Guy Marshall

Improving your diagramming

Hi! I'm the diagrams guy

Collaboration

How researchers use diagrams in communicating neural network systems GC Marshall, A Freitas, C Jay arXiv preprint arXiv:2008.12566	4	2020
The Diagrammatic AI Language (DIAL): Version 0.1 G Marshall, A Freitas arXiv preprint arXiv:1812.11142	4	2018
Understanding scholarly neural network system diagrams through application of VisDNA GC Marshall, C Jay, A Freitas International Conference on Theory and Application of Diagrams, 387-394	3	2021
Structuralist analysis for neural network system diagrams GC Marshall, C Jay, A Freitas International Conference on Theory and Application of Diagrams, 480-487	3	2021
Understanding scholarly natural language processing system diagrams through application of the Richards-Engelhardt framework GC Marshall, C Jay, A Freitas arXiv preprint arXiv:2008.11785	3	2020
Number and quality of diagrams in scholarly publications is associated with number of citations GC Marshall, C Jay, A Freitas International Conference on Theory and Application of Diagrams, 512-519	2	2021
Scholarly AI system diagrams as an access point to mental models GC Marshall, C Jay, A Freitas arXiv preprint arXiv:2104.14811	2	2021
Diagrammatic summaries for neural architectures GC Marshall, C Jay, A Freitas Beyond static papers: Rethinking how we share scientific understanding in ML ...	2	2021
Switching Contexts: Transportability Measures for NLP G Marshall, M Thayaparan, P Osborne, A Freitas Proceedings of the 14th International Conference on Computational Semantics ...	1	2021
Measuring diagram quality through semiotic morphisms GC Marshall, A Freitas Semiotica 2021 (239), 125-145	1	2021
Public perceptions and interactions with UK COVID-19 Test, Trace and Isolate policies, and implications for pandemic infectious disease modelling GC Marshall, R Skeva, C Jay, MEP Silva, M Fyles, TC House, E Davis, ... medRxiv		2022

MANCHESTER 1824
The University of Manchester

https://scholar.google.com/citations?user=Gx8xcGcAAAAJ&hl=en

What we'll do

- DISCOVER the philosophy and history of diagrams
- IDENTIFY diagramming practices
- APPLY scientific research to improve your diagrams
- PRACTICE using different principles in your diagrams
- ARTICULATE more effectively through diagrams to communicate about complex topics

History

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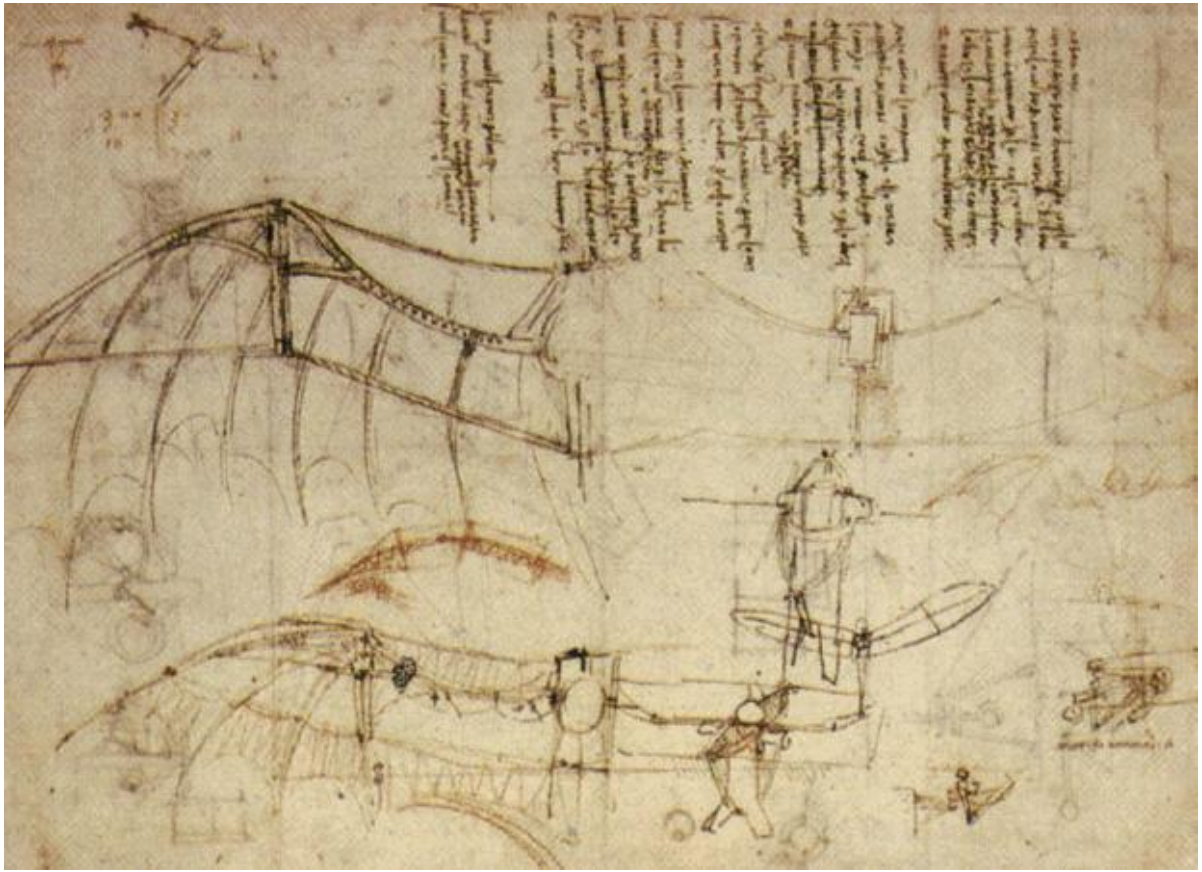

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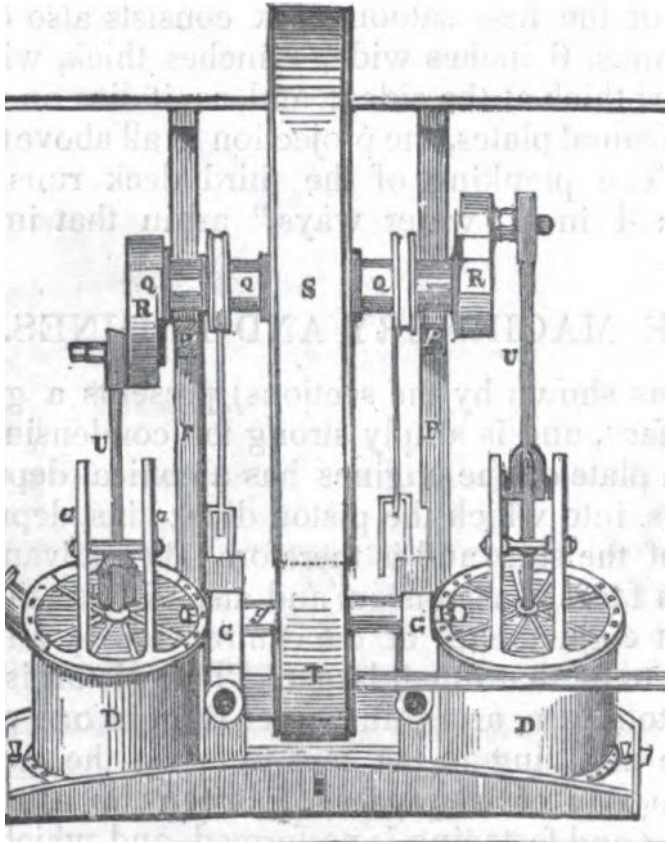
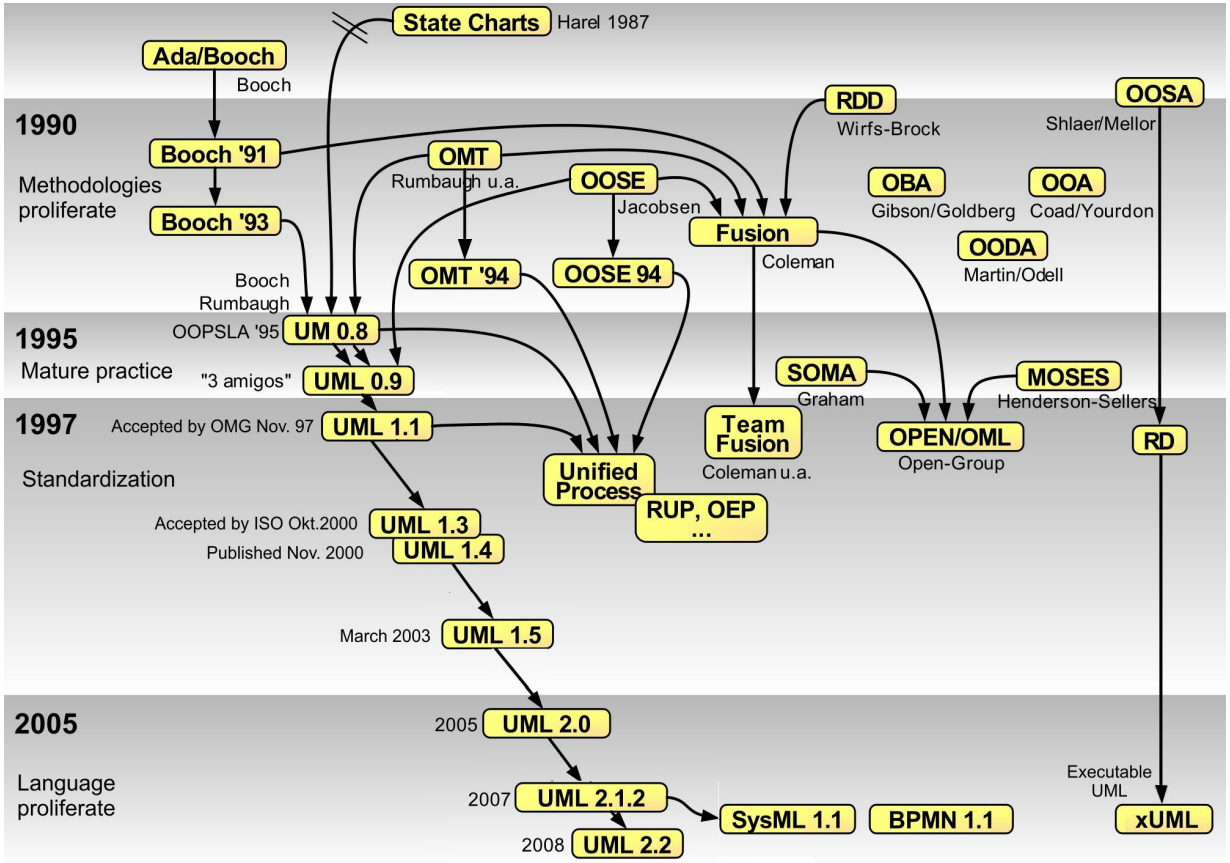


Claxton, Capt. R. N. (1845): *History and Description of the Steamship Great Britain*, J. Smith Homans, New York, page 10.



Guido Zockoll, Axel Scheithauer & Marcel Douwe Dekker (Mdd), CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

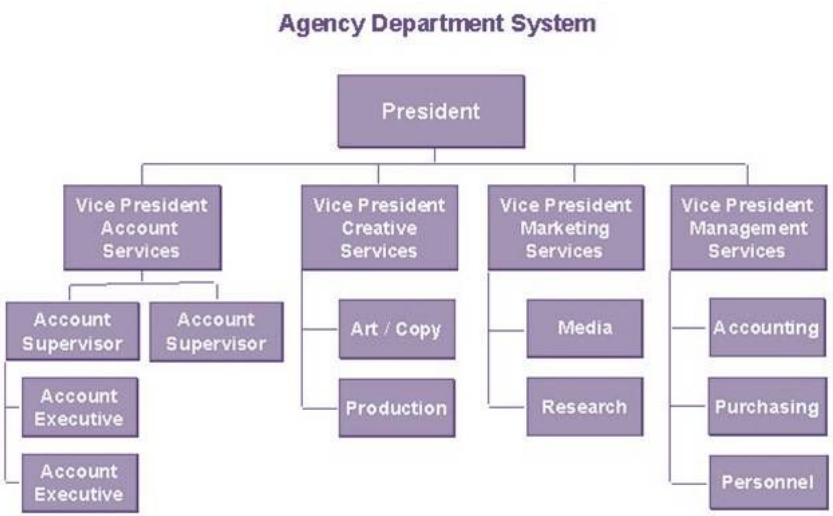
What is a diagram?

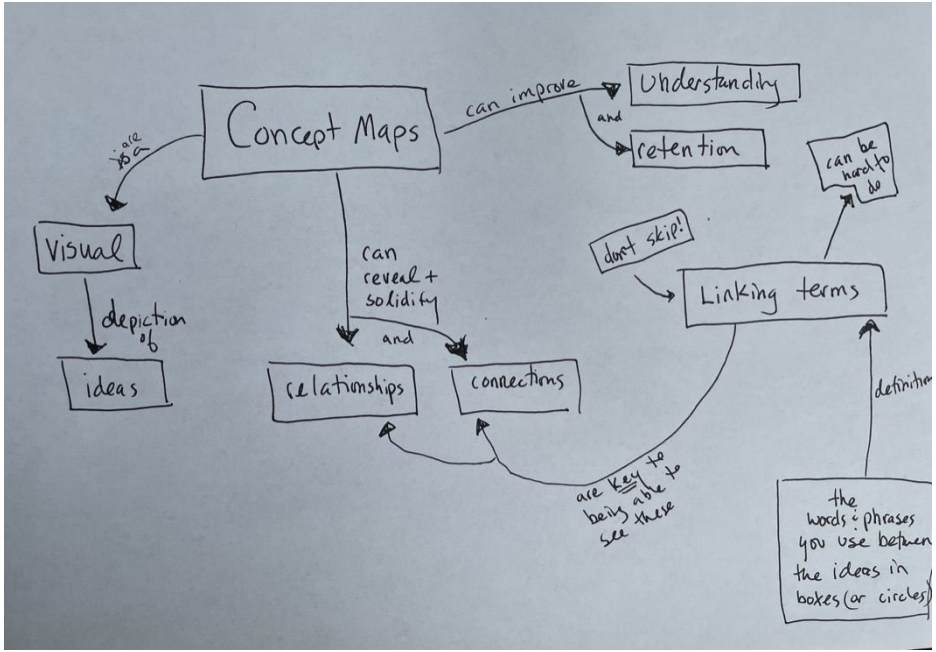
“a simplified drawing showing the appearance, structure, or workings of something; a schematic representation.” (Oxford English Dictionary)

“an icon of relation” (Peirce) where relations encode a physical resemblance to the signified. Diagram as distinct from an image or a metaphor.

“skeleton-like sketch of relations” (Stjernfelt on Peirce)

Agile-related diagrams





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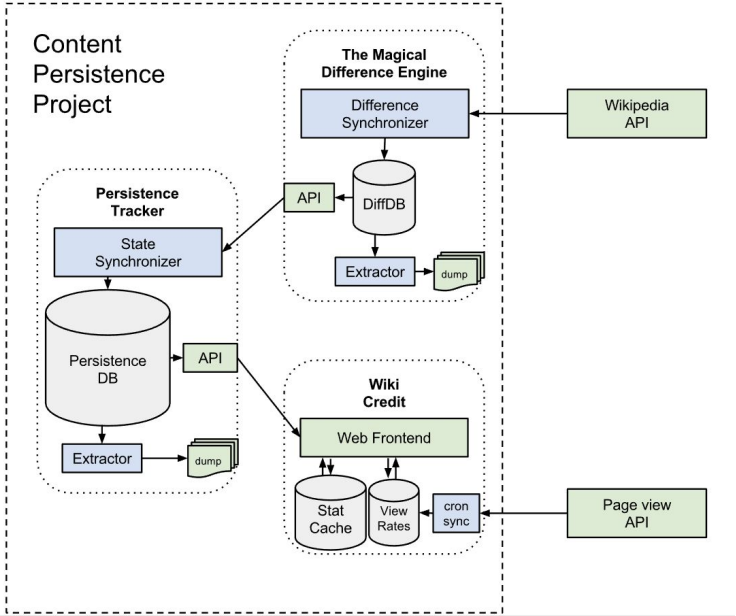
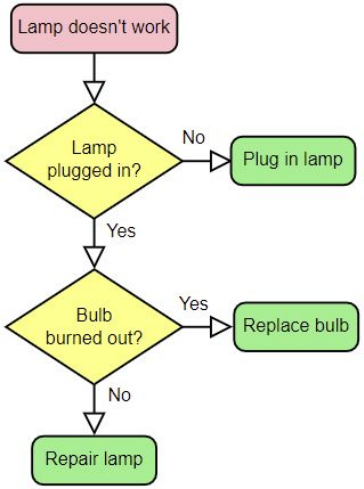
Right by Cornell Learning Strategies Center https://lsc.cornell.edu/how-to-study/studying-for-and-taking-exams/concept-maps/

Agile-related diagrams 2





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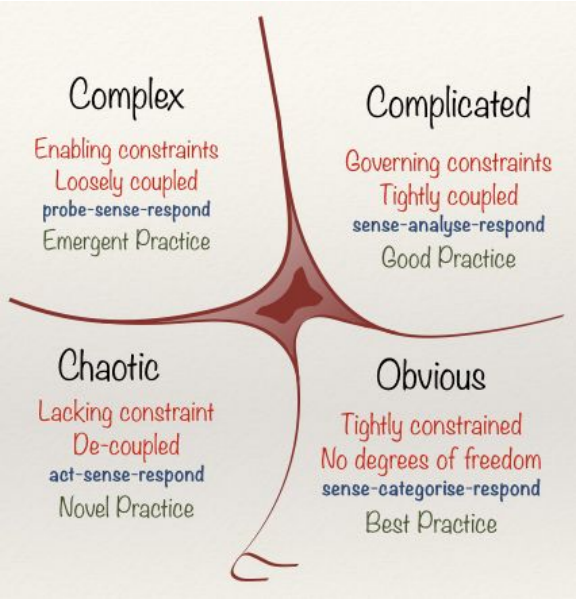
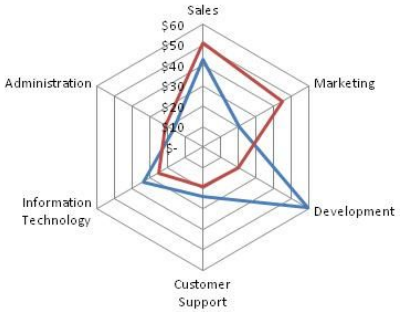
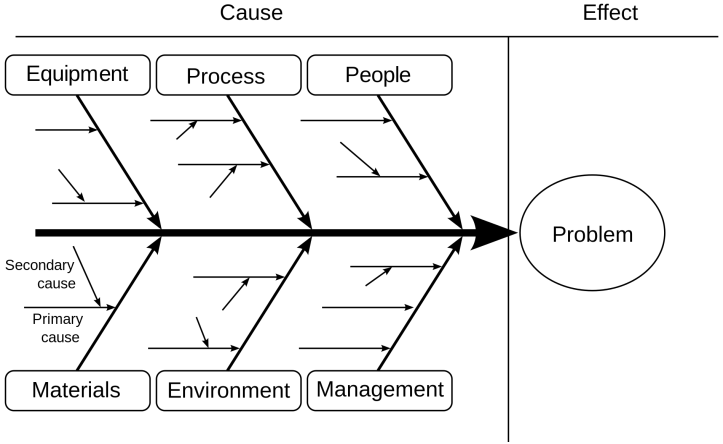
Agile-related diagrams 3







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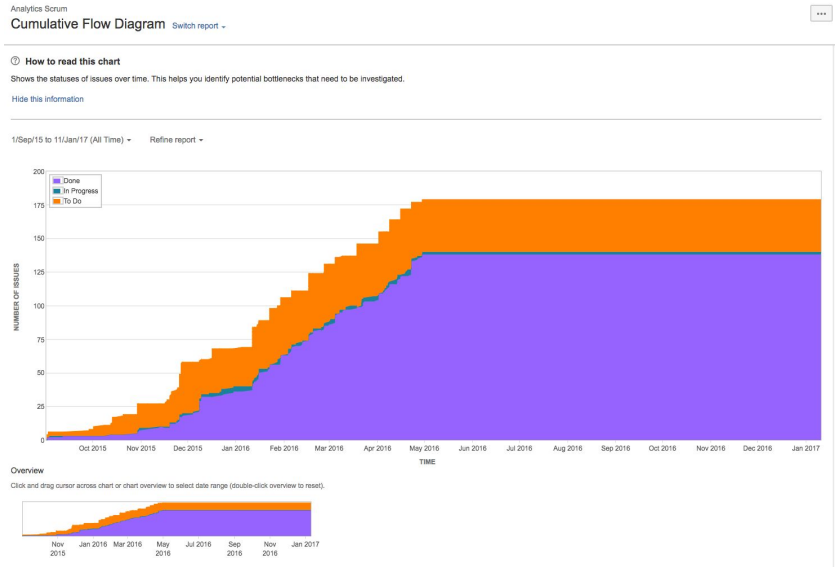
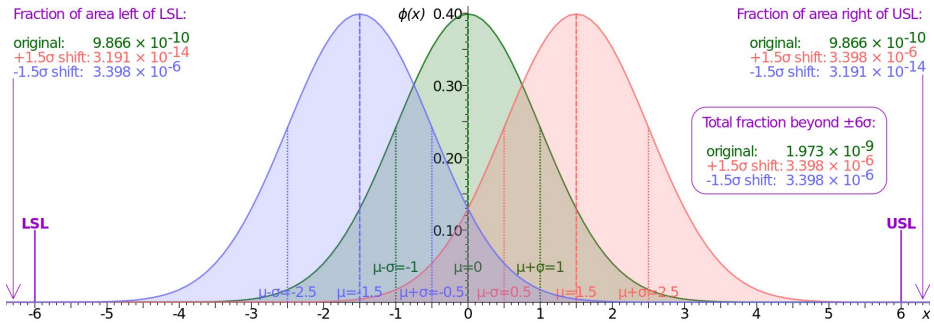
Agile-related diagrams 4





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Activity!

Draw a diagram

… any diagram!

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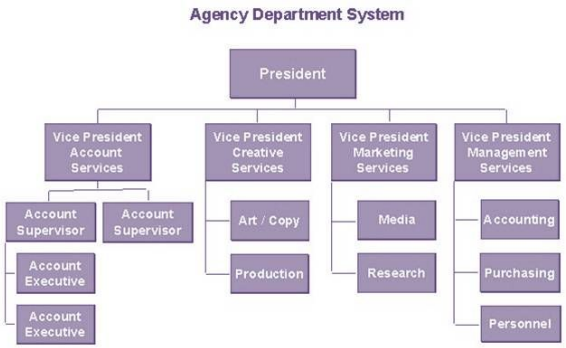
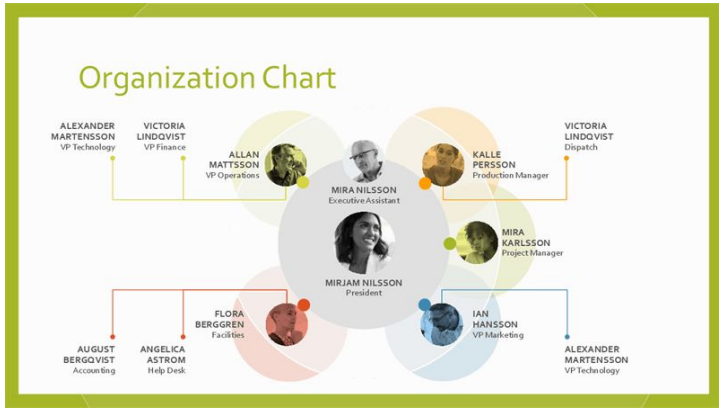
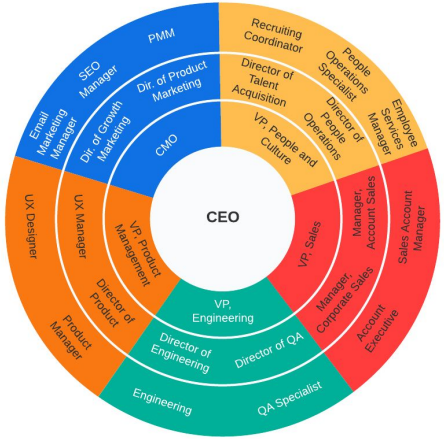
More about a specific diagramming domain







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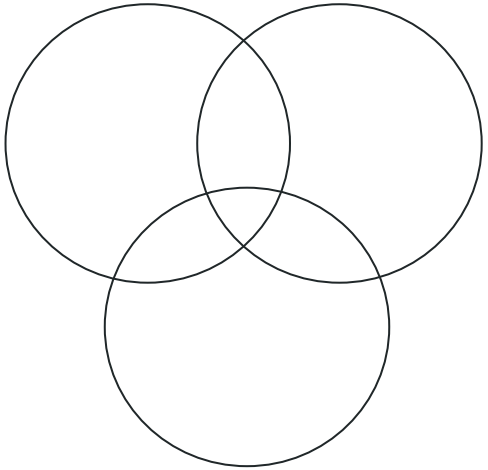
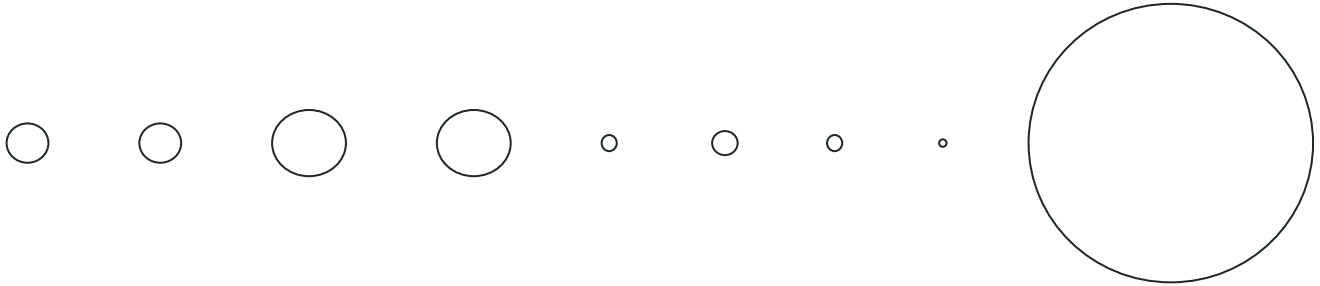
Right: https://www.lucidchart.com/blog/circular-org-charts

Diagrams can be simple. Here are some circles.

What does this tell you?



What might this represent?



Advantages of diagrams

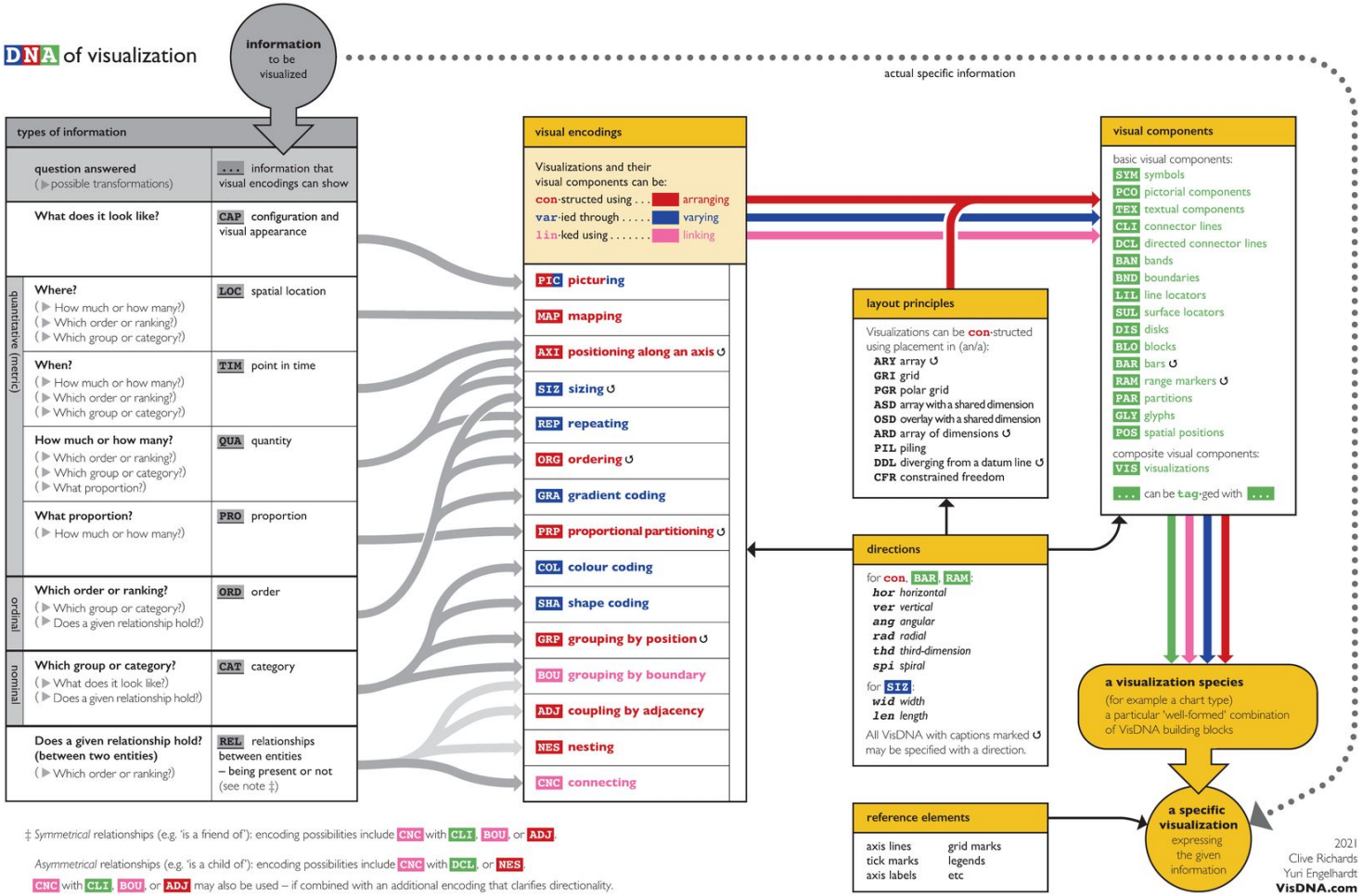
- Are external representational support to cognitive processes (Clark, 1998)
- Make topics simpler, leading to reduced search space and fewer cases to be computed over, by including minimal salient information (Sloman, 1984)
- Are manipulated in order to profile known information in an optimal fashion (Tylen et al., 2014)
- Make abstract properties and relations cognitively accessible (Hutchins, 1995)
- Facilitate perceptual “free rides” in inference, making relations evident that might not be obvious in a different representation (Shimojima, 2015)
- Can be in a public space, therefore enabling collective and temporally distributed forms of thinking (Peirce, 1931)

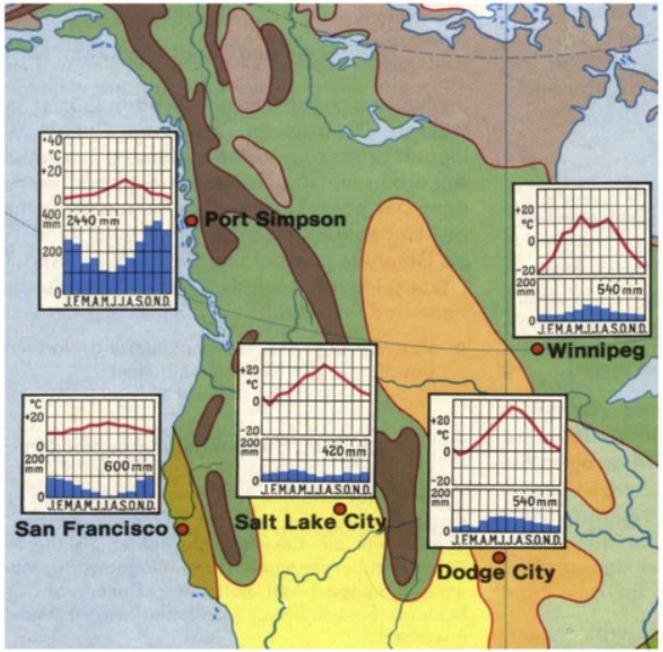
Relations and how they can be encoded

“data-ink” for meaningful encoding(Tufte, 2001).

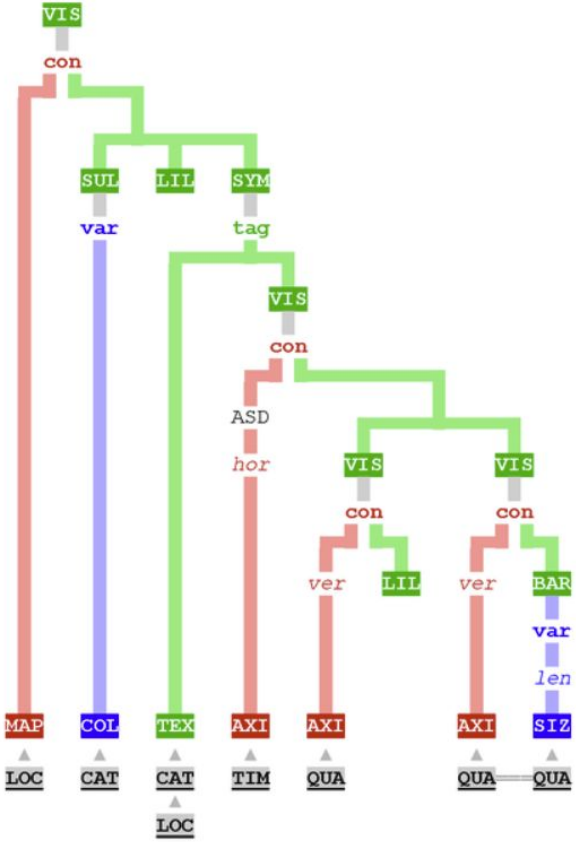
Researchers are trying to formalise diagrammatic encodings: e.g. VisDNA (Richards and Engelhardt, 2021).

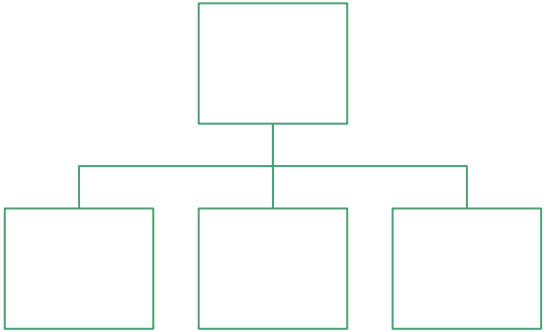
Understand what is happening now in order to improve things

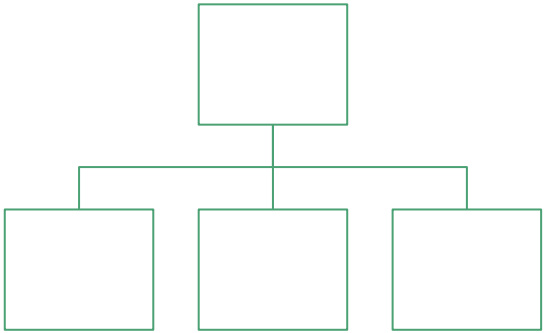

DNA of visualization
information to be visualized
actual specific information
types of information
question answered (▶ possible transformations)
... information that visual encodings can show
What does it look like?
CAP configuration and visual appearance
quantitative (metric)
Where? (▶ How much or how many?) (▶ Which order or ranking?) (▶ Which group or category?)
LOC spatial location
When? (▶ How much or how many?) (▶ Which order or ranking?) (▶ Which group or category?)
TIM point in time
How much or how many? (▶ Which order or ranking?) (▶ Which group or category?) (▶ What proportion?)
QUA quantity
What proportion? (▶ How much or how many?)
PRO proportion
ordinal
Which order or ranking? (▶ Which group or category?) (▶ Does a given relationship hold?)
ORD order
nominal
Which group or category? (▶ What does it look like?) (▶ Does a given relationship hold?)
CAT category
Does a given relationship hold? (between two entities) (▶ Which order or ranking?)
REL relationships between entities – being present or not (see note ‡)
visual encodings
Visualizations and their visual components can be:
con·structed using . . . arranging
var·ied through . . . . . varying
lin·ked using . . . . . linking
PIC picturing
MAP mapping
AXI positioning along an axis ↺
SIZ sizing ↺
REP repeating
ORG ordering ↺
GRA gradient coding
PRP proportional partitioning ↺
COL colour coding
SHA shape coding
GRP grouping by position ↺
BOU grouping by boundary
ADJ coupling by adjacency
NES nesting
CNC connecting
layout principles
Visualizations can be con·structed using placement in (an/a):
ARY array ↺
GRI grid
PGR polar grid
ASD array with a shared dimension
OSD overlay with a shared dimension
ARD array of dimensions ↺
PIL piling
DDL diverging from a datum line ↺
CFR constrained freedom
directions
for con, BAR, RAM:
hor horizontal
ver vertical
ang angular
rad radial
thd third-dimension
spi spiral
for SIZ:
wid width
len length
All VisDNA with captions marked ↺ may be specified with a direction.
visual components
basic visual components:
SYM symbols
PCO pictorial components
TEX textual components
CLI connector lines
DCL directed connector lines
BAN bands
BND boundaries
LIL line locators
SUL surface locators
DIS disks
BLO blocks
BAR bars ↺
RAM range markers ↺
PAR partitions
GLY glyphs
POS spatial positions
composite visual components:
VIS visualizations
... can be tag·ged with ...
a visualization species
(for example a chart type)
a particular 'well-formed' combination of VisDNA building blocks
reference elements
axis lines
tick marks
axis labels
grid marks
legends
etc
a specific visualization
expressing the given information
‡ Symmetrical relationships (e.g. 'is a friend of'): encoding possibilities include CNC with CLI, BOU, or ADJ.
Asymmetrical relationships (e.g. 'is a child of'): encoding possibilities include CNC with DCL, or NES.
CNC with CLI, BOU, or ADJ may also be used – if combined with an additional encoding that clarifies directionality.
2021
Clive Richards
Yuri Engelhardt
VisDNA.com

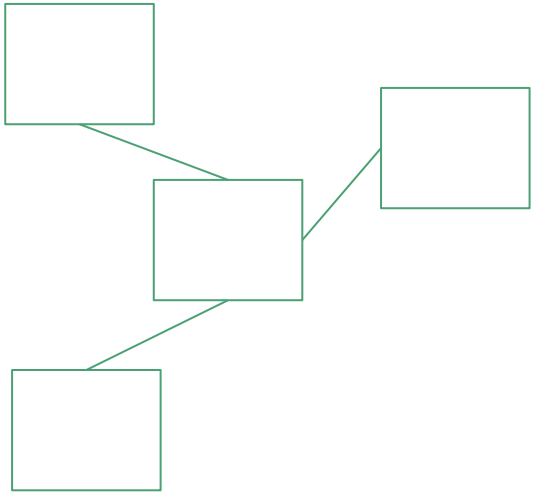


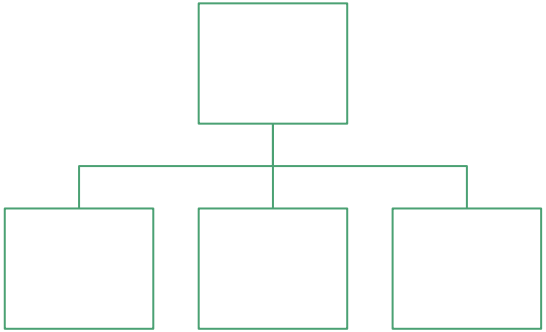
Climate map of North America
(map detail from Degn et al., Seydlitz, 1973)

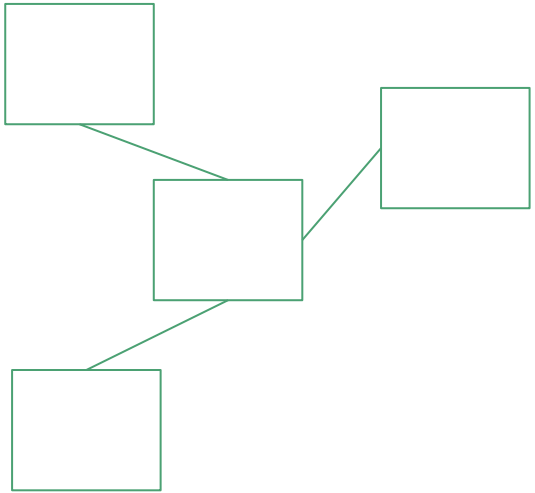


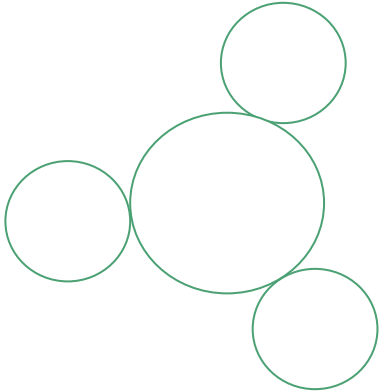


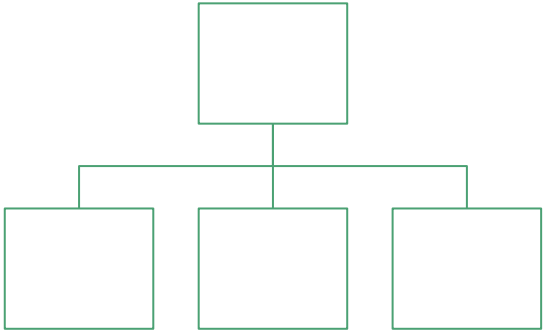


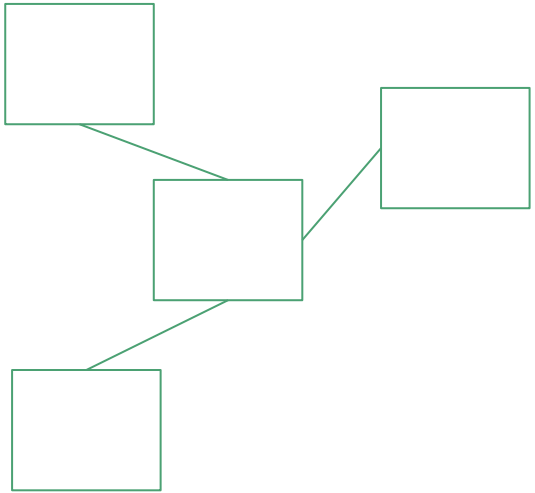


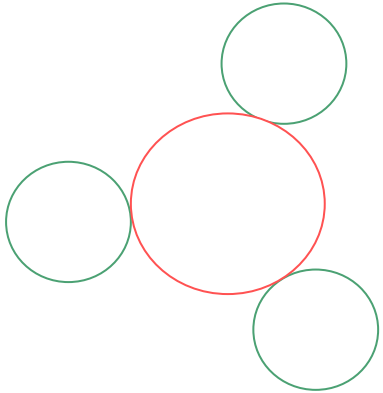


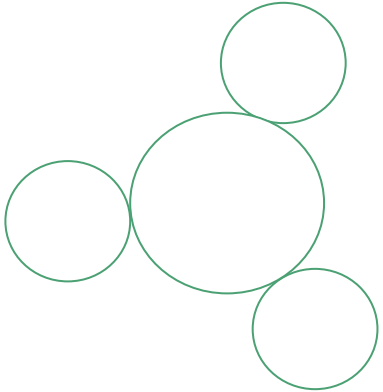


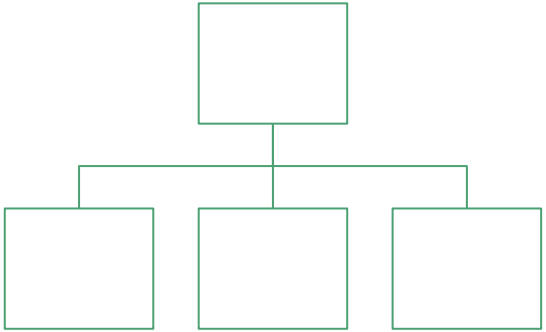


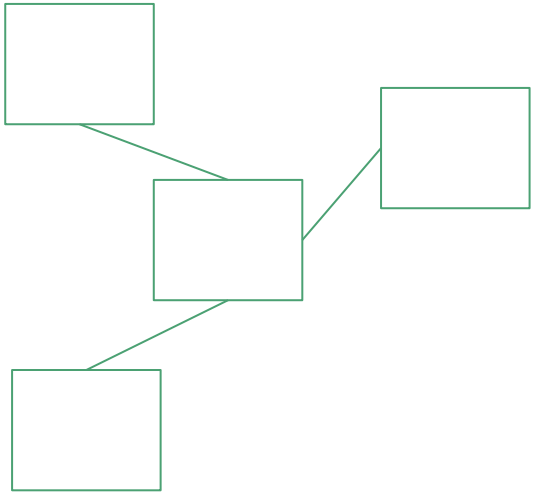


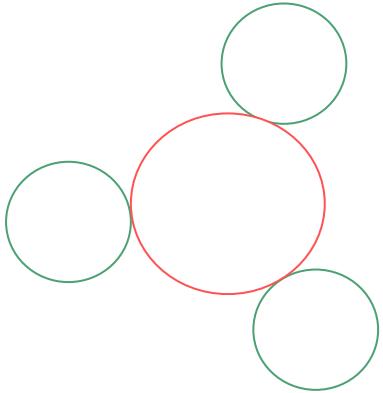


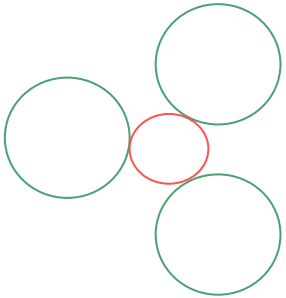


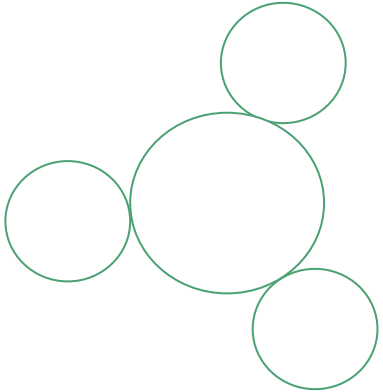












Activity!

Draw some very simple diagrams to practice using different visual encodings.

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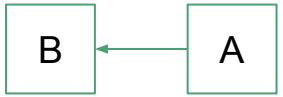
Reflection: Making diagrams better through more thoughtful use of content and visual encodings

Reflection: Why is this important?

- Effective communication
- Unambiguous communication
- Accessibility
- Unconscious bias
- …

Are these the same?

(i)



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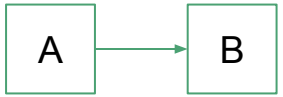

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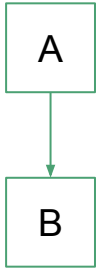

(iv)

Activity!

Swap your diagrams for interpretation by others. Share your thoughts with one-another.

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Reflection: Any surprises?

Diagrams are still evolving

- Images > Schematics > 3D
- Interactive diagrams?
- Diagrams should support wider business considerations to enable "optimising the whole"?
- PhD thesis: A framework for improved AI software diagrams
- ???

Activity!

In your day-to-day efforts interacting with your team, think of a new diagram to communicate about a particular aspect of your work (e.g. challenges, product flow, concepts)

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Reflection: What did you try?

Session reflection

- DISCOVER the philosophy and history of diagrams
- IDENTIFY diagramming practices
- APPLY scientific research to improve your diagrams
- PRACTICE using different principles in your diagrams
- ARTICULATE more effectively through diagrams to communicate about complex topics

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