

# Learning to See the Big Picture

---



**Chuck Cobb**

AGILE PROJECT MGT AUTHOR AND INSTRUCTOR

@chuckcobb3 [www.managedagile.com](http://www.managedagile.com)





# Systems Thinking

## Complex Adaptive Systems



# Systems Thinking

---



# Why is Systems Thinking Important?

## Defined Process



## Traditional Plan-driven Project

## Empirical Process



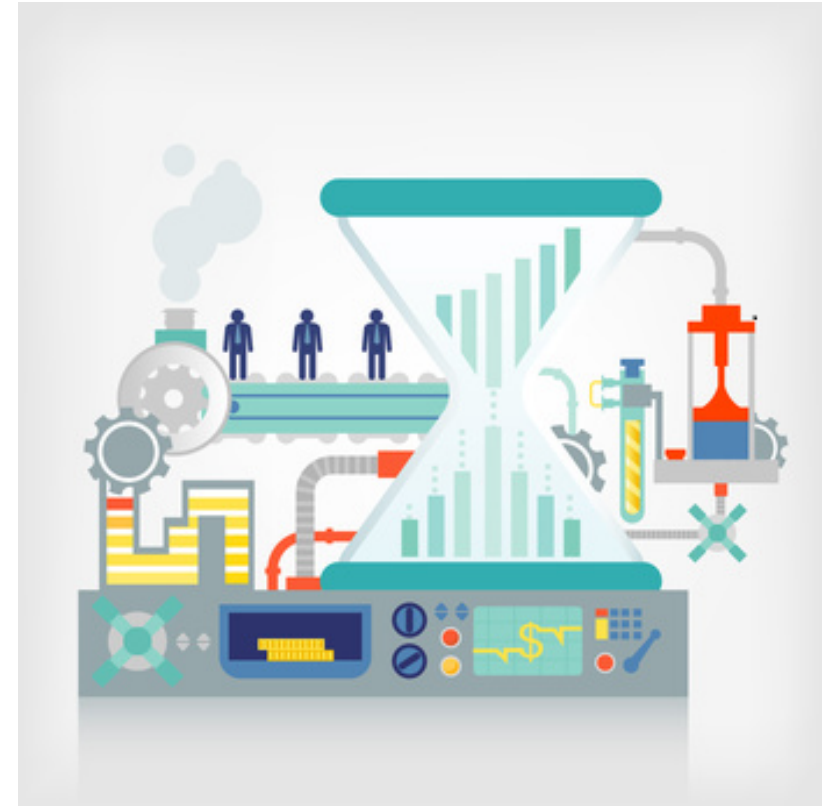
## Agile Project



# What Is Systems Thinking?

“Systems thinking utilizes habits, tools and concepts to develop an understanding of the interdependent structures of dynamic systems.

Systems thinking can be complex, but it doesn't need to be



# What Is Systems Thinking?

**“Systems thinking is a vantage point from which you see a whole, a web of relationships, rather than focusing only on the detail of any particular piece.”**

*isee systems, inc.*

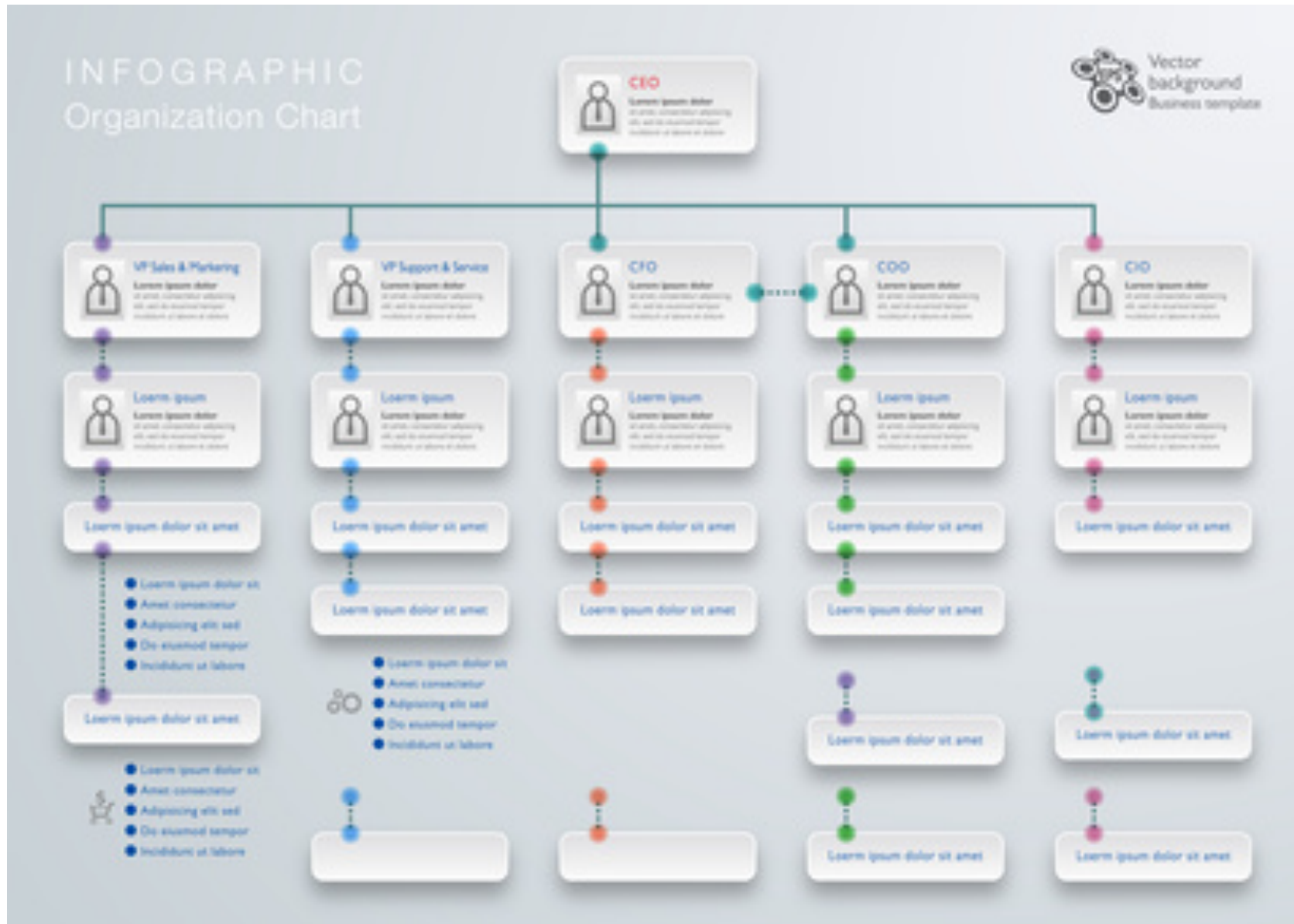




As it relates to Agile, “Systems Thinking” means being able to see a complex Agile process as a dynamic organism that has many elements with cause-and-effect relationships

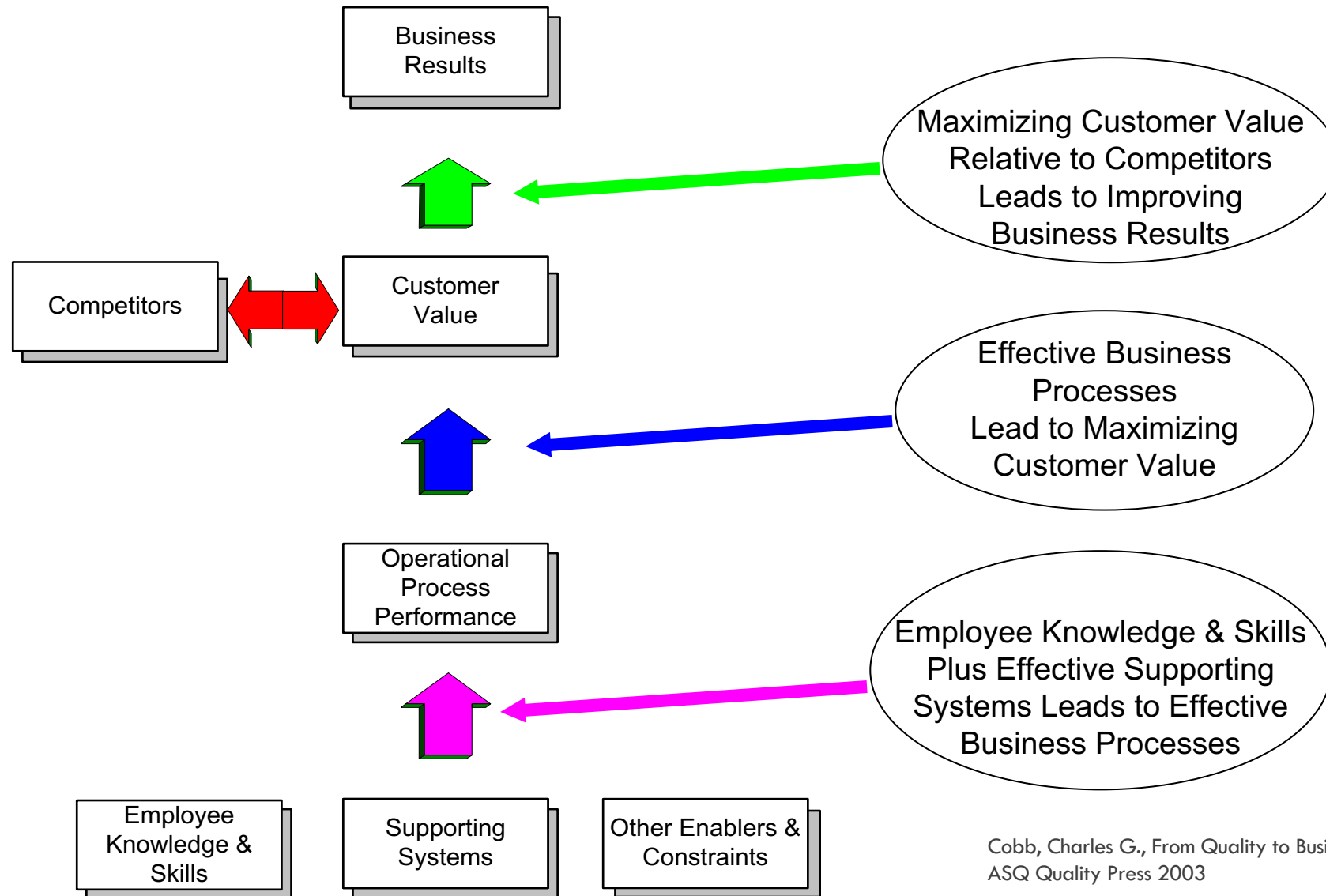


# An Example of Systems Thinking





# An Example of Systems Thinking



# Binary Thinking

An example of “binary thinking” is to think that a project is either totally Agile or totally plan-driven or Waterfall with no middle ground between those extremes



Cobb, Charles G., *Making Sense of Agile Project Management – Balancing Control and Agility*, Wiley 2011





**It's easier to accept a simple myth in some situations than it is to understand and accept complex reality**



# Binary Thinking and False Dichotomies

**Binary thinking is often based on a “false dichotomy”:**

“A dichotomy is a set of two mutually exclusive, jointly exhaustive alternatives...”

A false dichotomy is a dichotomy that is not jointly exhaustive (there are other alternatives), or that is not mutually exclusive (the alternatives overlap), or that is possibly neither”

“False Dichotomy”, <http://c2.com/cgi/wiki?FalseDichotomy>



# Binary Thinking and False Dichotomies

## An Example:

“If you want better public schools, you have to raise taxes.

If you don't want to raise taxes, you can't have better schools.” –

A third alternative is that you could spend the existing tax money more efficiently.”

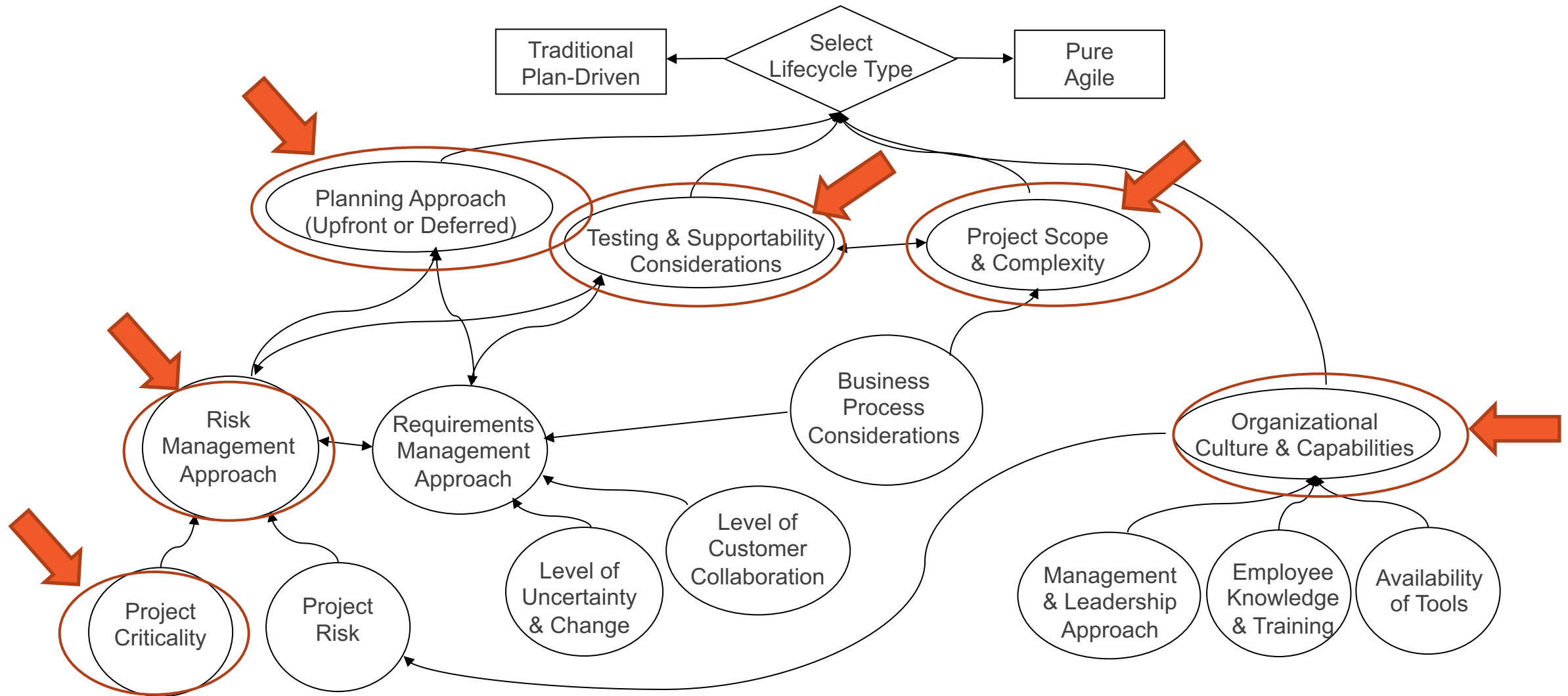




The typical “Agile versus Waterfall” argument is a perfect example of a “false dichotomy”



# An Example of Systems Thinking



# Systems Thinking Summary

“Systems’ thinking offers you a powerful new perspective, a specialized language, and a set of tools that you can use to address the most stubborn problems in your everyday life and work.





# Systems Thinking Summary

**“The human mind is not naturally programmed to think in systems. It does not naturally think non-linearly.”**





Don't just accept things at face value and mechanically follow a process without questioning why it is done that way and without determining if there is a better way to accomplish the same result



# Complex Adaptive Systems

---



# Complex Adaptive Systems

“A 'complex macroscopic collection' of relatively 'similar and partially connected micro-structures' – formed in order to adapt to the changing environment, and increase its survivability as a macro-structure”



# Example of a Complex Adaptive System



# Origins of Complex Adaptive Systems

“For many years scientists saw the universe as a linear place. One where simple rules of cause and effect apply...”

“Scientists believed the universe and everything in it could be predicted and controlled...”

“However hard they tried to find the missing components to complete the picture they failed...”

What are Complex Adaptive Systems?, Peter Fryer,  
<http://www.trojanmice.com/articles/complexadaptivesystems.htm>





Complex Adaptive Systems have been found in many natural environments since the beginning of time -

What has evolved is not the systems themselves, but our understanding of them



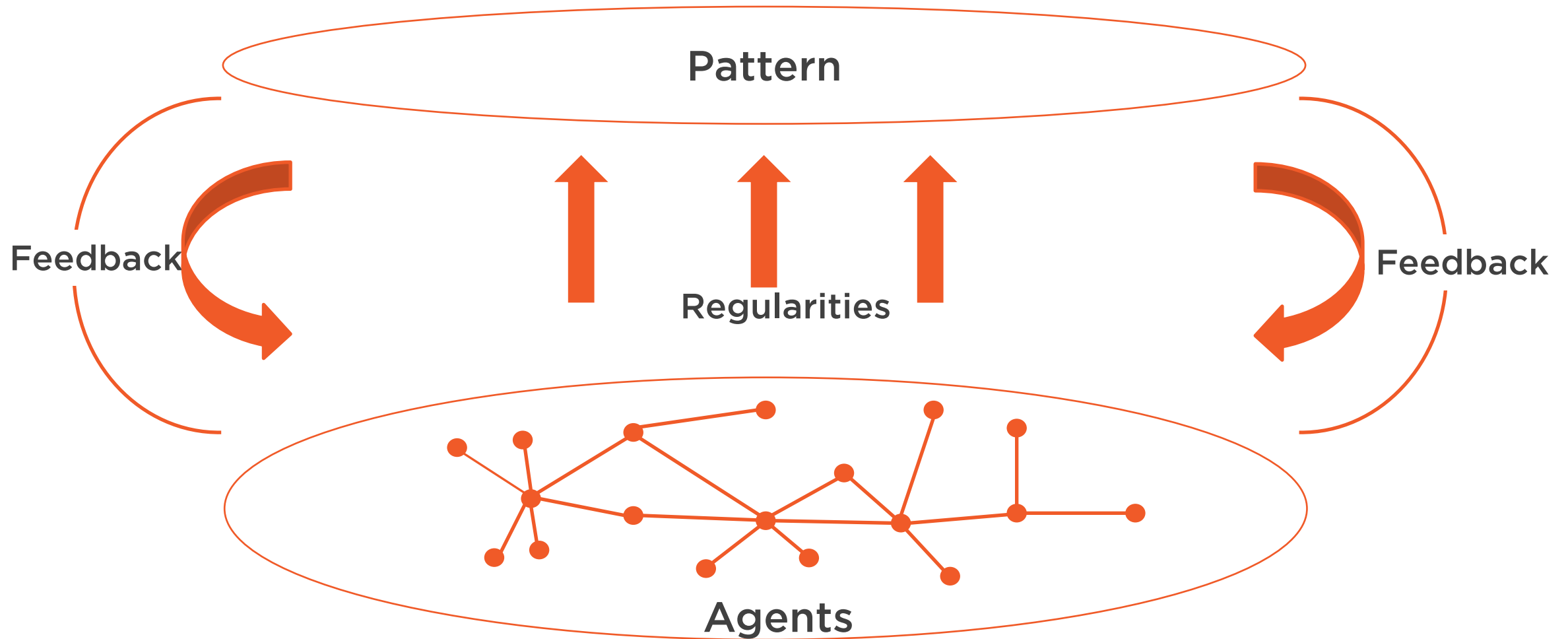


**A Complex Adaptive Systems model  
has the potential to develop much  
higher performance teams**





# How Do Complex Adaptive Systems Work?



What are Complex Adaptive Systems?, Peter Fryer,  
<http://www.trojanmice.com/articles/complexadaptivesystems.htm>



# Properties of Complex Adaptive Systems

## Emergence

Rather than being planned or controlled, the agents in the system interact in apparently random ways

## Co-Evolution

All systems exist within their own environment and they are also part of that environment

Therefore, as their environment changes they need to change to ensure best fit





We need to recognize the dynamic nature of Complex Adaptive Systems in our projects and

Also recognize that those systems need to evolve as needed to fit the environments that they are part of



# Properties of Complex Adaptive Systems

## Sub-Optimal

**A complex adaptive systems does not have to be perfect in order for it to thrive within its environment**

**It only has to be slightly better than its competitors and any energy used on being better than that is wasted energy**

What are Complex Adaptive Systems?, Peter Fryer,  
<http://www.trojanmice.com/articles/complexadaptivesystems.htm>





An Agile process is based on the understanding that absolute perfection is not necessarily the most appropriate goal

Ideally, an Agile process seeks to meet the requirements for a product in terms of minimal marketable features and only going beyond that level if it provides business value



# Properties of Complex Adaptive Systems

## Requisite Variety

**The greater the variety within the system the stronger it is.**

**Ambiguity and paradox abound in complex adaptive systems which use contradictions to create new possibilities to co-evolve with their environment**

What are Complex Adaptive Systems?, Peter Fryer,  
<http://www.trojanmice.com/articles/complexadaptivesystems.htm>





**A strong Agile team is able to successfully integrate people of different perspectives into a very cohesive cross-functional team**



# Properties of Complex Adaptive Systems

## Connectivity

The ways in which the agents in a system connect and relate to one another is critical to the survival of the system, because it is from these connections that the patterns are formed and the feedback disseminated







Agents in an Agile process are the people on the team as well as the outside stakeholders who interact with the team

The success of the process is critically dependent on the relationships and interaction among all these people



# Properties of Complex Adaptive Systems

## Simple Rules

Complex adaptive systems are not complicated

The emerging patterns may have a rich variety, but like a kaleidoscope, the rules governing the function of the system are quite simple



What are Complex Adaptive Systems?, Peter Fryer,  
<http://www.trojanmice.com/articles/complexadaptivesystems.htm>



# Properties of Complex Adaptive Systems

## Iteration

Small changes in the initial conditions of the system can have significant effects after they have passed through the emergence - feedback loop a few times

## Self-organizing

There is no hierarchy of command and control in a complex adaptive system. There is no planning or managing, but there is a constant re-organizing to find the best fit with the environment.





**An iterative development approach combined with an emphasis on self-organizing teams are both extremely critical for successful Agile projects**



# Properties of Complex Adaptive Systems

## Edge of Chaos

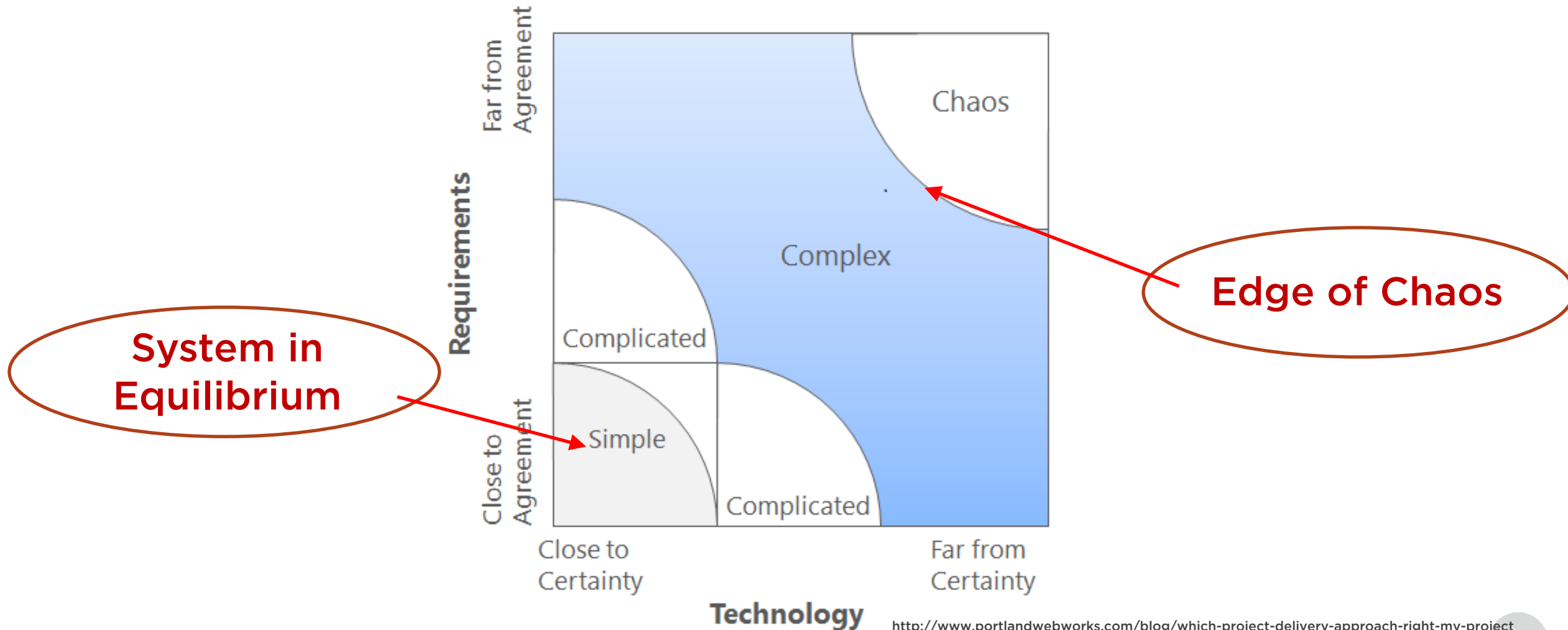
A system in equilibrium does not have the internal dynamics to enable it to respond to its environment and will slowly (or quickly) die.

A system in chaos ceases to function as a system

The most productive state to be in is at the edge of chaos where there is maximum variety and creativity, leading to new possibilities



# Stacey Complexity Model





**In a highly uncertain environment, an adaptive approach that encourages individual creativity is essential**



# Properties of Complex Adaptive Systems

## Nested Systems

**Most systems are nested within other systems and many systems are systems of smaller systems**

What are Complex Adaptive Systems?, Peter Fryer,  
<http://www.trojanmice.com/articles/complexadaptivesystems.htm>







It is important to optimize the performance of a project team within the broader context of the business ecosystem that it is part of rather than just within a narrower project development context



Up Next:  
Design Thinking

---

