



Building

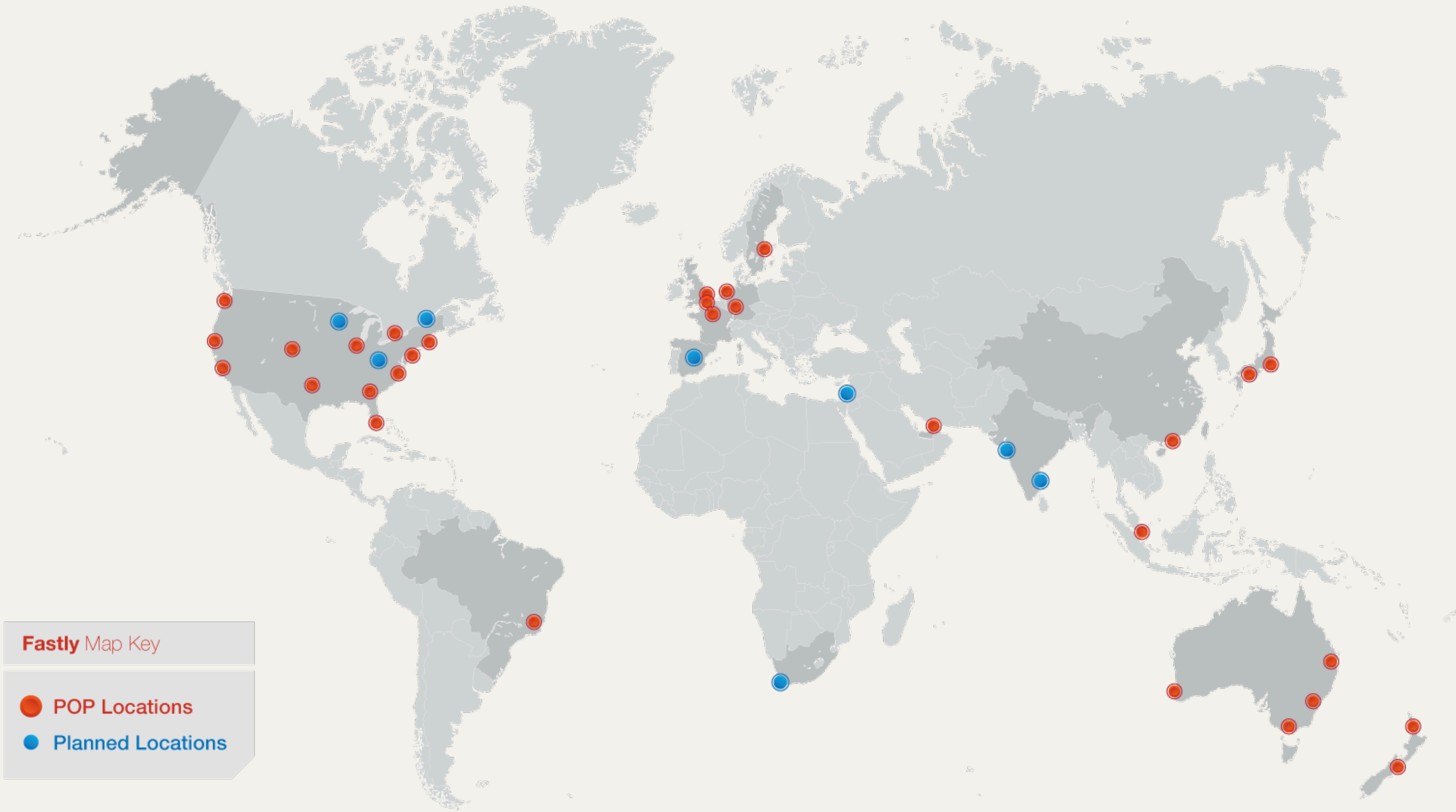
2

debugging

Mindset

QConSF 2016 | Devon H. O'Dell | @dhobsd



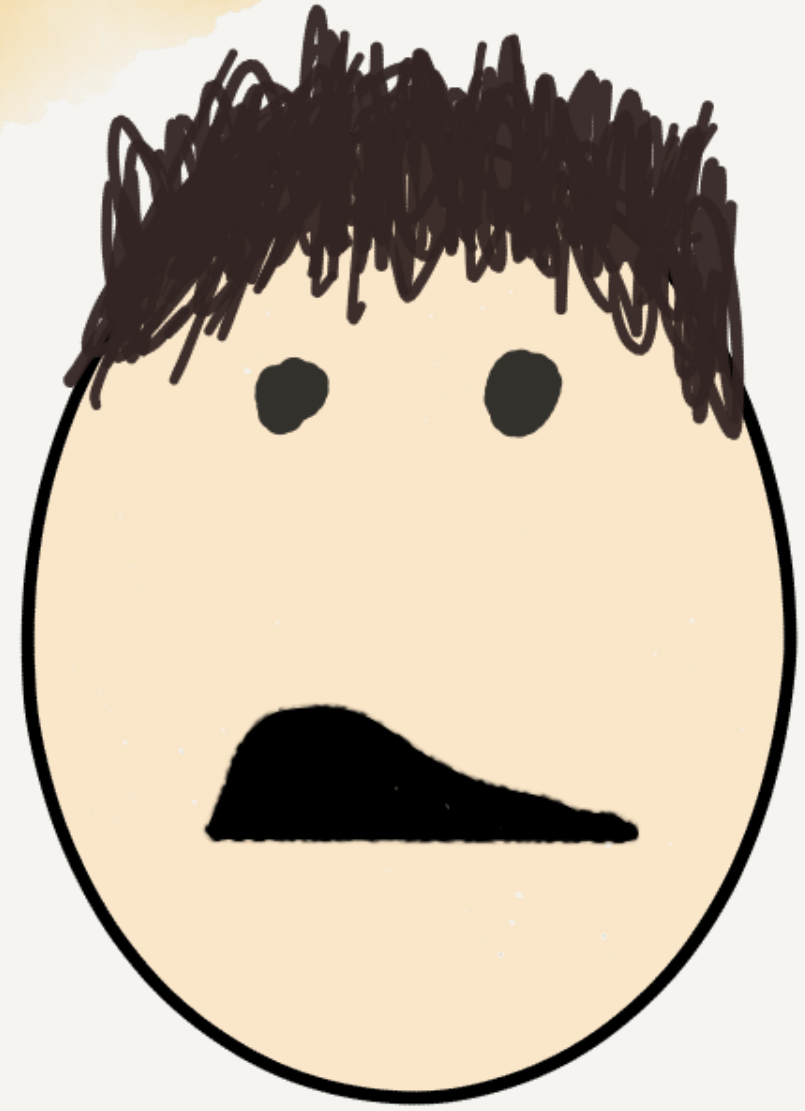


Fastly Map Key

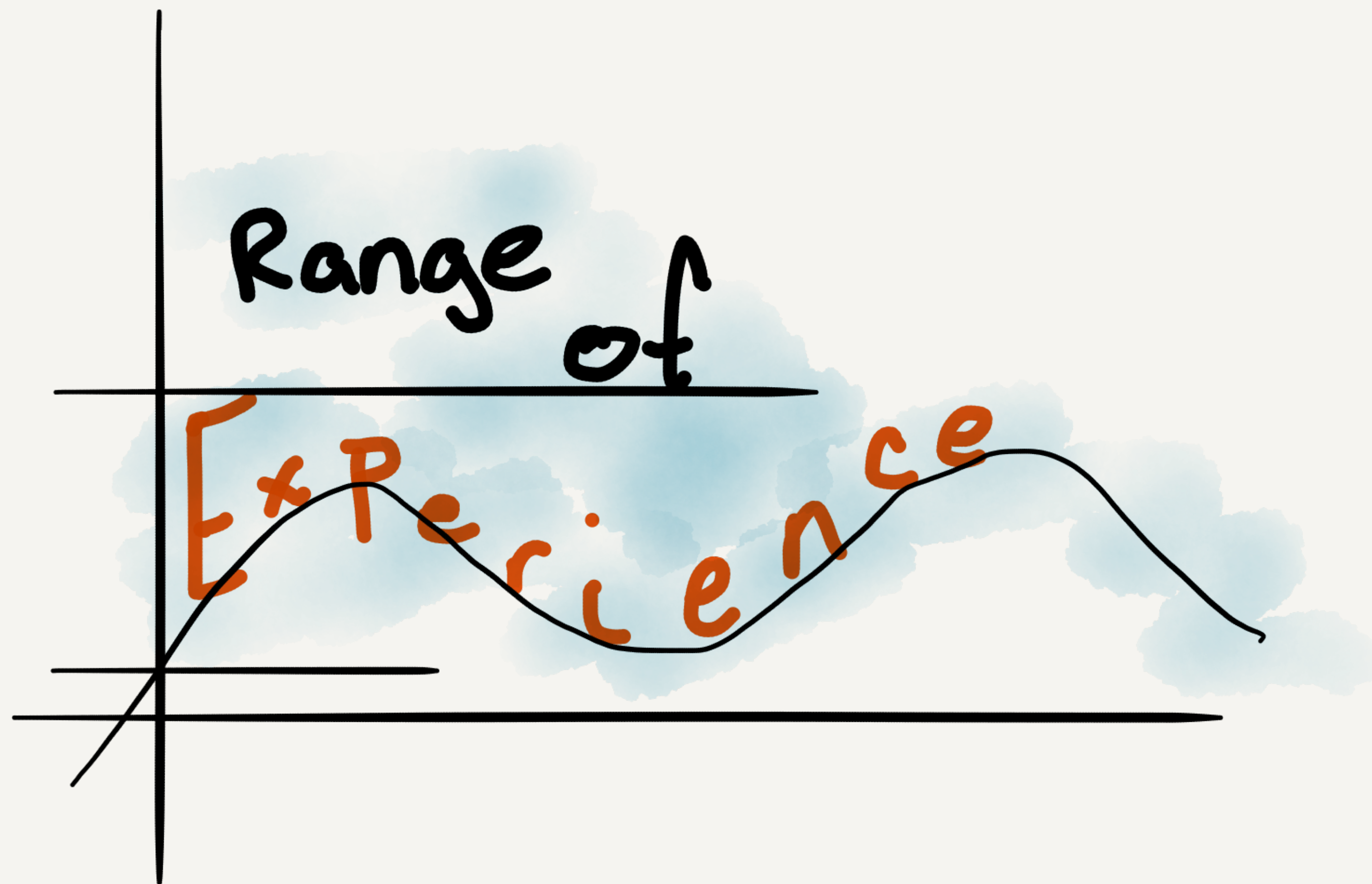
- POP Locations
- Planned Locations



Act 1



Why is
debugging
so **HARD**?



mmap(2)

confusing interfaces

The whole
picture?



June
1949

EDSAC

Maurice
Wilkes

Memoirs of a Computer
Pioneer

NOT
obvious



What have
I done?!

Brian
Kernighan



The
Elements
of
Programming
Style
1974

Everyone knows
debugging is twice as hard...

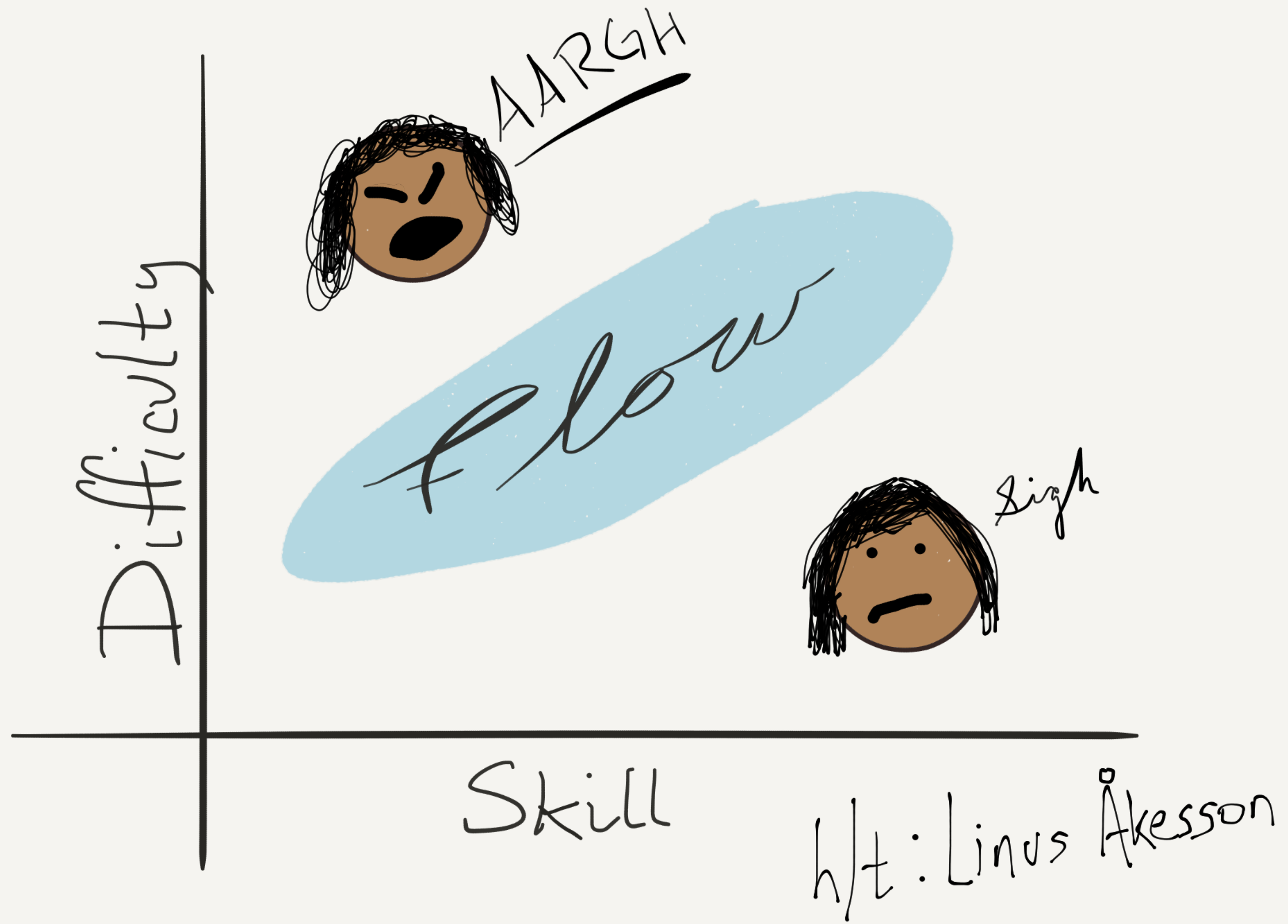
... if you're as clever as you can be
when you write it

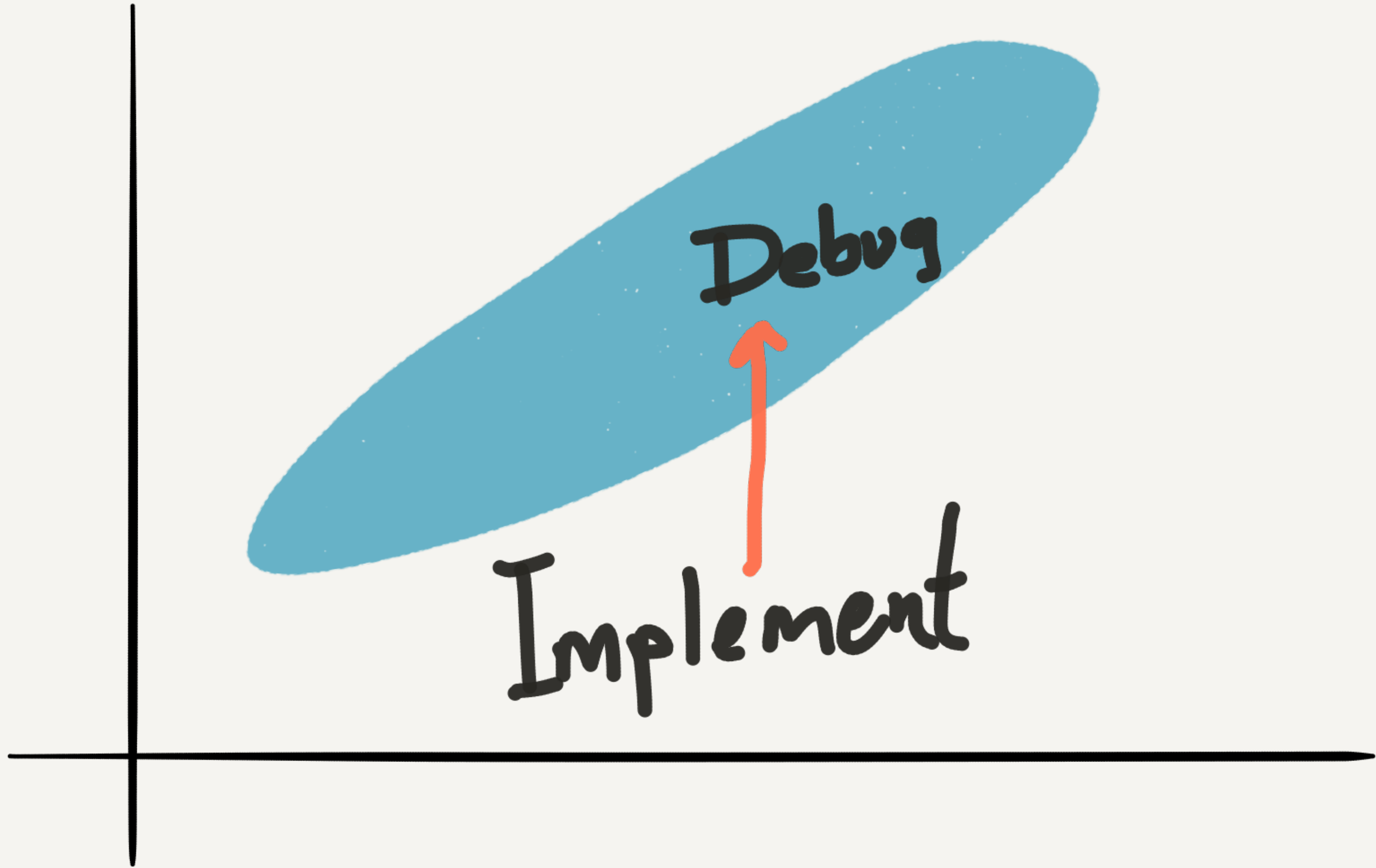
how will you
ever debug it

Challenge

Accepted

Flour





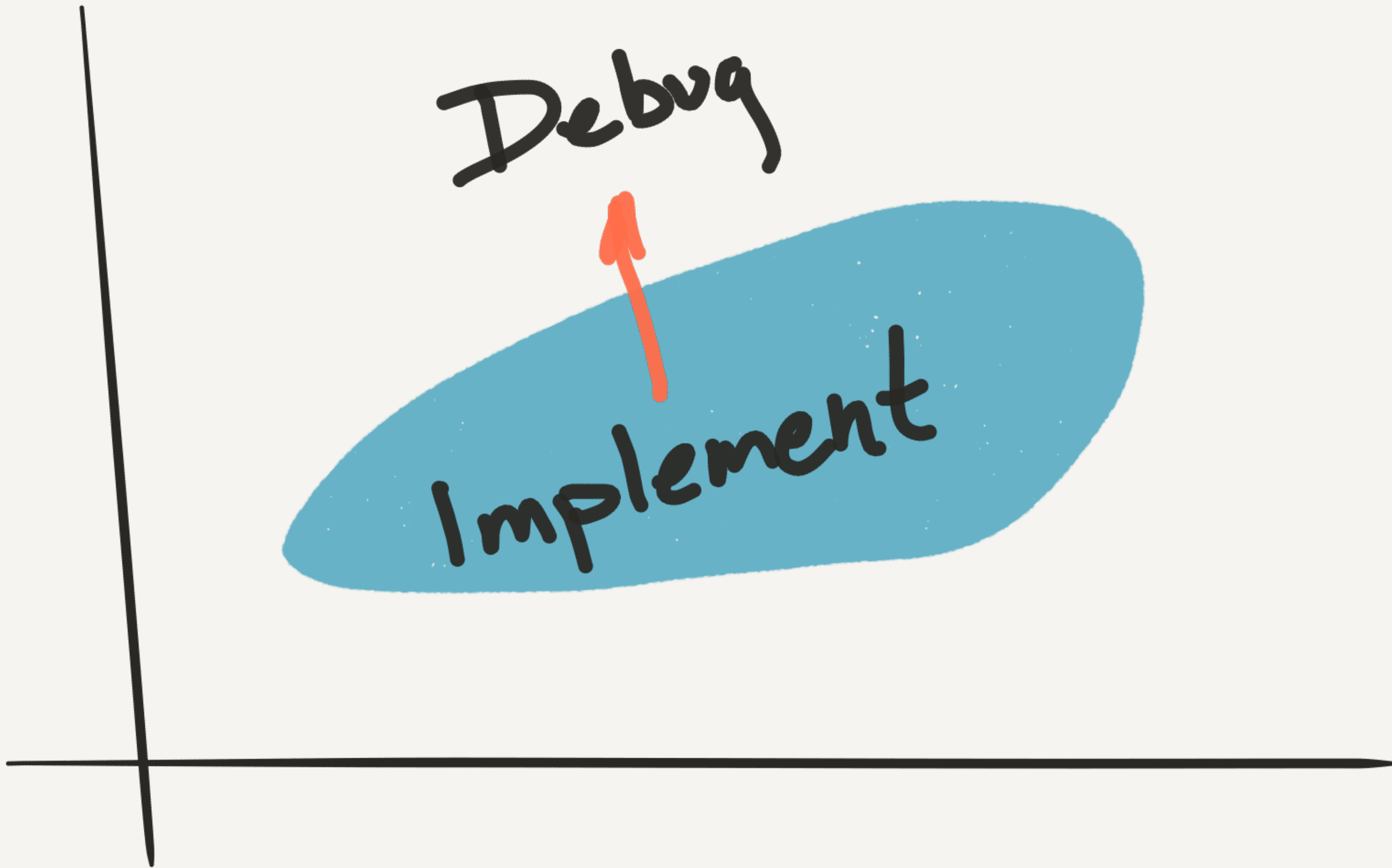
Debug

Implement

Debug



Implement



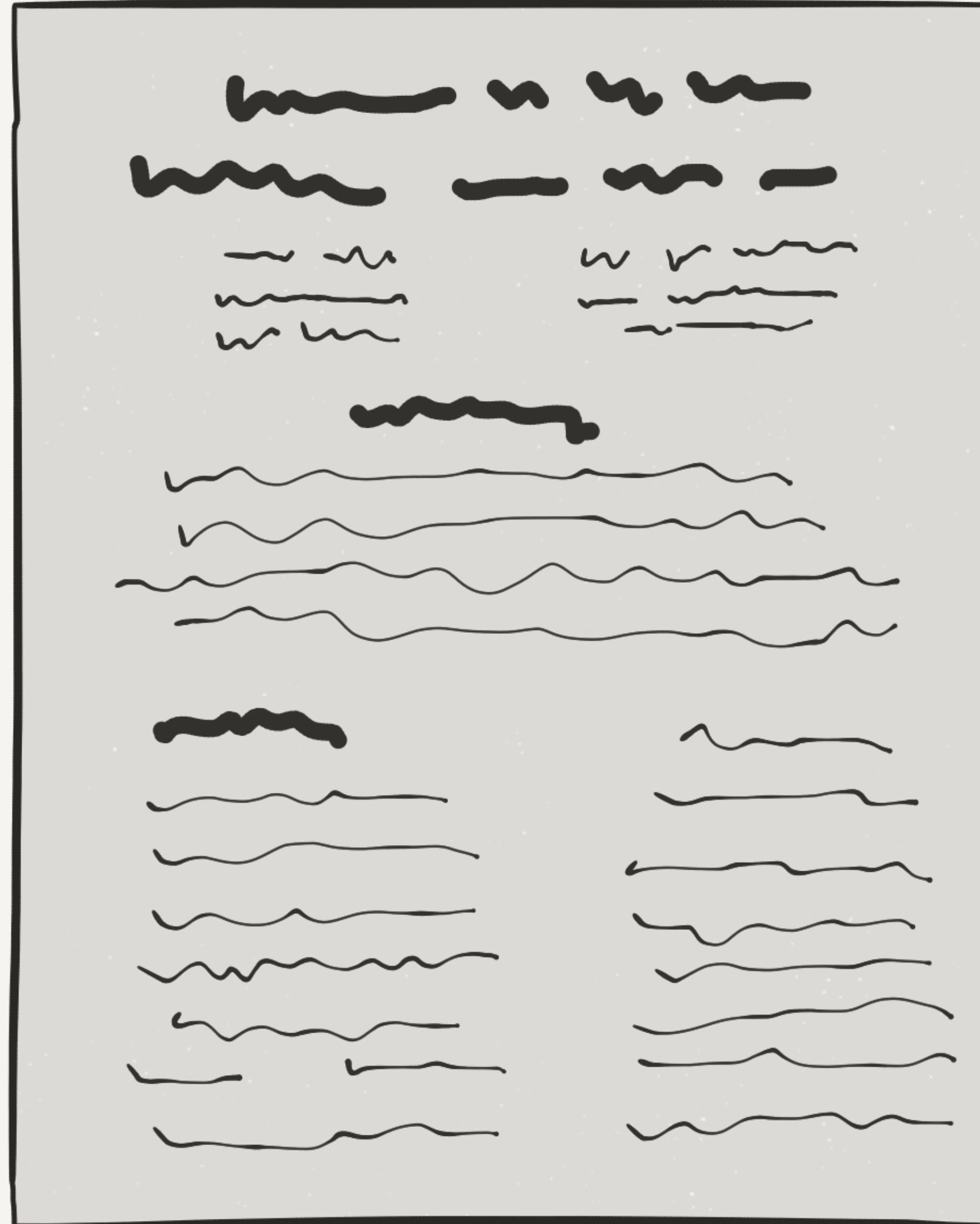
To gain skill

Practice at the
edge of your
ability

>52
PAPERS

Debugging:
a review of
the literature
from an
educational
perspective

Renée
McCawley
et al



1967

-
2008

don't
teach

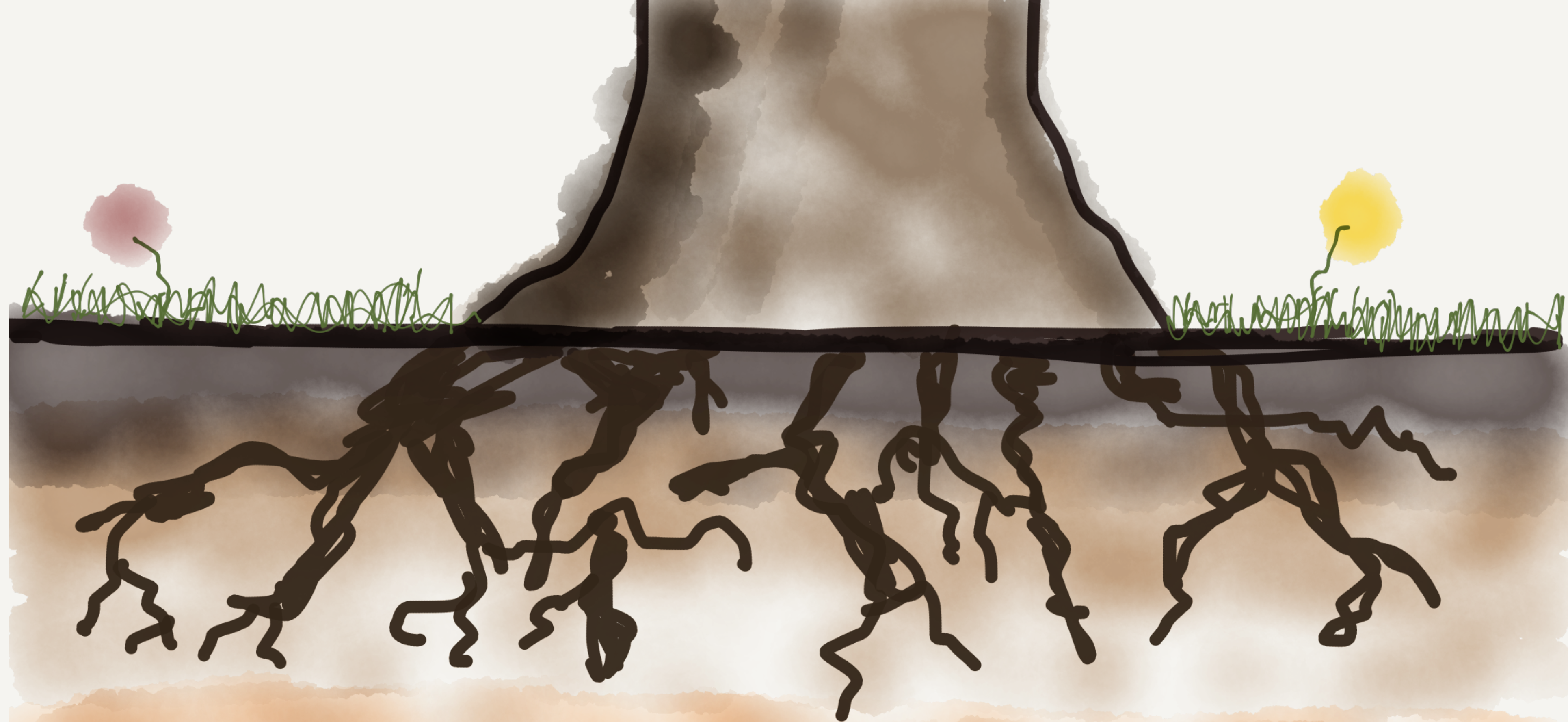
Who?
debugs

When?
do we debug

What?
is debugging

Why?
do bugs happen

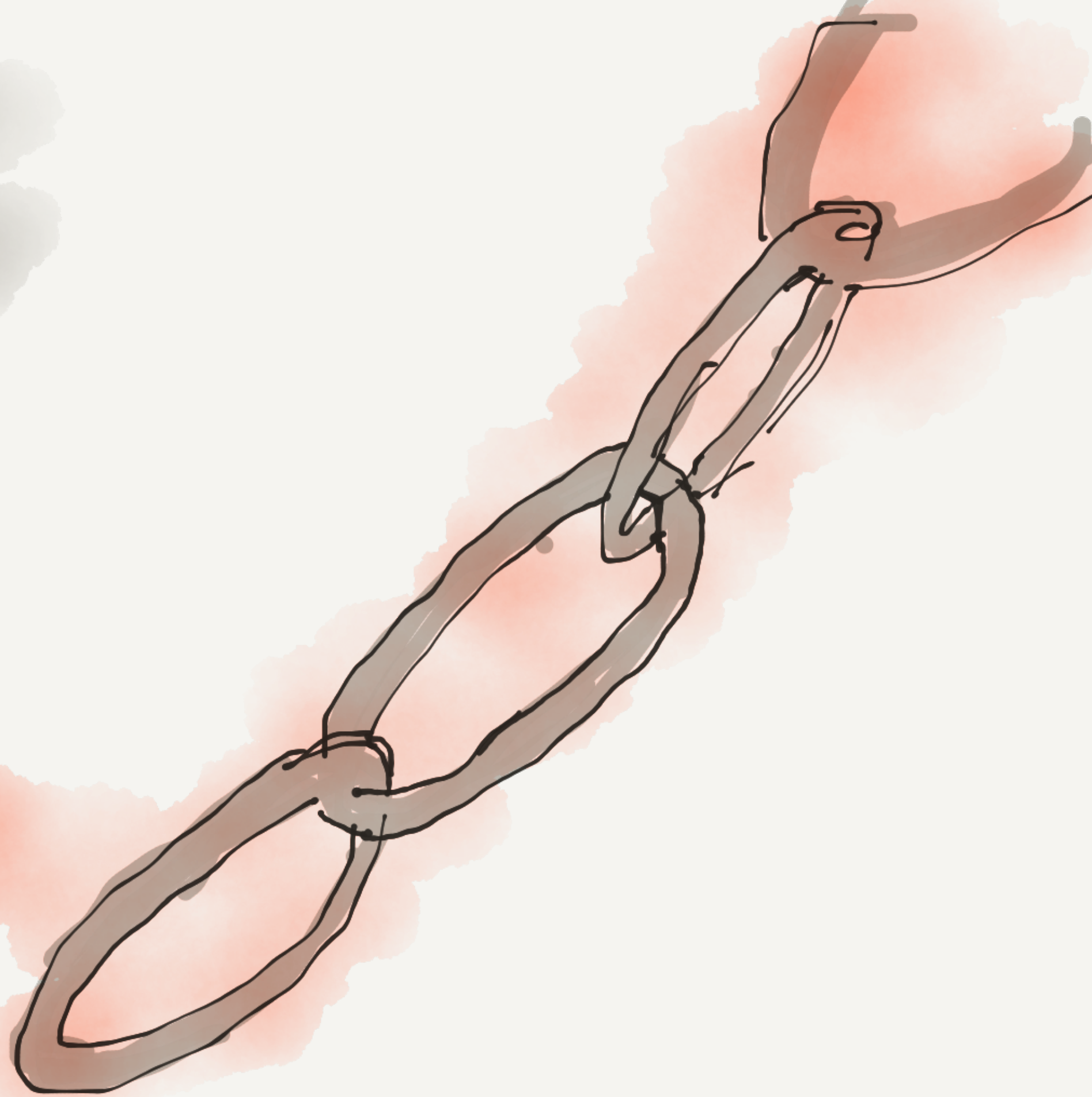
How?



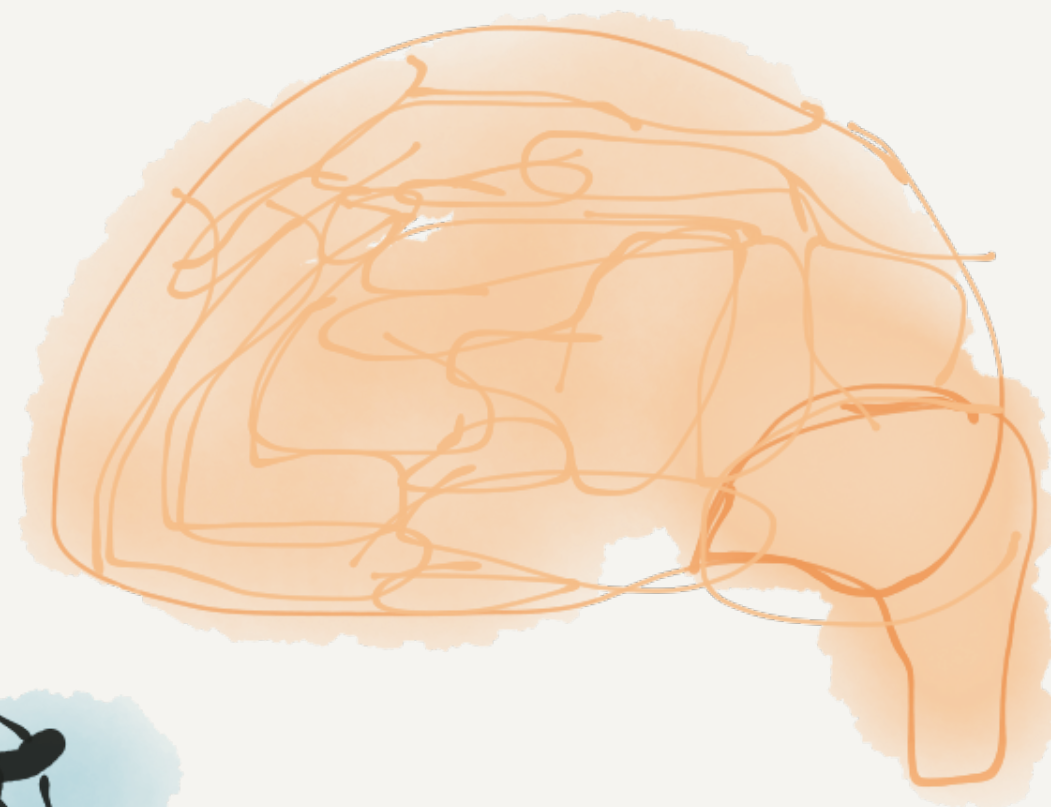
Root Cause

Chains of
cognitive

breakdowns



Faulty



Assumptions

Required
Knowledge



Software
Editor/IDE
Extensions
Protocols
Runtime Environment
APIs
VM/Hypervisor/Kernel/Syscall
Language
Hardware
Physics
.....



Actual
Knowledge

New software is
based on
existing knowledge

Debugging

Requires new

knowledge

Don't know
how to
teach it



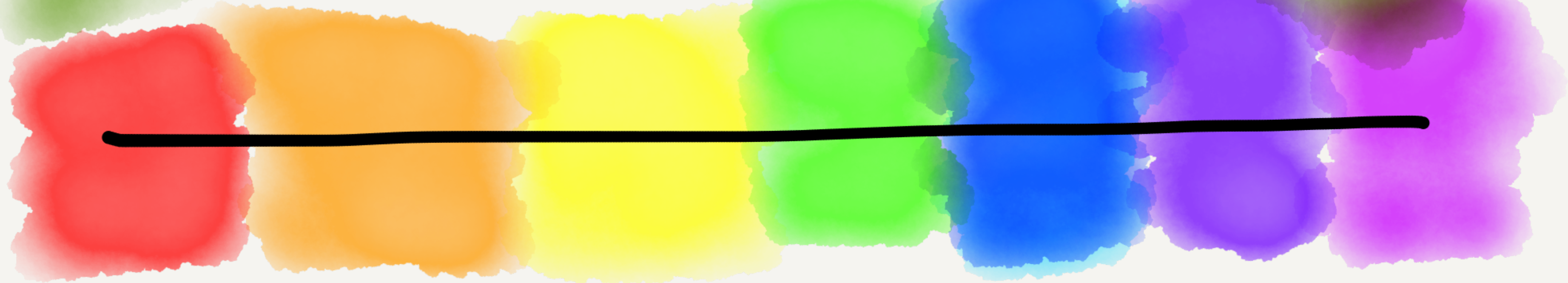
Carol
Dweck

Self-Theories
1999

Intelligence

Inherent
Trait?

Developed
Skill



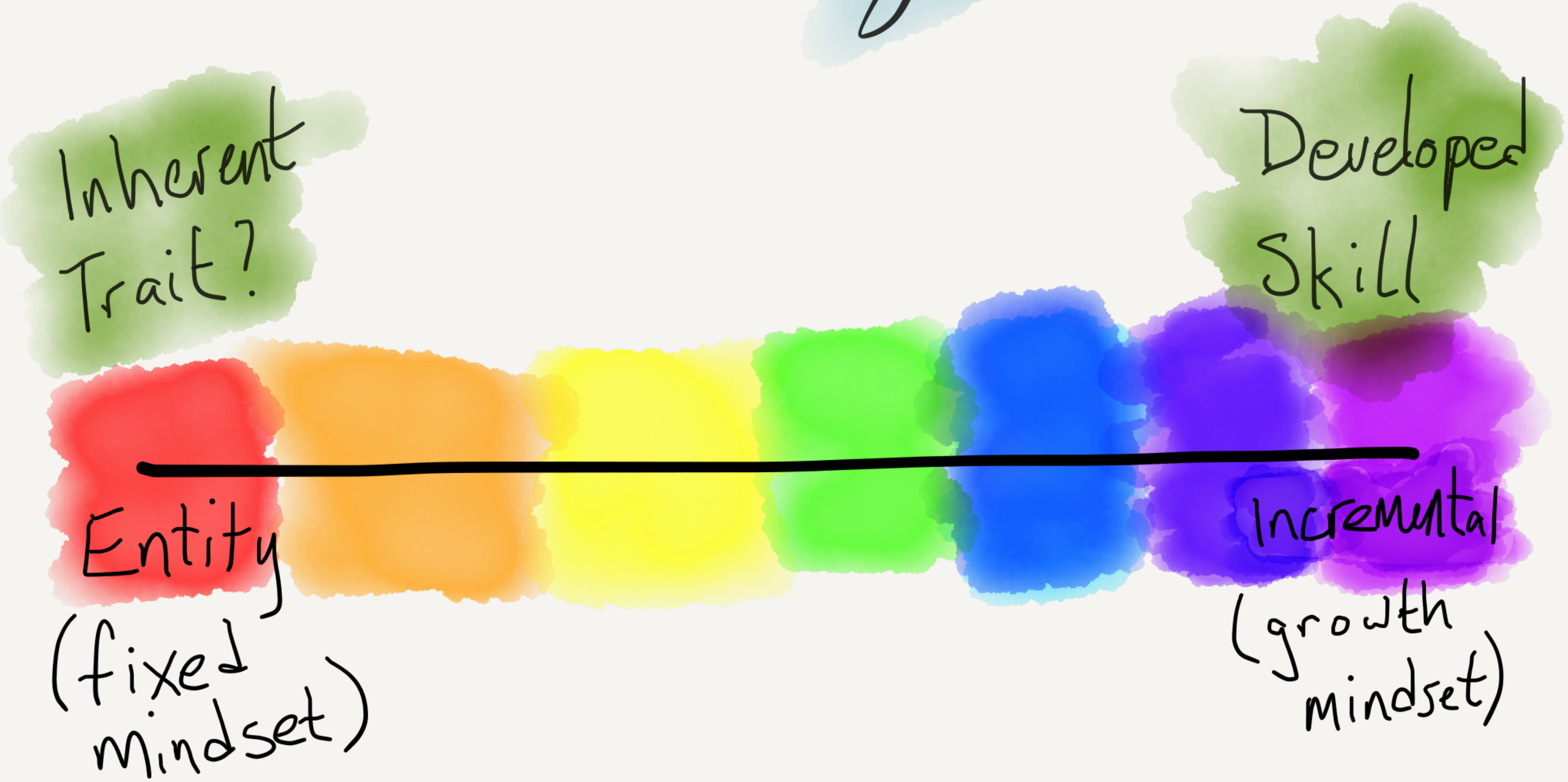
Intelligence

Inherent
Trait?

Developed
Skill

Entity
(fixed
mindset)

Incremental
(growth
mindset)



Fixed

Mindset

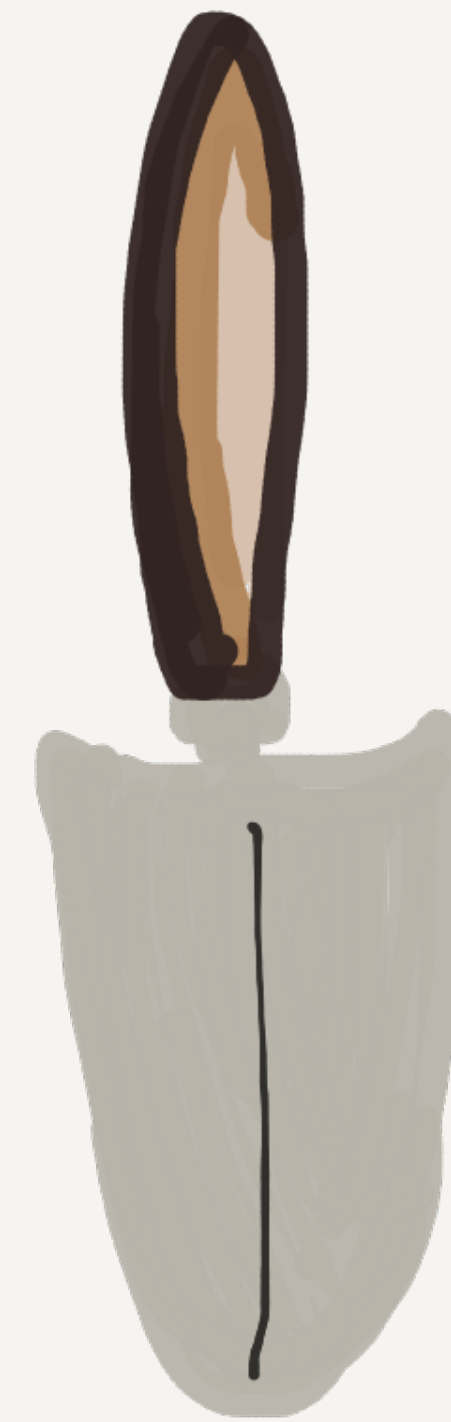
Growth

Mindset



Act 2:
mentoring

Growth



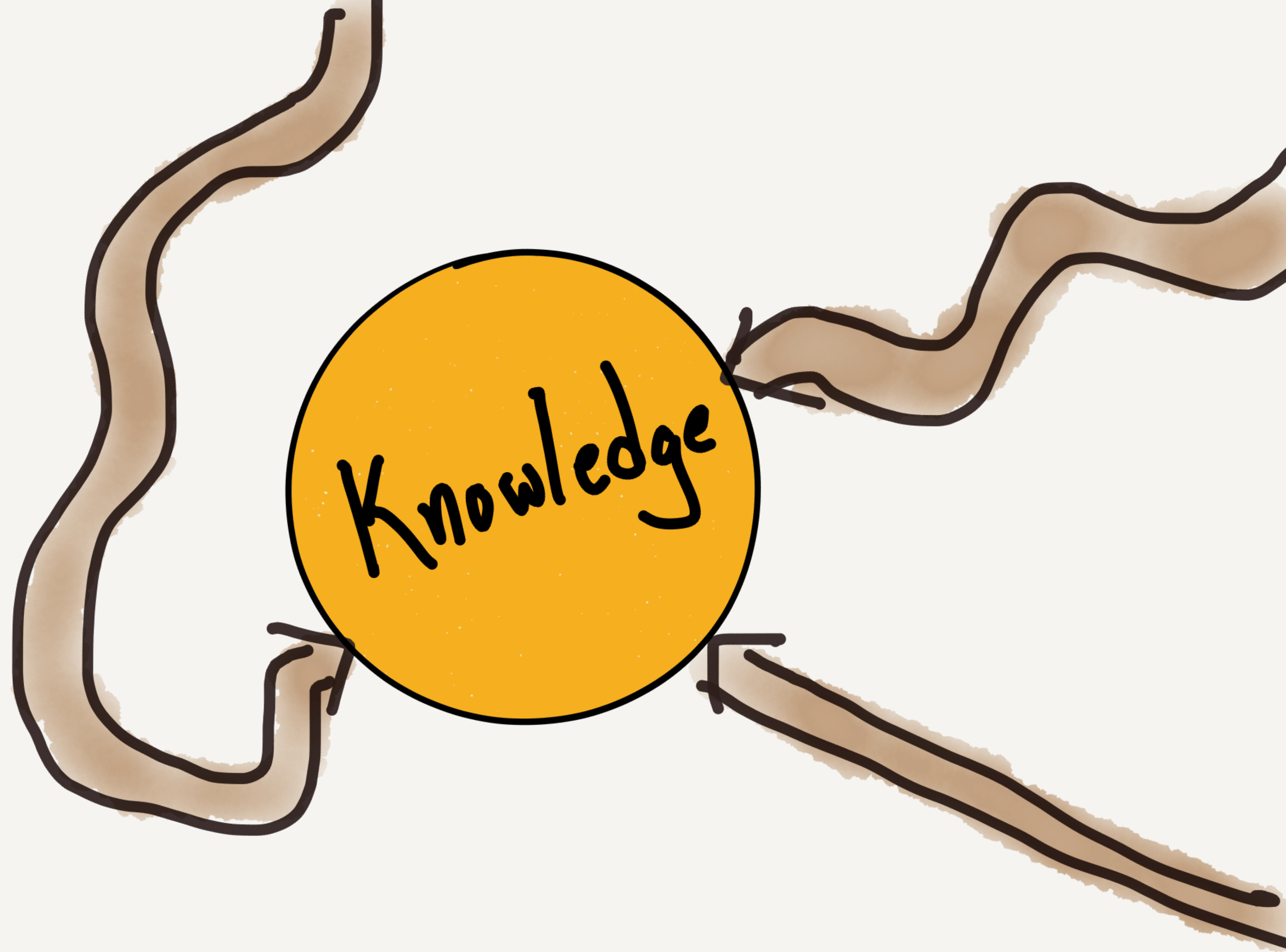
Create
Growth-oriented
Teams

Promote

Growth

Be

Curious



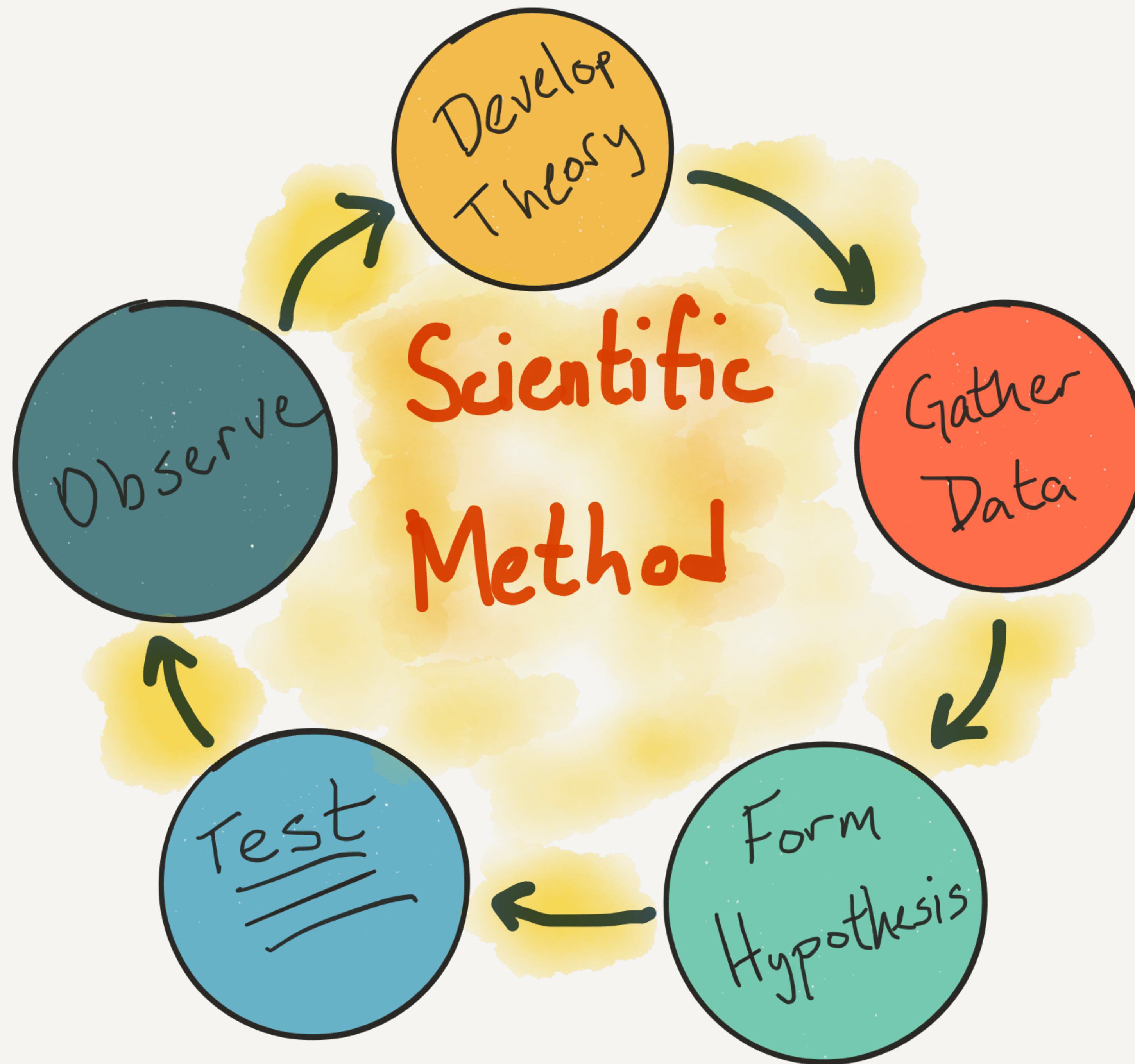


Debugging is:



ART?





“Obvious
memory
corruption”

Not

“Obvious
memory
corruption”

Hypothesis



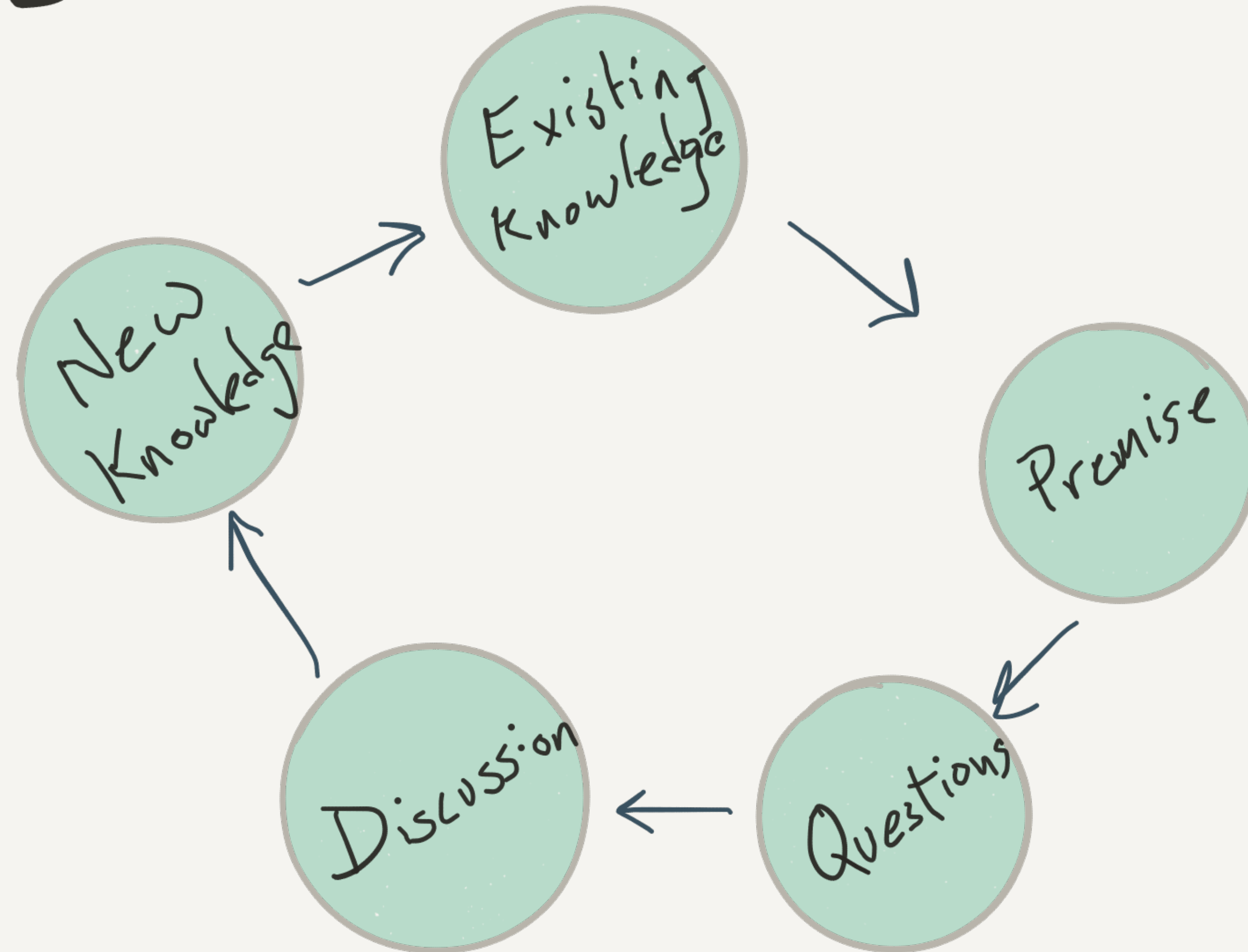
We debug
symptoms,
not causes

Heisenbugs

An uninitialized variable
causes us to write past the
end of object O when
conditions A and B are true.

What questions
do we
ask?

Socratic Circle



Let folks

own

their

Knowledge

Active Recall



What **ARE**
the arguments
to mmap(2)?

h/t Allison Kaptur

Spaced

Practice



Diminishing
returns

Persevere.



Call To

Action

(3d lenses not included)

✓ Praise Effort

✓ Be curious

✓ Science

✓ Learn

✓ Empathize

✓ Teach / Mentor

✓ Persevere

Everyone knows
debugging is twice as hard...

... if you're as clever as you can be
when you write it

how will you
ever debug it

Thanks!

@dhobsd

<https://9vx.org>

devon.odell@gmail.com

- Linus Åkesson - Kernighan's Lever, 2012
- Mihaly Csikszentmihalyi - Flow, 1991
- Carol Dweck - Self-theories: Their Role in Motivation, Personality, and Development, 1999
- Allison Kaptur - Effective Learning for Programmers, KiwiPyCon, 2014
- Brian W. Kernighan & P.J. Plauger - The Elements of Programming Style, 1974
- Renée McCauley et. al. - Debugging: a review of the literature from an educational perspective, 2008
- Maurice Wilkes - Memoirs of a Computer Pioneer, 1985