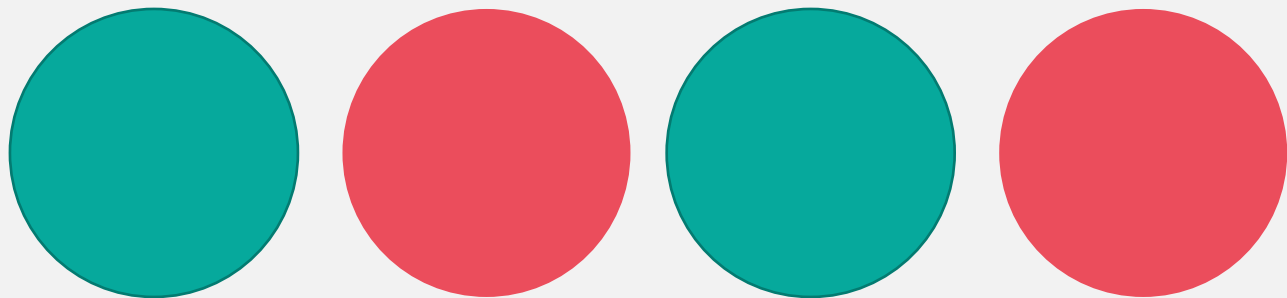
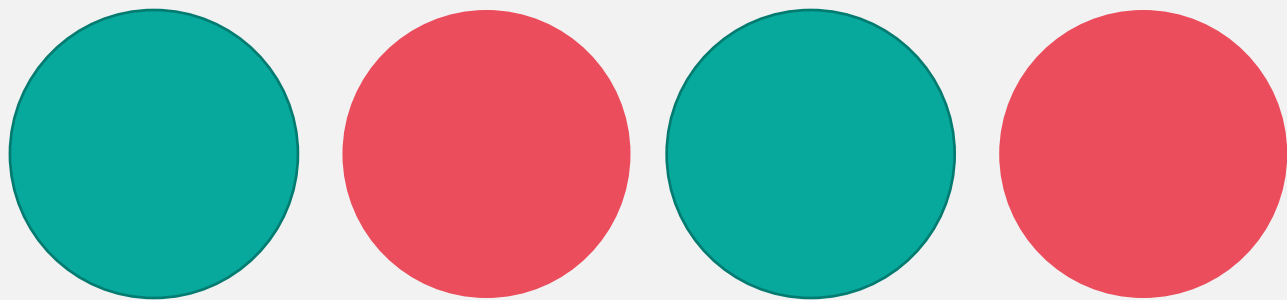
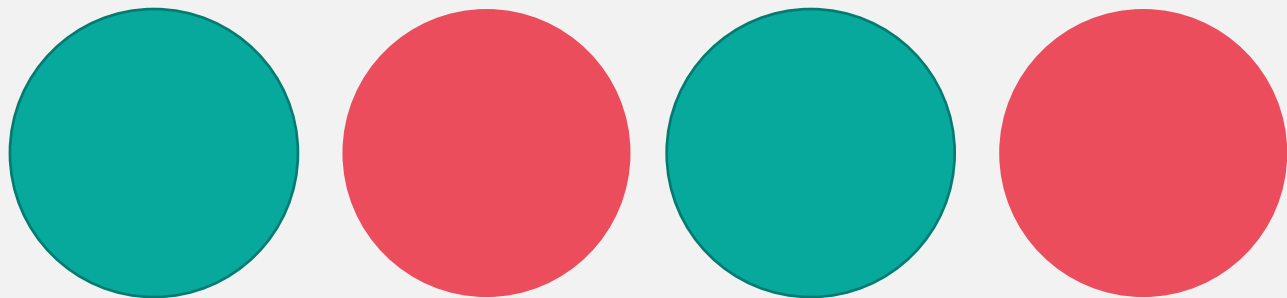


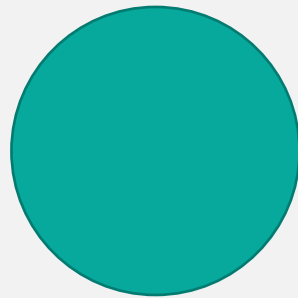
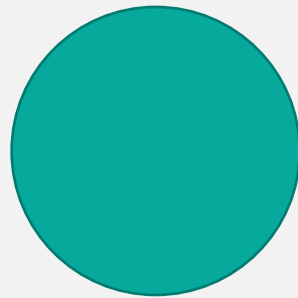
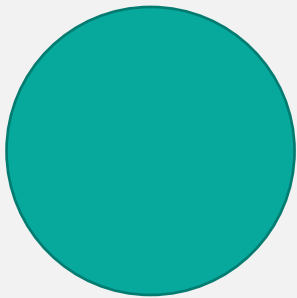
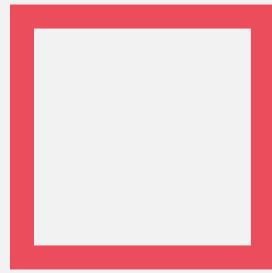
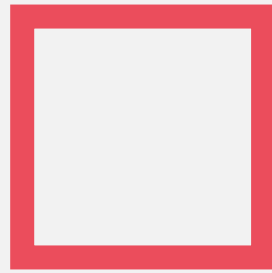
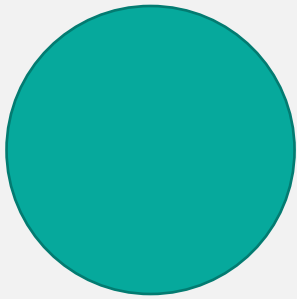
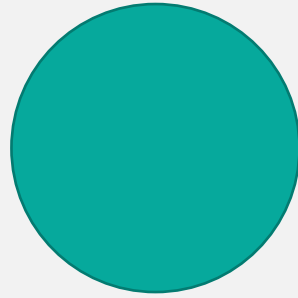
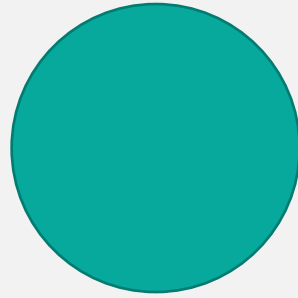
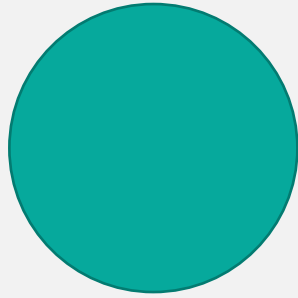
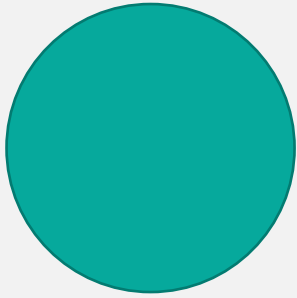


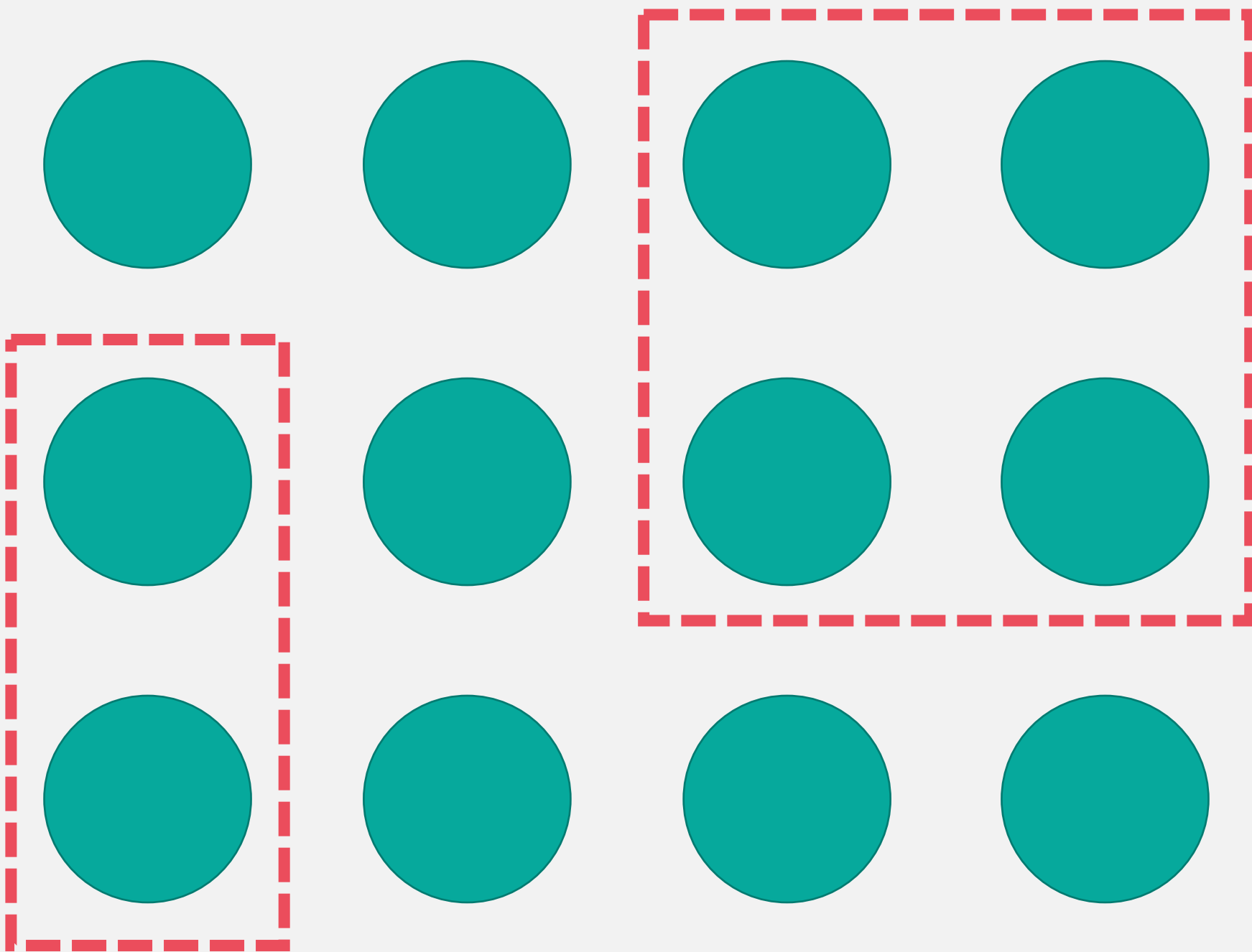


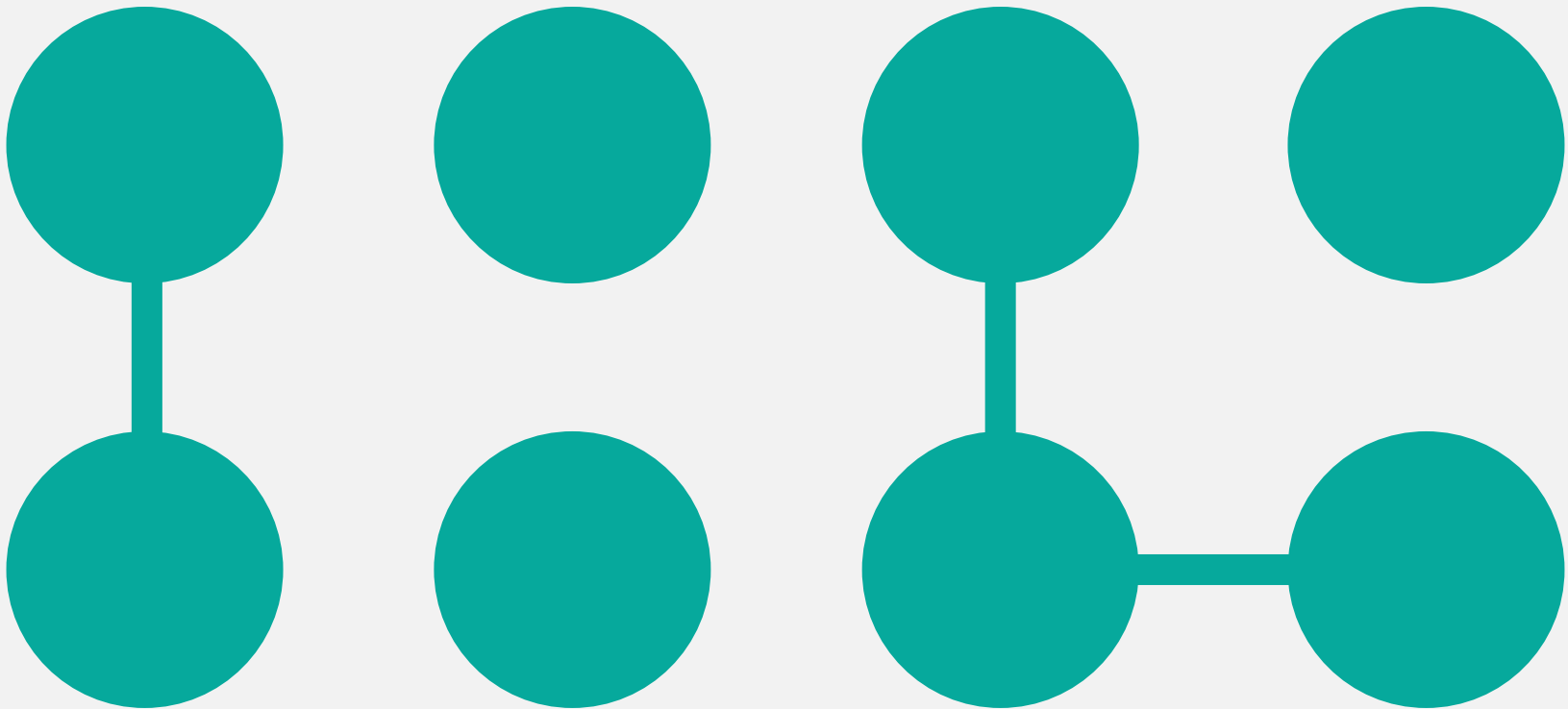
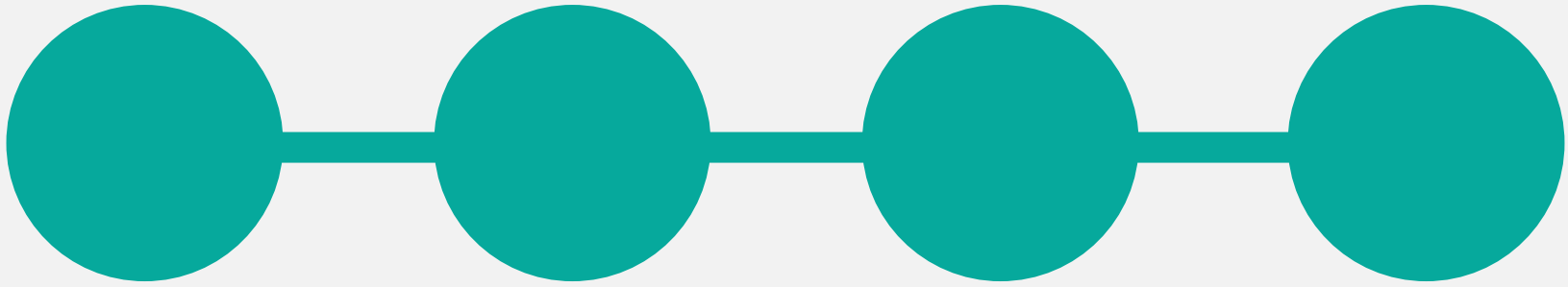


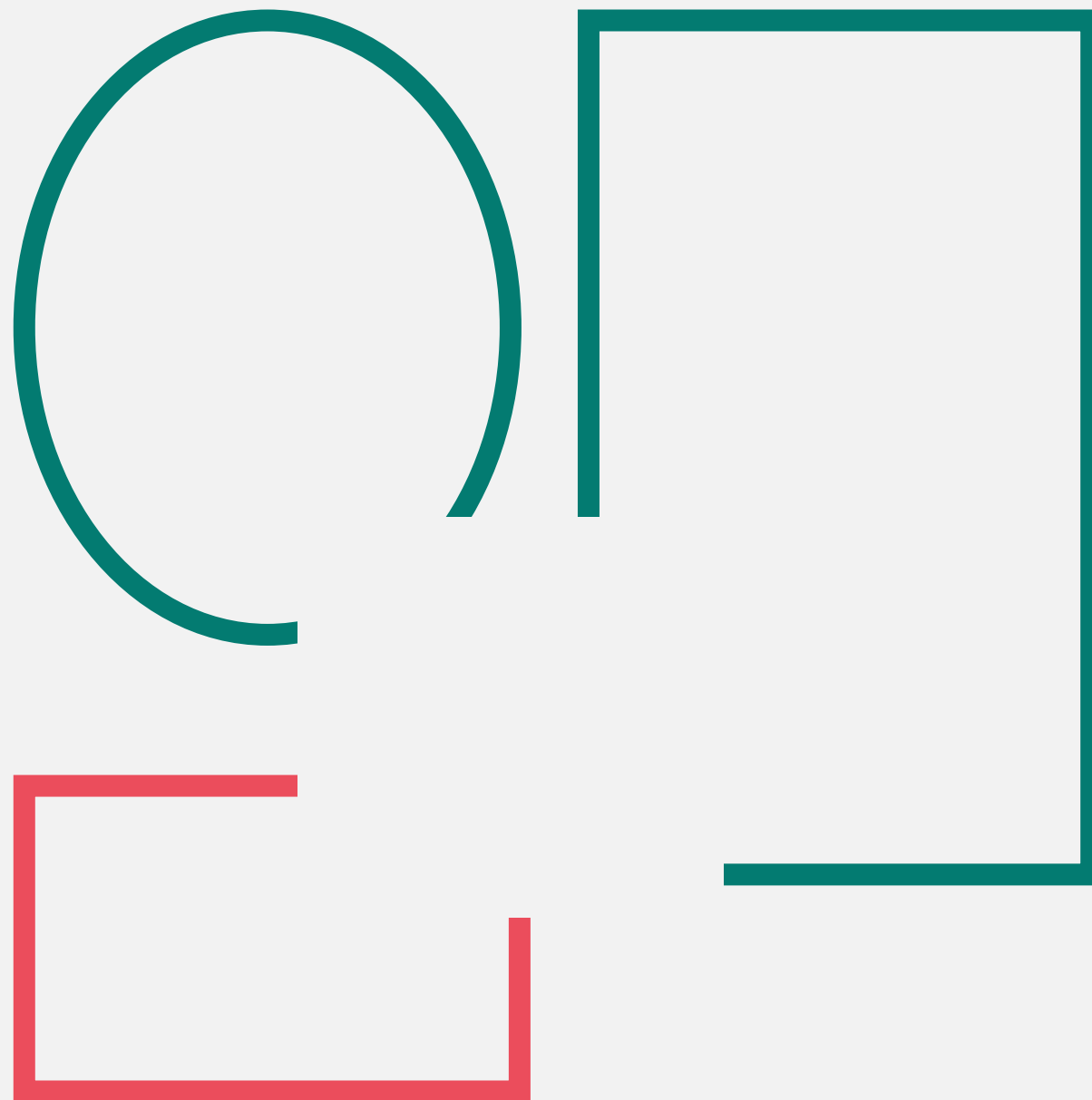


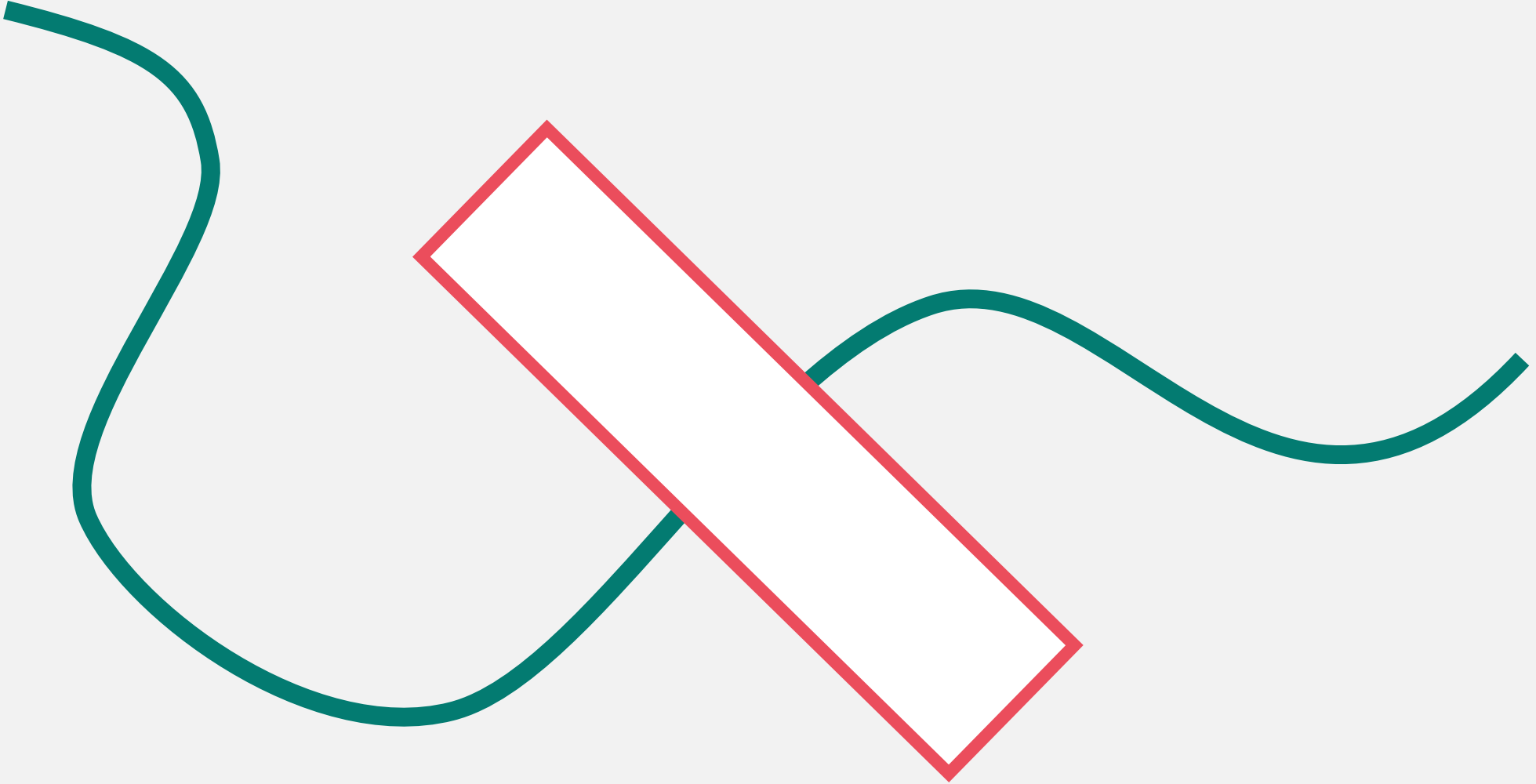




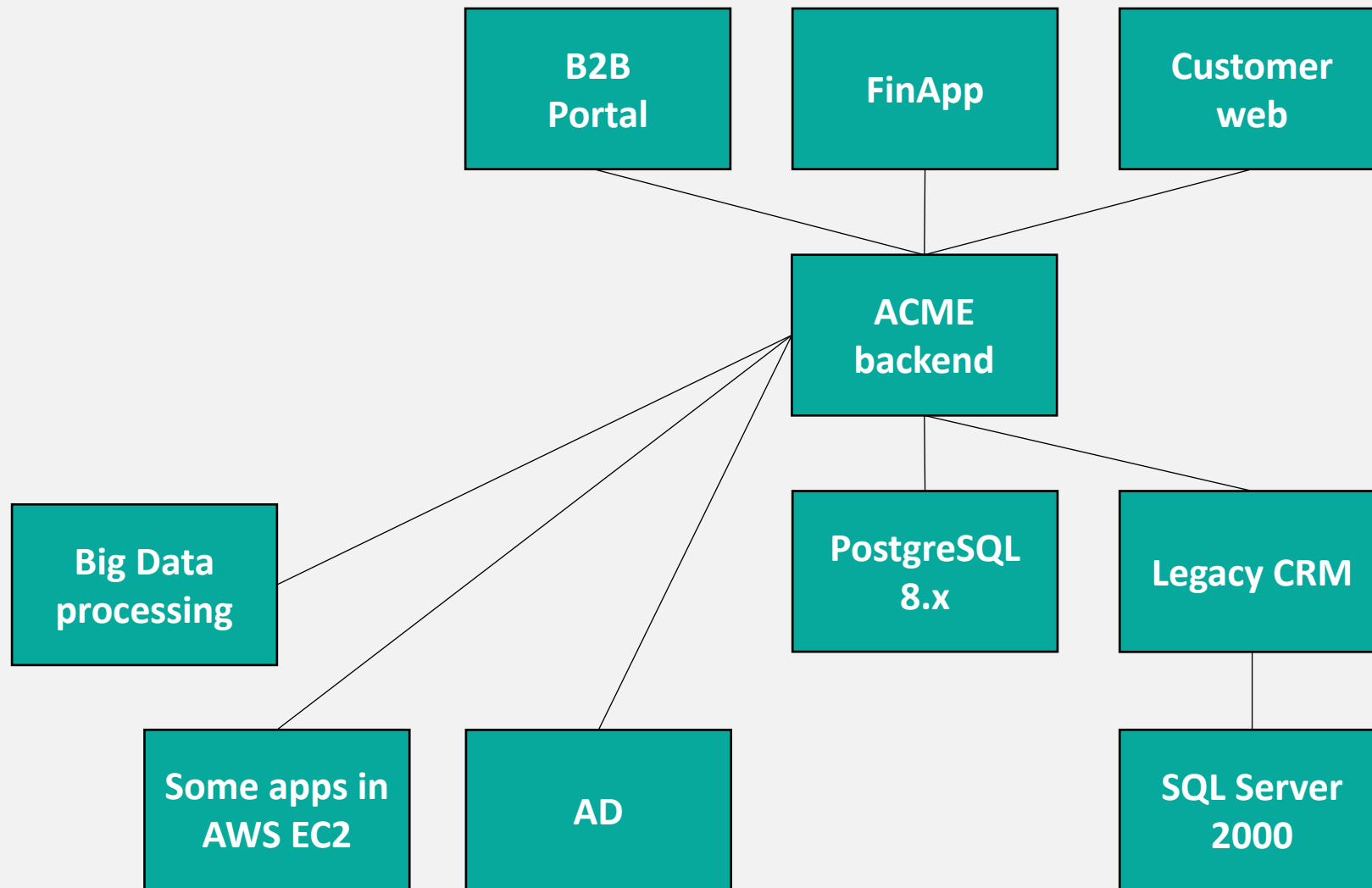


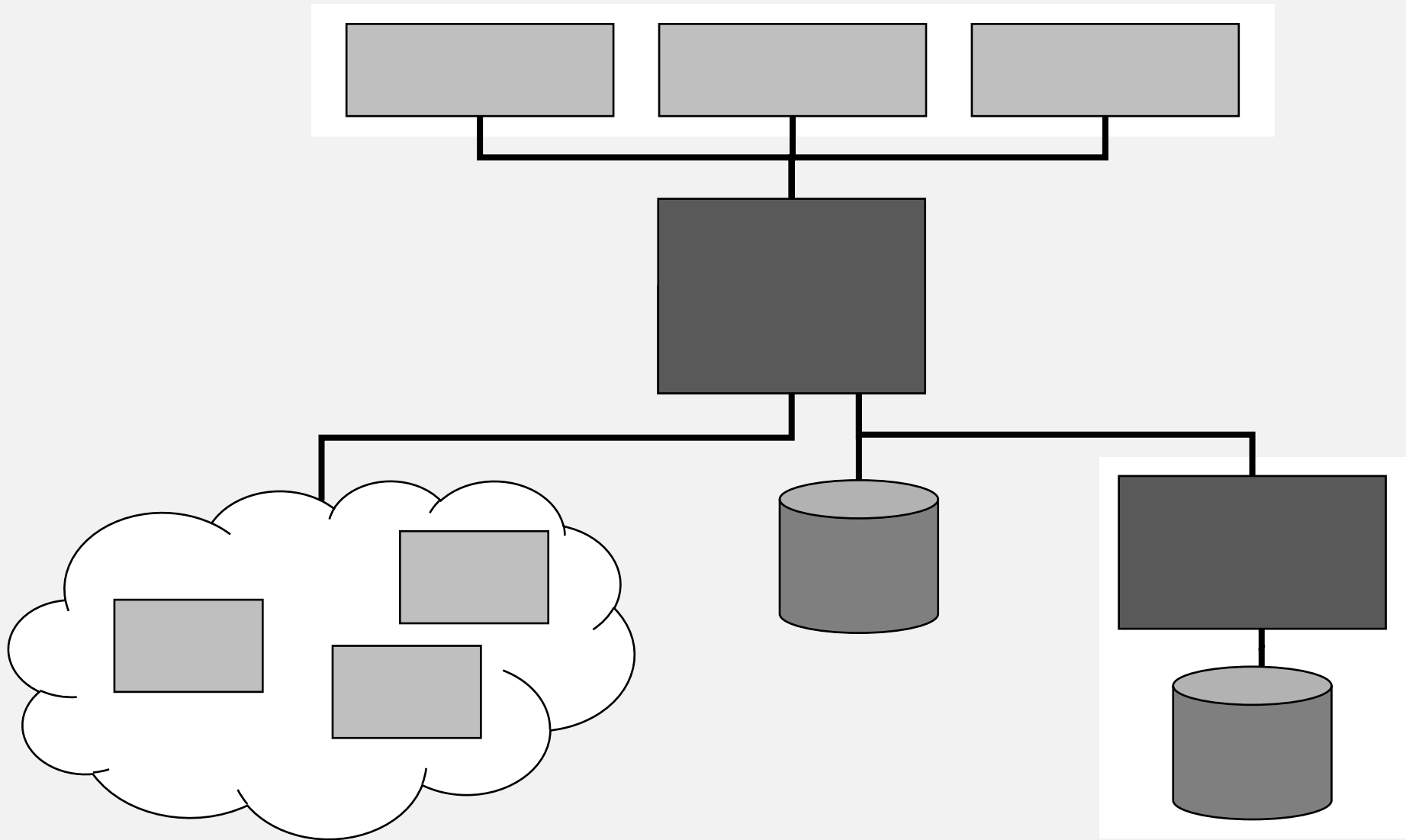


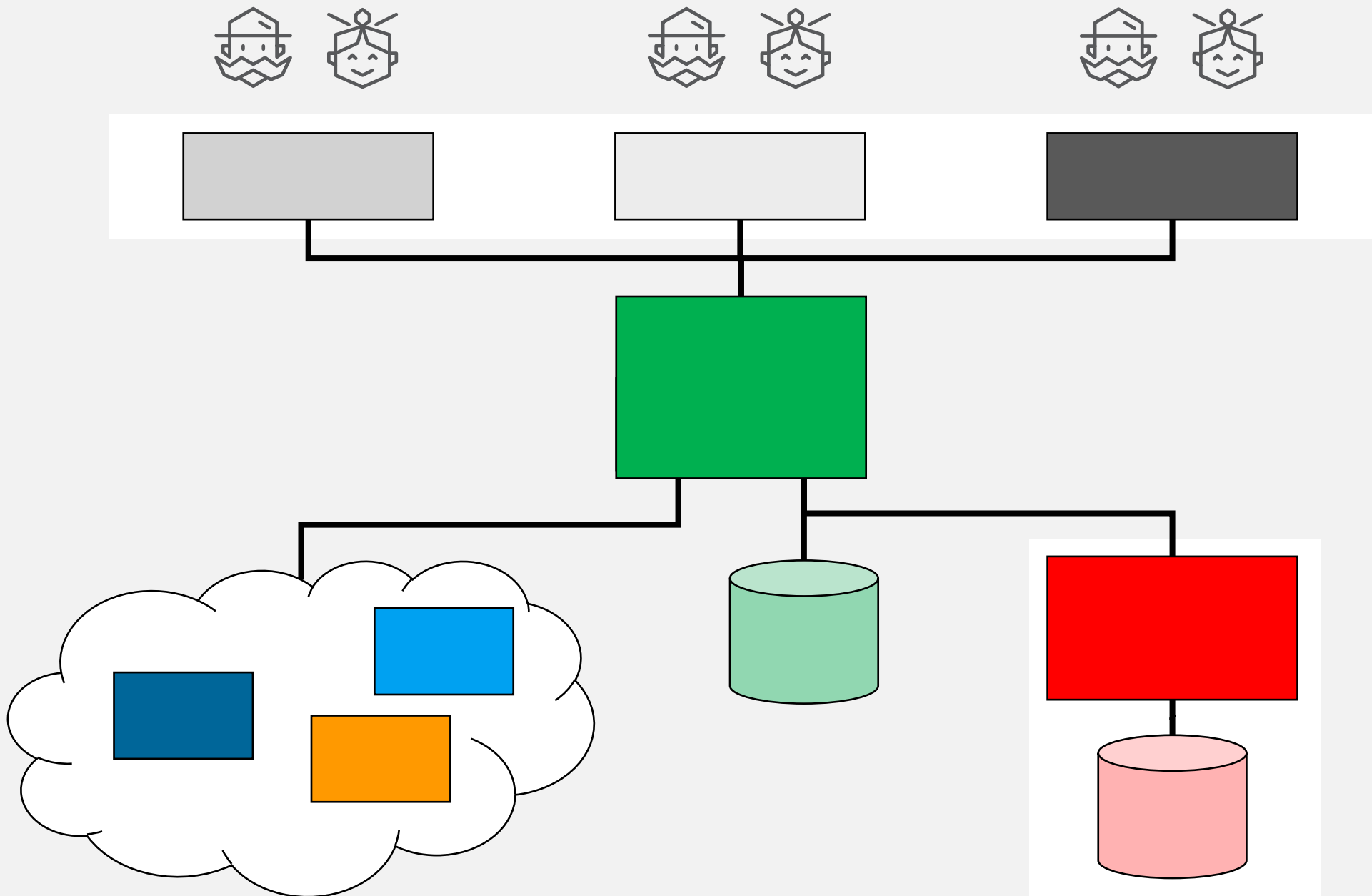




Protip: group things
when things are alike
(again, according to some measure)









Weekends: No service between Manhattan and Brooklyn

Weekends: No   service at
Park Place, Wall St, Clark St, Hoyt St
Use nearby   stations



1



Soda

2



Soda

3



Fuel

4



Social Network

5



Hamburgers

6



Coffee

7



Computers

8



Social Network

9



Search Engine

10



Search Engine

11



Luxury Cars

12



Social Network

Wealth
Wisdom
Royalty

Trust
Confidence
Stability

Safety
Harmony
Healthy

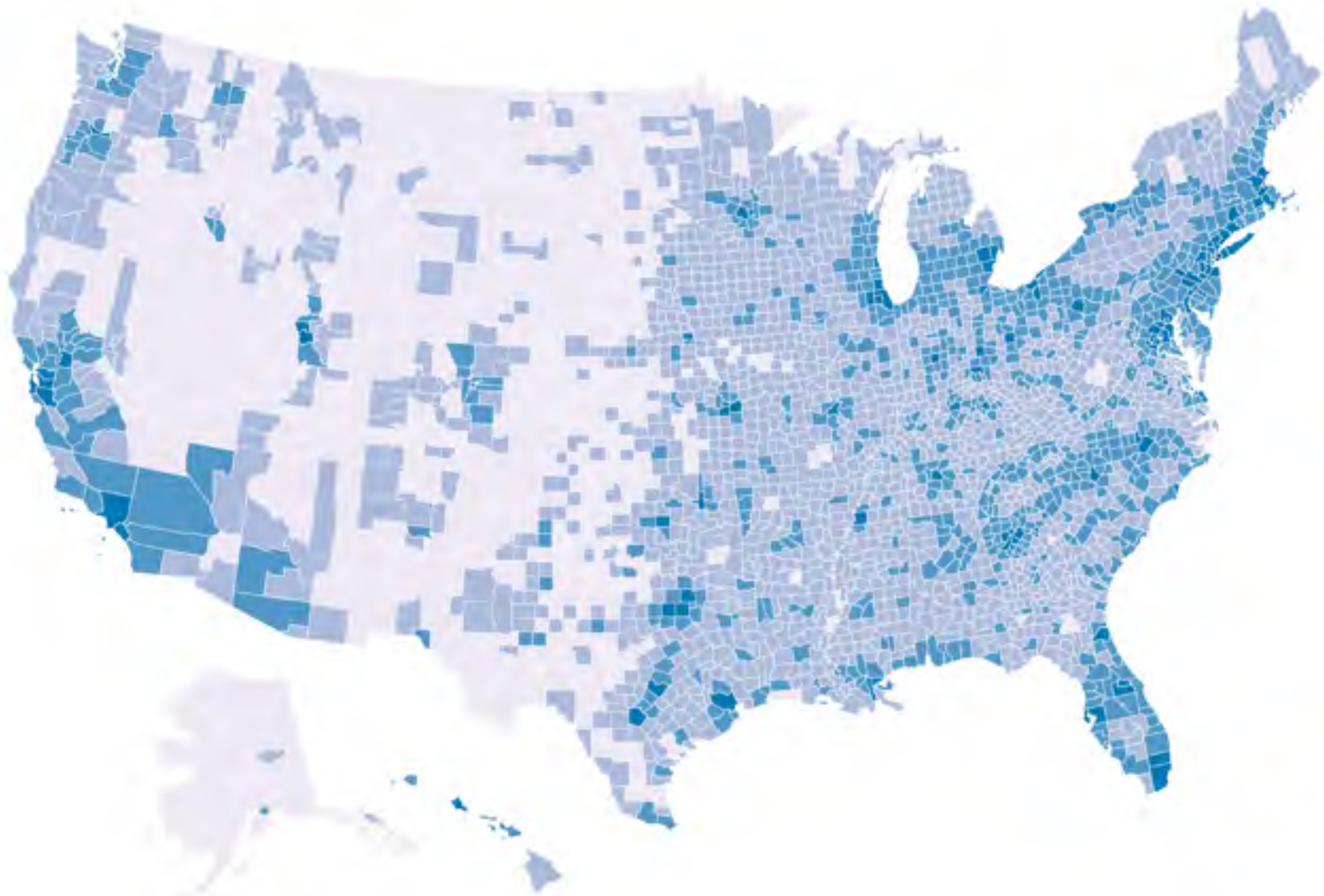
Clean
Purity
Light

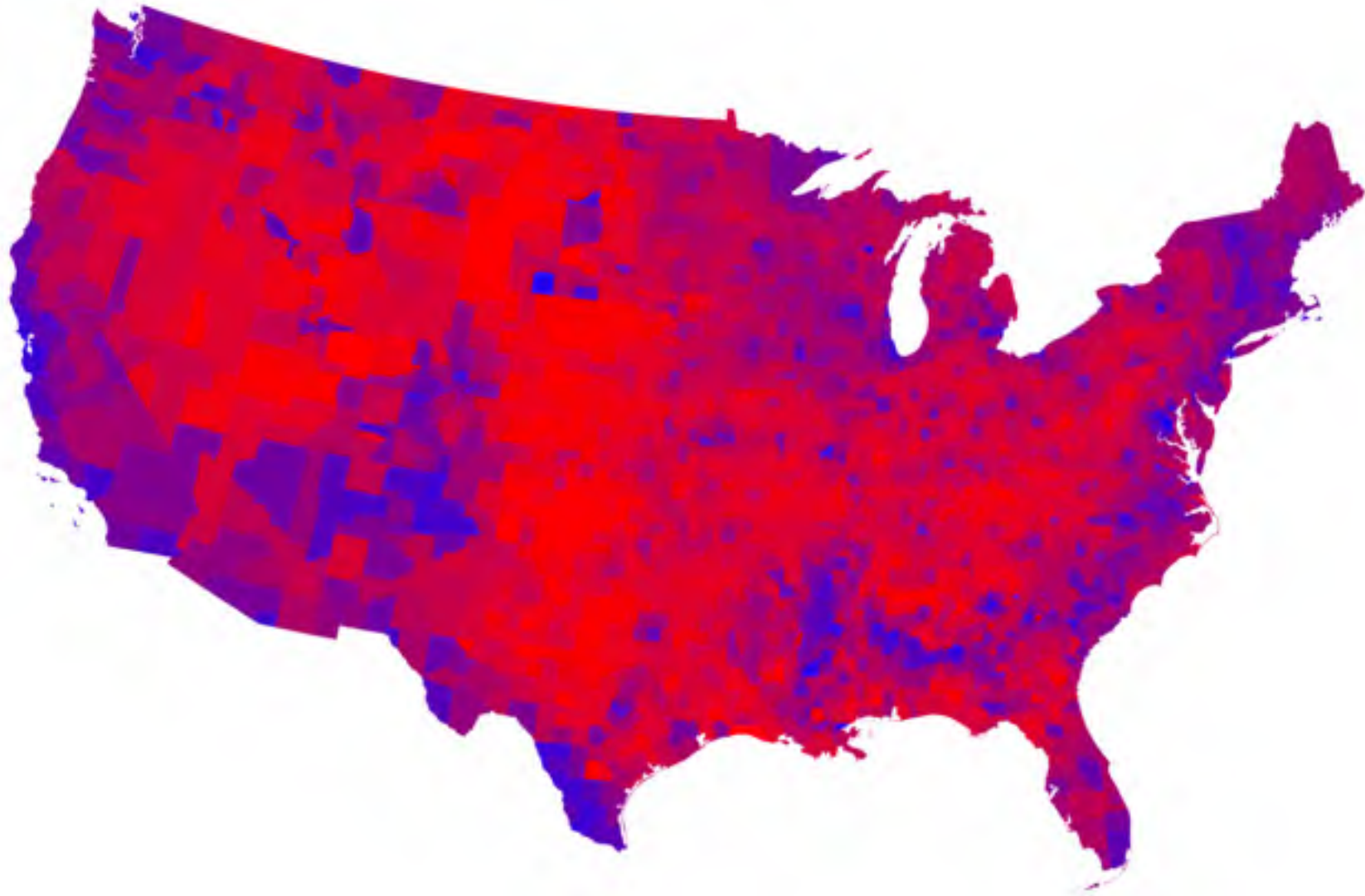
Energy
Attention
Happy

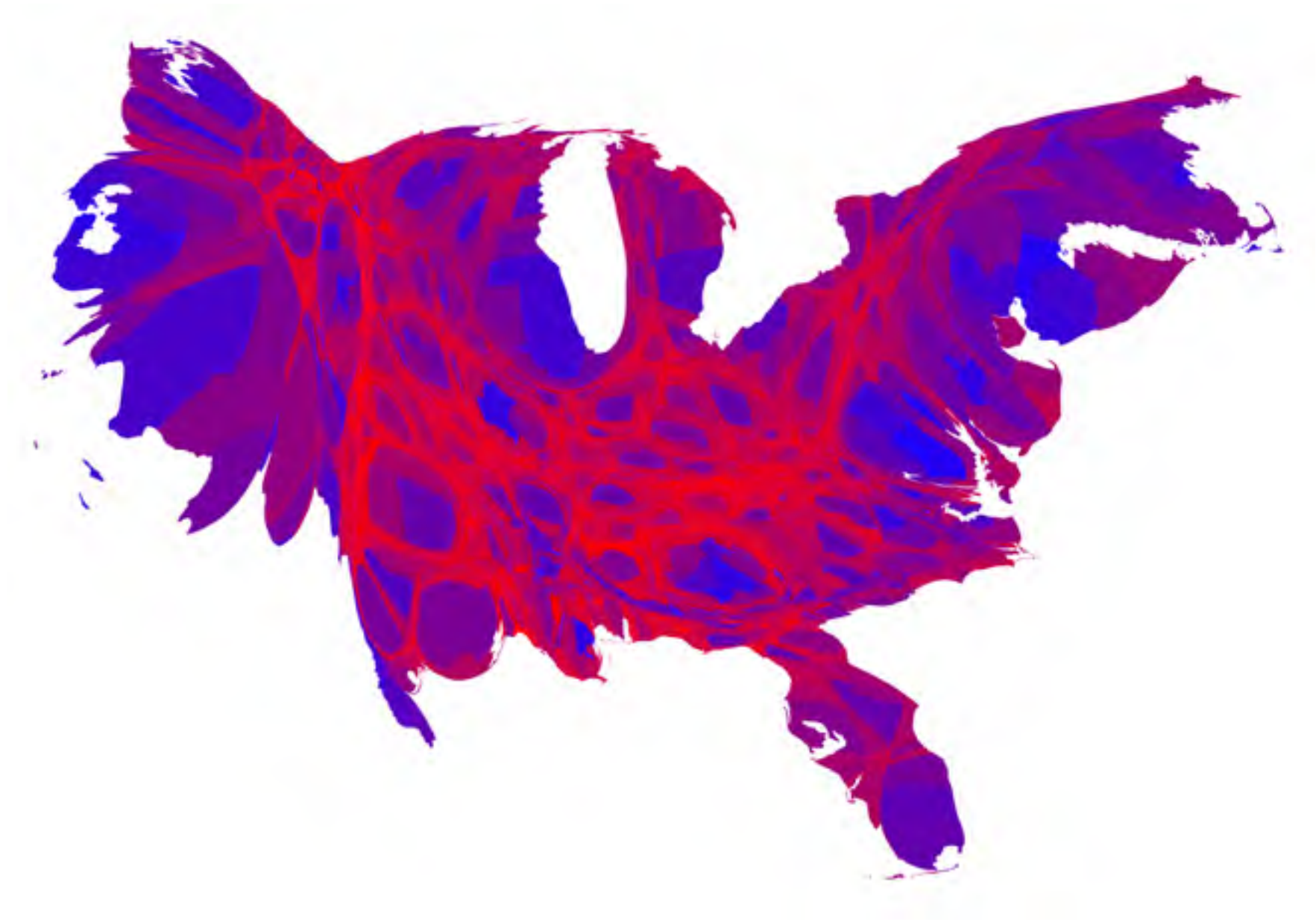
Success
Enthusiasm
Creativity

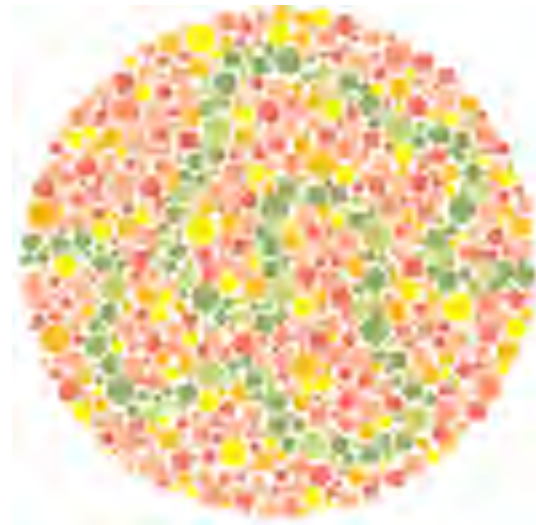
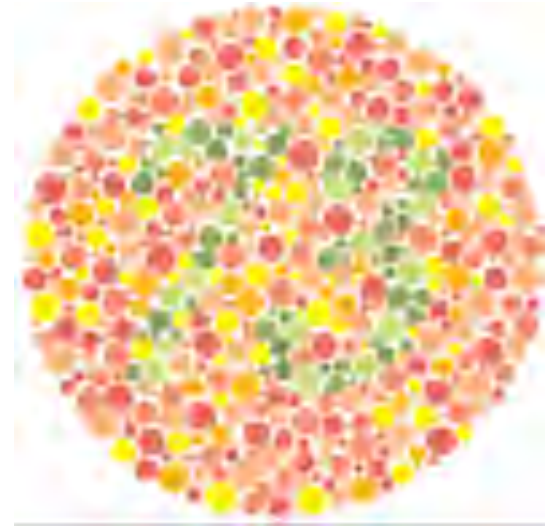
Passion
Strength
Energy

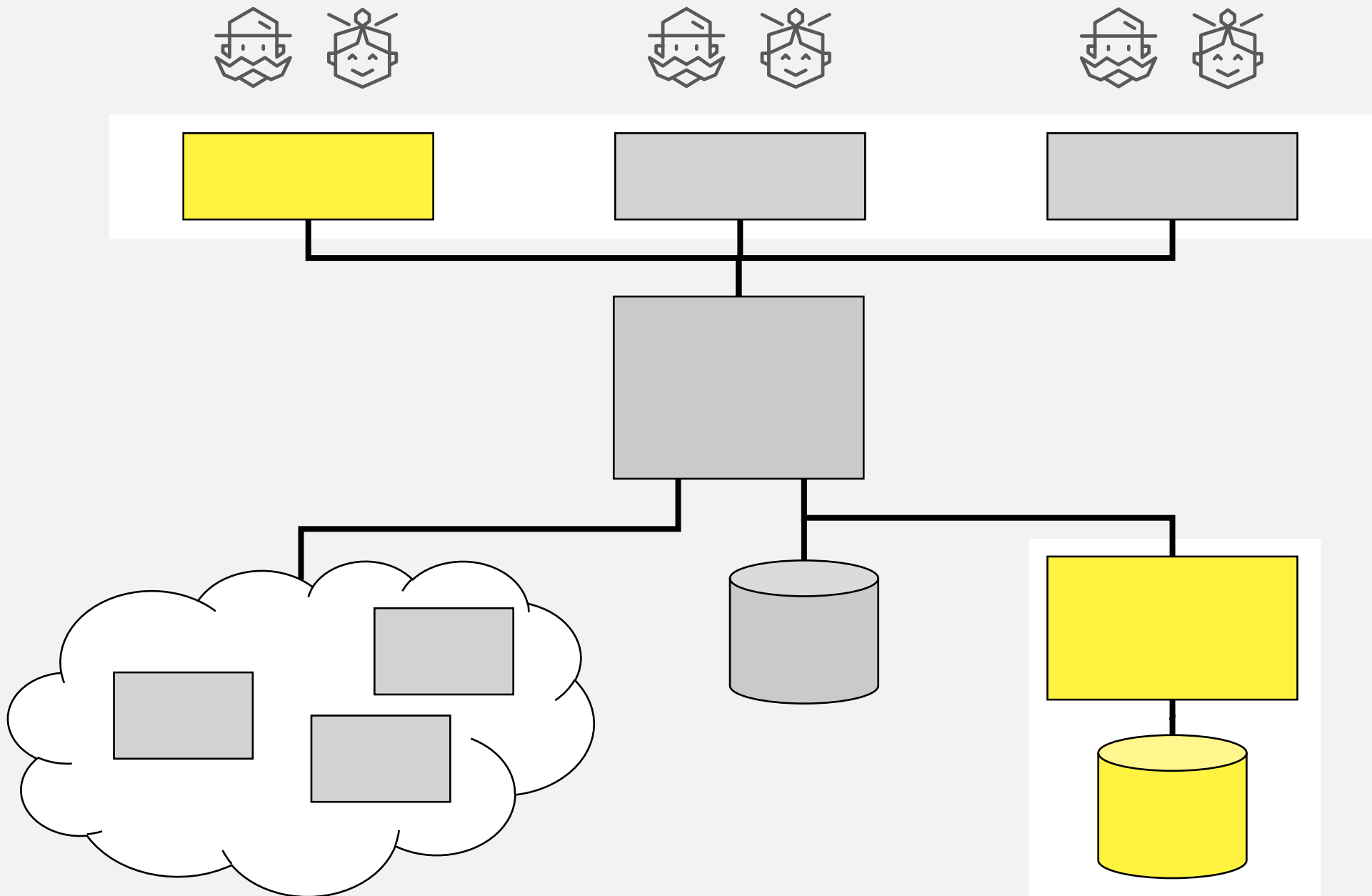
Mystery
Elegance
Power

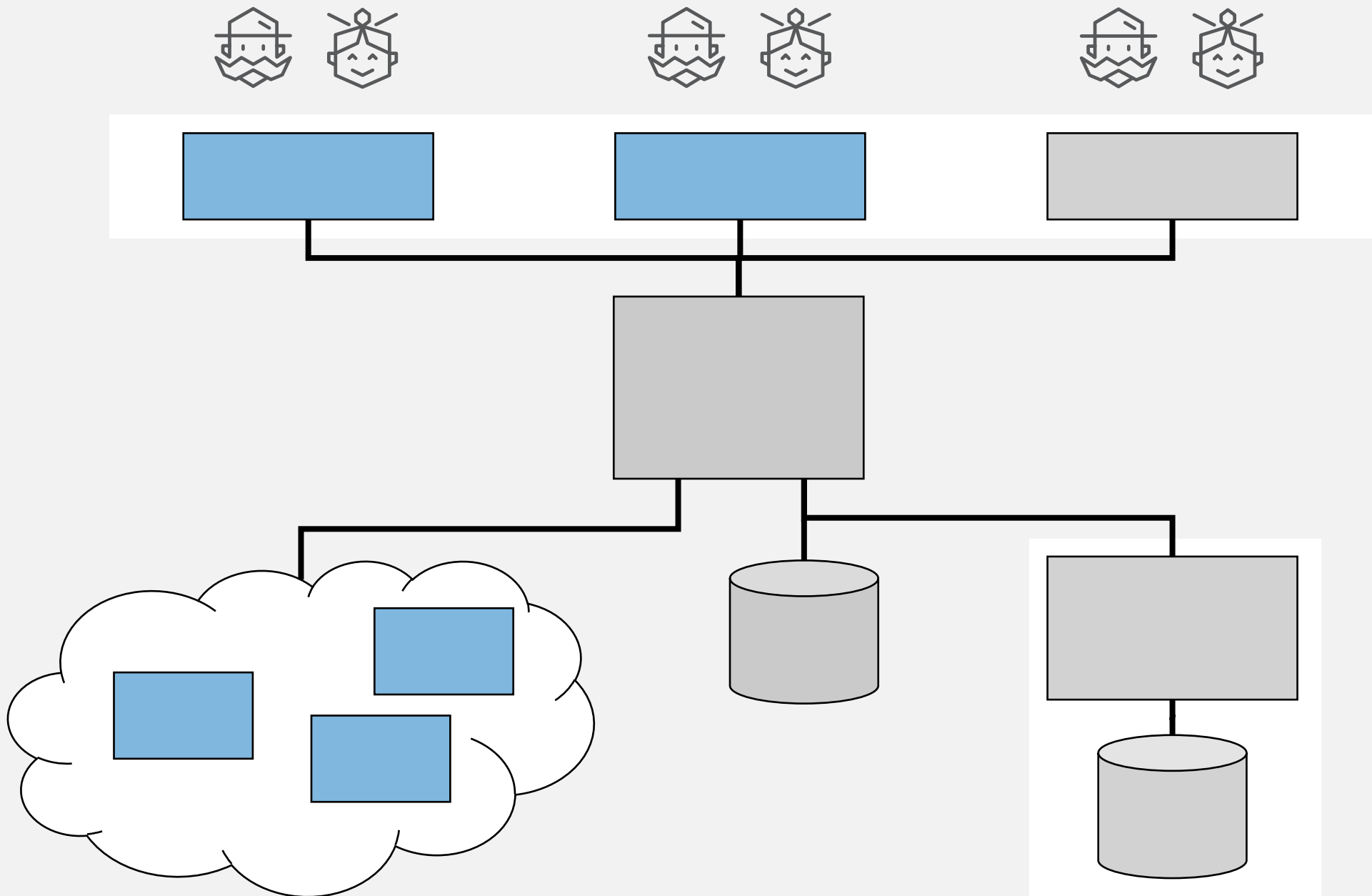


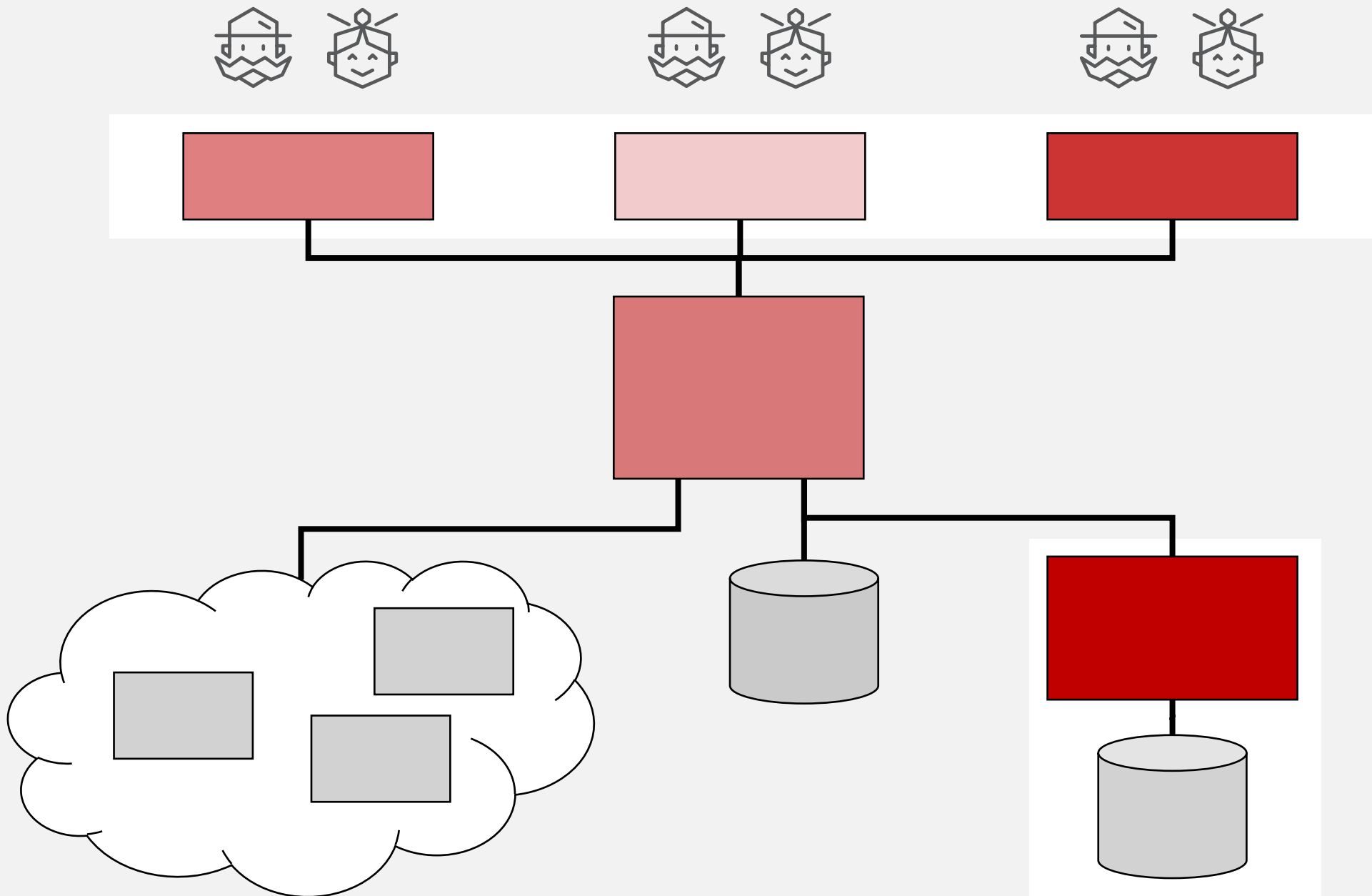






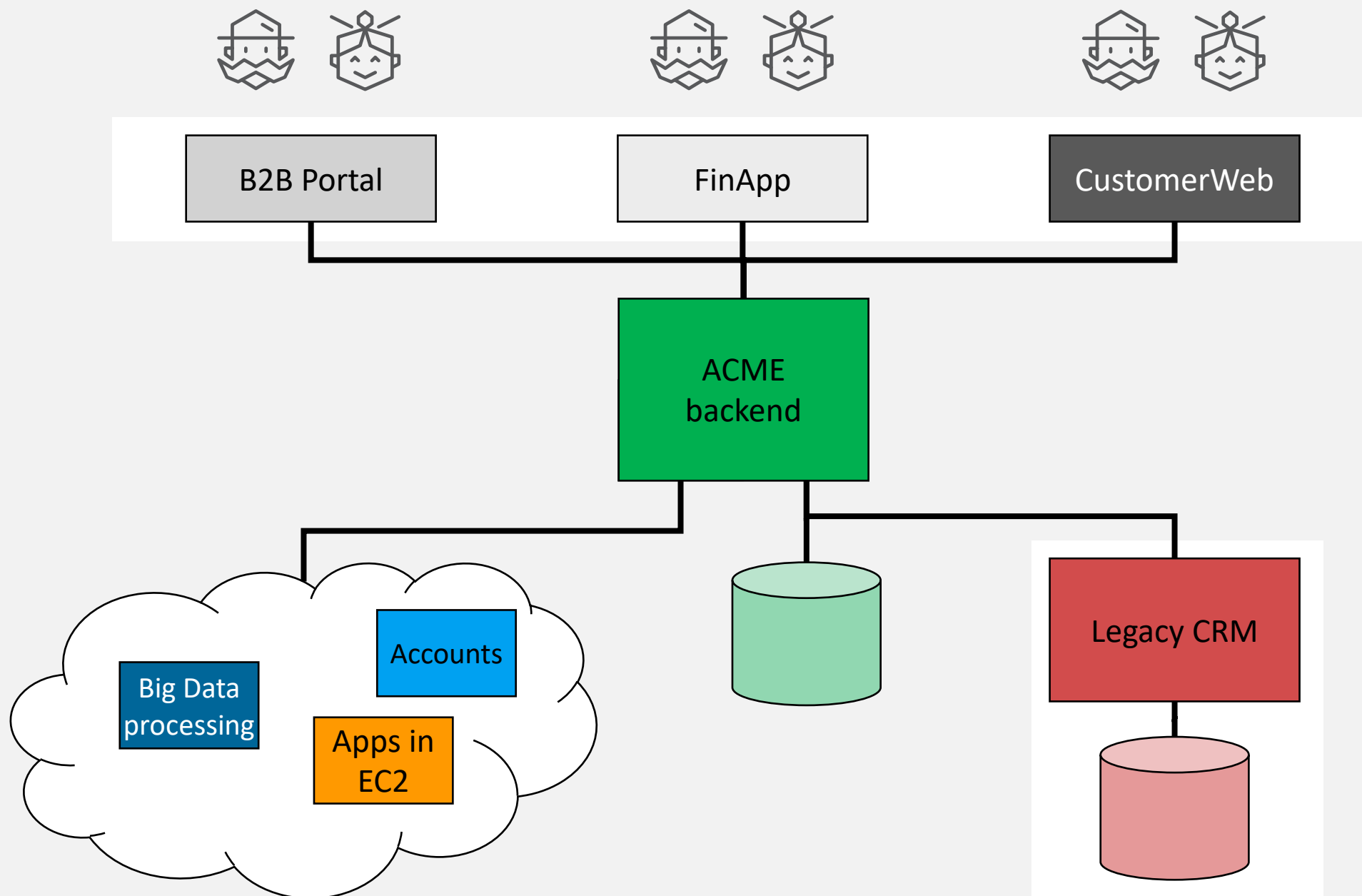






Protip: use color to convey
or **boost your message**

(but use it wisely, and not just to prettify)



users

~80k

560

27

uptime

99.7%

open defects

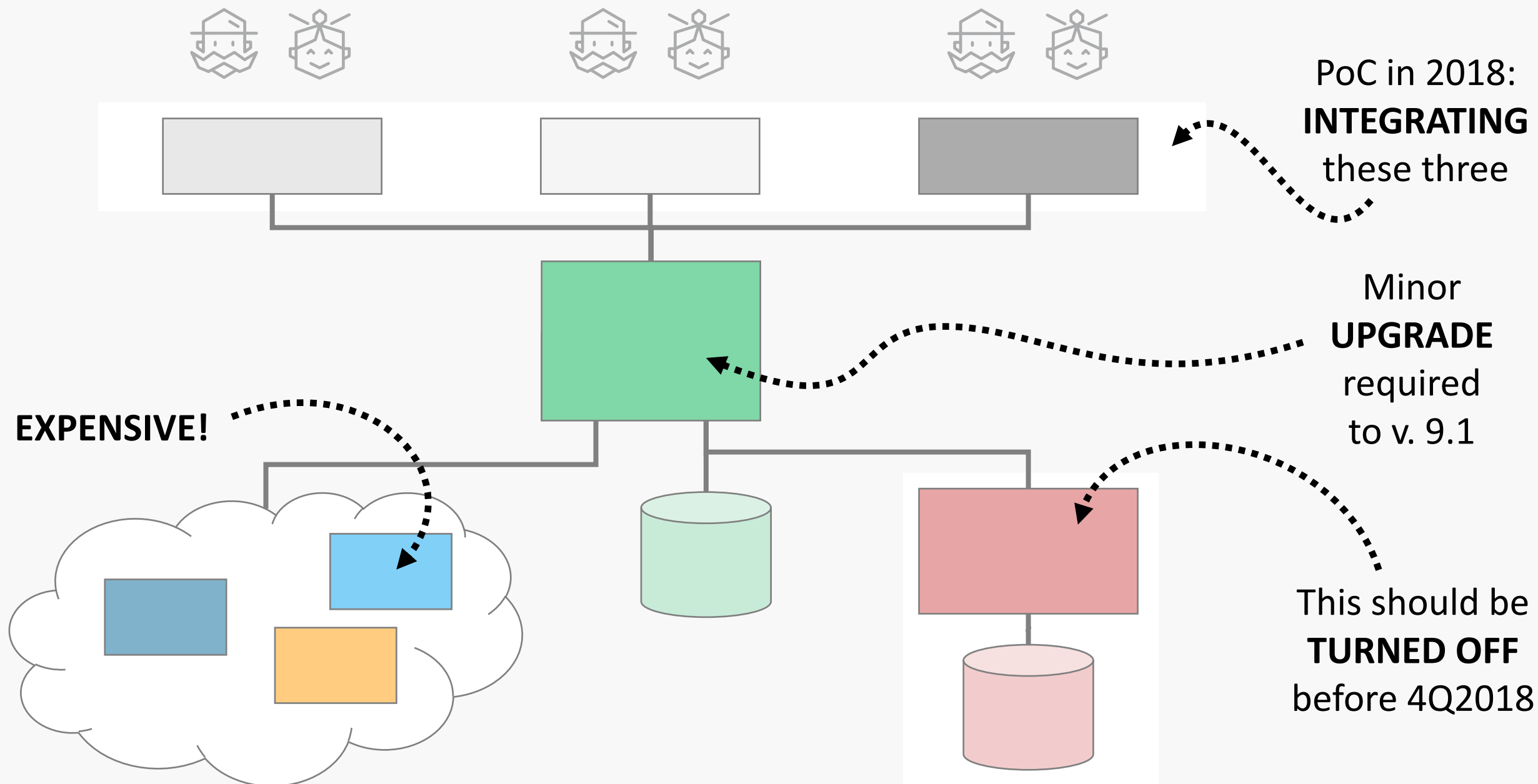
176

ACME's IT - today

Version 0.8

Feb. 27, 2018

author@acme.org



just right

*very creative,
not readable*

too few

this is way, way
too much text to
convey such
a simple tip

too small

suitable

o large

boring,
and ugly

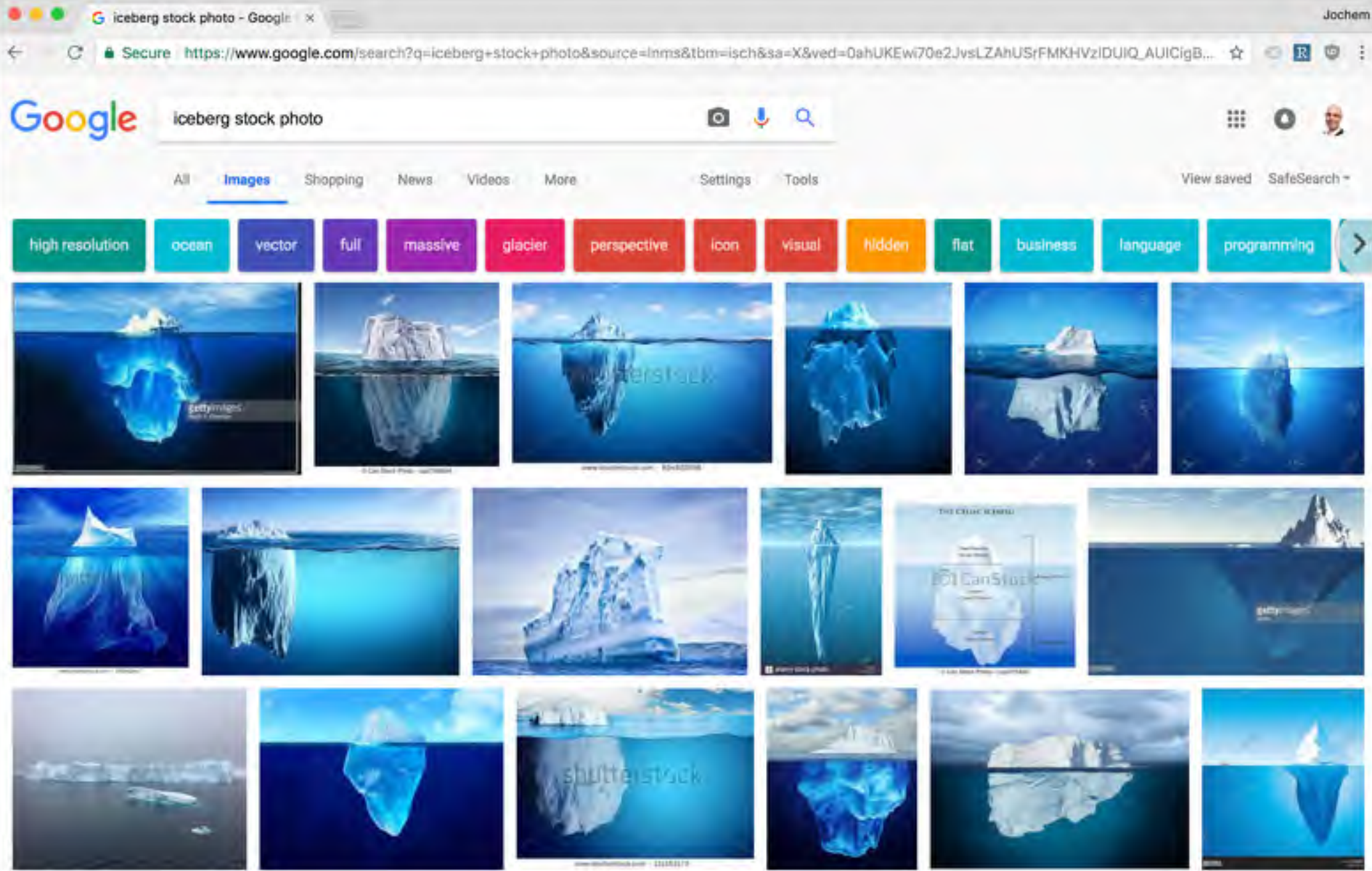
Ascender Descender
Do not Stem Tail Serif
Crossbar **Use** Counter
Eye Terminal **Jargon**
Condensed Kerning

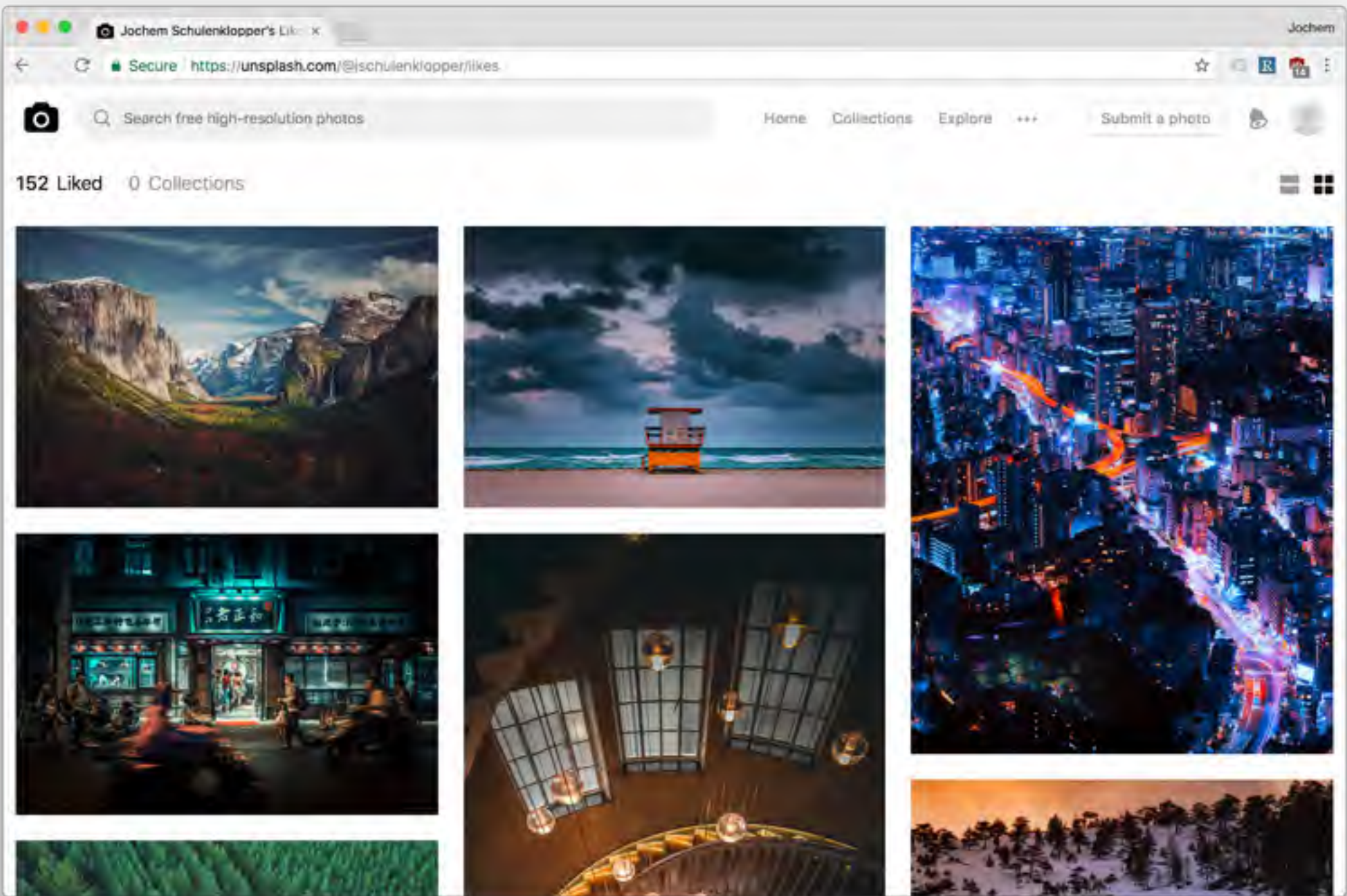
Protip: K.I.S.S.

(and do not use jargon)

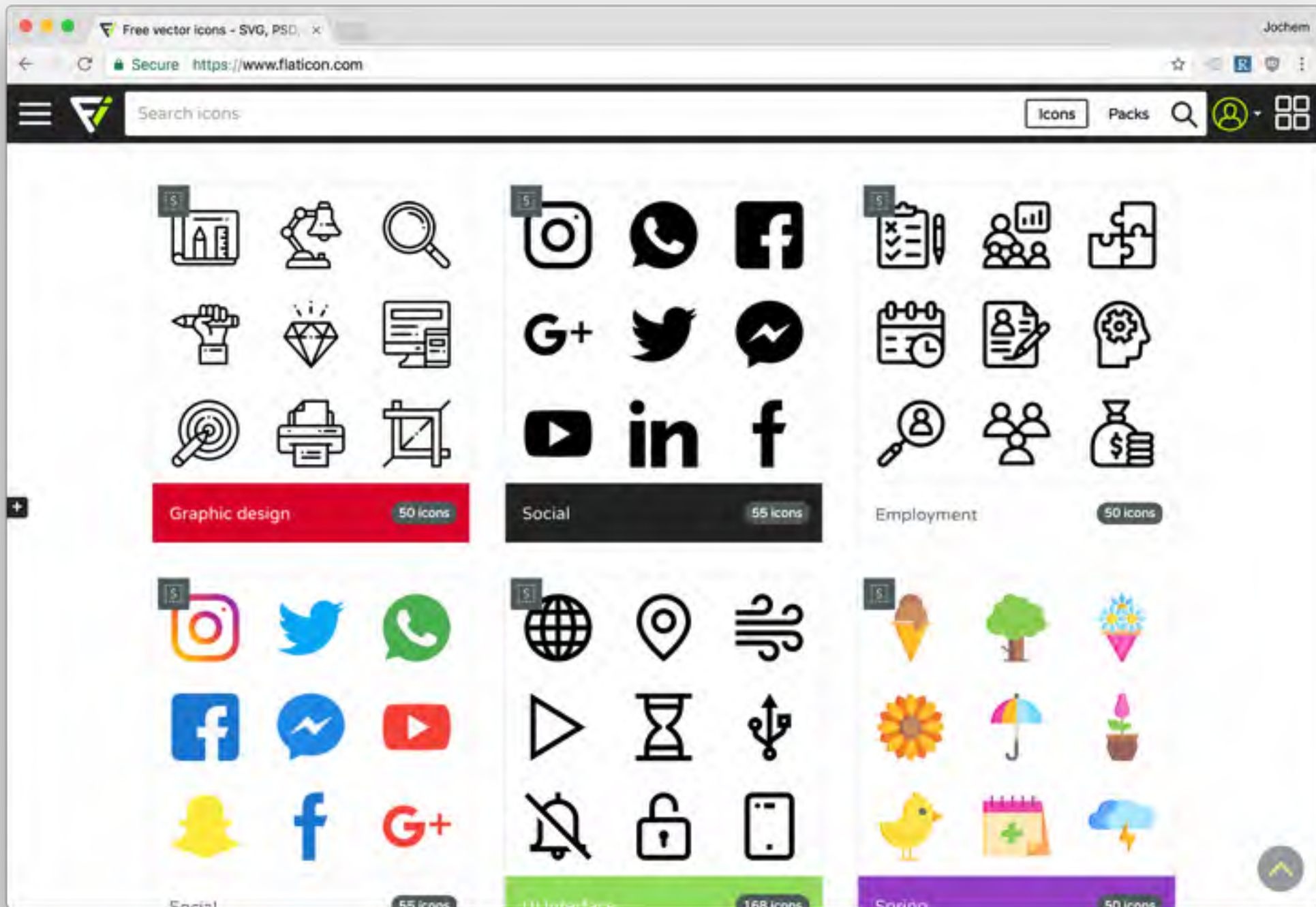
Yes, that's a joke. "K.I.S.S." is jargon.



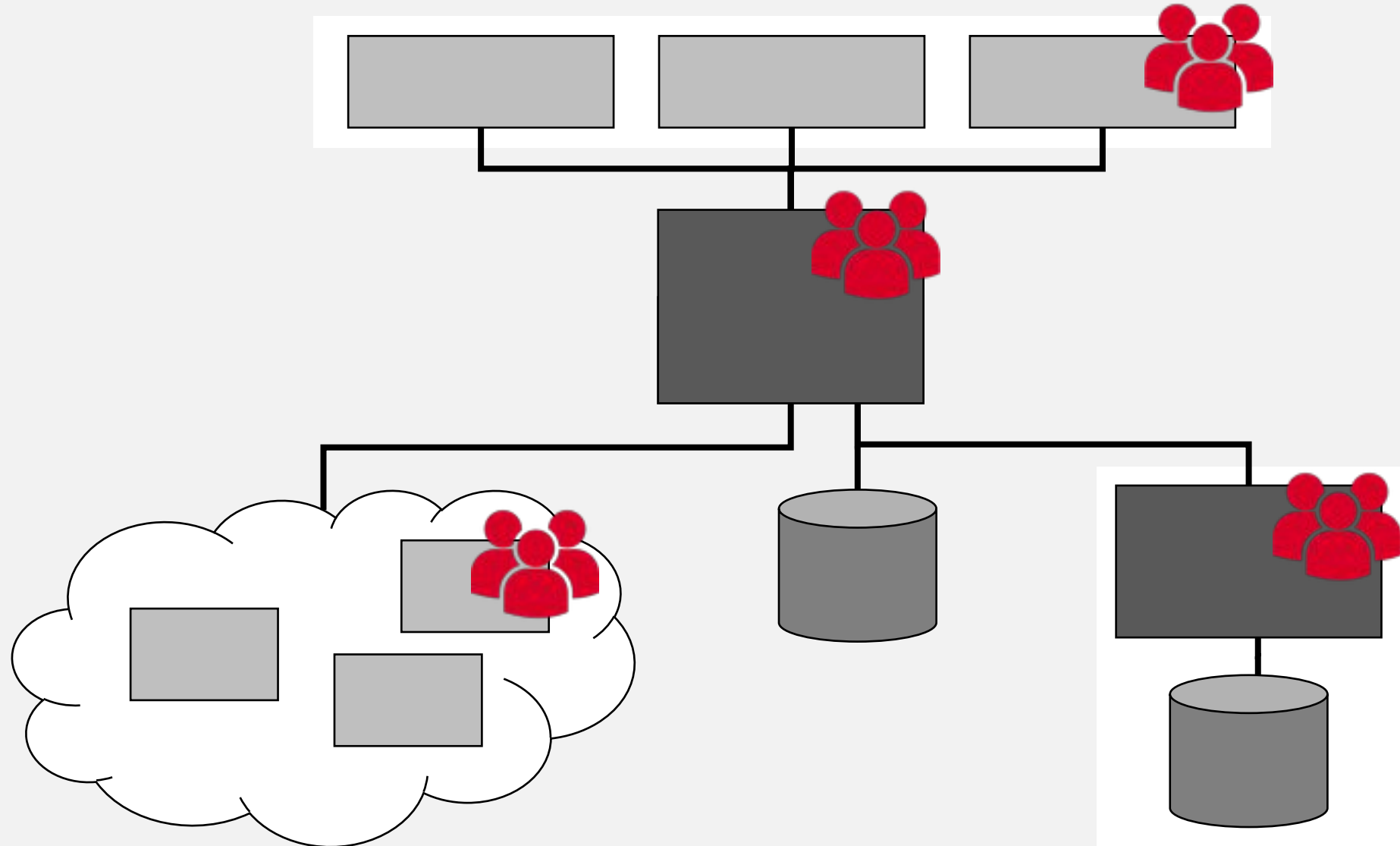








GDPR anyone? Where's our "personal data"?

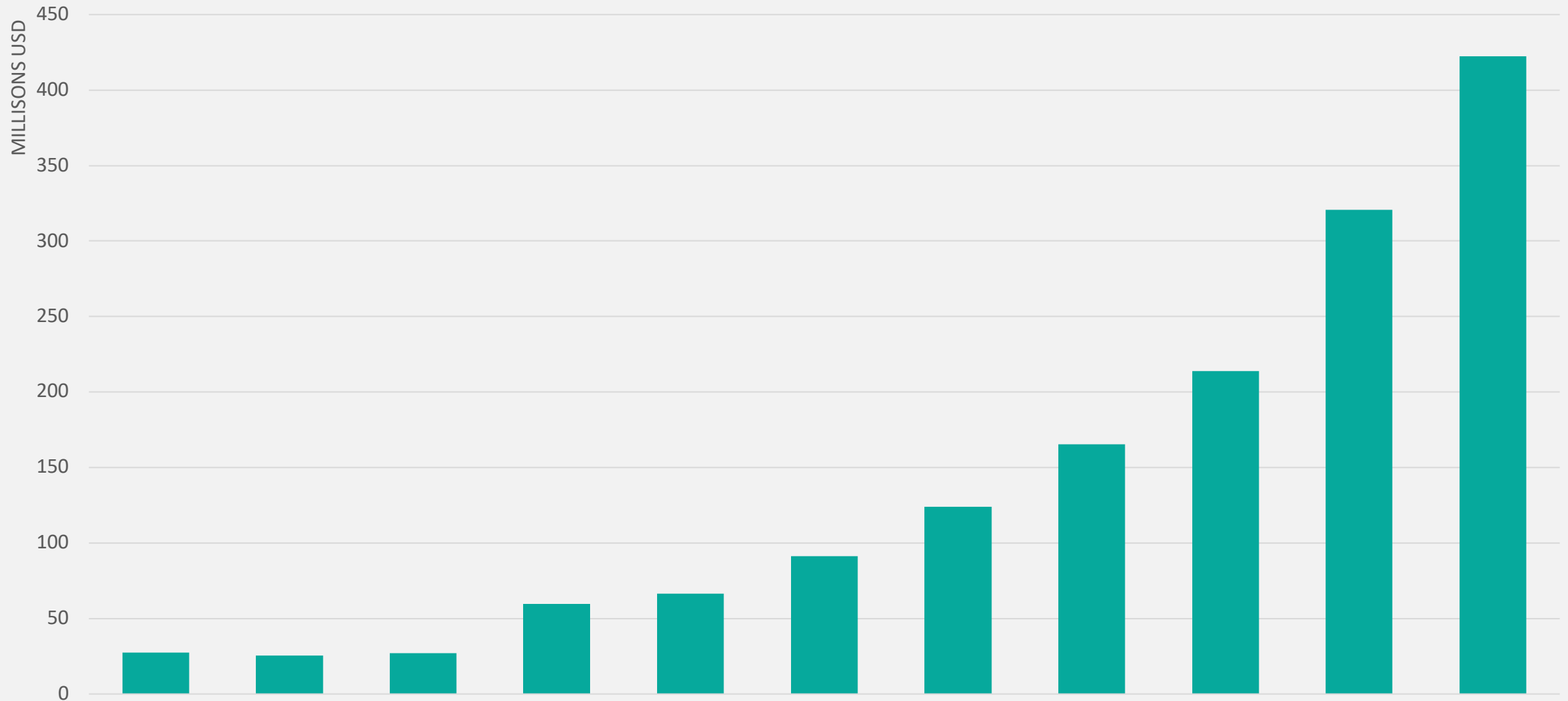


Protip: be prudent with pictures,
and intelligent with icons

(Use them, but with caution)

Vinyl records are back, unquestionably!

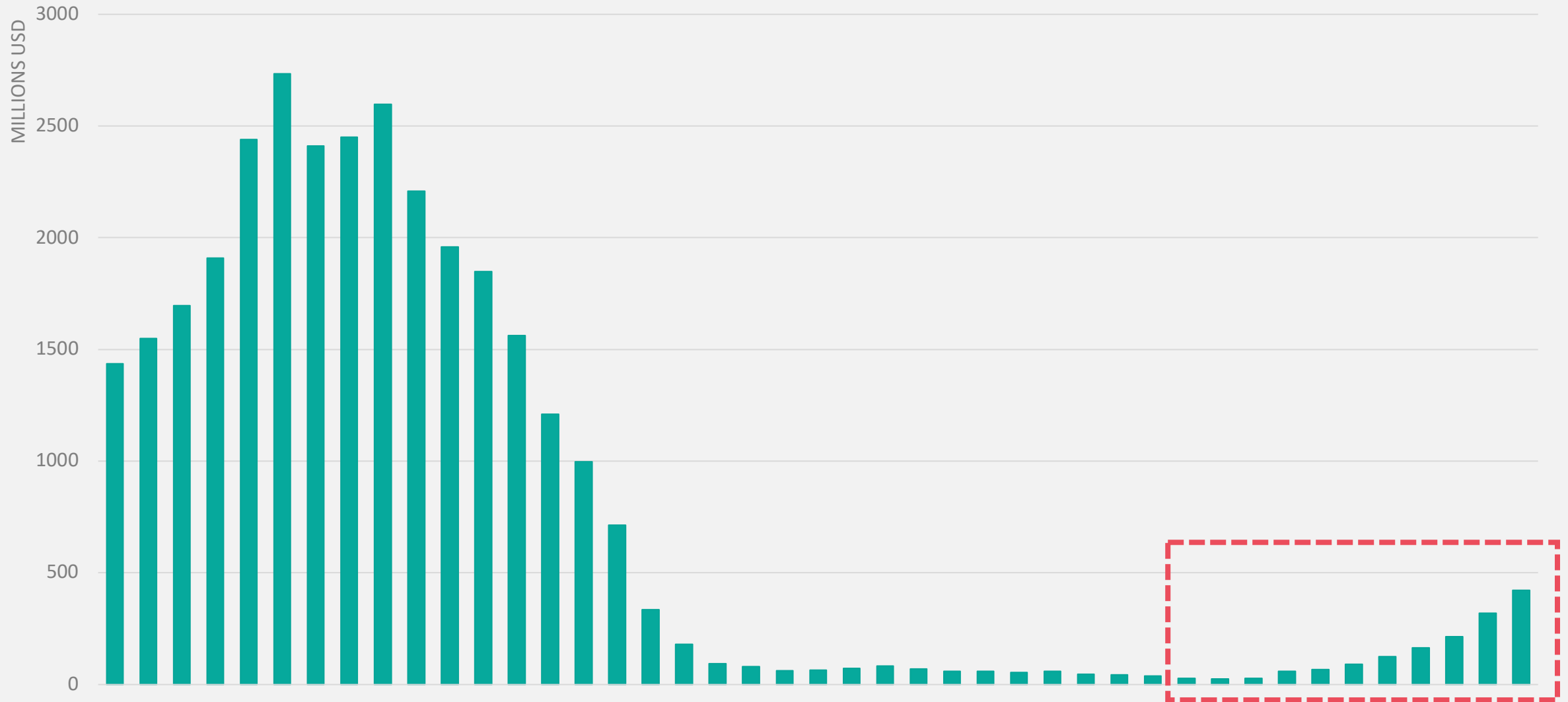
revenue 2005 - 2015



Source: US-based data compiled by the Recording Industry Association of America

... but it's still nothing compared to the '80s

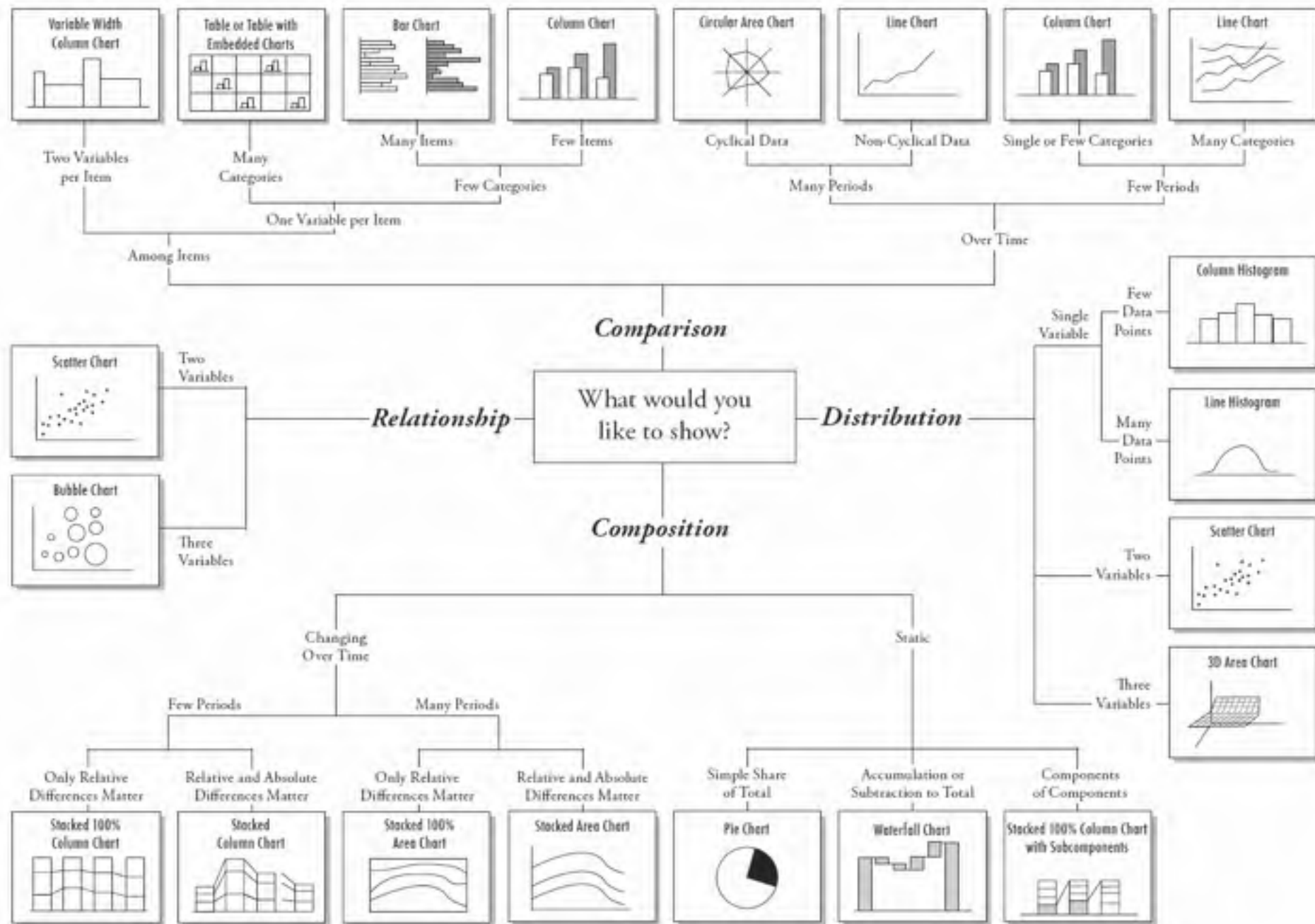
revenue 1973 - 2015






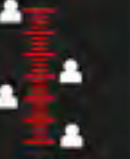










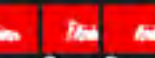
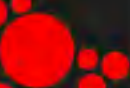





Source: US-based data compiled by the Recording Industry Association of America

*There are three kinds of lies:
lies, big lies, and ~~statistics~~ graphs.*

- Benjamin Disraeli could have said this



| who/which is involved? | where is it? | when did it happen? | what is it about? | how/why does it work? | how much is it? | |
|--|---|--|--|---|---|----------|
|  PROFILE |  LOCATION |  FAMILY TREE |  ORGANOGRAM |  NETWORK DIAGRAM |  VALUE | who |
| |  POSITION |  TRACK |  PLACE |  CONNECTION |  CHOROPLETH | where |
| | |  TIMELINE |  PERIOD |  EVOLUTION |  CHARTS | when |
| | | |  EXPLODED VIEW |  COMIC STRIP |  COMPARISON | what |
| | | |  PROCESS |  RELATIONS | | how/why |
| | | | |  DIAGRAMS | | how much |

infographics

are **not** just about picking
a random visualisation method

the result varies depending on
the structure of the data and
the (combinations of) questions

Please feel free to comment @fruys

Publicatw' Image Visualisatw' 2010/08 11

Who or Which?

Where?

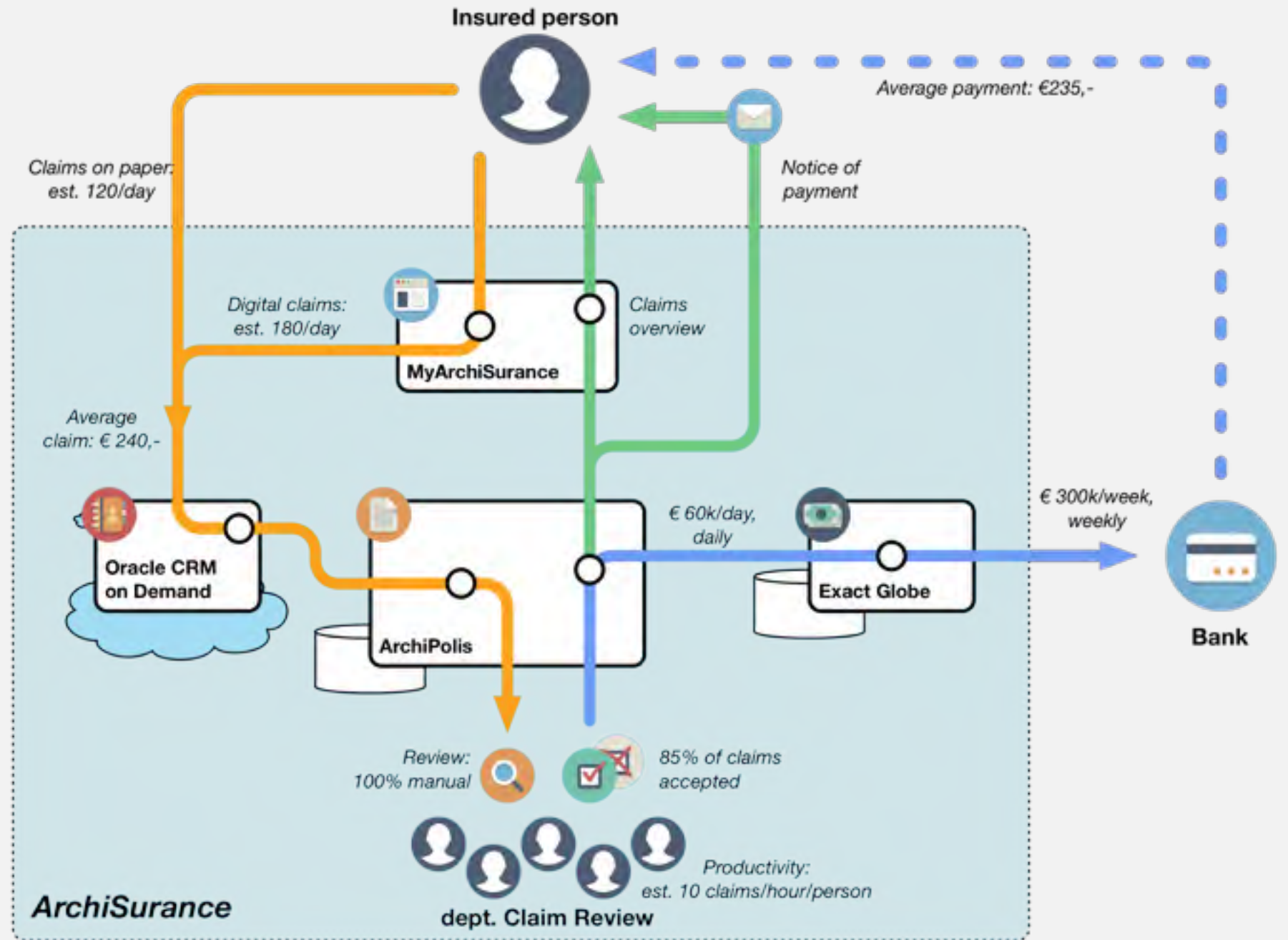
When?

What?

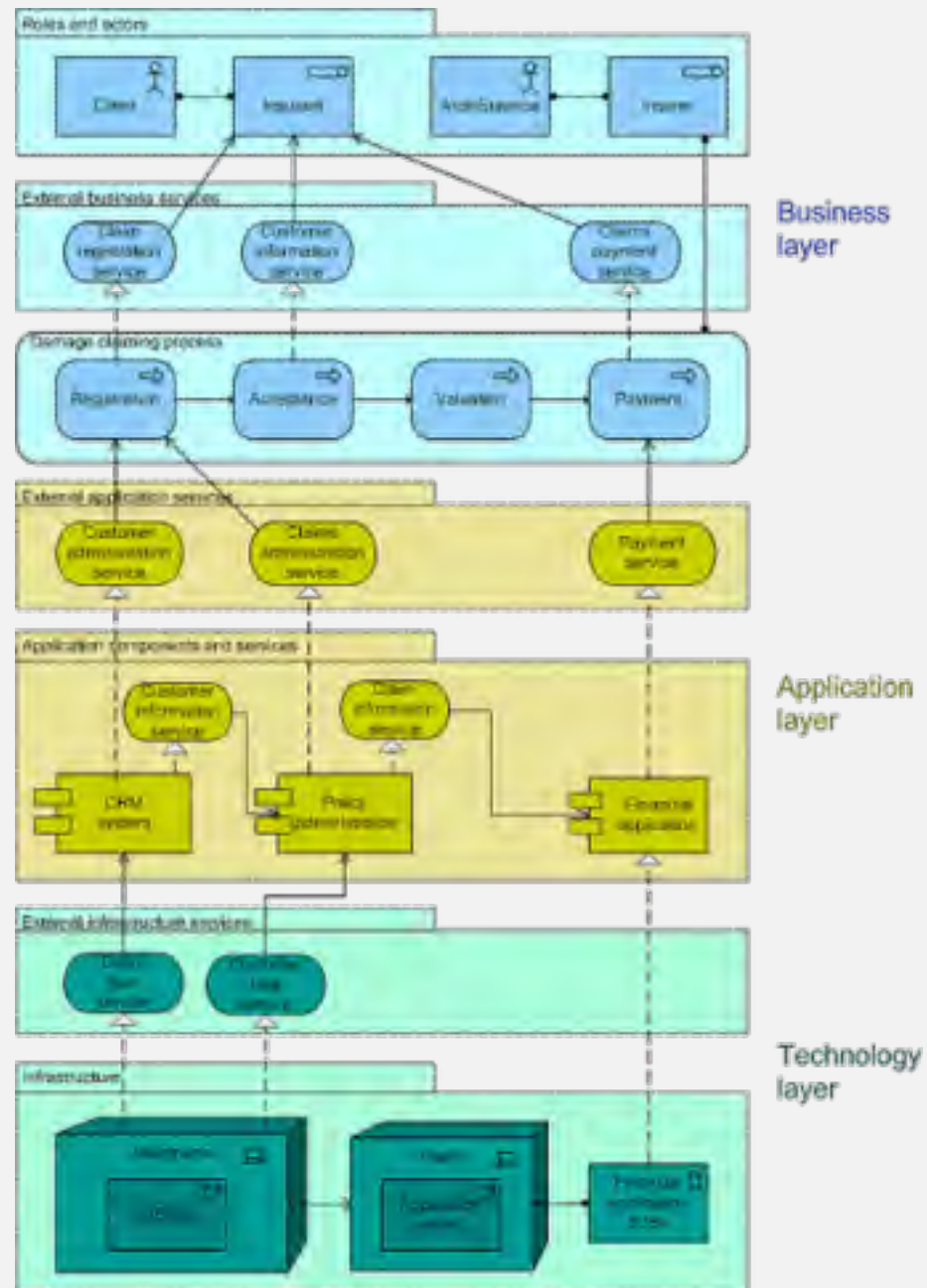
How or Why?

How much?

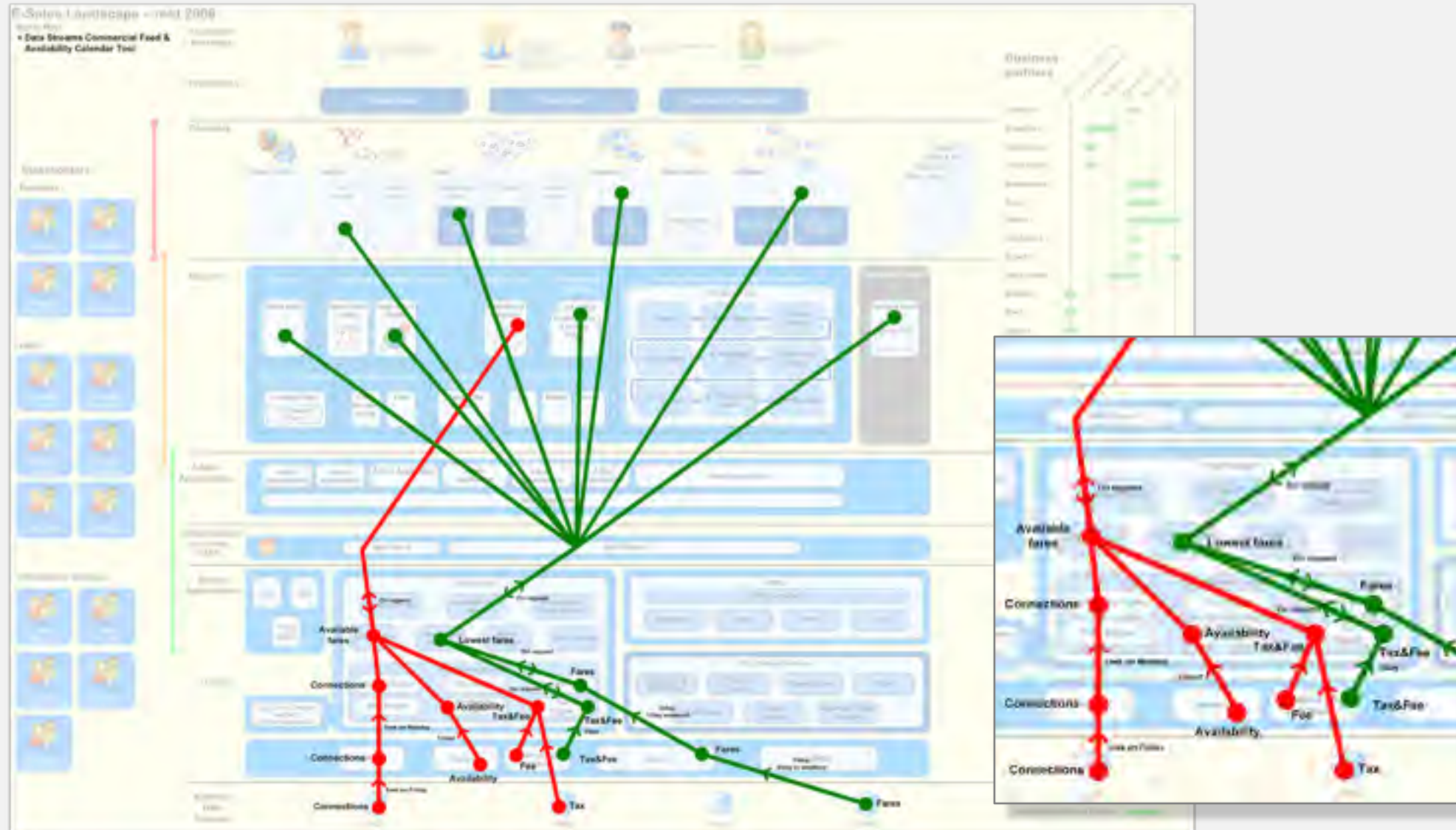
Business processes



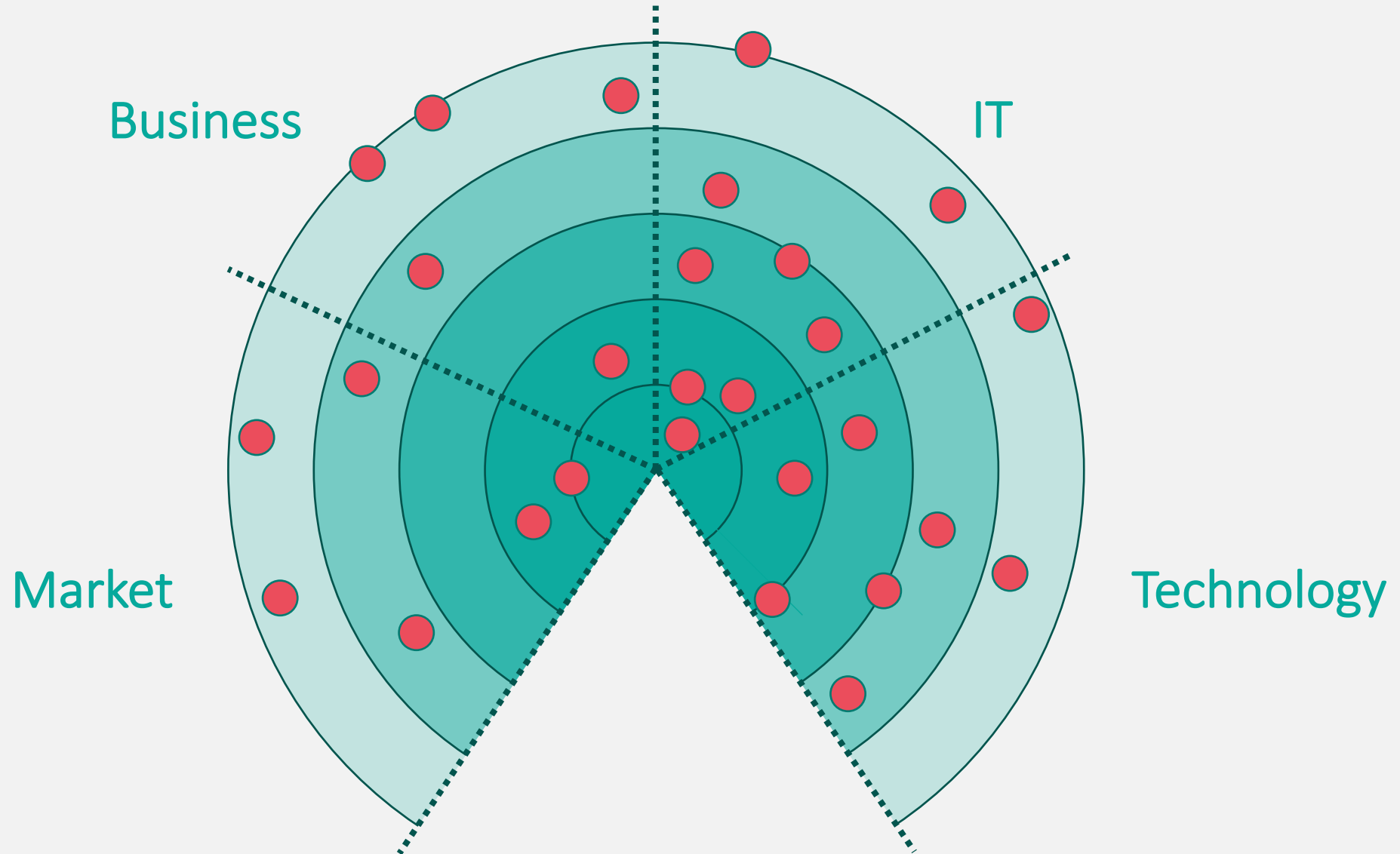
ArchiMate example



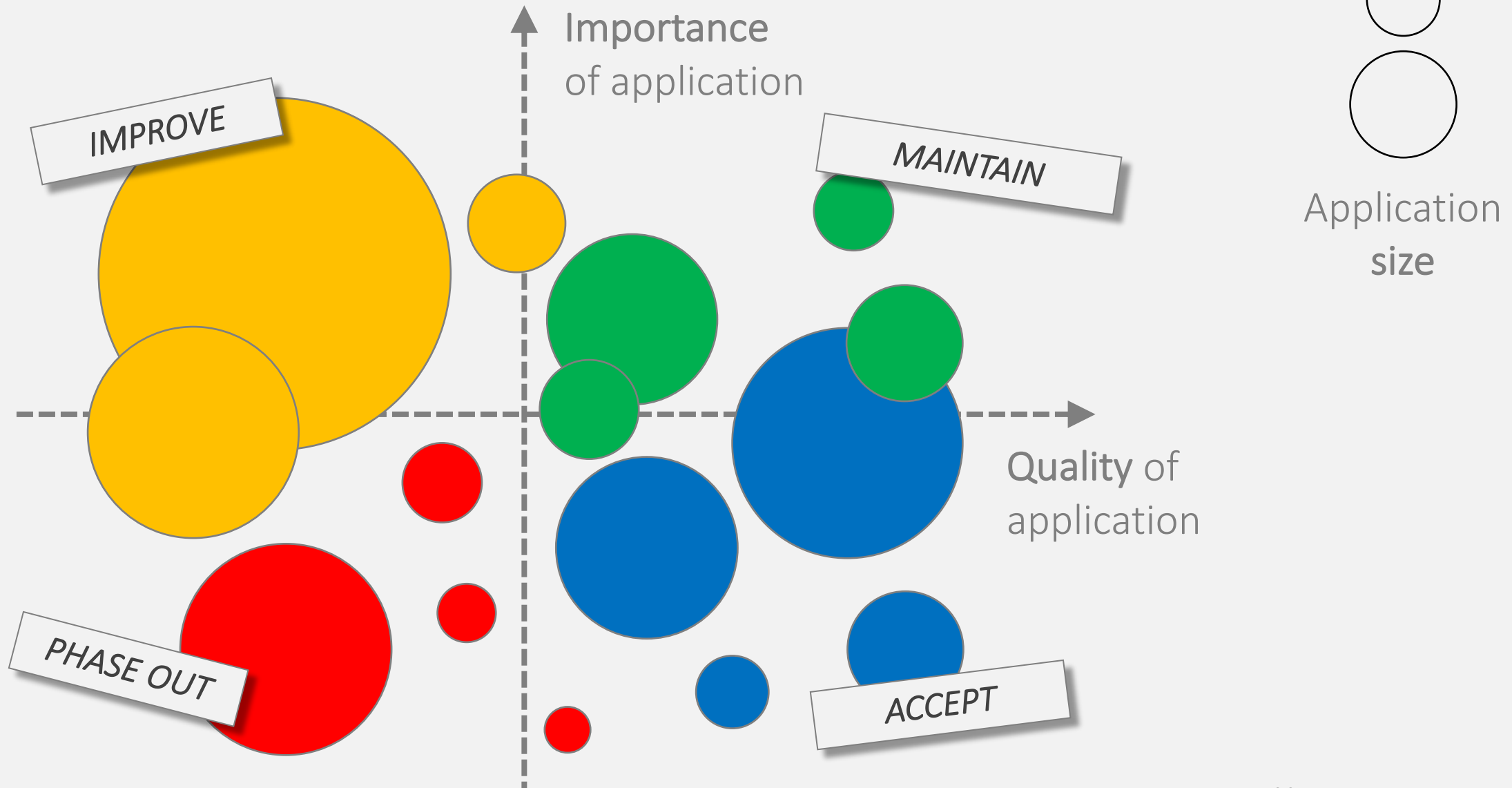
Flow of information through business



Radar plots



Application portfolio visualizations





Logins

172

Sign ups

263

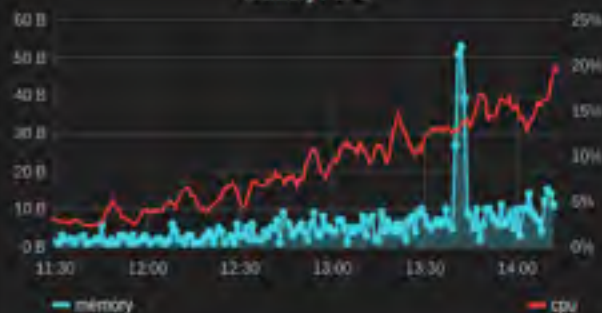
Sign outs

268

Support calls

80

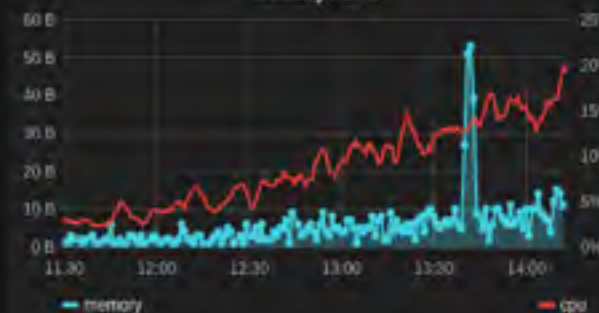
Memory / CPU



logins



Memory / CPU



logins



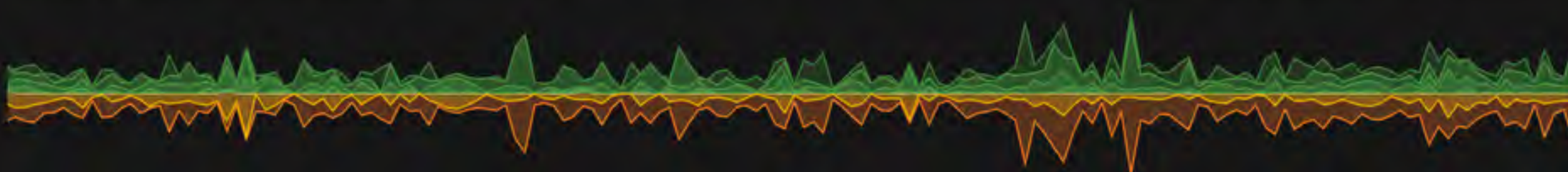
server requests



client side full page load



server requests





Data-Driven Documents

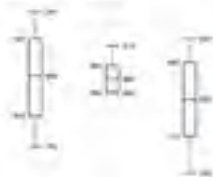


Like visualization and creative coding? Try interactive JavaScript notebooks in **Observable**!

D3.js is a JavaScript library for manipulating documents based on data. **D3** helps you bring data to

<https://d3js.org/>

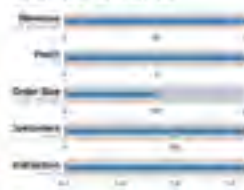
Box Plots



Bubble Chart



Bullet Charts



Calendar View



Scatterplot Matrix



Zoomable Pack Layout



Hierarchical Bars



Epicyclical Gears



Non-contiguous Cartogram



Chord Diagram



Dendrogram



Force-Directed Graph



Collision Detection



Collapsible Force Layout



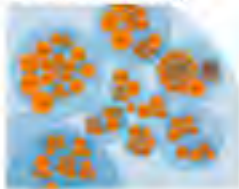
Force-Directed States



Azimuthal Projections



Circle Packing



Population Pyramid 2000



Stacked Bars



Streamgraph



Choropleth



Collapsible Tree Layout



Zoomable Treemap



Zoomable Partition Layout



Sunburst



Node-Link Tree



Treemap



Voronoi Diagram



Zoomable Area Chart



Drag and Drop Collapsible Tree Layout



Rotating Cluster Layout



Sankey Diagram



Hierarchical Edge Bundling



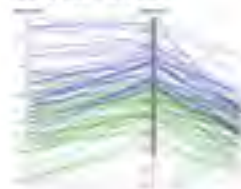
Voronoi Diagram



Symbol Map



Parallel Coordinates



Fisheye Distortion



Hive Plot



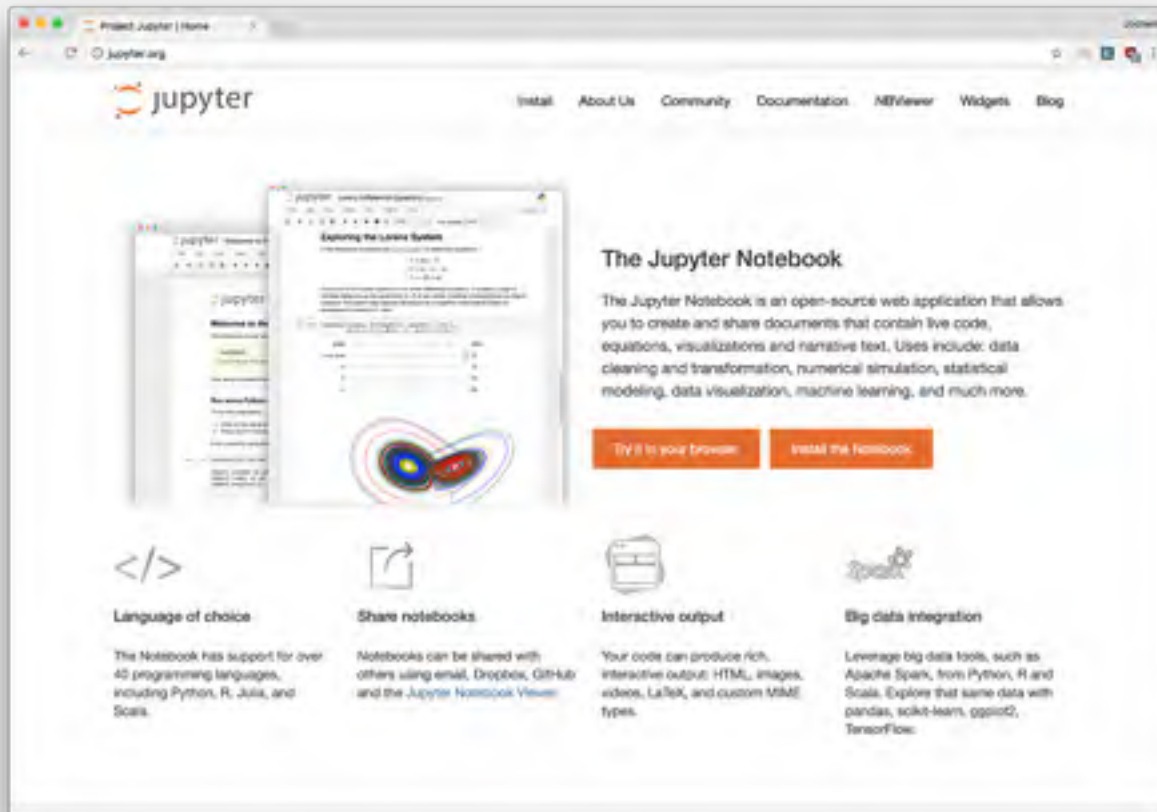
Co-occurrence Matrix



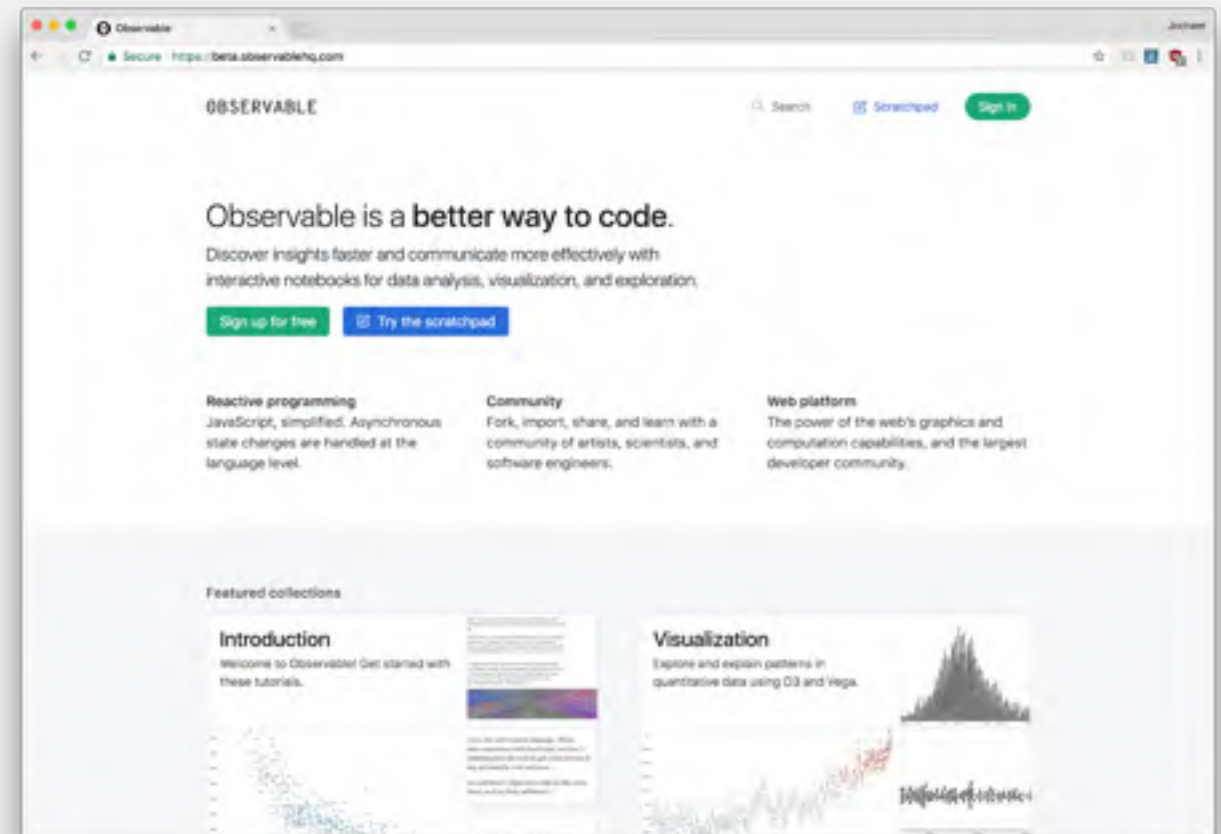
Motion Chart



Jupyter notebooks & Observable



<http://jupyter.org/>



<https://beta.observablehq.com/>

Some inspiration for data-based visualizations

Sites

- <https://informationisbeautiful.net/>
- <http://flowingdata.com/>
- <http://www.visualisingdata.com/>

Books

- <http://www.visualisingdata.com/book/>
- https://www.edwardtufte.com/tufte/books_vdqi
- <http://book.flowingdata.com/>

Tools

- <https://d3js.org/>
- <https://rawgraphs.io/>
- <https://www.tableau.com/>

Protip: be honest, clear,
intelligible and actionable

(and look for a high data-ink ratio)



<https://www.nytimes.com/interactive/2016/12/21/upshot/Mapping-the-Shadows-of-New-York-City.html>



The universe is made of stories, not of atoms

- Muriel Rukeyser

Public-key cryptography, also called **asymmetric cryptography**, is a *communication* where people exchange messages that can only be read by one another.

In public key cryptography, each user has a pair of *cryptographic keys*:

- a public key
- a private key

The private key is kept secret, while the public key may be widely distributed and used by other users.

Incoming messages are *encrypted* with the recipient's public key and can only be decrypted with their corresponding private key. The keys are related mathematically, but the user's private key cannot be easily got from the widely used public key. The most usual problem with this method arises when private key is accidentally leaked.

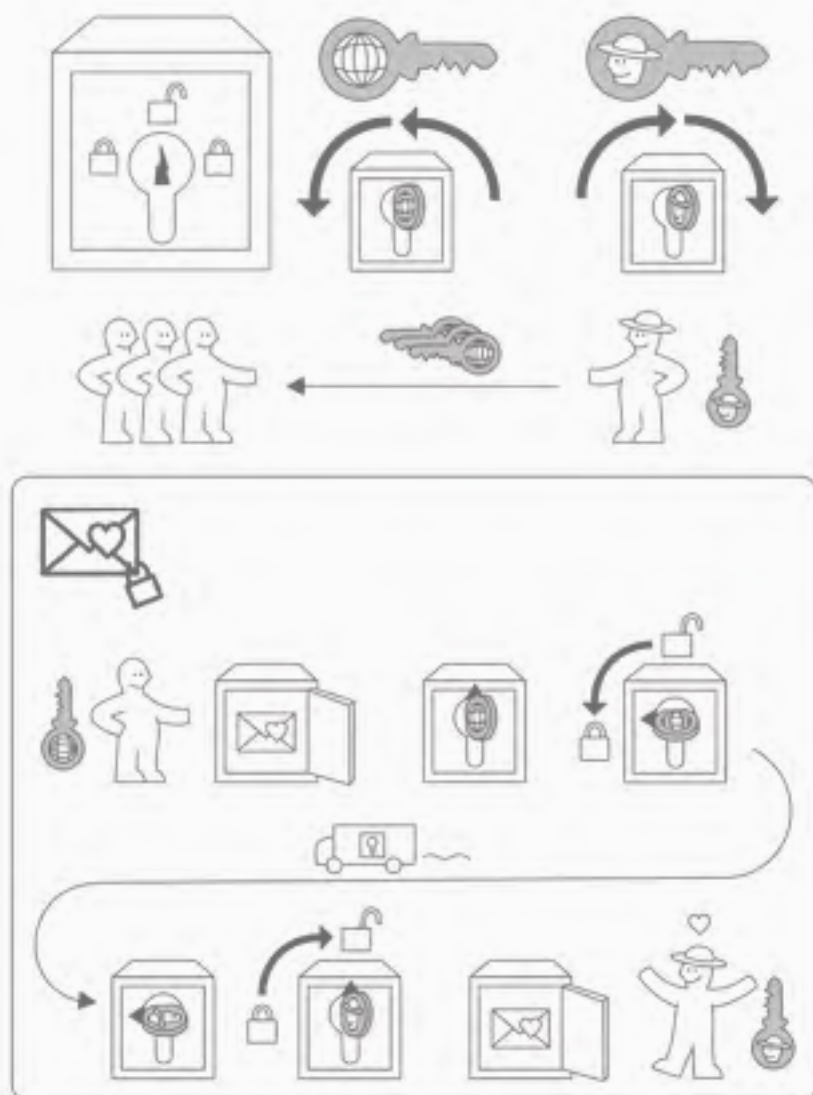
The two main branches of public key cryptography are:

- **Public key encryption**: a message encrypted with a *recipient's public key* cannot be decrypted except by the *recipient private key*. This is used to ensure secrecy.
- **Digital signatures**: a message signed with a sender's private key can be verified by anyone who has the sender's public key. So if the sender signed the message no one can alter it. This is used to get authenticity.

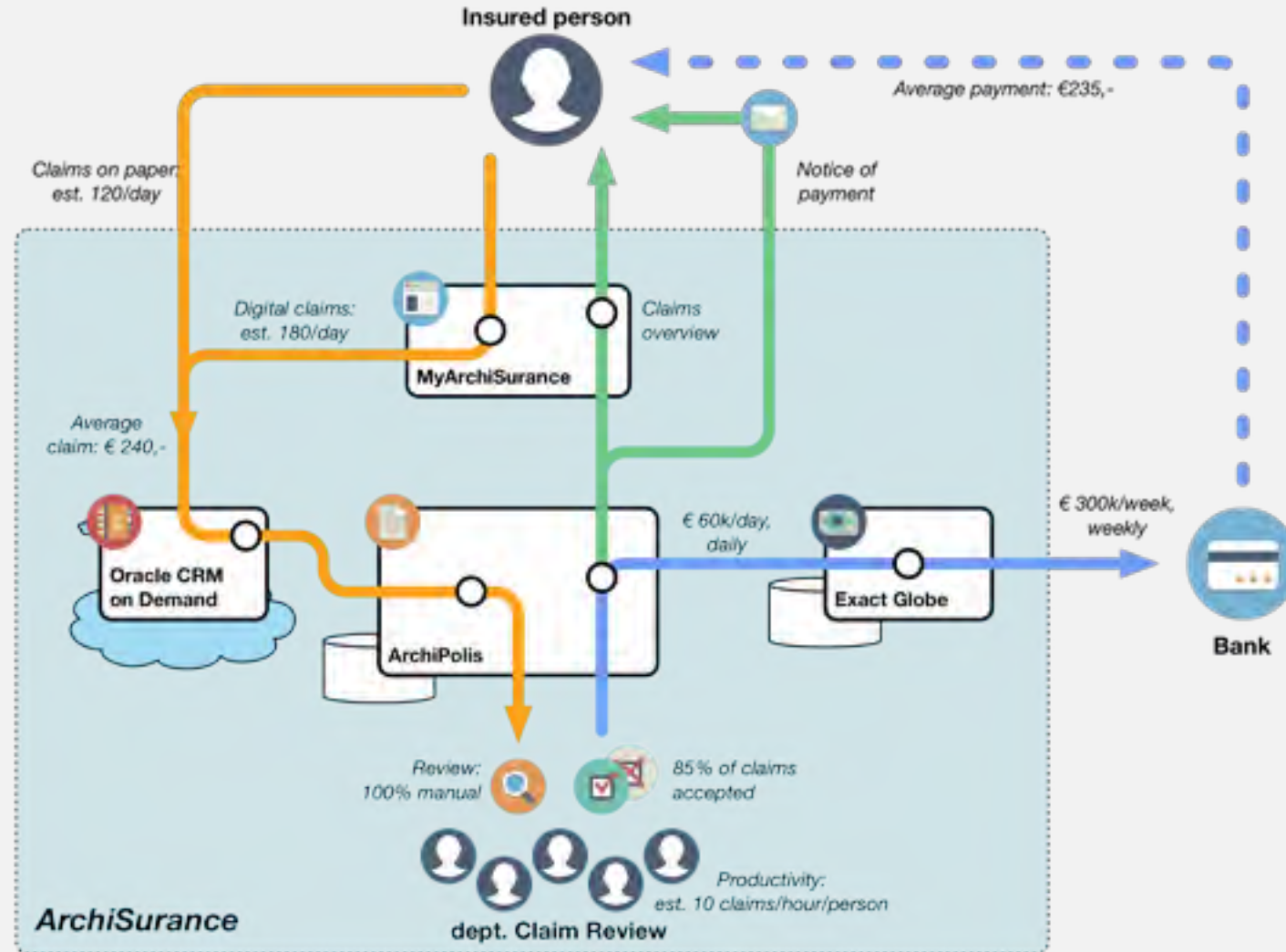
PUBLIC KEY KRÜPTO

idea-instructions.com/public-key/
v1.0, CC by-nc-sa 4.0

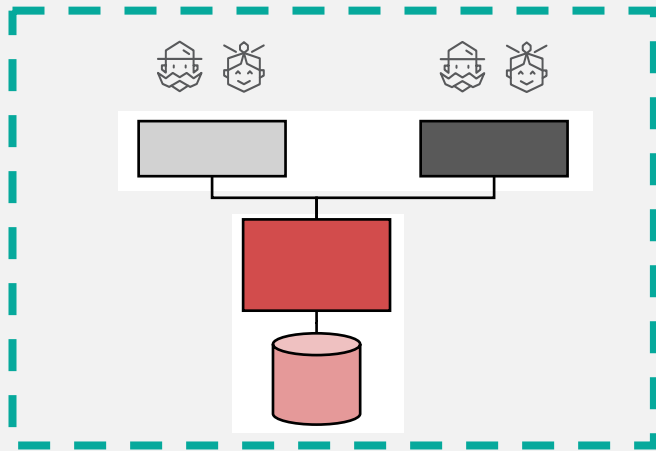
IDEA



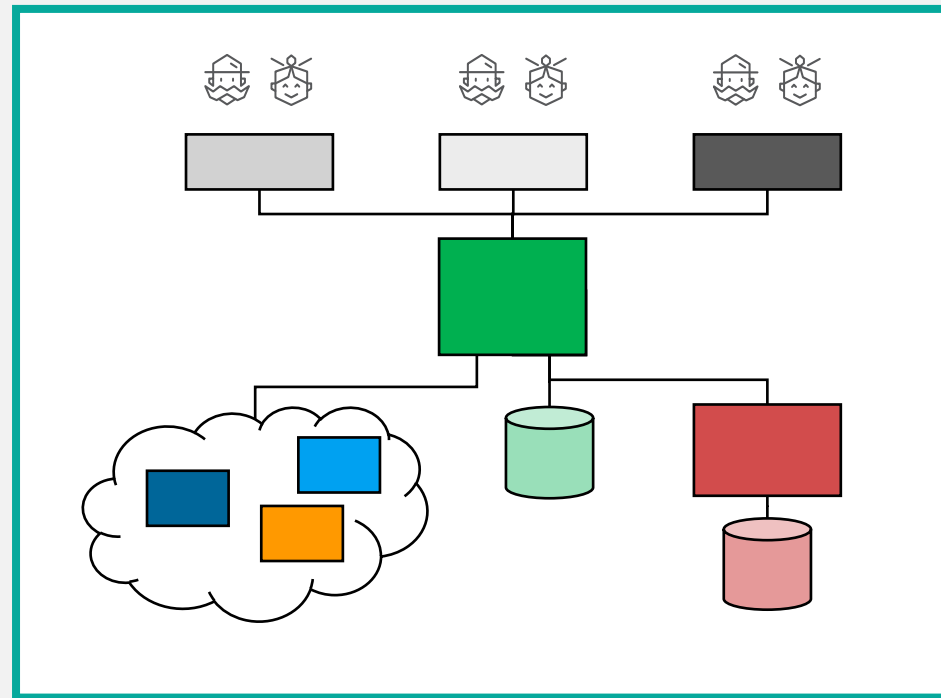
Business processes in landscape



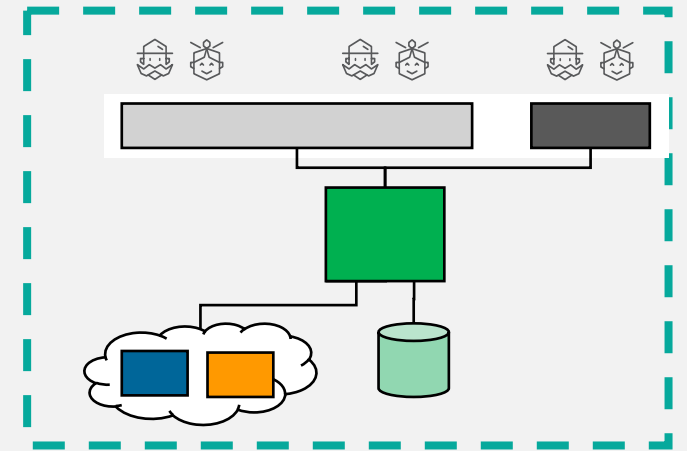
Evolution of an application or landscape



$t_{yesteryear}$



t_{today}



$t_{tomorrow}$

Protip: “Once upon a time...”

(Take a minute more, and imagine a story)

the SKETCHNOTE HANDBOOK

→ THE ILLUSTRATED *guide* ←
to VISUAL NOTE TAKING

Quicker, more versatile than other drawing tools

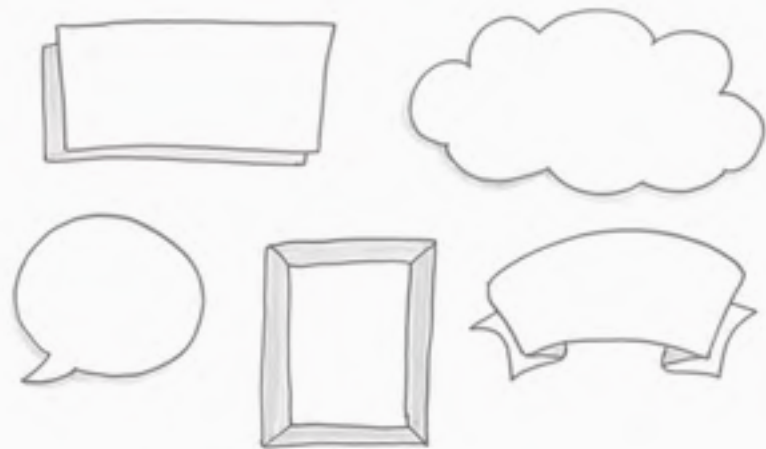
ABCDEFGHIJKLMNOPQRSTUVWXYZ

abcdefghijklmnopqrstuvwxyz

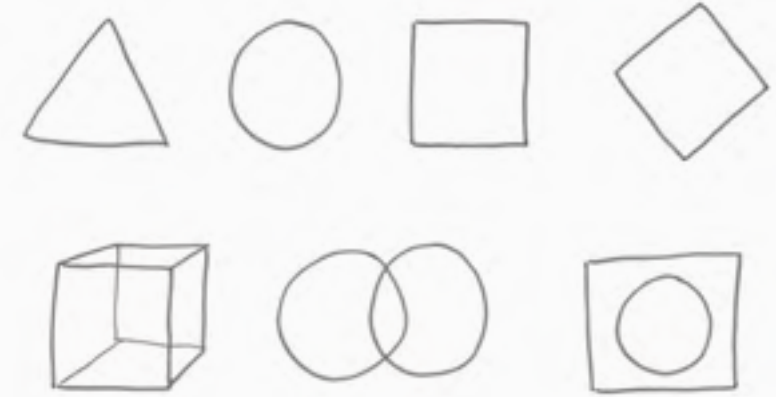
Normal everyday handwriting.

NORMAL EVERYDAY HANDWRITING

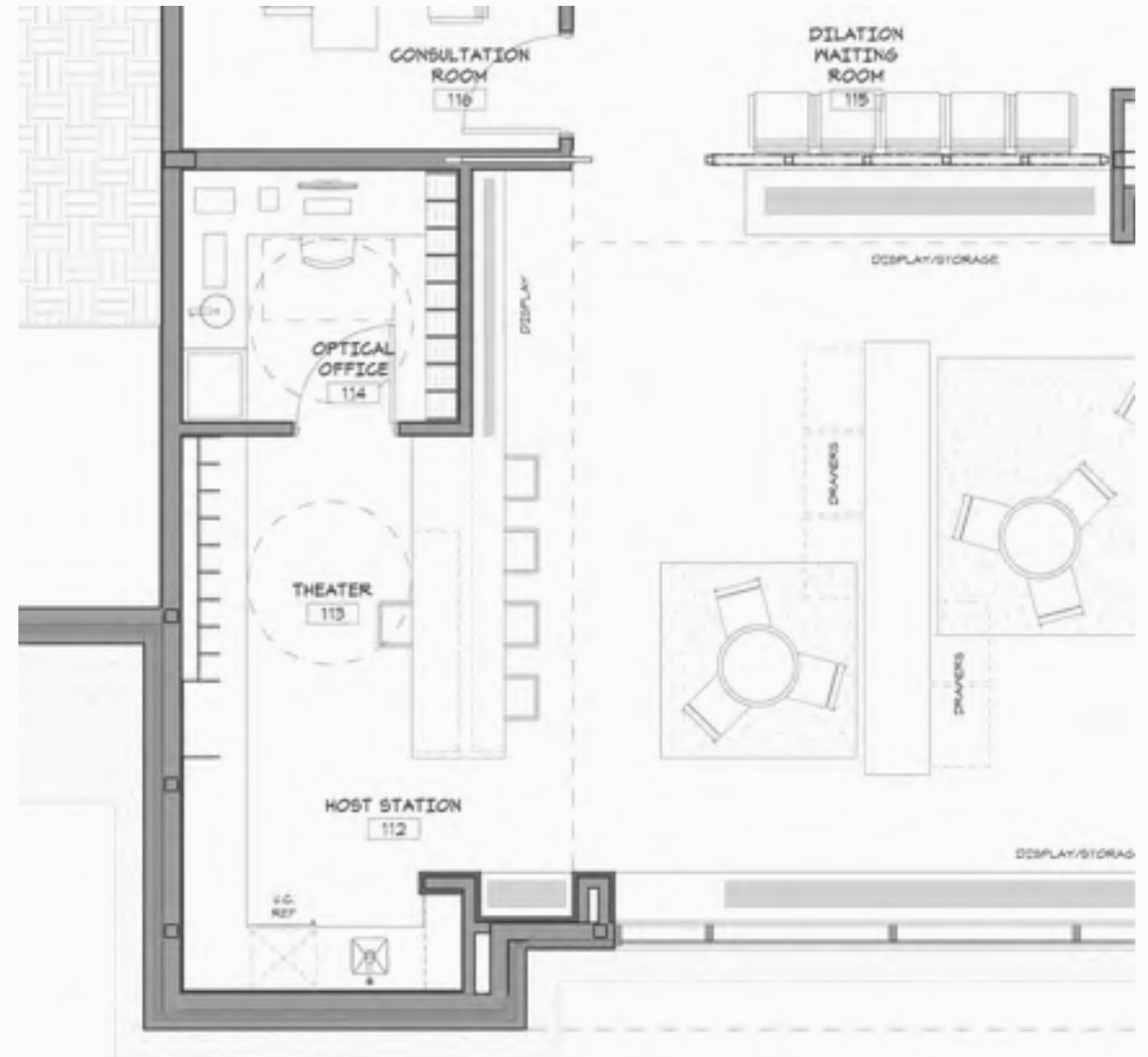
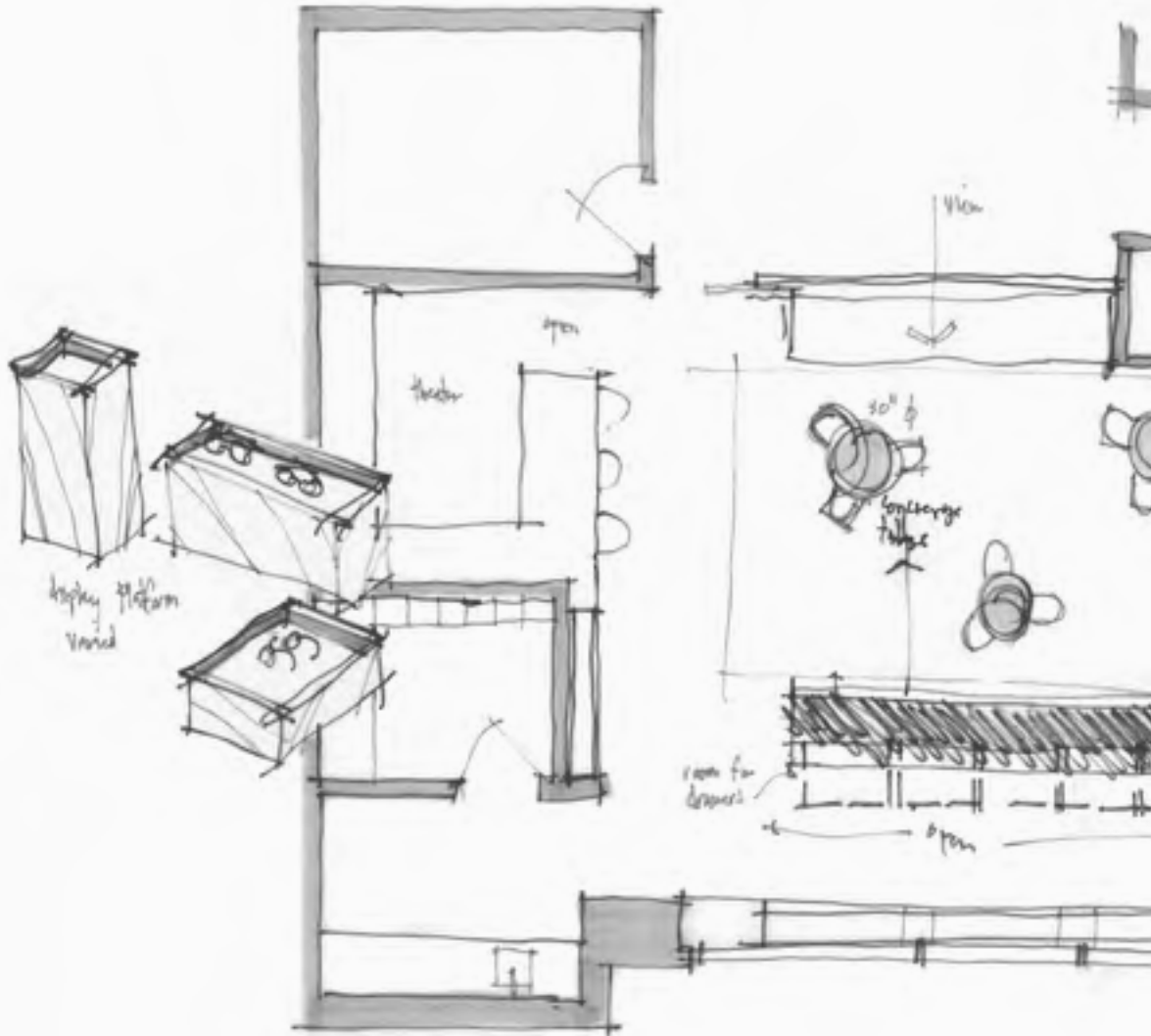
normal everyday handwriting



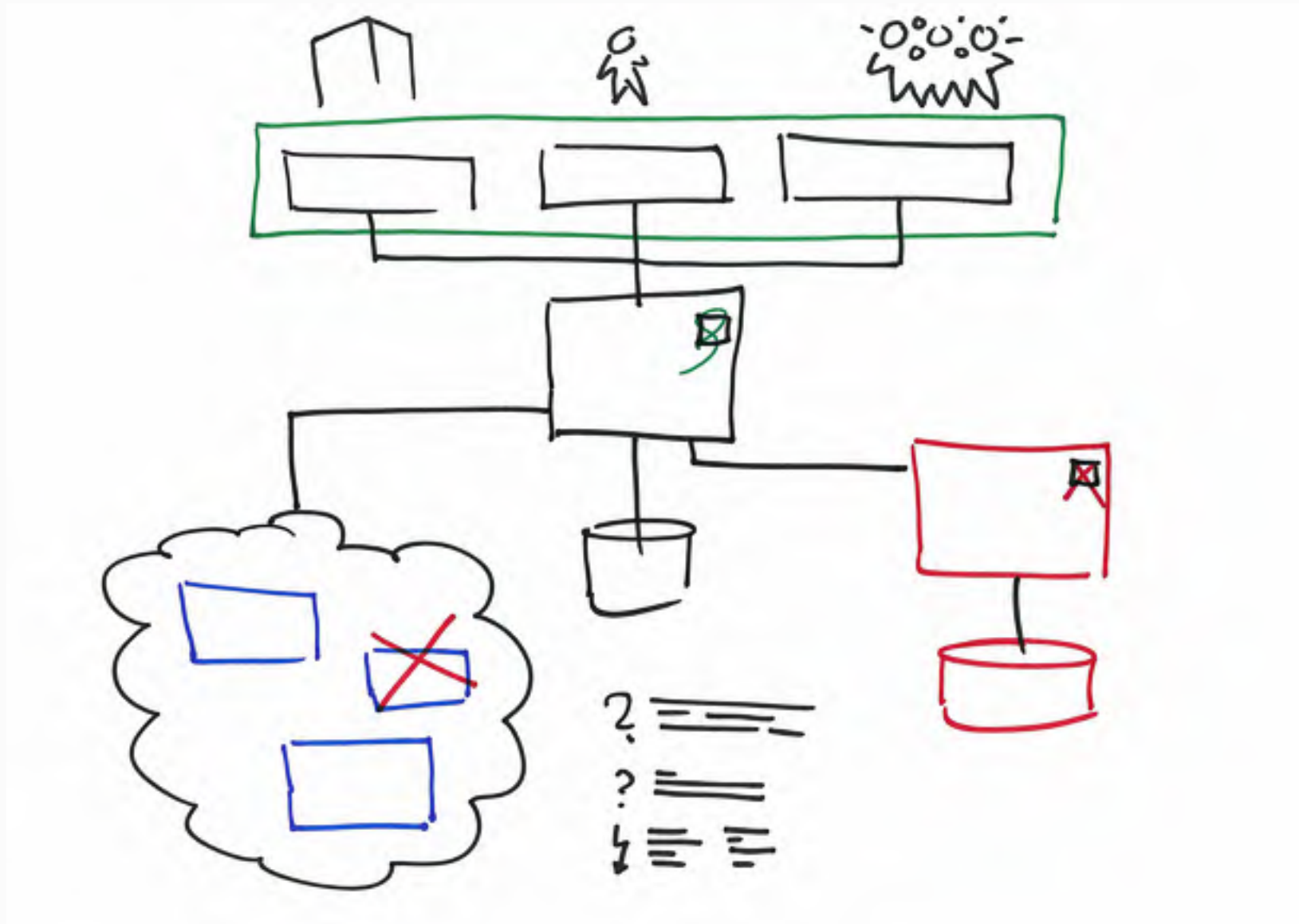
EMPHASIS
BOLD TALL *cursive*
SHADOW cloud
BUBBLE *moving*



Low-fidelity >> high-fidelity



Creates and shows a story at the same time



Protip: sketch, doodle, draw
and scribble more and more

(And hold back from PowerPoint,
Visio, Illustrator, OmniGraffle, ...)

So, don't make them guess

I'd love to see us all make better
architecture visualizations

Jochem Schulklopper, Xebia
@jschulklopper

