How to cope with complexity? - A review of project complexity literature using the Cynefin framework as theoretical lens

Abstract. The discussion of project complexity has mostly been fueled by research in IS projects. The discussion has engaged many people for in recent years and it is therefore relevant to stop and ask: What have we learned, and can this be used for living in the cloud? In the past two decades, papers on project management have displayed a variety of definitions of project complexity, but there are also many common patterns. In this paper we review literature on project complexity using the Cynefin framework as a theoretical lens. In doing so we can see a movement in the definitions from a focus on what is called complicated to an increased focus on complex matters. As a result of the review, the paper offers a new model for acting on project complexity that might be useful for leading projects in general when "living in the clouds", where boundaries appear blurred and vague and it is unclear where things start and end.

Keywords: Definition of Project complexity · Cynefin Framework · Complexity matrix · Project Management · Project Leadership.

1 Introduction

To quote the IRIS call for papers: "Living in the cloud" can refer to the sensation of being in a cloud where boundaries appear blurred and vague and it is unclear where things start and end. To many, this is the equivalent of working with complex IS projects. Living in the cloud is one among future trends increasing the complexity of projects. We therefore really need to get our head around project complexity.

One reason to research project complexity is to improve the likelihood of project success, or at least to understand the reasons for failure. This is the purpose stated for most scholars in the field.

Knowing the complexity of a given project has the highest value in the project setup phase. In the setup phase the central practitioners (Project Owner, Chairman, Project Manager and the like) will have a very urgent question: What kind of project approach will give us the best chance of success with this project? Can we succeed with a waterfall approach? Is a stage/gate approach better in this case? Or should we take the Agile PM approach? Maybe, the political setting is still too chaotic to even consider starting a project at this time?

One might expect to find inspiration for decisions like these in the field of project complexity. As we will see later, someone with this expectation might be disappointed.

The scientific debate on project complexity seems to be near completion. That is, at least according to a simple measurement of publications per year found by the search engine on scholar.google.com.

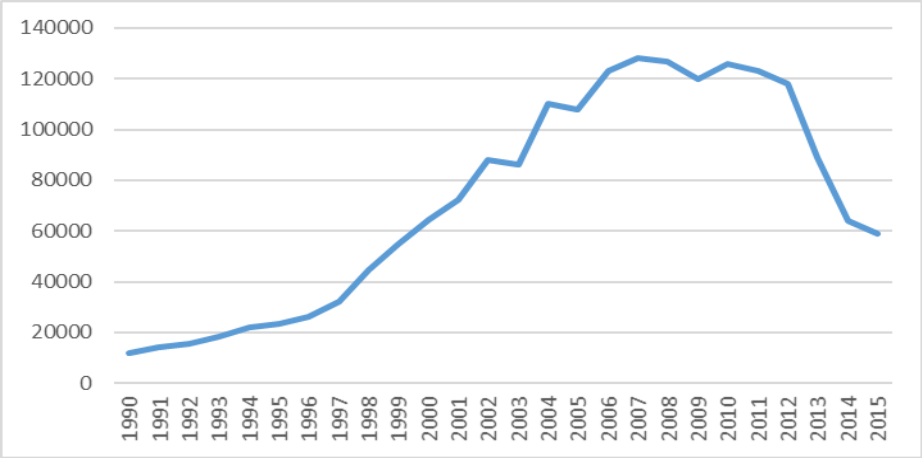

Fig. 1. The graph shows the returned hits each year on the search string: complexity + project + management from each year from 1990 to 2015.

So, what have we learned about the topic from the last two decades? Are we thinking differently about project complexity today? This question is answered by looking at the definitions used by scholars.

The starting point for our research is (Baccarini, 1995) because most scholars agree that this paper was the one that started the stream of papers on the topic of Complexity in Project Management. In figure 1, the growing interest starting in the second 2nd half of the 1990s. can be seen. Prior to the paper by Baccarini, there had been other papers addressing the matter, but they stand isolated in the overall picture.

2 Method

First we give a short description of the Cynefin Framework by Snowden (Snowden, 2007). Snowden argues that this Framework is highly relevant for Project Managers, but there has been little – almost no - attention on this Framework from scholars working within the field of project complexity.

We picked 16 definitions of project complexity from the last 20 years, primarily from IS research papers. We do not claim that our choice has exhausted the field of project complexity. This was never intended. However, we do believe we have a mix that represents the field as a whole. The order of appearance is chronological. This is both to give a sense of how the thinking has developed over the two decades and to build up to our conclusion.

The discussion part of the paper will elaborate on the keywords from the definitions of project complexity, with the aim of extracting the essence. One might get stuck in the discussion of project complexity because of the lack of comparability of the models. A metaphor can be used to described this. Let's put forward a question: How big is it? One group of people starts a discussion on what "size" is, and whether it can be measured. Another group decides to make categories like small, medium and large. The two groups will likely never agree. They are both right, and have valid arguments for the wrongness of what the other group is doing. It all comes down to what you need the answer for.

Trying to combine the keywords from the definition of project complexity with the Cynefin Framework can easily end in a discussion like the one above, which we need to avoid.

3 Description of Cynefin Framework

The Cynefin Framework is a sense-making model. See fig. 2. The word Cynefin can be translated as habitat or landscape. It is also a categorization model, helping leaders make appropriate choices. Each domain requires different actions.

Simple and complicated contexts assume an ordered universe, where cause-and-effect relations and perceptible, correct answers can be determined based on facts. Complex and chaotic contexts are unordered – there is no immediately apparent relationship between cause and effect, and the way forward is determined based on emerging patterns (Snowden, 2007).

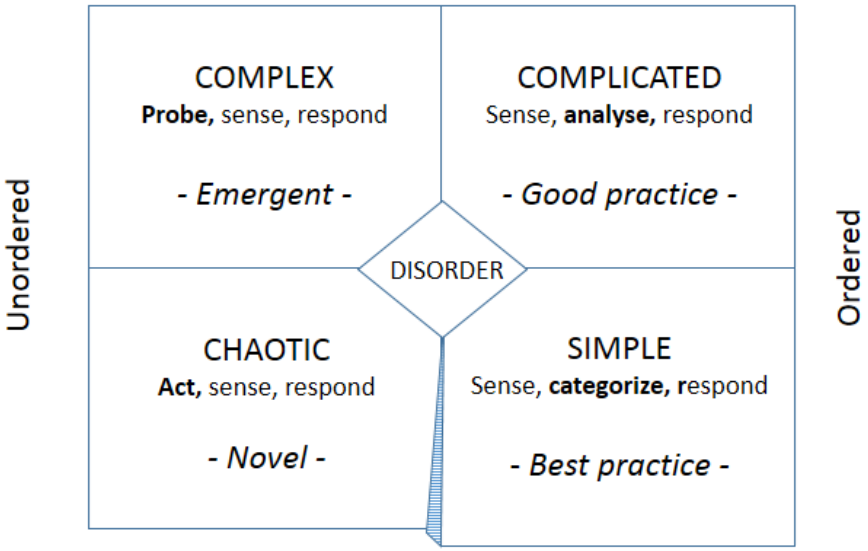

Fig. 2. Cynefin Framework (Snowden, 2007)

In addition to the four domains, there is a fifth: Disorder, which is where things are until they reveal what domain they currently belong to. The small fold in the bottom represents a cliff as a metaphor for the danger of complacency, if things are believed to be simple, when in fact they are unordered. All three other transitions, from one domain to another, are more like continuums.

A practitioner of Project Management will probably add the following: A project does not exist in one domain alone; it will instead be spread out across the map. One way of deploying the Cynefin Framework could be to have the entire WBS spread out across the four squares. Or this could be done with the current project tasks, risks and issues. Each new task, risk and issue will begin in Disorder and from here take its path through the map until it is solved during the project.

The Cynefin Framework is not a Project Management model. Nevertheless, it can carry recommendations for the choice of project approach. In the complicated domain, we can foresee the future, and therefore the Waterfall model seems appropriated. However, when in the complex domain, a better choice would be some kind of agile approach with flexibility and adaptability.

4. Going through the definitions from scholars – one by one

However, others choose to split the models, and sort the dimensions into groups across the papers The choice here is to examine them one paper at a time. The assumption is that each scholar's mental model is best understood if the model is kept intact. In the following the *keywords from the definitions are shown in cursive*

The first paper states that project complexity is a matter of: *Variation and interrelations - Organizational and technical* (Baccarini, 1995). By this definition the degrees of project complexity can almost be. Interestingly, Baccarini rejects the idea that project complexity is a matter of being intricate. As we will see in the following, others think that this is the heart of the matter. Further, Baccarini sees project complexity as something other than uncertainty. Also here there are recommendations for the opposite viewpoint.

The Baccarinien definition is often later referred to by other scholars as "Structural Complexity", as is the case in the definition from the next paper: *Structural Complexity, Uncertainty: uncertainty in goals; uncertainty in methods* (Williams, 1999). Williams includes uncertainty in the definition of project complexity. In this paper Williams use expressions such as "weakness of goals" and "newness of technology" as synonyms for the two kinds of uncertainty. The first fits on the left side of the Cynefin Framework and the second on the right side.

The two kinds of uncertainty correspond with the terms "Ambiguity" and "Novelty" used by other scholars, as we will see later.
Project complexity can be described by a two-by-two table*: Organizational vs Technological. Structural vs Dynamic* (Xia, 2004). Xia does not include uncertainty as Williams did, but instead he includes the dynamic aspect (equal change).

In the square "Organizational and Dynamic" Xia talks both changes made by the project and changes to the project from the outside. He hereby confuses Change Management with Change Control. Xia further writes "… factors largely beyond the project team's control" – Other scholars do not pick up on this, but this might be an essential distinction as we will return to later.

A very different definition is: *Mission, Organization, Delivery, Stakeholders* and *Team* (Mayer et al, 2008). The five topics are divided into 13 sub-dimensions, with a total of 120 questions beneath them. The claim is that these are the parameters making a project complex. "Mission" is much like uncertainty of goals from (Williams, 1999). "Organization" has some of the same content as structural and dynamic organization by (Xia, 2004), but not all. Delivery is divided in process and resource, where process includes topics like Change Management. "Stakeholder" includes topics such as support, experience, power, socio-political etc. "Team" is about the people on the project.

From the same year we have this definition: *Details, Ambiguity, Uncertainty, Unpredictability, Dynamics, Social Structure* (Mulenburg, 2008). Interestingly, Mulenburg specify unpredictability as a dimension that is different to uncertainty. "Details" are the number of variables and interfaces, "Ambiguity" is a lack of awareness of events and causality, "Uncertainty" is an inability to pre-evaluate actions, "Unpredictability" is the inability to know what will happen, "Dynamics" is the rapid rate of change and "Social Structure" is the number and type of interactions.

In a toolbook on complex projects we find this definition: *Structural Complexity, Technical Complexity, Directional Complexity, Temporal Complexity* (Remington and Pollack, 2009). The "structural complexity" is in the author's own words which is equal with complicated. "Technical" is the novelty of the solutions. "Directional" is about unshared goals, unclear meanings and hidden agendas. "Temporal" is the shifting environment and strategic directions outside the control of the project.

Another handbook suggest that a project is complex if it either included a large scale enterprise change or if the problem is difficult to define and the solution difficult to achieve (Hass, 2009), making a complex project appear like a small program.

Garaldi attempted in her paper to wrap up many previous definitions in these five dimensions: *Structural. Uncertainty. Dynamic. Pace. Socio-political* (Garaldi 2010). "Structural" includes size and interdependence, which is less than (Baccarini, 1995). "Uncertainty" contains novelty, experience, availability of information and includes ambiguity. This is very different from (Williams, 1999). "Dynamic" covers change in scope, goals etc. but not organizational change like in (Xia, 2004). Garaldi includes "Pace" as a dimension. "Socio-political" covers importance, support to, fit/convergence and transparency.

Gul expands the realm of the word uncertainty by giving us this definition: *Structural. Uncertainty (Goal uncertainty, Methods uncertainty, Environmental). People uncertainty (Social interactions, Rules of interaction)* (Gul, 2011).

The flowing definition from Vidal might be considered as a kind of old school definitions where "Uncertainty" is out along with many of the more "soft" dimensions: *Size, Interdependence, Variety and Context.* (Vidal, 2011). The three first match "structural complexity" very much. The last, the context dimension, consists of the sub-criteria: Cultural configuration and variation, Environmental Organizational Complexity and Environmental Technical Complexity.

From the same year, we have this definition, which is almost a set of complimentary dimensions compared to Vidal: *Uncertainty, Ambiguity and Decreasing level of trust*. (Remington, 2011). It is interesting to find the word trust in this context.

Even though the following definition is from the construction business, it is interesting to bring into this field: *Task, Social, Cultural, Cognitive and Operative* (Brockmann, 2012). "Task" and "Social" are very much like structural complexity. "Task" is about the construction work in time and space. Social is about the interaction. These two are therefore very similar to structural complexity. "Cultural" is a measure proposed by Hofstedes. Cognitive is a new dimension. Cognitive and operative are about need for learning/change. It is proposed that "Cognitive" is divided into three types of Frames (based on Snowden). "Operative" is about changes in skills.

Greogory builds on the division of structural complicity versus dynamic complexity (Xia, 2005) but gives them new content, where structural becomes *Variety*

and Interdependency and dynamic becomes *Uncertainty and Ambiguity* (Gregory, 2013).

Building on many other papers Qureshi ends with the following keywords: *Non-linearity, Context Dependence, Uniqueness, Uncertainty, Trust, Capability* (Qureshi, 2014). This is a definition that has very little in common with the Baccarinien definition of project complexity from 20 years earlier.

Dunovic tries to turn back time with this attempt at a definition:
Structural (number of elements and dependencies), Uncertainty (of objectives and methods), Constraints (of environment, resources and objectives) (Dunovic, 2014).
Dunovic weaves the three dimension together into one expression: Structural complexity compounded by uncertainty increased by constraints.

The final definition that we present here is from Botchkarev, who describes project complexity as a matter of three system levels that interact with each other, described with these keywords: *Product (solution/business challenges), Project (knowledge and skills gaps) and External Environment (stakeholder nonalignment, user incongruity)* (Botchkarev, 2015).

5. Discussion

The definition of project complexity has grown over to past two decades from something so simple you could almost count it, to something much more complicated. Some might even say that the field of defining the project complexity in itself has become complex due to the ambiguity that exists in the terminology.

As we have seen, there are vast variations and contradictions in the definitions. However, as none of the definitions can be disregarded as false, we therefore need to encounter the whole field.

5.1 Discussion of keyword in the definitions

The following discussion will be concentrated in clusters around chosen keywords.

Structural complexity

There exists a general agreement that size matters. This could be measured in the number of elements, variations, variety and interfaces, interrelations or interdependencies. It could be both technical and organizational. Some call this complicated. Snowden would probably agree that this is a part of what he calls complicated in the Cynefin Framework.

Uncertainty

Almost everybody agrees on uncertainty, but nobody seems to agree on what this keyword actually includes. Paradoxically there seems to be much uncertainty connected to uncertainty (or to be exact, the ambiguity of the descriptions gives rise to

uncertainty on the meaning of the keyword uncertainty). We have encountered uncertainty in method and in goals, but also uncertainty of environment, peoples' social interactions and rules.

One scholar has unpredictability as a keyword together with uncertainty. Others do not, but does that mean they include unpredictability as a part of uncertainty, perhaps as a high degree of uncertainty? Unpredictability is central aspect of ordered vs unordered in the Cynefin Framework.

Given the many papers including uncertainty in their definition we must conclude that it is a part of project complexity. However, it is not possible to be conclusive about the limits/scope of the keyword Uncertainty.

In context of the Cynefin Framework we need to know how much uncertainty will make the switch from the complicated domain to the complex – or the chaotic for that matter. Uncertainty of course includes risks, and these should be divided into knowns and unknowns, where Risk Management controls the former. The existence of the latter kind of risks gives rise to unpredictability.

For the Cynefin Framework this means:

- Estimations + knowable risk = Complicated domain
- Unpredictability = Complex domain

Pace – and other constraints

Interestingly, the keyword Pace was included in early definitions, but disappeared again later. In practice there are many projects that have been regarded as complex – even partly chaotic – due to high pace as a result of a tight deadline. But then again, pace compared to what? Pace is a tricky topic that depends very much on experience and the perceived realism of the deadline: "Do we agree, that it is possible? Can we be certain of reaching the deadline?" This turns pace into a matter of disagreements and uncertainties.

This applies to other constraints as well. Take the Iron Triangle for example, the balance between deliverables, resources and timeframe is only a problem if it is unrealistic or we disagree on which corner of the triangle should be cut back in case unexpected events make us cut corners. Again, this is a matter of disagreements and uncertainties. This is also the case for constraints like quality, policies, compliance, and legislation.

In cases of narrow constraints, uncertainty will arise. If slack is cut out of the schedule and budget – and there is no room for adjusting the scope – of course this will increase uncertainty. But tight constraints do not appear by themselves, they are a consequence of stakeholder disagreement – either between themselves or in opposition to the people on the project. One common complex issue is the misalignment of prioritization of the corners in the Iron Triangle among stakeholders.

Novelty

Some scholars include a keyword like novelty, uniqness and the like. Here we really need the know the degree, for if a project is not novel or unique it is not a project based on the core definition of projects. If we have done something many

times before, it ceases to be a project. The yearly financial report is not a project, even if it is a challenging task. According to the Cynefin Framework this is where best practice rules (simple domain).

Novelty at a basic level is a prerequisite for having a project in the first place, and the dimension is therefore relevant in the switch from simple to complicated. The novelty can be in the realm of "good practice", that is experts can analyze the problem, design a solution and predict the output and outcome with high accuracy. Thereby it is "only" complicated.

If the novelty is so high that we cannot foresee the consumer/stakeholder reaction, and the project becomes open ended and non-linear, then we enter the complex domain in the Cynefin Framework.

Ambiguity

Many point to the keyword ambiguity, some without defining it. One scholar gave a surprising translation into: "lack of awareness of event and causality". The Oxford dictionary gives this definition: "The quality of being open to more than one interpretation".

As earlier noted, ambiguity is very much about uncertainty. Maybe ambiguity has even more to do with disagreements. Particularly in consensus cultures, there is a tendency to use ambiguity when talking about ends and means, because this will trigger less disagreement and resistance, at least in the beginning. Ambiguity will eventually dissolve and uncover the hidden disagreements, resulting in complex – eventually chaotic – situations.

The question is how much ambiguity can we cope with in each domains of the Cynefin Framework? What makes us move from simple to complicated? And from complicated to complex? The answer might be that this is something that we have to learn to be aware of. Maybe putting awareness into the definition of ambiguity is not a bad idea after all?

From a philosophical standpoint it is given that any kind of communication is inherently ambiguous. This sentence included! And to make things worse, no-one can tell whether that "this" referred to the first or the second sentence in this paragraph, which absolutely proved the point. By questioning each and every word - due to the ambiguity of words – one can easily turn any communication into a chaotic state. The same is true for a project. We need trust to move us out of chaos. Trust is a keyword that we will come back to later.

Change!

Many scholars include change in one form or another. Often it is called "Dynamics" or the rate of change. The latter is used in the sense that slow change might not be a problem. In the papers, three unique kinds of change have been discovered. The first is changes to the project, that is changes in scope/time/resources. The second is the project changing the organization. The third is change in the environment that alters the circumstances the project was built on. The first one often goes be the term "Change Control" (PMBOK, 2001). The second is often referred to as Change Management or Leading Change. This is not a part of Project Management. It is however included in Program Management (MSP, 2009). There is no single methodology corresponding with the third kind of change.

The first kind of change (Change Control) in the Cynefin Framework will be either a matter of best practice or good practice, that is being in the simple or complicated domain.

Some, but not all, of the scholars, who talks about the second kind of change (Change Management) as a part of project complexity, do so without reflection on whether this is out of scope for Project Management. Don't they care – or don't they know? Regardless of the answers to this, somewhat provocative, question, we have to take Change Management into account. As one scholar points out, complex projects resample small programs. Dealing with organizational change makes the project complex, but what are the complexities in organizational change? To simplify three things can be said. The first is that no-one knows exactly what the organization will change into; that is goal uncertainty. The second is that no-one knows how much it will take to make the change; this is method uncertainty. The third is that no-one can predict the level of change resistance; this is more a topic of disagreements, where we do not agree to change visions, end goals, importance or ways of doing things.

The third kind of change will bring the project over to the left side of the Cynefin Framework, even if it began being ordered, in other words complicated. The problem is, that you can never tell beforehand whether the project will encounter unexpected changes in the environment. However, if it does, it will probably result in a context that is either complex or chaotic.

Disagreements

Many scholars talk about disagreements – especially in the papers from the most recent decade – but through the use of a variety of different keyword: Direction complexity, level of trust, people uncertainty, stakeholder non-alignment and user incongruity. Papers also mention lack of support, fit/convergence, and transparency as well as hidden agendas and disagreements on importance or urgency.

As mentioned, we also have disagreement in the form of change resistance. A common practical aspect is that stakeholders expect Project Managers to handle change. but do not give them the necessary resources and power (authority over the organization) to do so. In essence this is also a disagreement. As mentioned previously, ambiguity is used to cope with disagreements. Some of the troubles with constraints are a matter of disagreement, particularly those about prioritizing different constrains.

It is very interesting that "trust" has become a keyword in project complexity. The word trust in not even mentioned in the indices of PMBOK or PRINCE2. Seen through the lens of the Cynefin Framework, disagreements can move the project from complicated into the complex domain, and even further down to the Chaotic. Especially if the level of trust is low, one might expect periods of chaotic processes.

Summary of keywords

As shown above, structural complexity and novelty can be covered by complicated. Furthermore, the discussions have shown that the rest of the keywords can be summarized in two: Uncertainty and disagreements.

Ralf Stacy, long ago, proposed a matrix to illustrate complexity. Although Stacy does not talk about projects – or management of projects for that matter – his matrix can be of value to us.

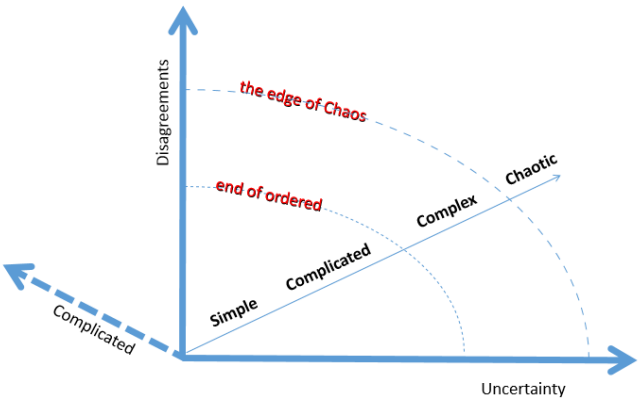

Fig. 3. Combination of Stacey uncertainty-disagreement matrix with Snowden's Cynefin Framework. "Complicated" is here the 3th dimension octagonal to the surface.

The "end of ordered" refers to Snowden's terminology and one could say that this is where it passes beyond control, where you can no longer foresee and (project) manage the future with an iron triangle. Beyond control you have only leadership to count on.

5.2 A simplified model

It is said that simplicity is complexity explained. There is clearly a need to simplify the definition of project complexity, and the recommendation is to use just three dimensions, each covering many other keywords:

1. Complicated
2. Uncertainty
3. Disagreement

A complicated project has a certain threshold of structural complexity and novelty, otherwise it is not a "real" project, only a task. Over a second threshold, the combination of uncertainty and disagreement makes the project complex. The more complicated the project, the lower threshold 2 (entering the complex domain) will be.

When the project – or parts of the project – reduce the uncertainty or disagreements to under threshold 2, we can manage and control it with constraints (the Iron Triangle), otherwise we must rely on leadership and framesetting.

From the complex domain, the project (or parts of it) could instead enter a chaotic state, where the project will have to struggle for its survival. This is called threshold 3 and is very much related to the low levels of trust.

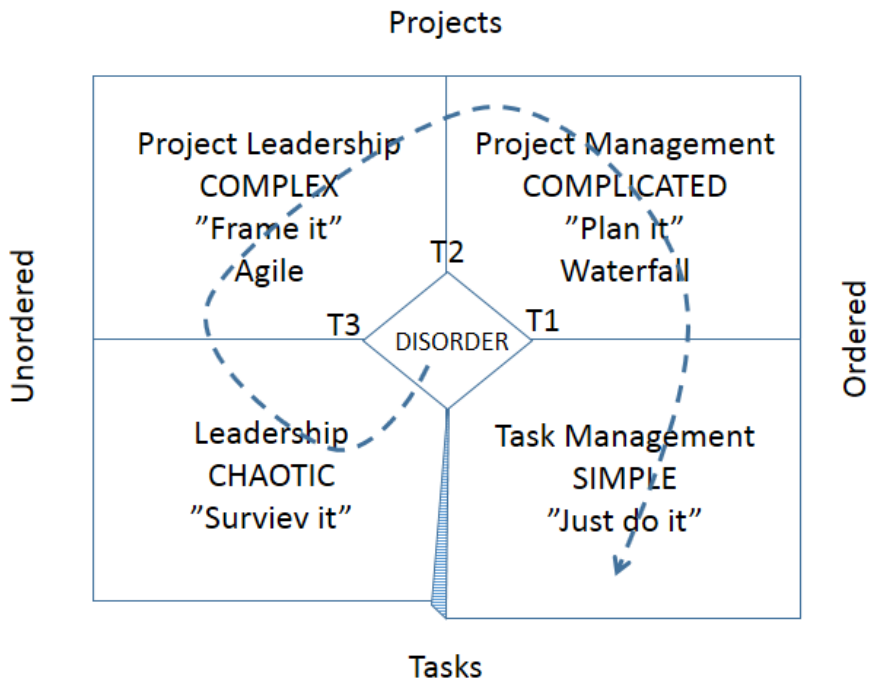

Fig. 4. Cynefin Framework adjusted to Project Management. The lines (T1, T2 and T3) are thresholds for the increasing complexity of the project. The dotted line is the Project Life Cycle.

"Frame it" is about setting the scene and the rules to play by. An example is Scrum's roles, artefacts and ceremonies (Schwaber, 2010). The left side is dedicated to leadership, which focuses on "setting direction, aligning people, motivation and inspiration" (Kotter, 2001).

"Plan it", in contrast to this, focuses on the content that is knowable and therefore possible to plan. The right is dedicated to management which is "planning, budgeting, organizing, staffing, controlling and problem solving" (Kotter 2001). Depending on the complicatedness, this can be regarded as a simple task or a complicated project.

The waterfall approach is where stakeholders agree on deliverables, create a WBS, make schedules including the critical path, and execute the plan. On the other hand the agile approach is focused on reducing complexity one sprint at a time. A sprint is like a project (Schwaber, 2010). As put in others' words: "Wise leaders take small steps before making giant leaps" (Collins, 2011). From the same author, we have the

quotes “Shoot bullets before cannonballs” and “Test your assumptions by shooting bullets”. In other word, a project is in the complex domain until the assumptions are tested and it is ready for cannonballs. Bullits in the left and cannonball the right side of the model.

The more on the left side, the harder the project is to manage. One generalized rule of thumb might be that the left side produces insight while the right side produces the deliverables.

5.3 The three thresholds in the Cynefin Framework

The Cynefin Framework in itself can draw our attention towards a certain kind of disagreements: What is complexity of the specific project? In the following we will look at disagreements concerning these three thresholds.

Threshold 1. If the assignment is very large, it is obvious that we need to handle this as a project. In other word, there is no disagreement that we have crossed threshold 1. But often it is not that clear. Many practitioners know the struggle when they are handed an assignment with the instructions, “This is simple, just do it” when in reality it is a project, that needs to be analyzed and planned before execution. If the premise that it is simple, when it is not, is accepted then practitioners will be doomed to work with the so called “task” for a long time without progress. This is a result of the different expectations between the owner of the assignment and the one executing it.

Threshold 2. Just as we have seen with threshold 1, there can be disagreements over whether we have crossed border 2. In some cases, it is very clear to everybody that the project is complex, but often it is not. Threshold 2 is much more difficult to discuss than threshold 1. The things we might discuss are the level of uncertainty (have we crossed the line of unpredictability?) or level of ambiguity (are we misunderstanding each other?). Discussions of border 2 are very real when working with the business cases of the projects. Again the border is about disagreements, but threshold 2 is very abstract and dependent on the future, hence it is very difficult to handle.

Threshold 3. The complex domain can be a nightmare for a Project Manager, especially if the Project Owner consider the project to be “only” complicated. This nightmare can become a life-or-death situation if the project crosses over threshold 3. Just like the other two borders, it is difficult and a cause of much disagreement whether or not the context is chaotic: Are the things we see around us random events or are they a part of an emergent pattern? If a project crosses the border into the chaotic domain, there are often no alternative to shutting it down, and perhaps starting a new project from scratch

The fourth domain transition, the one Snowden calls a cliff, is rarely the Project Manager's concern. It might be important for a Line Manager, but in the study of project complexity it is not relevant.

5.4 Project Life Cycle and complexity

In all the papers about project complexity we have researched, there seems to be a common unexpressed assumption: The complexity of a project is stable, and can be known in advance. In retrospective this might seem right, but experiencing the projects as they evolve suggest otherwise:

The project life cycle can be seen as a journey clockwise around the Cynefin Framework. Throughout the project life cycle, the project tasks, risks and issues will fluctuate across the Cynefin Framework. A project will be born in "disorder" and end in simple. On the way the will go through the chaotic, the complex and the complicated to finish in the simple, where the last activities are completed. Going counter clockwise allways upset stakeholders.

From disorder, the idea will develop into a chaotic state also known as the "fuzzy front end of the project". The project is very fragile and can die at any moment if not money, claritity and power is fertilizing the project idea.

From the chaos, the project might develop through some time in the complex zone. We cannot tell in advance how long the project will occupy the different domains. Some projects move fast though the left side, because there is unity and clarity. Other projects need to be in the complexity zone for a long time. The time the project stays in each domain will also depend on the people leading it.

The goal development phase of a project will complex, and many project will stay in the complex domain beyond the gaolsetting. Some projects will stay partly in the complex domain throughout the project lifecycle. If the framework of the project is agile, this can be described as staying in the complex zone while spurring sprints into either the complicated (or simple) domain.

6. Conclusions

We have examined definitions of project complexity given by scholars working with the field. We found that scholars focus on the dimensional approach to project complexity.

Over the last two decades, many new dimensions have been added, making the current understanding of project complexity very comprehensive. The movement is from right to left in the Cynefin Framework, starting with aspects of "complicated" and over time picking up on the more "complex" matters.

The definitions include issues which are far beyond traditional Project Management, like Change Management and open ended business problems and benefitrealisation.

In none of the papers on project complexity did we find answers to a question like "what project approach should we choose to use in a given project (waterfall vs agile)?" These are not well covered in the field of project complexity.

Even though the Cynefin Framework is more a decision-making model for leaders, it gives good overall guidance in this matter. However, it lacks details that might be discovered through use of the dimensions from the field of project complexity.

Therefore, we have suggested a combination of the two. We suggest a simplified version of project complexity based on three dimensions that function as thresholds between the four domains of the Cynefin Framework.

Furthermore, we suggest that a project is not a unified whole with one complexity (as apparently assumed by many scholars). Instead it is a diversified clochward movement round all the four (five) sectors in the Cynefin Framework with a dynamic distribution throughout the project lifecycle.

References

1. Baccarini, David. "The concept of project complexity—a review." International Journal of Project Management 14.4 (1996): 201-204.
2. Botchkarev, Alexei, and Patrick Finnigan. "Complexity in the Context of Systems Approach to Project Management." (2014).
3. Brockmann, Christian, and Kalle Kähkönen. "Evaluating Construction Project Complexity." CIB JOINT INTERNATIONAL SMPOSIUM, Rotterdam (2012): 716-727.
4. Collins, Jim, and Morten T. Hansen. Great by Choice: Uncertainty, Chaos and Luck-Why some thrive despite them all. Random House, 2011.
5. Damasiotis, Vyron, Panos Fitsilis, and James F. O'Kane. "Measuring communication complexity in projects." the Proceedings of the Management of International Business and Economic Systems (MIBES-ESDO) 2012 International Conference, School of Management and Economics, TEI of Larissa, Greece. 2012.
6. Dunović, Ivana Burcar, Mladen Radujković, and Kristina Ana Škreb. "Towards a New Model of Complexity–The Case of Large Infrastructure Projects." Procedia-Social and Behavioral Sciences 119 (2014): 730-738.
7. Geraldi, Joana, Harvey Maylor, and Terry Williams. "Now, let's make it really complex (complicated) A systematic review of the complexities of projects." International Journal of Operations & Production Management 31.9 (2011): 966-990.
8. Gregory, Robert W., and Everlin Piccinini. "The Nature Of Complexity In IS Projects And Programmes." Nature 7 (2013): 1-2013.
9. Gul, Saleem, and Shahnawaz Khan. "Revisiting Project Complexity: Towards a Comprehensive Model of Project Complexity." 2nd International Conference on Construction and Project Management. Singapore, IACSIT Press. IPEDR. Vol. 15. 2011.

10. Hass, Kathleen B. Managing complex projects: A new model. Management Concepts Inc., 2009.
11. Kotter, John P. What leaders really do. Harvard Business School Publishing Corporation, 2001.
12. Van Marrewijk, Alfons, et al. "Managing public–private megaprojects: Paradoxes, complexity, and project design." International Journal of Project Management 26.6 (2008): 591-600.
13. Maylor, Harvey, Richard Vidgen, and Stephen Carver. "Managerial complexity in project-based operations: A grounded model and its implications for practice." Project Management Journal 39.S1 (2008): S15-S26.
14. MSP. Office of Government Commerce. Managing successful projects with PRINCE2. The Stationery Office, 2009.
15. Mulenburg, Dr. Jerry, PMP. What Does Complexity Have to Do With It? NASA Project Management Challange, florida. 2008. http://www.slideshare.net/NASAPMC/geraldmulenburg
16. PMBOK. "Project Management Body of Knowledge (PMBOK® GUIDE)." Project Management Institute. 2001.
17. PRINCE2. Office of Government Commerce. Managing successful programmes. The Stationery Office, 2007.
18. Qureshi, Sheheryar Mohsin, and ChangWook Kang. "Analysing the organizational factors of project complexity using structural equation modelling." International Journal of Project Management 33.1 (2015): 165-176.
19. Remington, Kaye, and Julien Pollack. Tools for complex projects. Gower Publishing, Ltd., 2007.
20. Remington, Kaye. Leading complex projects. Gower Publishing, Ltd., 2011.
21. Schwaber, Ken, and Jeff Sutherland. "Scrum. The Official Guide." 2010
22. Stacey, Ralph. Strategic management and organisational dynamicsPitman Publishing, 1996.
23. Vidal, Ludovic-Alexandre, Franck Marle, and Jean-Claude Bocquet. "Using a Delphi process and the Analytic Hierarchy Process (AHP) to evaluate the complexity of projects." Expert systems with applications 38.5 (2011)
24. Xia, Weidong, and Gwanhoo Lee. "Grasping the complexity of IS development projects." (2004)