

# The Journey towards Profound Simplicity: How to Effectively Navigate Complexity in Projects<sup>1, 2, 3</sup>

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## Introduction

*“Complexity is a fact of life and projects”. “There is no escape. Think about the coronavirus pandemic and how it has upended our lives. Who would think that, even after more than one year, we’ll still be struggling with this invisible, tiny but so powerful virus? So, you’d understand that complexity is part and parcel of projects, which are akin to a bet on the future.” – Lavagnon Ika (see PMR, 2021) [Interview with Lavagnon Ika - PM World Journal](#)*

As it unfolds, policy-makers all over the world have recognized the complexity of the delivery of “Operation Warp Speed” – a portfolio of vaccine development projects – (Winch et al., 2021) [Operation Warp Speed: Projects responding to the COVID-19 pandemic - ScienceDirect](#) and the subsequent vaccination rollout program, two major initiatives to deal with the coronavirus pandemic (Ika & Paché, 2021). [Mass Vaccination: The Battle Will Not Be Easily Won \(uottawa.ca\)](#)

Other non-pandemic projects are prone to high complexity. For example, the Big Dig highway project in Boston, Massachusetts, was one of the largest and most expensive and complex infrastructure projects in US history. Over the 15 years of construction and notwithstanding best practices and innovative tools to mitigate risk and control costs, the project went from a budget of \$2.6 billion to a final cost of \$15 billion. According to close observers such as the risk manager of the project, this project incurred significant blowouts due to complexity (Greiman, 2010).

[The Big Dig: Learning from a Mega Project | APPEL Knowledge Services \(nasa.gov\)](#)

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<sup>1</sup> We would like to acknowledge the insightful comments of Professors Stephane Tywoniak, Jeff K. Pinto, and Peter E.D. Love who had helped improve this article.

<sup>2</sup> Second Editions are previously published papers that have continued relevance in today’s project management world, or which were originally published in conference proceedings or in a language other than English. Original publication acknowledged; authors retain copyright. This paper was originally published in PM Review (China). It is republished here with the author’s permission.

<sup>3</sup> How to cite this paper: Ika, L. (2022). The Journey towards Profound Simplicity: How to Effectively Navigate Complexity in Projects; originally published in *PM Review* in China, republished in the *PM World Journal*, Vol. XI, Issue VI, June.

While failure to understand complexity tends to lead to failure in projects, we still do not know what makes a project complex and what to do about such a problem in practice. Even the US-based Project Management Institute’s Body of Knowledge (PMBOK®), which has been largely silent over the years, now heralds “complexity” as one of its “project delivery principles” in its latest version (PMI, 2021).

[Standards and Guides Projects | Project Management Institute \(pmi.org\)](https://www.pmi.org/standards-and-guides-projects)

If complexity remains a challenge in the delivery of major projects, how do we deal with it in practice to help project funders and managers deliver more success?

### **The central idea of this article**

This article suggests that our understanding of project complexity has moved from “superficial simplicity” to “confusing simplicity”, but the road to “profound simplicity” is still long (see Table 1). Indeed, understanding, it has been suggested, goes through three stages. In the first stage, people tend to settle for convenient and apparently solid but deceiving explanations (superficial simplicity). Soon, people realize things are not so simple and when they start working out more nuanced explanations, confusion emerges (confusing simplicity) and thus initial simplifications then appear superficial. But as people come up with excessively complex ideas and solutions, weigh in assumptions, conduct experimentations and entertain doubts, such confusing explanations will hopefully pave the way for the emergence of “wisdom” in the form of deep, tested and seasoned explanations (profound simplicity) (Schutz, 1979).

[Profound Simplicity - The Schutz Company](#)

**Table 1: Our evolving understanding of project complexity**

Attitude towards complexity	Understanding of complexity
Wait and see – “You will know it when you see it”	N/A
Look for isolated sources of complexity (e.g., scope, stakeholders, dynamics)	Superficial simplicity
Reduce complexity (e.g., common project complexity models)	Confusing simplicity
Embrace, not reduce, complexity (Highlight complexity manifestations and their interactions; take up emergence and adapt)	Moving towards profound simplicity

In this article, we offer practical suggestions for how our more complex and holistic accounts of complexity can reach the stage of profound simplicity, without which practitioners will continue to face an uphill battle to deliver their assigned projects. Let us first get our basic concepts right.

## The notions of complexity, uncertainty and risk

Though a fact, project complexity is often misunderstood by practitioners and researchers alike.

The jury is still out. There is no consensus on project complexity. Indeed, apart from the notion of project success (Pinto et al., 2021), [Call for Papers for Special Issue on Project Success - Call for papers - International Journal of Project Management - Journal - Elsevier](#) there is perhaps no other topic in the field of project management that is so frequently debated and yet so rarely agreed upon as the term project complexity.

Researchers, for instance, still conflate the notions of complexity, uncertainty and risk (Padalkar & Gopinath, 2016). [Are complexity and uncertainty distinct concepts in project management? A taxonomical examination from literature - ScienceDirect](#)

But let us be clear. When we think of complexity in this article, we refer to a property of a project that consists of many varied parts with a multitude of existing and emerging interrelations, which make it difficult to understand, foresee and control its overall behavior (Bakhshi et al., 2016). [Clarifying the project complexity construct: Past, present and future - ScienceDirect](#)

Risk occurs in a context where *all* relevant alternatives, consequences and probabilities *can* be known. This is the realm of the “known unknowns”.

Uncertainty, however, occurs in a context where *some* of the alternatives, consequences and probabilities *are* unknown. This is the realm of “unknown unknowns” (e.g., Love et al., 2021). [Risk and Uncertainty in the Cost Contingency of Transport Projects: Accommodating Bias or Heuristics, or Both? | IEEE Journals & Magazine | IEEE Xplore](#)

**Table 2: Definitions of complexity, uncertainty and risk**

Key concepts	Definitions
Complexity	A property of a project that consists of many varied parts with a multitude of existing and emerging interrelations, which make it difficult to understand, foresee and control its overall behavior. Or the degree to which funders and managers understand the cause-and-effect relationships between the different parts of the project
Risk	A context where <i>all</i> relevant alternatives, consequences and probabilities <i>can</i> be known (known unknowns)
Uncertainty	A context where <i>some</i> of the alternatives, consequences and probabilities <i>are</i> unknown (unknown unknowns)

There is, however, a rapprochement between the cognate concepts of complexity, uncertainty and risk. It is useful to look at complexity as a property of a project that occurs in simple, complicated, complex or chaotic contexts, which, in terms of risk and uncertainty, fall on a continuum from “known knowns” to “known unknowns” to “unknown unknowns” to “unknowables” (see Table 3).

We note that, while every project may exhibit some degree of complexity, many observers tend to take “complex” for the opposite of “simple” or blur “complex” and “complicated”, not to mention “complex” and “chaotic”. *In this article, we take complexity to be the degree to which funders and managers understand the cause-and-effect relationships between the different parts of the project.* Our complexity thinking is essentially context-based and a matter of point of view. Project funders and managers should sense the appropriate context in which their project seemingly falls.

Notably, “simple” refers to a context where transparent cause-and-effect relationships prevail between the few parts of the project and solutions to the challenges posed by the project (options) are obvious and undisputed among all the few stakeholders. This is the domain of the “known knowns” and *best practices*. A shed renovation is such a project.

Complicated concerns a context where cause-and-effect relationships exist but the options remain technically challenging and not obvious and thus can only be ferreted out by experts. This is the domain of the “known unknowns” and *good practices*. Developing a new smartphone is a project in a complicated context.

Complex applies to a context where there is no right option analysis, even by the most accomplished experts. The numerous interactions between the different stakeholders and/or parts of the project make the right option less obvious and more difficult to sell to all stakeholders. Emerging patterns can, however, guide the project teams. This is the domain of the “unknown unknowns” and *emergent practices*. A good example is the Canadian Firearms Registry project, which aimed at developing a register of every gun owned in Canada.

Chaotic rather refers to a context where cause-and-effect relationships, due to their shifting nature and the lack of manageable patterns, cannot be determined. The urgency to act leaves less time for the project team to plan the project and many decisions will have to be made on-site. This is the domain of the “unknowables” and *rapid response*. The Earthquake in Port-au-Prince (Haiti) Recovery is such a project undertaken in a chaotic context (Snowden & Boone, 2007). [A Leader’s Framework for Decision Making \(hbr.org\)](http://hbr.org)

**Table 3: Simple, complicated, complex, chaotic contexts (Adapted from Snowden & Boone, 2007)**

Complexity contexts	Risk/Uncertainty	Project management approach
Simple	Known knowns	Best practices
Complicated	Known unknowns	Good practices
Complex	Unknown unknowns	Emergent practices
Chaotic	Unknowables	Rapid response

Clearly, every seasoned practitioner recognizes that it is risky to adopt a position like “you will know it when you see it” in the face of complexity. When complexity strikes, it is going to be too late. Yet, key questions remain: What makes a project complex? How can project funders and managers sense the appropriate context and effectively respond to

its associated complexity?

### **What makes a project complex or superficial simplicity at work?**

When complexity is at work, it may feel comforting for project funders and managers to look for distinct and isolated sources of project complexity such as scope, stakeholders, and dynamics (Hass, 2009). [Kathleen Hass and Associates](#)

However, such comfort will fade quickly. Part of the challenge lies in the difficulty to define and assess complexity. In other words, complexity remains difficult to measure in projects. Indeed, it would appear that there are as many as 125 aspects of project complexity (Bakhshi et al., 2016). [Clarifying the project complexity construct: Past, present and future - ScienceDirect](#)

Take the 1,000km and 4 billion-dollar Chad-Cameroon project. The project, which was delivered on time by an oil consortium led by ExxonMobil, was a high profile World Bank-funded project and the largest single private sector investment in Sub-Saharan Africa at the time (2000-2003). The project had a number of intangible goals and expectations from different stakeholders including: to deliver the pipeline and make it profitable for the oil consortium; to double annual revenues for the Chadian government; to improve Chad's institutional capacity and reduce poverty by delivering services to the poor (paid by oil money), key expectations for the World Bank (Ika & Saint-Macary, 2012). [The project planning myth in international development | Emerald Insight](#)

So, if we count the number of stakeholders and lack of clarity of goals as two different and independent sources of complexity, we run the risk of not capturing the important interactions between these two interconnected sources. In other words, listing these different but interconnected aspects or sources of complexity separately is akin to superficial simplicity.

### **What makes a project complex or confusing simplicity at play?**

Interestingly, our understanding of complexity has evolved from a rather simplistic conceptualization of complexity to more sophisticated accounts of complexity. Notably, over the years, a few complexity models such as the PMI Navigating Complexity Guide [Navigating Complexity Practice Guide | PMI](#) have become available to project management practitioners (Ika et al., 2021). [pmwj105-May2021-Ika-Couillard-Garon-coping-with-project-complexity.pdf \(peworldlibrary.net\)](#)

But as the failure rate of major projects remains high, it remains challenging to navigate complexity in project management. We construe such progress as confusing complexity. For example, most of these project complexity models still fail to consider a defining feature of systems thinking, which some authors call "complexity of interaction" (Gerald, & Adlbrecht, 2007). [On Faith, Fact - Interaction in Projects - Pattern of Complexity \(pmi.org\)](#)

## **Two manifestations of complexity or the beginning of a journey towards profound simplicity?**

So, if you ask what makes a project complex, you will most likely learn that a myriad of factors can lead to complexity in projects. But there are essentially two manifestations of complexity: the intrinsic complexity of the project and the sociopolitical complexity of the setting (Turner & Maylor, 2017).

### [Understand, reduce, respond: project complexity management theory and practice | Emerald Insight](#)

The mass vaccination program offers an excellent example of the two manifestations of complexity. The intrinsic and logistical complexity of vaccination stems from both the vaccines themselves and the difficulties in getting them to mass vaccination sites, pharmacies or patients' homes with no loss of doses. Such logistical complexity is compounded by the variety of situations encountered: one dose (Johnson & Johnson) versus two (Pfizer/BioNtech and Moderna); varying recommended times between doses (initially 21 days for Pfizer/BioNtech and 28 days for Moderna, even though, in practice, people waited four months); technologically different cold chains (initially -70°C for Pfizer/BioNtech, -20°C for Moderna, and positive cold for AstraZeneca and Johnson & Johnson).

In Canada, for instance, the sociopolitical complexity arising from the large number of actors involved was notable, with the Canadian federal government handling procurement on the international markets, as Canada, which was no more a vaccine producer, failed to produce its own vaccine, while vaccination was under provincial jurisdiction. Each province had a different way of doing things: for example, Quebec involved pharmacies in the process along with large and medium-sized businesses. Ontario put most of its efforts into mass immunization clinics, but also pharmacies and mobile sites in neighborhoods in crisis. We therefore could not be sure that Canada was able to avoid "the confusion of having 13 different strategies across the country", as Prime Minister Trudeau feared as early as November 2020.

Moreover, we should not overlook emergence, a key property of complexity that makes the project dynamic and unpredictable. A case in point is the uncertainty related to the emergence of variants such as Delta and Omicron for which some vaccines may not be fully efficacious and the vaccine hesitancy, which both could compromise the achievement of herd immunity. Thus, things happen in the environment surrounding the project and there may be changes in the manifestations of complexity over time due to the interactions among the different parts of the project. Risks and uncertainties may emerge. Opportunities may arise. Options cannot be imposed as they instead arise from the circumstances. The whole is more than the sum of its parts. Thus, in light of such a dynamic nature and emergent behavior of complex projects, it is only in hindsight that we can fully understand the arising manifestations of complexity (Ika & Paché, 2021). [Mass Vaccination: The Battle Will Not Be Easily Won \(uottawa.ca\)](#)

Again, the Big Dig project provides yet another illustration. The intrinsic complexity of the

project was notable. It consisted of a 12-km (7.5 mile)-long corridor in one of the oldest and busiest cities in the country. It included replacing the elevated highway I-93 with an eight-to-ten-lane expressway, erecting a ten-lane cable-stayed bridge across a river, extending the highway I-90 to Logan Airport through a harbor tunnel, and building four major highway interchanges. As the risk manager of the project writes, such an intrinsic complexity of the project is one of the main reasons for its dismal underperformance: “*If there is a single cause for the massive cost escalation on the Big Dig, it probably involves the management of the project’s complex integration*” (Greiman, 2010). [The Big Dig: Learning from a Mega Project | APPEL Knowledge Services \(nasa.gov\)](#)

In addition, other observers trace the underperformance of the project back to the sociopolitical complexity or the complexity of the project setting including its stakeholders. As the Harvard University Professor Kenneth Rogoff notes: “*This was less the result of corruption than of underestimating various interest groups’ bargaining power. Police required substantial overtime payments, affected neighborhoods demanded soundproofing and side payments, and there was pressure to create jobs leading to overstaffing.*” (Rogoff, 2020). [The Infrastructure Spending Challenge by Kenneth Rogoff - Project Syndicate \(project-syndicate.org\)](#)

Emergence wise, as we learn from its risk manager, the Big Dig project was full of unwelcome surprises such as “*uncharted utilities, archaeological discoveries, ground-water conditions, environmental problems, weak soil, and hazardous materials. The project faced safety and health issues, frequent design changes, and changes in schedules and milestones. The unexpected discovery of 150-year-old revolutionary-era sites and Native American artifacts was one surprise complication and source of delays, requiring approvals from yet another diverse set of stakeholders, including historical and preservation organizations and Native American groups.*” (Greiman, 2010) [The Big Dig: Learning from a Mega Project | APPEL Knowledge Services \(nasa.gov\)](#)

How could practitioners then respond to complexity? It seems that 80% of the complexity of a project lies in intrinsic and sociopolitical aspects and 20% with emergence (Maylor et al., 2013). [How Hard Can It Be?: Actively Managing Complexity in Technology Projects: Research-Technology Management: Vol 56, No 4 \(tandfonline.com\)](#)

So, we should address these two aspects if we are to be successful. A sound project management plan is a good start to tame intrinsic complexity. Good context assessment and stakeholder engagement can help with socio-political complexity. A realistic risk management plan can help anticipate both welcome and unwelcome surprises and thus confront emerging complexity.

### **Three steps in our journey towards profound simplicity**

In our view, such a two-manifestation approach to complexity potentially fits with projects of all types and speaks to practitioners of all stripes. We then take it to be the beginning of the journey towards profound simplicity. However, this approach to engaging with complexity is not complex enough in our view.

First, there prevails a micro [complexity manifestations] – macro [project complexity as a

whole] divide or a trees-forest distinction. Put differently, we “*see the trees or the forest [of project complexity]...without connecting one with the other, and often overlooking how the interconnections between the trees [complexity manifestations] shape the forest [project complexity as a whole], and vice versa.*” (Tywoniak et al., 2021)

[A Pragmatist Approach to Complexity Theorizing in Project Studies: Orders and Levels - Stephane Tywoniak, Lavagnon Ika, Christophe Bredillet, 2021 \(sagepub.com\)](#)

For instance, practitioners wonder how the sociopolitical complexity of the project setting influences the intrinsic complexity of the project or how the collective choice of the stakeholders affects the scope of the project and, more importantly, the creation and distribution of value (Gil & Pinto, 2018). [Polycentric organizing and performance: A contingency model and evidence from megaproject planning in the UK - ScienceDirect](#)

Second, not all projects are alike on the complexity scale. As noted earlier, a good response to complexity depends on the complexity context of a project. But what is it anyway if we consider the two manifestations of complexity and how can project funders and managers make sense of the appropriate context and when?

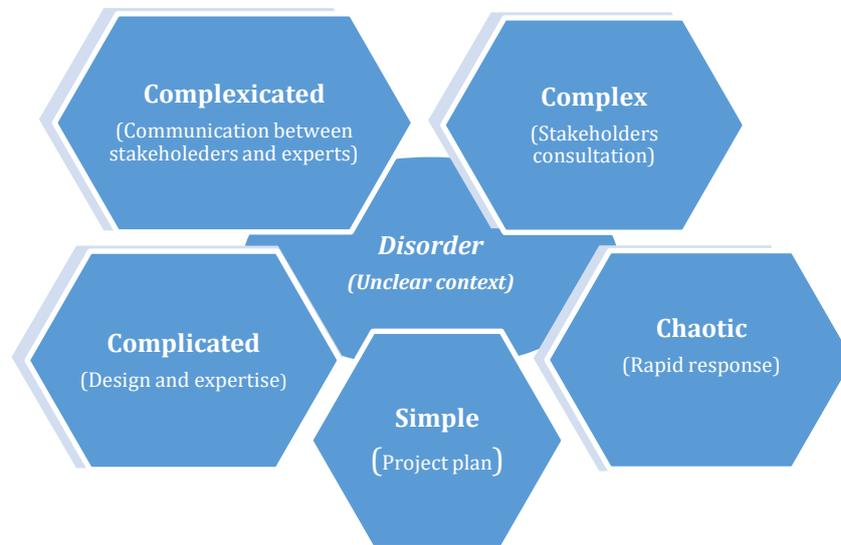
*We proffer that the complexity context of a project is the degree to which funders and managers understand the compounded effect of the cause-and-effect relationships in both the intrinsic and sociopolitical aspects of its complexity.* Based on complexity and systems thinking, practitioners can distinguish between (not four but) five different types of project complexity contexts: simple, complicated, complex, “complexicated” (that is both complicated and complex) and chaotic. Notably, the Airbus A 380 is such a project that fits in a complexicated context.

In preparing their response plan, they may focus on the project plan in simple contexts, design and expertise in complicated contexts, stakeholders in complex contexts, communication between stakeholders and experts in complexicated contexts, and rapid response and high adaptability in chaotic contexts.

Such responses to complexity are a matter of point of view. The trick for project funders and managers is to be continually alert to sense the appropriate context during initiation or planning and adapt to the changing context during execution (Ika et al., 2021). [pmwj105-May2021-Ika-Couillard-Garon-coping-with-project-complexity.pdf \(peworldlibrary.net\)](#)

Figure 1 displays five complexity contexts for a project and potential responses to complexity.

**Figure 1: Five project complexity contexts (Source: Ika et al., 2021)**



This figure illustrates the five different project complexity contexts with a sixth one, disorder, that occurs when the context is unclear to the project team. The “disorder” context is characterized by highly divergent views from stakeholders with regard to the project goal (what is the project all about) causing its halt. Practitioners can move out of the disorder context by breaking down the situation into different parts and assigning each to one of the other five contexts.

Third and last, a good response to complexity requires a good attitude towards complexity. Take iPhone 13 as a small product change project. The traditional “understand-reduce-respond” attitude to complexity might work as a good recipe, especially in simple and complicated contexts, but it could fall short for more complex contexts. Such a reductionist approach may fall short for the more complex projects such as iPhone 1 (a breakthrough), which need more creativity, experimentation, and iteration for their delivery. For these breakthrough projects, an “understand-embrace-adapt” attitude to complexity is more suitable, as the tip is to embrace, not reduce, complexity. Here, adaptation is key to success.

Project funders and managers should brace for a few welcome or unwelcome surprises down the road in any major project. Adaptation concerns the ability of the project to monitor not only for risks but also opportunities, give the space to project staff to motivate, and empower teams, facilitate relationships, provide guidance, be able to act on information in a timely manner, adjust the plan when needed, and solve problems or design innovative solutions to challenges. The “understand-embrace-adapt” approach is a holistic attitude that has proven more effective in dealing with the pandemic (e.g.,

economic and health responses by governments; learning and adjusting to the emergence of variants for both vaccine development and vaccination rollout).

## Final words

Complexity remains a daunting challenge, particularly in major project settings. The road traveled so far is notable but we are still far away from deeply understanding complexity and responding effectively to it in the delivery of projects. There is a need to move from simplistic and reductionist models to more holistic accounts of complexity in projects. The intrinsic–sociopolitical complexity conceptualization is a good point of departure as it charts the movement away from superficial simplicity and confusing simplicity and sets us at the beginning of our journey towards profound simplicity.

To reach the profound simplicity that can inspire practitioners in their attempt to engage with complexity and win more success, more work is required. In particular, we need to further *complexify* our understanding of complexity. In other words, we shall endeavor to take into account the context of the project, highlight the interactions among complexity manifestations and their interconnections with project complexity as a whole, and take up emergence or any significant changes over time and adapt. In any case, while profound simplicity remains aspirational, we shall shy away from ready-made solutions to the project complexity challenge. Will we be up to the task?

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