V is for volatile

With over $350bn of damage, natural disasters across the globe made 2011 the costliest on record in terms of property damage. 2011 is “one for the record books,” said Bob Hartwig, head of the Insurance Information Institute, “we are rewriting the financial and economic history of disasters on a global scale”

Complex systems are said to exist at a far-from-equilibrium state, meaning that they consume a lot of energy so that they are able to avoid their lowest energy state (otherwise known as equilibrium) and are able to continuously change and evolve. This is what physicists call a dynamic system and it is one of the key properties of complex systems. Biological systems are good examples of dynamic systems they require a constant input of energy in order to maintain homeostasis(live) and grow.

Another feature to complex systems is that they can flip from one state to another very rapidly, through what is called a phase transition. A phase transition doesn’t just change some of the systems properties, it changes the structure and make up of the system itself, the actually parameters that define it. Think about a butterfly changing into a caterpillar, this is a phase transition it is a systemic change, the metrics and the vocabulary we uses to describe the creature before and after the transition are fundamentally different.

The result of this is that complex systems are volatile, meaning they are constantly changing, they can change very fast and importantly their state can change drastically, that is, shift from one regime to another - Dubai’s transition from traditional fishing village to global metropolis within a few decades is an example of a rapid phase transition or regime shift

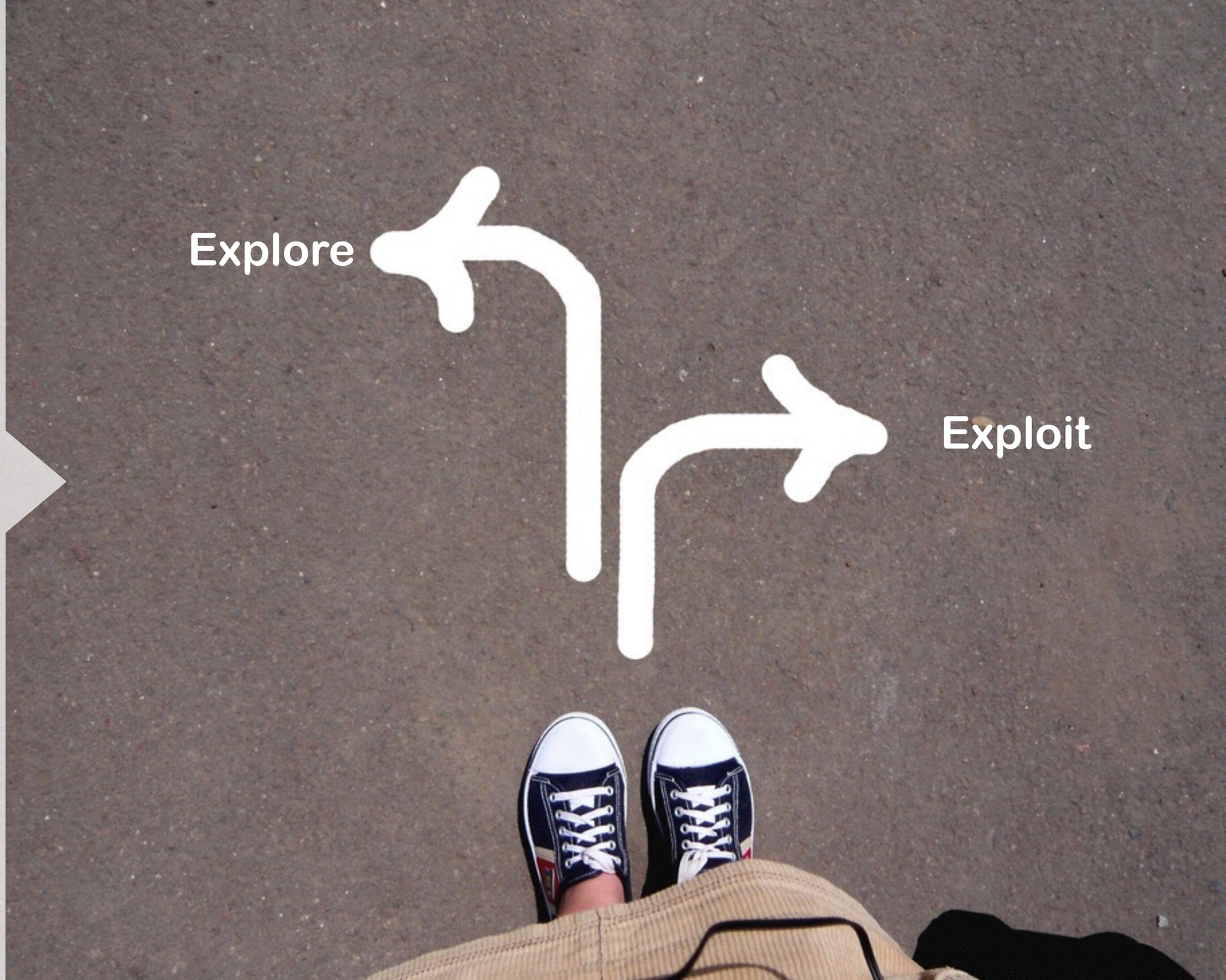
The rapid pace of change within the global economy has been driven largely by technological development, as the rate of technological innovation has greatly increased over the past few decades with the advent of information technology and today the rise of clean technology. Coupled with this has been the expansion of the global economy as many more countries have joined, creating an environment of heightened competition. Within this environment corporations are eager for a competitive advantage through innovation, the net result is a rapid drive forward of technological development.

As globalization takes us into this expanded global environment, the distribution of possible states to organisations and their environment is greatly broadened. For example in this global environment a business may be operating in both an economy with a GDP per capita of six hundred dollars or fifty thousand dollars, working under a dictatorship or along side a pluralistic democracy.

Heightened Interconnectivity and interdependency means volatility is no longer just a local event but it is increasingly systemic, financial crisis are no longer contained to a particular country, they effect the entire global financial system. Climate change is another example that alters some of earth's most fundamental systems and thus creates systemic volatility. With these systemic shocks no one is too big to fail, by definition complex systems are always greater than any one of their constituent elements, meaning every element is dependent upon and vulnerable to changes within the system as a whole.

Within environments that are subject to systemic shock it is not the scale and level of resources that an element has that defines whether it will survive or not, it is the degree with which it can adapt to the rapid change, an earthquake is a good example of a systemic shock, where scale and strength are of little advantage but flexibility becomes the defining factor.

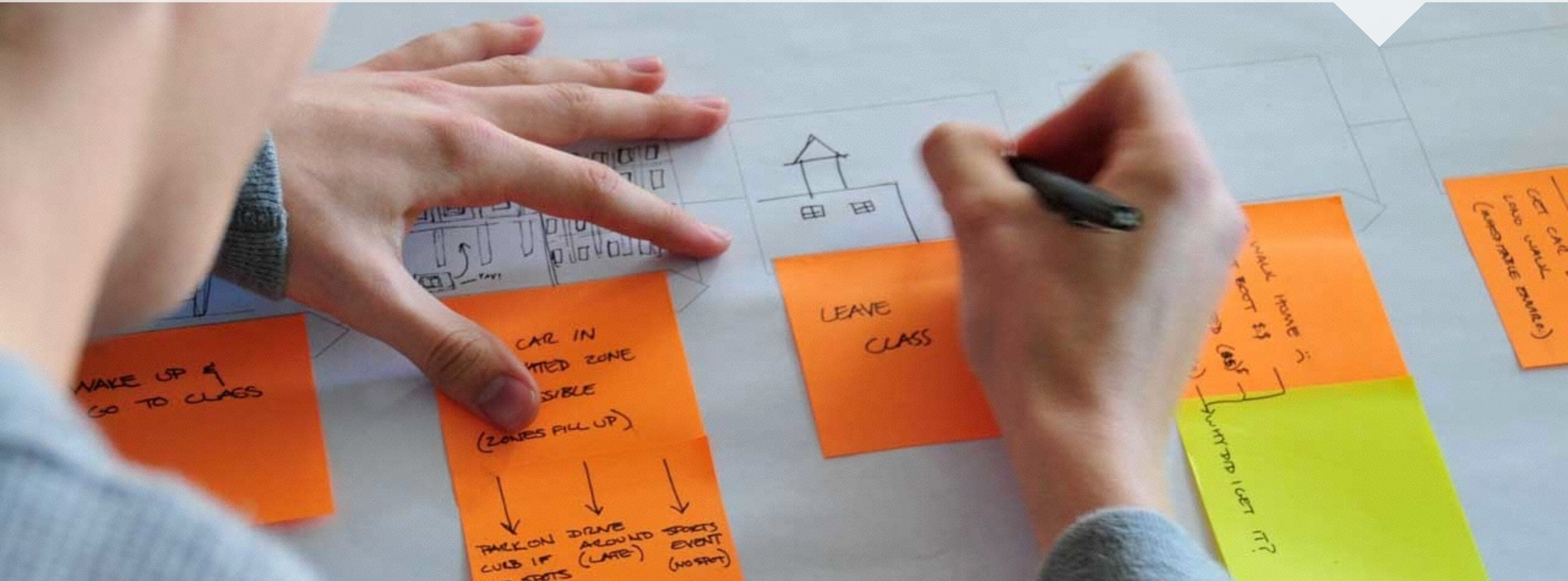
The terms explore and exploit are used to describe the trade-off agents within a complex adaptive system face between either exploiting what they already have or exploring their environment to find new opportunities and agents always face a trade off between the two



Within relatively stable environments an organisation can invest a relatively small amount in exploring before finding a niche to exploit and then throw up barriers to competitors, invest its resources in becoming more efficient at exploiting this one source of revenue and thus become larger and more capable of expending resources in order to resist change and fend of new competitors.

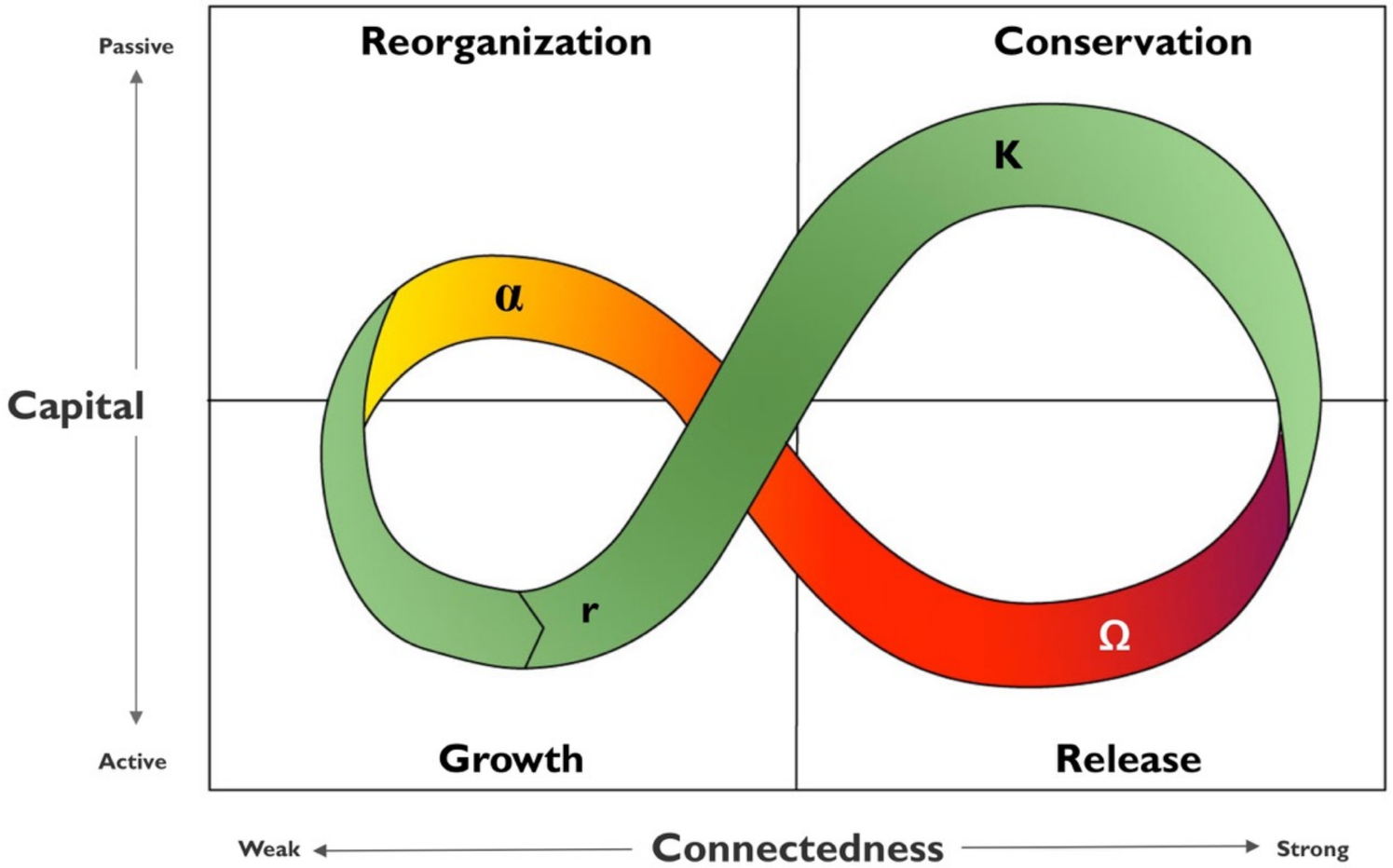
Volatile environments are also sometimes described as dancing landscapes (within the vocabulary of complex systems), due to the fact that the actual topology of the environment is changing, competitors are acting and reacting to each other, new technologies and institutions are being invented or retired and in so doing shaping the landscape and the optimal place for your organisation to be within that landscape.

Within these volatile and changing landscapes organisation have to expend much more resources on exploring their options (the best place to be within the landscape) as their options are constantly changing in response to what other players are doing. This means multiple experiments, rapid prototyping of projects and computer simulations to explore viable solutions, dampening down the ones that don't work, amplifying the ones that are successful and iterating on the process



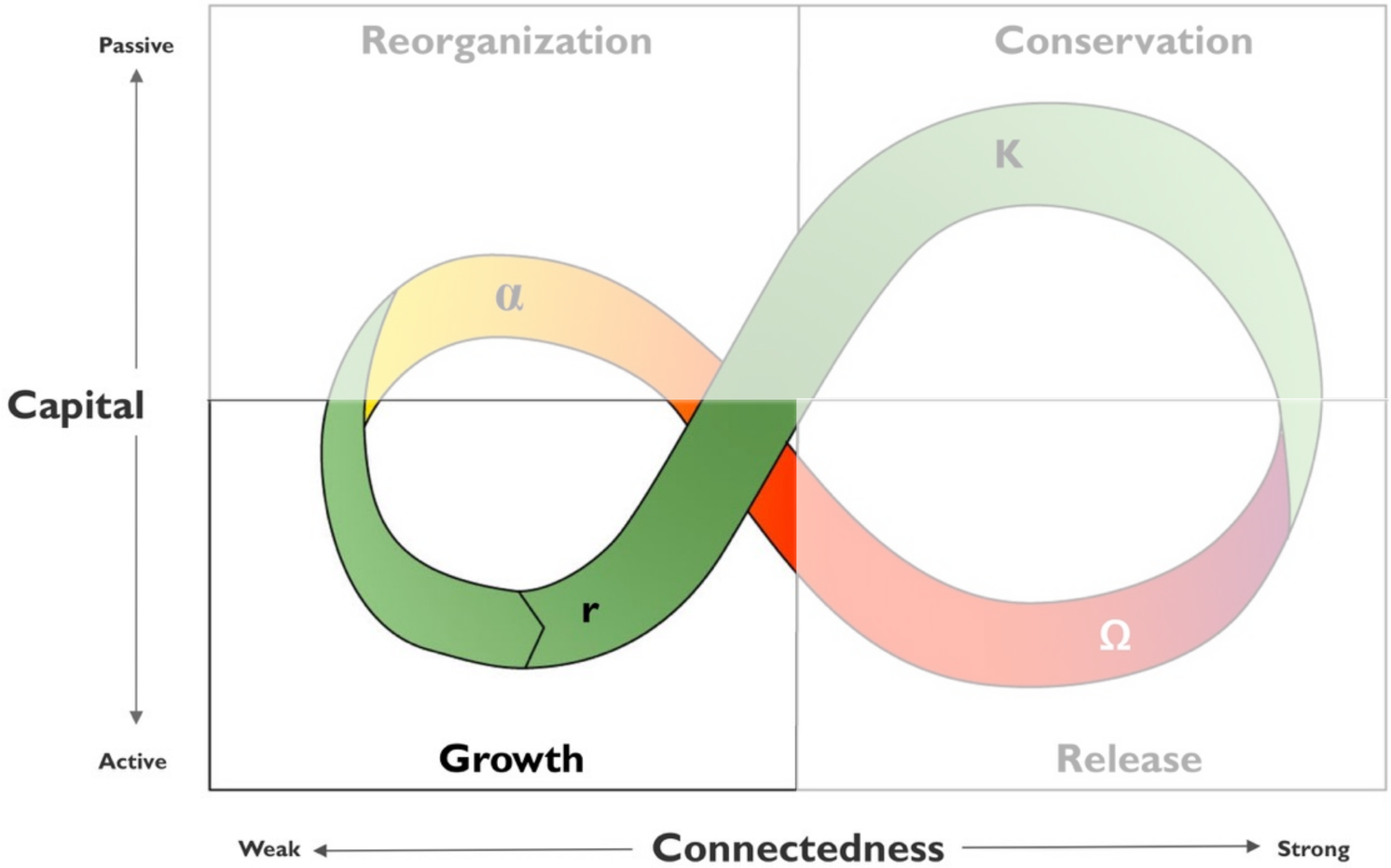
In this way organisations shift from being inert structures that were well suited to stable environments, to organisations that can develop and adapt through an evolutionary mechanism of creating multiple divers projects, testing them out within the environment and using feedback to selectively scale up or dampen down initiatives.

The adaptive cycle is a model taken from ecology that captures the dynamic process through which ecosystems adapt to change and evolve overtime. It is meant to present a broad outline of the phases the system goes through as it grows, matures, collapses and reorganise. The adaptive cycle model captures the core process at the heart of many (if not all) complex adaptive systems that evolve and grow.



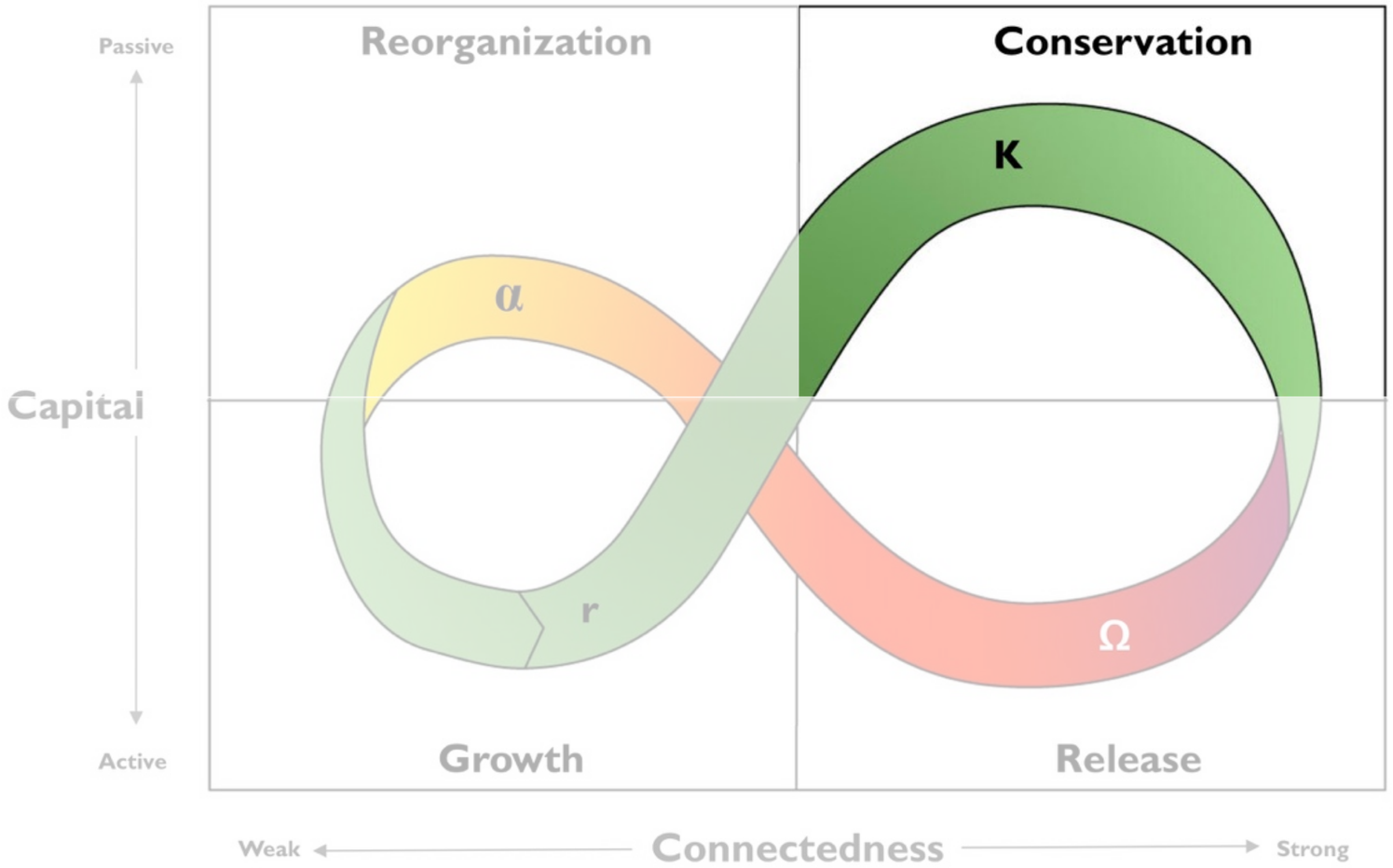
Growth

The first section to the process is one of rapid grow, a new environment (emerging market) offers lots of available resources, its a time of exploration, many small players can compete and quickly occupy niches, connections are formed and patterns within the system start to emerge.



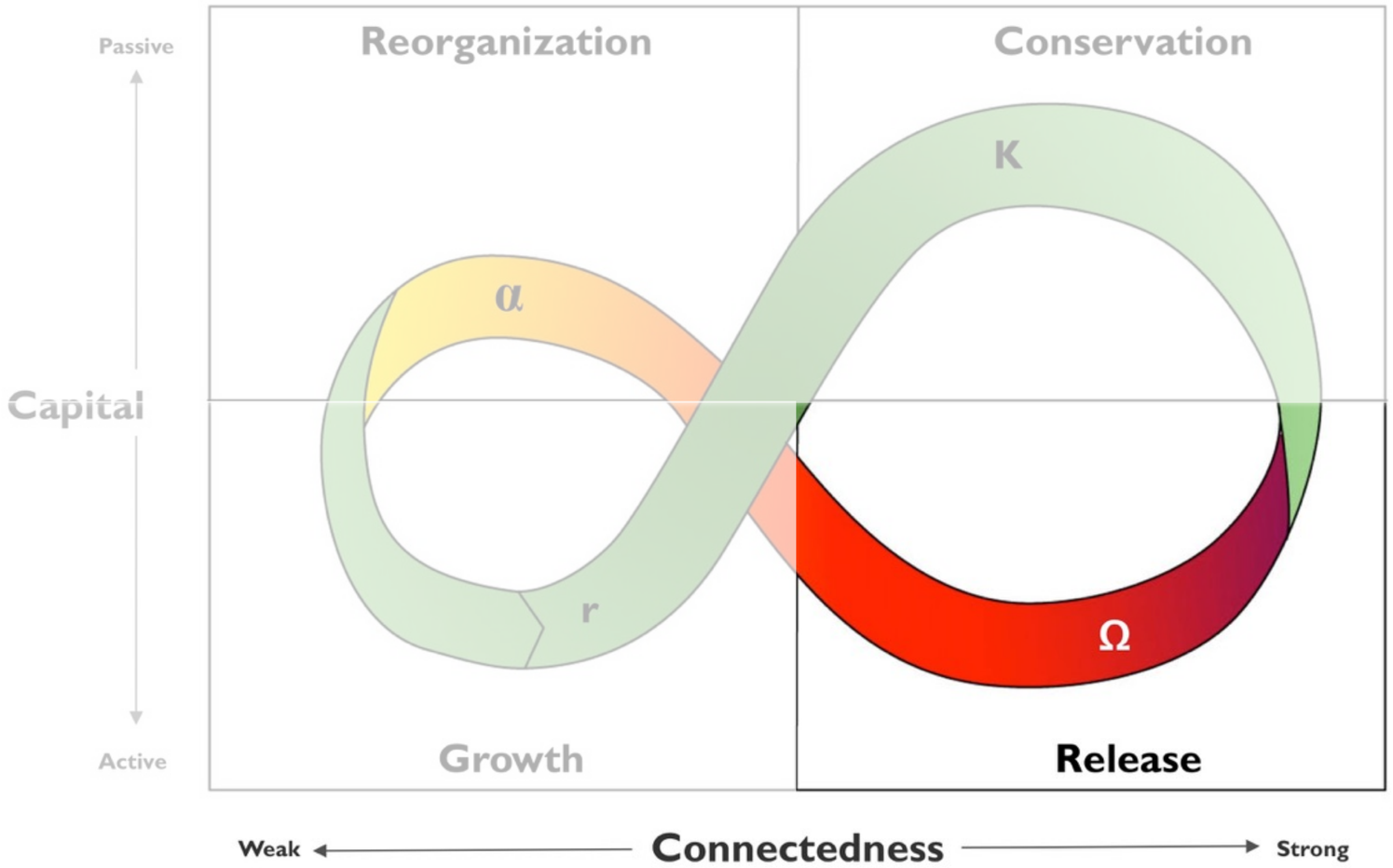
Conservation

Following on from the intense competition the most adapt players are able to scale-up. The elements become establish, the interactions between them become stronger and in consequence, more dependable. Large incumbents start to dominate the market, economics of scale are the order of the day, its a time for exploitation of preexisting models and processes.



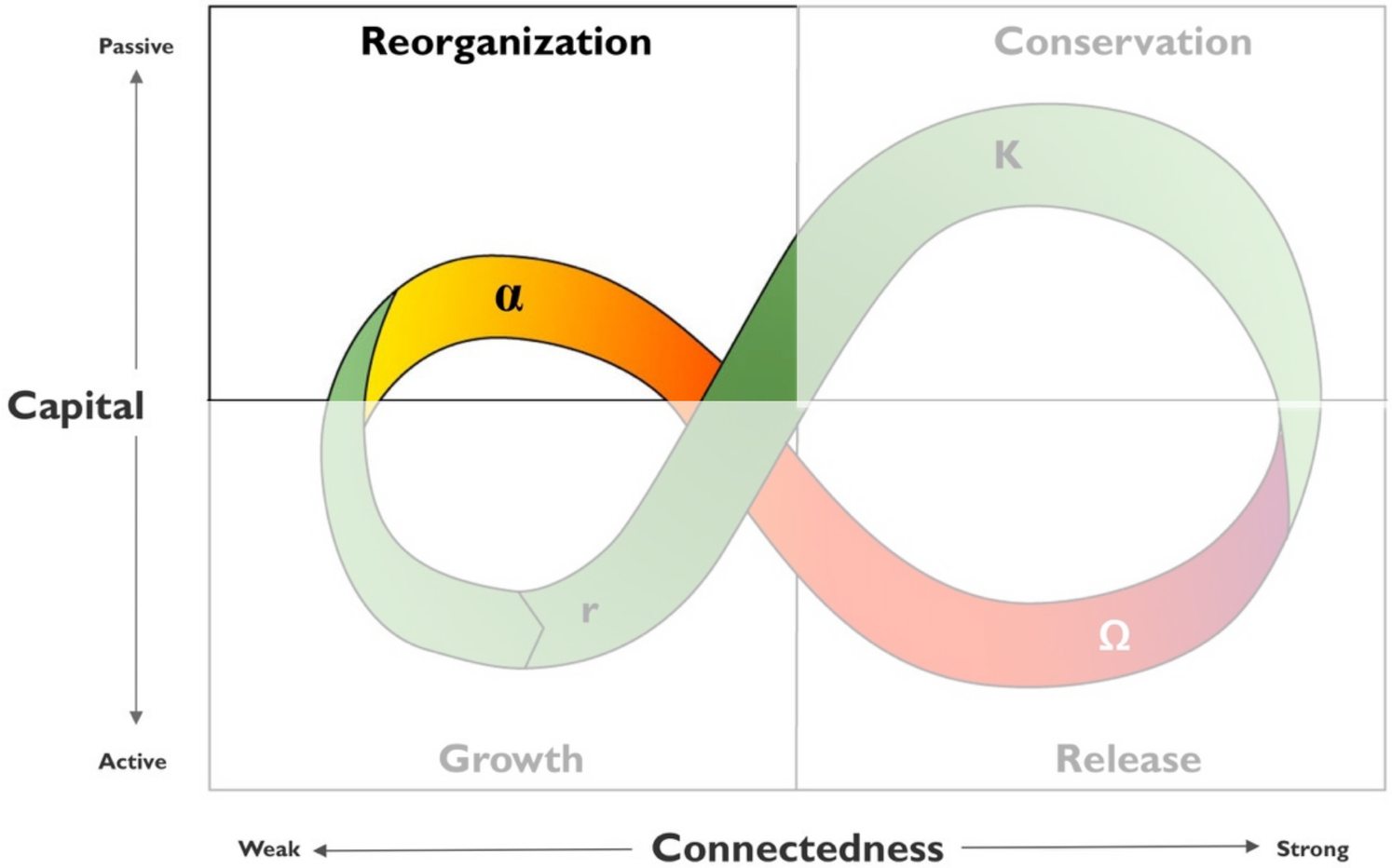
Release

Some external environmental disturbance eventually triggers the collapse of the system as elements have become inflexible from over exploiting a single niche. The relationships are broken, the elements and the resources they held are released



Reorganisation

The elements that remain after the release stage will reorganise. In this stage, the connectedness of the system is low but the potential is very high; therefore, novelty arises. Foreign elements that would in other stages be out competed can establish at this point. The growth stage follows and a new cycle begins.



Summary

Complex systems and complex environments are often volatile, due to their inherently dynamic nature, their capacity for rapid phase transitions and systemic shocks.

Rapid technological development, expansion into a more heterogeneous global economy and heightened connectivity and increasing changes within the natural environment are some of the major factors in the increase in volatility and systemic shocks over the past few decades.

In response to rapid and systemic change, using traditional methods of creating fixed goals and developing strong organisations (through the amassing of resources) to weather out change is inherently limited.

In stead organisations need to embrace an evolutionary mechanism at their core so as to continue adapting to change in the short-term and the long-term. In order to do this they need to expend more resources on exploring the possibilities within their changing environment, creating rapid incubators for performing multiple experimentations in order to see which will work within the environment, dampening down those that don’t and being able to rapidly scale up those that do.