First Principles in Scrum
A New Way of Thinking

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Agile Manifesto Signatory

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FIRST PRINCIPLES
IN SCRUM

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Co-Creator of Scrum and
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Questions, questions, questions
All reflecting an old mindset

- **Explain to Chinese managers why we have to have autonomous teams?**
  - They like directive hierarchy
- **Why Scrum@Scale?**
  - There are plenty of other scaling frameworks
- **What if my unique organization can't do some things in Scrum?**
  - Can we still call it Scrum?
- **What if managers won't help?**
  - Will our Agile Transformation fail?
- ***The questions are endless!***

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The Universe is Observed as Energy, Matter, and Frequency
Scrum uses frequency to focus energy to overcome matter

Wave Structure of Matter
- Particles like electrons and protons are composed of two spherical quantum waves, one moving outward and one moving inward. Energy (frequency) creates the illusion of matter.

Binary Universe
- Nature is binary in its physical structure of matter and energy. This binary nature is seen in the inward and outward quantum waves that constitute the charged particles of matter.

Resonance
- One special property that leads to the complexity of solid matter is the ability of waves to resonate with each other when they occupy the same space. This property of resonance leads to the atomic table of elements and the vast numbers of molecules which can be formed from them.

Binary Communication
- The binary nature of matter and the binary nature of computer technology, suggest that just as complex images and messages can be created from a stream of binary numbers, complex structures and phenomena can be created from the binary pair of inward and outward quantum waves.

Musical Analogy
- Just as simple waves can be combined in a myriad of ways to produce vast numbers of melodies and compositions, the binary pair of waves provides endless combinations to form different kinds of matter.
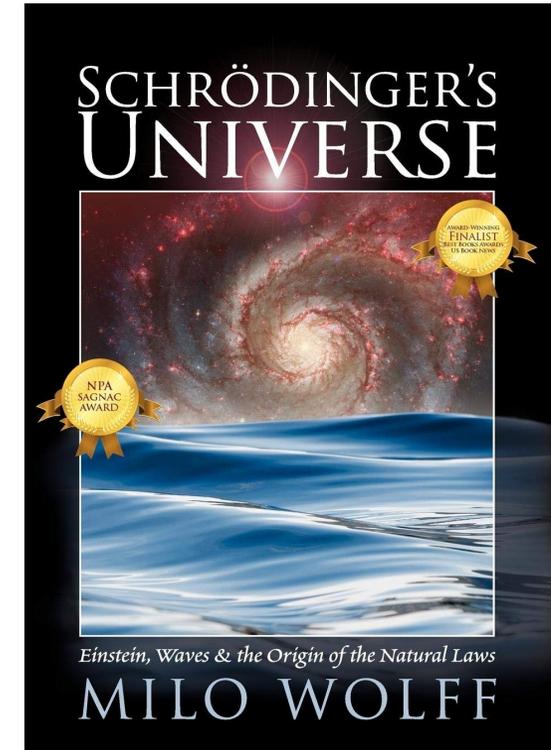
Planck's constant emerges from the wave structure of matter!

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Computational Irreducibility is the Key to Agile

Unpredictability
There are some systems for which no shortcuts exist to predict their outcome. The only way to know the final state of these systems is to perform each step of the computation or process.

Complexity from Simple Rules
Even simple rules can lead to complex and unpredictable behavior. Simple cellular automata can generate highly complex patterns that are computationally irreducible.

Implication for Physics
Certain physical processes might be inherently unpredictable, not due to a lack of understanding or measurement precision, but because they are computationally irreducible.

Implication for Philosophy and Free Will
Computational irreducibility has been interpreted as providing a potential explanation for free will in a deterministic universe. If our brain's operations are computationally irreducible, then our future actions cannot be predicted, even if the underlying processes are deterministic.

Contrast to Computational Reducibility
Computational irreducibility contrasts with computational reducibility, where systems can be predicted without performing each step of the computation. Many traditional mathematical and physical models are computationally reducible.

Limitations of Traditional Science
Computational irreducibility suggests limitations to traditional scientific methods, which often rely on finding computationally reducible, predictive models. It implies that there may be inherent limits to our ability to predict certain phenomena.
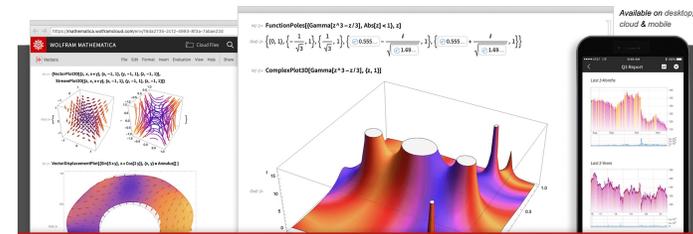
Universality
Many different types of systems, even simple ones, can perform computations of equivalent sophistication, leading to computational irreducibility. This universality is a key feature of Wolfram's New Kind of Science.
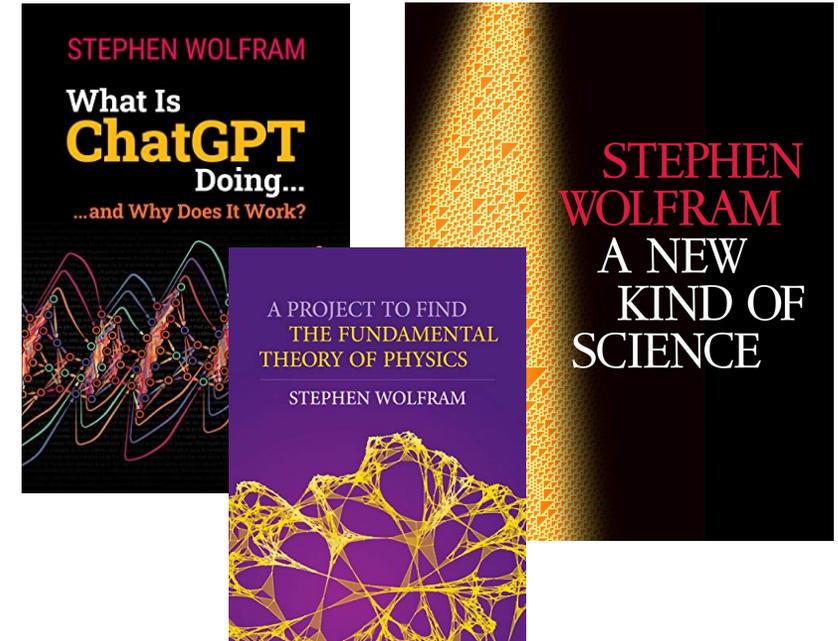
WOLFRAM MATHEMATICA
The world's definitive system for modern technical computing

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The Fog of War and the Friction of Side Effects Destroy the Best Laid Plans

- Computation irreducibility implies that you must use empirical process control.

- Waterfall assumes plan is predictable and generates massive failures.

- It is possible to generate small islands of computational reducability.

  - Systematic has done that for waterfall with 98% success rate.

  - However, waterfall products cost twice as much, take twice as long, and have twice the risk of not meeting customer need.

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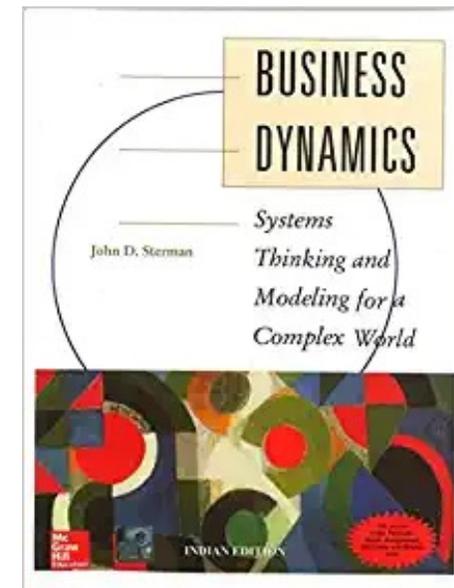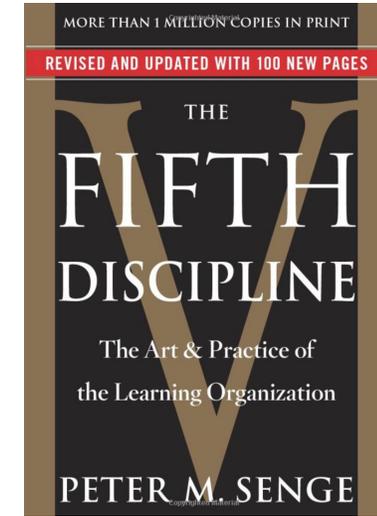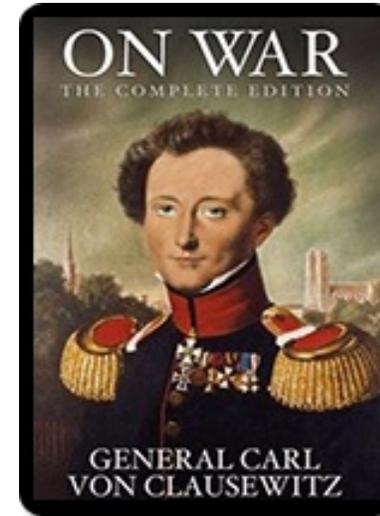
Empirical Nature of Universe Forces Relativity and Quantum Mechanics to Emerge

**1. Simple Rules, Complex Behavior:** Wolfram's models, often based on cellular automata, show that very simple rules can generate highly complex behavior. This behavior is often computationally irreducible, meaning there's no shortcut to predicting the outcome other than running the system.

2. Space as a Network: In Wolfram's model, space is represented as a vast network of interconnected points. The connections between these points form a kind of graph, and the evolution of the universe is represented by transformations of this graph.

3. Emergence of Relativity: The structure of this network and its transformations obey certain rules that, when considered at a large scale, average out to reproduce the equations of Einstein's theory of general relativity. This is how the curvature of spacetime and the effects of gravity emerge in Wolfram's model.

4. Quantum Mechanics from Path Summation: In Wolfram's model, multiple paths can exist between points in the network, each representing a different history of the universe. The principle of computational equivalence suggests that all these paths contribute to the behavior of the system, which is reminiscent of the path integral formulation in quantum mechanics. This is how quantum phenomena emerge in Wolfram's model.

5. Computational Irreducibility and Uncertainty: The inherent unpredictability of computationally irreducible systems in Wolfram's model mirrors the inherent uncertainty in quantum mechanics. Just as we can't predict the exact outcome of a quantum measurement, we can't shortcut the computation of the system's evolution.

6. Unification of Physics: Wolfram's approach offers a potential unification of relativity and quantum mechanics, two pillars of modern physics that have traditionally been difficult to reconcile. Both emerge naturally from the same simple computational rules, suggesting a possible path to a theory of everything.

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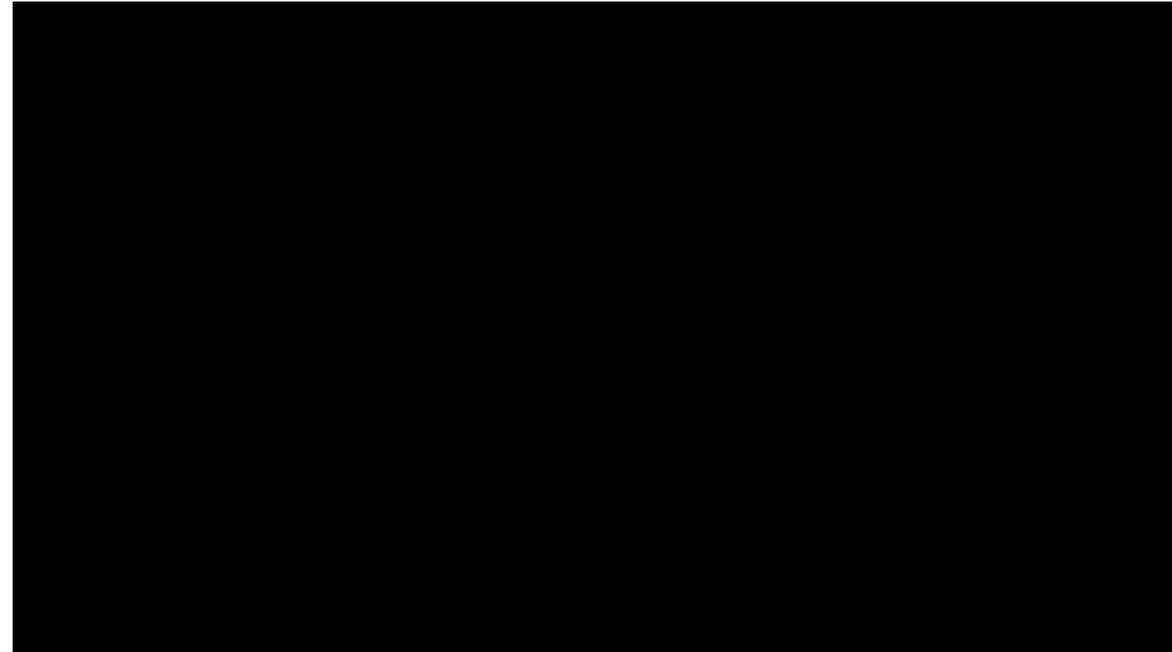
Physics->Chemistry->Biology->Evolution

1. **Universal Acid:** Dennett describes Darwin's theory of evolution as a "universal acid" that can dissolve traditional beliefs and ideologies. It challenges the notion of purposeful design in nature, suggesting instead that complexity can arise from simple, mindless processes.

2. **Algorithmic Processes:** Dennett argues that evolution is an algorithmic process, meaning it follows a set of simple rules without any guiding foresight or purpose. This perspective allows him to draw parallels between biological evolution and other algorithmic processes, such as cultural evolution and the development of artificial intelligence.

3. **Mind as an Evolved Phenomenon:** Dennett applies the principles of evolution to the mind, suggesting that consciousness and intelligence are not divine gifts but evolved phenomena. He argues that our minds, like our bodies, are the product of countless generations of natural selection.

4. **Cultural Evolution:** Dennett also explores the concept of memes, units of cultural information that replicate and evolve much like genes. He suggests that cultural evolution, driven by the spread and selection of memes, is another manifestation of Darwin's dangerous idea.
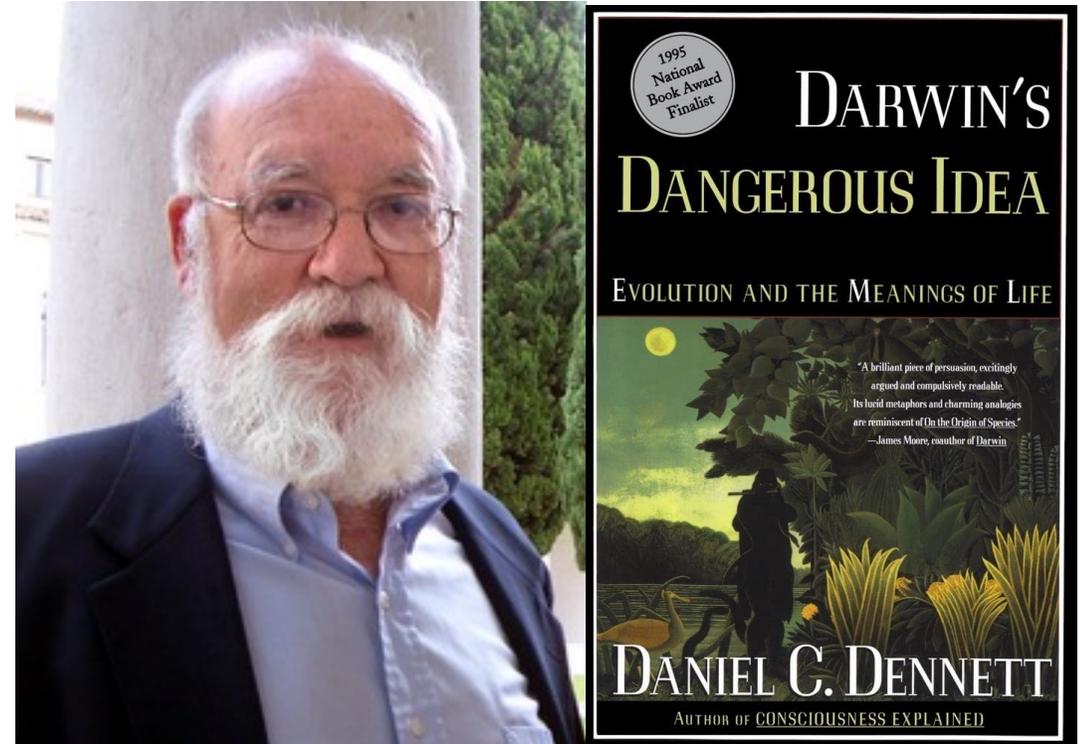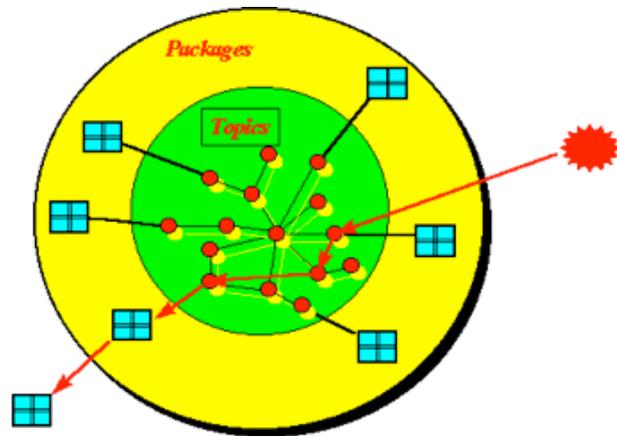
Punctuated Equilibrium is the Secret Sauce of Scrum

"It is not the strongest of the species that survives, nor the most intelligent that survives. It is the one that is most adaptable to change." Charles Darwin, Origin of the Species
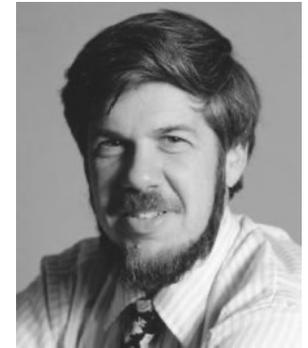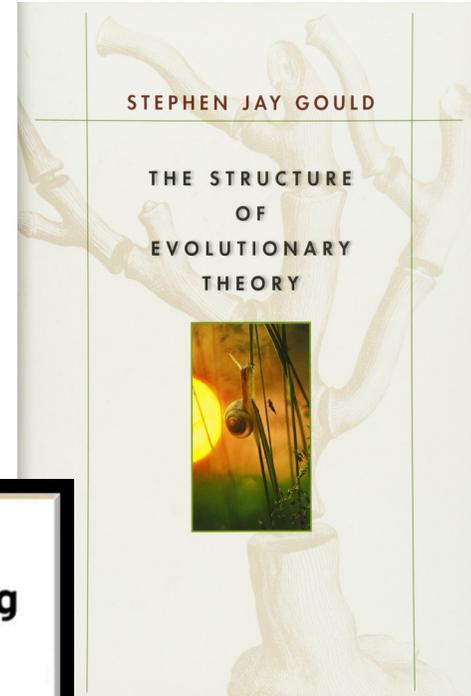
Punctuated equilibrium is a concept in evolutionary biology that posits species experience long periods of stability, punctuated by brief periods of rapid change. This concept is central to Scrum's effectiveness and is often referred to as its "secret sauce."

Iterative Development: In the context of Scrum, punctuated equilibrium is reflected in the iterative development process. Scrum teams work in short, time-boxed iterations known as sprints, each resulting in a potentially shippable product increment. This approach allows for rapid adaptation to changing requirements or market conditions, mirroring the rapid change periods in punctuated equilibrium.

The 'Next Best Step' in Scrum is a manifestation of punctuated equilibrium. Teams dynamically select the next small change or action that can trigger a ripple effect through the system, leading to rapid progress and the emergence of new features. This approach promotes system evolution and efficient decision-making, akin to how species evolve during periods of rapid change in punctuated equilibrium.

STEPHEN JAY GOULD

THE STRUCTURE OF EVOLUTIONARY THEORY

Stephen Jay Gould, from evolution to revolution

Packages

Topics

Self Organization
The Secret Sauce for improving your Scrum Teams

Jeff Sutherland
September 4, 2008

Google

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Maximizing Autonomy in Scrum: The Edge of Chaos

**Christopher Langton's Work**

- Developed a mathematical lemma proving that computer simulations of biological species evolve faster when degrees of freedom are maximized up to the edge of chaos.

- This principle has been influential in shaping Agile methodologies, particularly Scrum.

Autonomous Teams in Scrum

- Autonomy is a critical component of Scrum as Jeff Sutherland, Co-Creator of Scrum, was inspired by Langton's work.

- Autonomous teams are empowered to make decisions and adapt quickly to changes, enhancing the team's ability to evolve and respond effectively to project challenges.

- This autonomy is balanced with a framework of guidelines and principles to prevent descending into chaos.

Ken Schwaber and Control Chaos

- Ken Schwaber, co-creator of Scrum, emphasizes the importance of operating at maximum autonomy without crossing over into chaos.

- His original website, controlchaos.com, reflects this philosophy.

- Schwaber's approach to Scrum embodies the balance between autonomy and structure, enabling teams to adapt and evolve rapidly while maintaining order and focus on the product goals.

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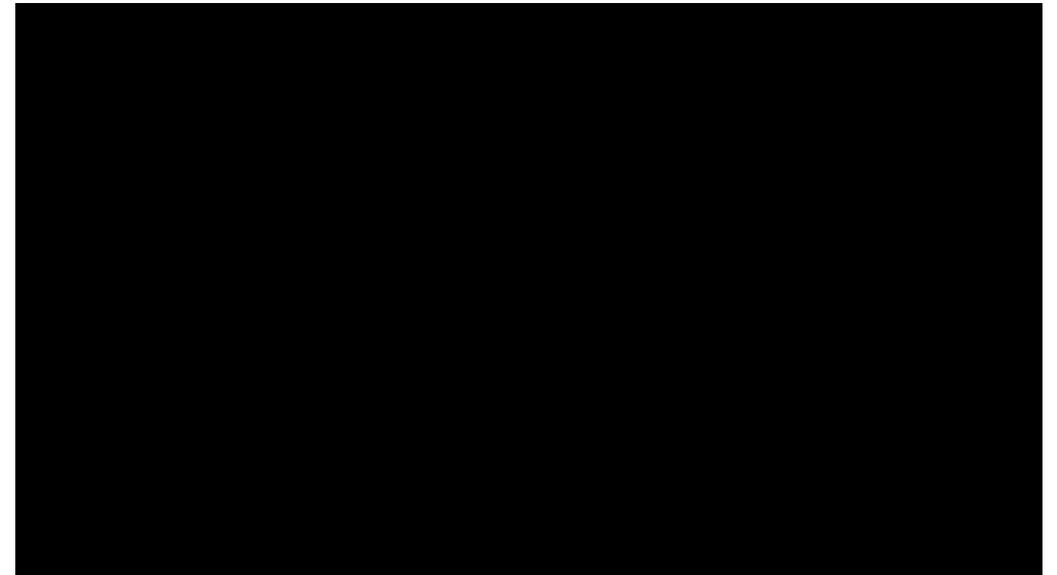
Scrum is Based in Complex Adaptive System Theory

It is a framework to create a resonant frequency for rapid adaptation!

1. **Self-organization towards goals:** CAS components organize themselves and adapt without a central authority or external guidance.
2. **No single point of control:** In CAS, there is no centralized control or command structure.
3. **Interdisciplinary teams:** CAS components often have diverse skills and knowledge. Components share resources to achieve goals.
4. **Emergent behavior:** In CAS, new behaviors and patterns emerge from the interactions between components, often unpredictably.
5. **Outcomes emerge with high dependence on relationship and context:** CAS outcomes are highly dependent on the relationships between components and their environment.
6. **Team performance far greater than the sum of individuals:** In CAS, the combined performance of components often exceeds the sum of individual performances.

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Managers Seven Deadly Sins

- **Doing Agile rather than being Agile.** Many organizations focus on the mechanics of Agile—practices like sprints and stand-ups—without fully embracing transparency, inspection, and adaptation.

- **Ignoring Agile principles when responding to problems.** When issues arise, there's a tendency to revert to traditional, command-and-control style management.

- **Failing to adapt the performance management system.** Traditional performance management systems, centered on individual performance evaluations, can undermine Agile teams.

- **Underestimating the importance of good Scrum Masters and Product Owners.** These roles are crucial to Agile teams, and organizations that overlook this often struggle.

- **Neglecting to remove impediments**. Managers sometimes fail to eliminate obstacles, such as outdated systems, excessive bureaucracy, or rigid hierarchies that hinder Agile teams.

- **Ignoring culture.** Agile transformation is as much a cultural shift as it is a change in working methods, requiring transparency, team-based rewards, and a focus on customer value.

- **Failing to properly scale Agile.** Many organizations grapple with extending Agile beyond individual teams, struggling to coordinate different parts of the organization and align strategic objectives with team-level work.

Rigby, D. K., Sutherland, J., & Takeuchi, H. (2016). Embracing Agile. Harvard Business Review, 94(5), 40-50.

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Collaborative Environment and Social Neuroscience

- When individuals collaborate, their brains engage in a complex dance of social interaction. This involves several brain regions, including the prefrontal cortex (involved in decision-making and social behavior), the amygdala (emotional processing), and the anterior cingulate cortex (conflict detection and resolution).

- These areas work together to foster trust, empathy, and mutual understanding, which are crucial for effective teamwork.

- The release of oxytocin, often referred to as the "bonding hormone," further enhances these social connections and promotes cooperation.

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Iterative Progress and the Zeigarnik Effect

- The Zeigarnik Effect refers to our brain's tendency to better remember unfinished tasks.

- This is due to the activation of the dorsolateral prefrontal cortex, a region involved in goal-directed behavior and executive functions.

- When a task is left incomplete, it creates a state of cognitive tension or dissonance, which keeps the task at the forefront of our memory.

- Once the task is completed, the tension is resolved, and the memory of the task fades.

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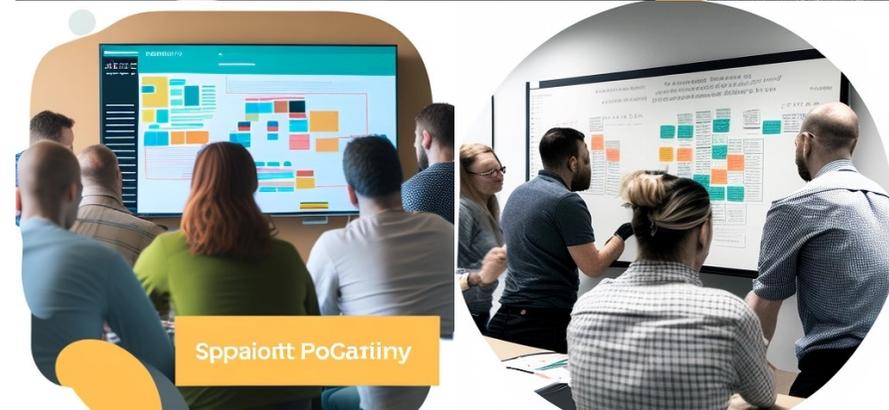Education

Feedback Loops and Dopamine Reward System

- Feedback, particularly positive feedback, triggers the release of dopamine, a neurotransmitter associated with reward and pleasure.

- This occurs in the ventral tegmental area and the nucleus accumbens, key components of the brain's reward system.

- Dopamine not only makes us feel good but also enhances motivation and learning.

- It strengthens neural connections, making it easier to repeat the behaviors that led to the reward.

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Scrum Master's Six Neuroscience Accelerators
Adaptive Change and Neuroplasticity

- Neuroplasticity refers to the brain's ability to rewire itself in response to new experiences, learning, and changes in the environment.

- This involves the strengthening of existing neural connections and the formation of new ones, primarily driven by the release of brain-derived neurotrophic factor (BDNF).

- This adaptability is crucial in Scrum, where teams must continually adapt to changing project requirements.

- Just as the brain adjusts its neural connections, Scrum teams adjust their strategies and approaches.

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Empirical Process Control and Predictive Coding

- Predictive coding theory suggests that our brains are constantly predicting what will happen next, based on our past experiences and current context.

- This involves a complex network of brain regions, including the prefrontal cortex and the hippocampus.

- When a prediction error occurs (i.e., when reality doesn't match our prediction), it signals our brain to update its model of the world.

- This process of continual learning and adaptation mirrors the empirical process control in Scrum, where teams learn from their experiences and adjust their strategies accordingly.

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Vagus Nerve Stimulation and Emotional Regulation

- Scrum's emphasis on team collaboration, trust, and empathy can stimulate the vagus nerve, leading to emotional regulation and a sense of calmness.

- This aligns with the neuroscience of the vagus nerve, which is activated during feelings of compassion and empathy. By creating an environment that promotes these feelings, Scrum can enhance team cohesion and effectiveness.

- Furthermore, practices like mindfulness and positive self-talk, which are often encouraged in Scrum retrospectives, can further stimulate the vagus nerve, leading to better mental health and resilience. This can make teams more resilient tostress and better equipped to handle the challenges of complex projects.

- Moreover, the vagus nerve's role in managing fears aligns with Scrum's approach to addressing and overcoming project obstacles. By acknowledging and addressing these 'fears' or challenges in a supportive, team-oriented environment, the vagus nerve's calming and regulating effects can be harnessed.

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Not just another guide to Scrum
- delves deep into the foundational concepts
- explores the first principles that make Scrum a powerful tool

Created from discussions with Registered Scrum Trainers worldwide
- treasure trove of insights, strategies, and practical wisdom
- draws on a wealth of experience and knowledge

Comprehensive guide to understanding and applying Scrum
- rooted in the fundamental principles underlying Scrum
- Each piece is self-contained, complete with references to original works, making the book an excellent resource for discussion and contemplation.

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