CS 428 "The Five Orders of Ignorance" (Armour)

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The true nature of software

- Software is a knowledge-storage medium
- Developing software is a knowledge-acquiring activity
- We seldom have perfect knowledge ahead of time
  - If we do, then why are we doing this? The problem has already been solved.
- Therefore, software development is an inherently inefficient exploration and discovery process
  - We determine what works
  - We determine what does not work (for this particular system)
- Observations and experiences?

What can happen along the way

- The problem of late discovery
  - Blind alleys, significant backtracking
  - Webster: Do not Defer the Difficult in IT Projects (2013)
- Two kinds of knowledge
  - Again, what doesn't work and what does
  - Sometimes, what doesn't work is just as valuable, but is often discarded
- "Corrupted" knowledge
  - The code often contains artifacts or remnants of our knowledge exploration during development – these may be misleading or obscuring
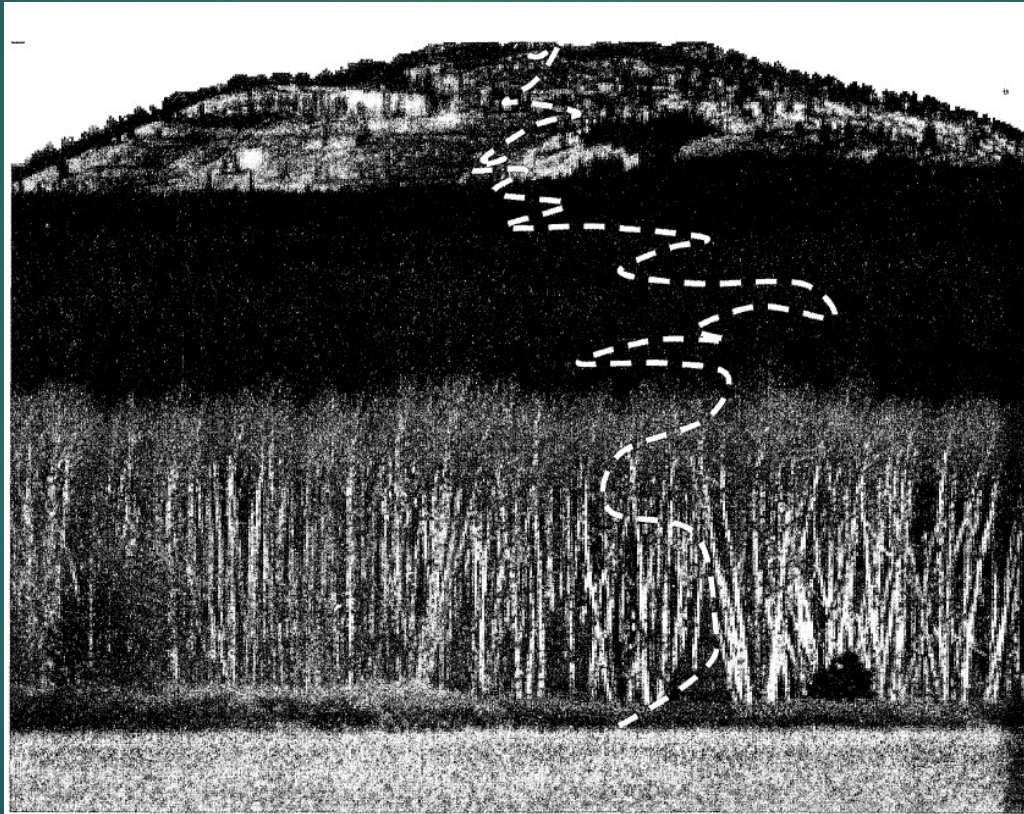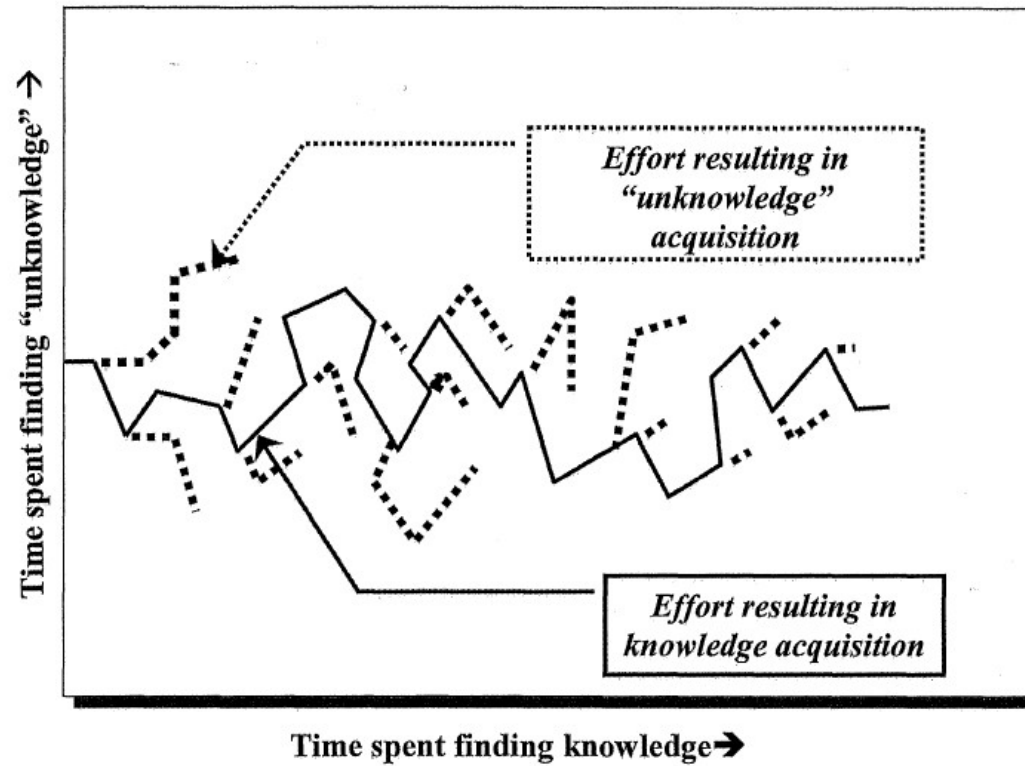- Observations/experiences?

What the discovery process looks like

Exhibit 6. A path through the woods.

What the discovery process yields

Exhibit 4. Hacking project: Full build.

The five orders of ignorance

- Zeroth Order: Lack of Ignorance
  - I know something, I know that I know it, and I can demonstrate I know it
- First Order: Lack of Knowledge
  - I don't know something, and I know I don't know it
- Second Order: Lack of Awareness
  - I don't know something, and I don't know that I don't know it
- Third Order: Lack of Process
  - I lack a process by which I can discover that I don't know that I don't know something
- Fourth Order: Meta Ignorance
  - I don't know about the Five Orders of Ignorance

Applied to software development

- 0th Order: I know how to complete the system

- 1st Order: I know what I will need to know to complete the system

- 2nd Order: I don't know yet what I will need to know to complete the system

- 3rd Order: I don't know how to discover what I need to know to complete the system

- 4th Order: I have no clue about any of the issues above
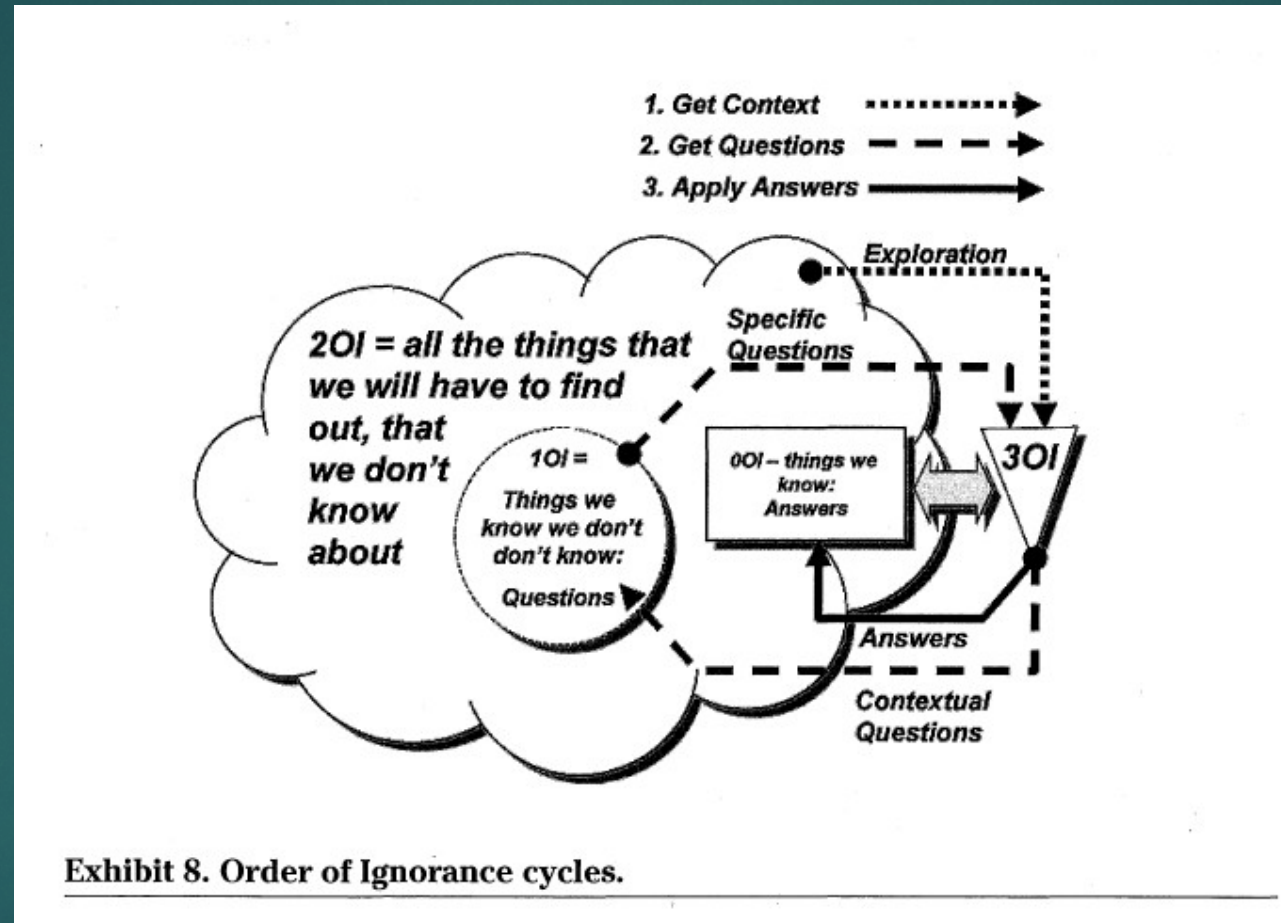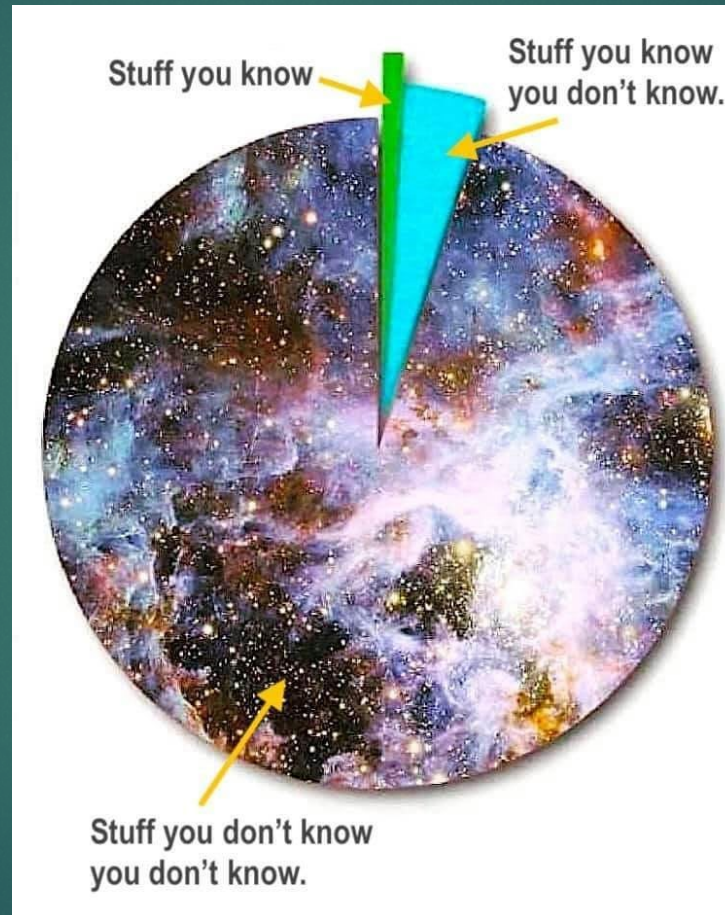
Order of Ignorance Cycles

Exhibit 8. Order of Ignorance cycles.

How it actually is

Nature of the process

▶ To identify whether there are areas where we have ignorance (need to acquire knowledge)

▶ To identify what questions we would need to ask to resolve ignorance in these areas

▶ To obtain the answers to these questions in a form that we can usefully integrate into the system

▶ Key problems

  ▶ Acquiring knowledge also illuminates more areas of lack of knowledge

  ▶ Humans have not found a way to empirically measure knowledge

  ▶ The critical measure of knowledge in software is that of the knowledge *not* in the software

▶ Observations/thoughts?