Curious Cloud: A conceptual methodology to support the solving of 'messy' problems within organisations.

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Abstract

People in organisations are well-used to solving straightforward problems as part of their day to day roles, but they are less adept at spotting and addressing more tricky or messy challenges, which are often ignored or approached in an ill-judged, piecemeal way. Organisational structures often unintentionally limit the holistic perspective required to more fully understand these messy problems, whilst the limits of human cognitive bandwidth mean that people often rely on inefficient heuristic search strategies and thus only consider a limited number of alternatives. The resultant solutions have the potential to create or exacerbate problems elsewhere in the organisation, leading to frustration, wasted effort and the potential for increased organisational risk. In order to assist problem solvers at all levels within organisations to exercise greater care, a series of 12 steps have been drawn together to form three distinct phases: identifying problems or opportunities; solving problems cognitively; and carefully implementing solutions. These phases create a complete and practicably applicable model to improve organisational problem solving. This conceptual article introduces academic literature that relates to each of the three phases, offering organisations a richer perspective on the subject, before outlining the Curious Cloud methodology as a simple integrative guide that can be used by people at all levels in the organisation to help notice and work to solve messy business challenges.

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Introduction

The nature of organisational challenges varies considerably, from simple, clear and narrow in nature to more complex, opaque and all-encompassing. Problem solving is a day to day occurrence for many employees, but those more tricky or messy challenges are often unseen, ignored or approached in an ill-judged, piecemeal way. Schwarzand & Skurnik (in Davidson & Sternberg, 2003, p. 264) highlight that when people try to solve complex problems, they quickly exceed their ability to grasp the inherent complexity and tend to rely instead on 'heuristic search strategies'. These cognitive shortcuts tend to be based largely on previous experience, resulting in the consideration of only a small number of promising alternatives.

Having helped to design and deliver a business school undergraduate module (Creativity in Enterprise) which, from 2013, taught creative thinking behaviours and techniques as a means of solving complex organisational challenges, the author realised that what students lacked was not the ability to grasp or utilise the different tools, but rather an appreciation for how the tools could be fitted together into a productive sequence for different use-cases. What was needed was a holistic model which more effectively framed the different approaches being taught: in essence a way of looking at a given problem space and identifying which tools might be most appropriate to use. A literature review in 2016 highlighted some interesting candidate models (Wallas, 1926; Guilford, 1967; Mumford et al., 1991; Amabile, 1996). However, none of these models simply and completely explained the creative problem-solving process from a start-point prior to the identification of a problem, to an end-point of a fully implemented solution. A simplistic model, notionally called 'Curious Cloud', was therefore developed to fulfil the needs of the initial brief and from 2017 this was modified to additionally support students studying towards an MBA. The model, which will be explained in greater depth later, comprises of three phases: an initial phase that involves the mindful discipline of daily input, supporting the identification of problems that may need solving; a second phase which is involved with solving a given problem from a cognitive perspective; and a third phase which focuses on implementation, solving the problem in practice. Within these three phases there are a total of 12 activities, which flow into one another, but which can be applied discreetly as required. Whilst initially designed to help students learn how to address organisational challenges and devise effective, differentiated strategies, the model introduces a pragmatic and potentially useful integrative way to look at the subject of solving messy organisational problems.

Messy problems

Jonassen (2000) describes ‘problems’ as having two critical attributes. First, that they are the ‘unknown’ aspects of the difference between a current state A and a goal state B. Second, that finding or solving this ‘unknown’ must have some social, cultural or intellectual value: in other words it must be a challenge worth solving. Quoting Anderson (1980, p. 257), Jonassen (2000, p. 65) states that ‘problem-solving is any goal-directed sequence of cognitive operations’, a deliberate effort to understand the unknown elements and determine how to move from A to B. Ackoff (1981) adds a third attribute, that the decision maker has some doubt as to which alternative solution should be selected. A problem thus arrests cognitive progress towards a meaningful goal and presents a challenge of both identifying and choosing between alternative solutions.

Treverton (2003) and Gladwell (2009) offer a usefully simple classification of problems, where they exist on a spectrum between ‘puzzles’ and ‘mysteries’. Problems that are puzzles (such as jigsaws, whodunnits, Rubik’s, video games etc) can be quite complicated but the solver is relatively clear about the nature of the pieces that need to be manipulated and aware that there is a definitive, correct solution to work towards: in other words a clear and unambiguous goal. A puzzle-solver generally suffers from having too little information, so the process of solving typically involves diligent focus, in order to discover the relevant rules and information which allow the puzzle to be unraveled and solved.

In contrast, would-be solvers of problems that are mysteries (such as ethical dilemmas, design challenges, strategy formation, environmental or economic conundrums etc) often have a lack of clarity about the true nature of the challenge, let alone whether there are any possible solutions. These problems can also manifest in different ways depending on the physical and mental perspectives of a given viewer, like the parable of the blind men and the elephant (Mintzberg, Ahlstrand & Lampel, 1998; Edmondson, 2016). Mason & Mitroff (1983) highlight that there may be as many different definitions of a given problem as there are different stakeholders who make a significant impact on it. In these cases, they suggest, the thorny issues at the heart of the matter might even lurk out of sight, in the shadows. Unlike in a puzzle, a mystery-solver suffers from too much information and the challenge is in deciding what is relevant amongst an almost infinite number of 'weak' signals. With so much ambiguous and possibly irrelevant data in the system, the diligent focus of the puzzle-solver is of little help, so the mystery-solver must utilise peripheral vision to scan for potential clues. Composing a clear problem-statement or a clear goal may be seen as additional challenges in their own right, with each stakeholder having a potentially different view.

Whilst the idea of puzzles and mysteries is useful in terms of simplicity, Jonassen (2000) introduces a more comprehensive taxonomy which differentiates between 11 types of problem: logical; algorithmic; story; rule-using; decision-making; trouble-shooting; diagnosis-solution; strategic performance (strategy execution); case analysis (strategy formation); design; and dilemmas. These differ based on variations on three axes: the structuredness of the problem; its complexity; and its abstractness or domain specificity. Simple, well-structured problems (such as logic, algorithm or story problems) that exist in a single domain, are consistent with the idea of puzzles above. These have a clearly understood initial state A, a definable goal state B and an identifiable (or discoverable) set of logical processes that can be used to move from A to B. Those problems that are ill-structured, complex and involve working across different domains of expertise (such as dilemmas, strategy formation and design problems) are consistent with the idea of mysteries. This more challenging end of the spectrum corresponds with what Checkland (1972) termed soft problems, Ackoff (1979) called messes and Rittel & Webber (1973, p. 160) referred to as 'wicked problems, as opposed to tame ones'. Rittel & Webber (1973) suggested that these wicked problems could be seen as part of an interconnected network of nodes (tricky, malignant, vicious spirals), where root causes are opaque and those actions designed to solve one node (one perspective of the elephant) have the potential to induce unintended and potentially severe repercussions at some other node. As a result, the root causes of a given symptom in one area can often be found in the ill-judged solutions to a seemingly different challenge elsewhere (Rittel & Webber, 1973). A simple example of this is the author's own observation of silo mentality within organisations, where processes designed to help one function or department to be efficient, often surprisingly allied to diligence within the team, have the potential to create inefficiency and frustration in other adjacent departments. This is consistent with what Tucker & Edmondson (2003) term 'first order' problem solving, where diligent employees solve the obvious issue, often again and again, without addressing the root causes. Jonassen (2000) highlights that the challenge of solving these myriad interconnected 'external' factors is further compounded by 'internal' factors represented by the experience and understanding of the problem-solvers themselves. As with the parable of the blind men and the elephant, this is likely to lead participants to frame the challenge in different ways, which helps explain why stakeholders might hold differing views regarding what the problem is and even, as Vennix (2001) highlights, whether they see a problem at all.

Ackoff (1997) highlights that the properties and functions of a system derive from the interaction of its parts, with overall performance depending more on how the parts fit together than how they perform separately. Ackoff goes on to suggest that developing an understanding of these interactions might allow a challenge to be addressed by solving it in a different 'node' to the one where the symptoms manifest.

A problem that is messy thus tends to be ill-structured and complex in nature (in other words, difficult to explain), requiring an understanding of multiple stakeholder perspectives and a grasp of more than one domain of expertise.

Solving messy problems

Guilford (1965, in Runco 2014 p. 16) came to the conclusion that all problem solving is creative, stating that 'wherever there is a genuine problem, there is some novel behaviour on the part of the problem solver, hence there is some degree of creativity'. However, Runco (2014) cautions that it is probably best to accept that not all problem solving requires creativity and that creative performance is not always the solution to a problem. In fact, Lubart (2001) highlights that problems are often overcome using a series of small steps, each formed of relatively ordinary cognitive processes. Torrance (1965; p. 663) accepts that creative thinking is one special kind of problem solving and describes creativity in terms of a process which is particularly germane to this discussion: first ‘becoming sensitive to problems, deficiencies, gaps in knowledge, missing elements, disharmonies, and so on’; second ‘identifying the difficulty’; third ‘searching for solutions, making guesses, or formulating hypotheses about the deficiencies’; fourth, testing, modifying and retesting these hypotheses; and fifth, ‘communicating the results’. In order to help compare the different academic approaches for solving complex problems, Torrance’s criteria have been condensed into three high-level phases (figure 1) that will be considered in turn: identification of the problem; solving the problem as a concept; and the implementation of this solution.

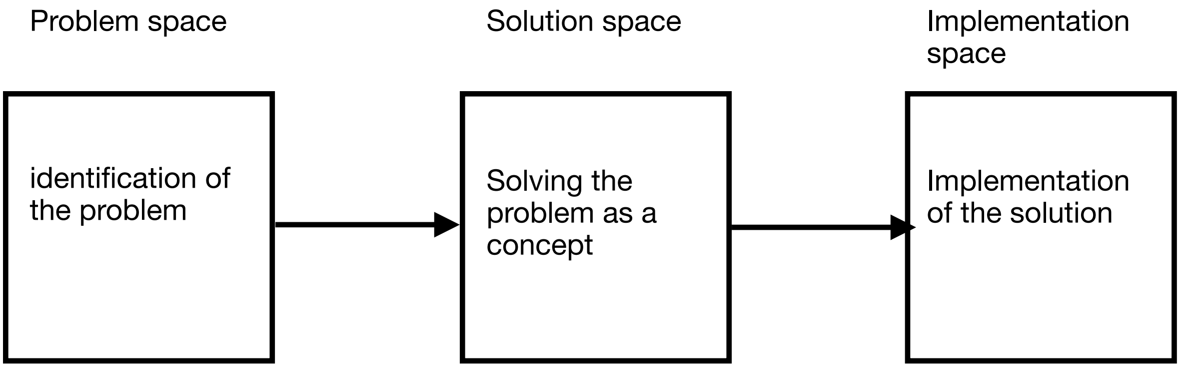

Figure 1.

1: Identification of the problem

In order to solve a problem we first need to identify that it exists, either currently or as a likely future challenge. Maitlis & Sonenshein (2010, p. 565) suggest that what organisations need most in changing times is ‘curiosity, openness and the ability to sense complex problems’, something that Guilford (1950, in Lubart, 2001) calls sensitivity to problems and Amabile (1996) refers to as problem or task identification. Schoemaker & Krupp (2015, p. 40) offer more practical advice, suggesting that we can ‘learn to anticipate better by simply being more curious, looking for superior information, conducting smarter analyses and developing broader touch points with those in the know.’ Schoemaker & Krupp go on to suggest that we must not only understand the deeper trends and key uncertainties that might fundamentally affect our world, for example by identifying the weak signals of emerging trends at the periphery of our sector, but that we must also deliberately seek out views that diverge from our own so that we are less likely to discount nascent opportunities and threats when we do spot them.

The award-winning author Barry Lopez captures the nature of the overall challenge by suggesting that to be fully informed, a person would need both a grasp of the ‘extreme complexity of the local situation’ and an understanding of ‘the unbounded enormity of the grand overview’ (Lopez, 2019, p. 106). He goes on to say that it is possible to break down the constraints that defeat our ability to imagine, when we are faced by difficult or even seemingly impossible situations, if we develop the capacity to appreciate the nuances of both local and macro factors. This is echoed by Stein (1953, quoted in Runco & Jaeger, 2012, p. 95) who says that the ‘creative person has a lower threshold, or greater sensitivity, for the gaps or the lack of closure that exist in the environment’. However, Maitlis & Sonenshein (2010) hint at a very interesting ontological point here: that our beliefs and assumptions will affect the extent to which we have the time or ability to notice things that we can affect. Thus, it seems possible that whether a person thinks that they can spot valuable information (for example to discover that a problem exists), or thinks that they can’t, they are probably right.

Whilst there is a traditional focus on first-mover advantage (Spence, 1981), Randal (2015, referencing Kim & Mauborgne) suggests that there may be more to be gained from being a fast-follower, leveraging additional insights gained from the first-mover to create a more appealing & better differentiated ‘value-cost’ trade-off. This insight reminds us that foresight is as much about interpreting how others see the future as it is about interpreting how we think the future will unfold. Markides (1999) gives some usefully practical advice, encouraging us to regularly monitor leading indicators of strategic performance such as employee morale, customer satisfaction and feedback from suppliers and distributers. He goes on to suggest that we should keep an eye on niche or maverick competitors, who might be more likely to break the established industry rules in novel or thought-provoking ways. Sull (2005) makes the point that during any period of ‘active waiting’ we should conserve financial resources and develop organisational capabilities, what Teece (2018) calls ‘dynamic capabilities’, so that we not only become more able to spot problems, but are also better placed to be able to take advantage of these emergent insights.

This focus on probing the future and seeking to understand how it might apply to an organisation and its environment, fits well with the idea of strategic or corporate foresight and to an extent, the process of ‘sensemaking’. Rohrbeck, Battistella & Huizingh (2015) highlight the importance of perception, interpretation and response as a powerful competitive mechanism for organisations: picking up on early signs of emerging trends; effectively interpreting the relevance of these signs; and then proactively responding ahead of other players in their market. Iden, Methlie & Christensen (2017) highlight that the gathering of strategic foresight should not be outsourced, instead arguing for decision-makers to be involved in the process. Darkow (2015) goes further and makes a good argument for the inclusion of organisational perspectives beyond those of top management in this process. She makes the point that the latter group 'cannot claim to have the full scope of knowledge and capabilities required for creating a long-term, robust and implementable strategy' (Darkow, 2015, p. 10). Dufva and Ahlqvist (2015, p. 117) highlight that the interaction between stakeholders involved in the process creates 'emergent phenomena in the system' such as new knowledge, shared perceptions or even a change in the absorptive capacity of the organisation.

This interaction between stakeholders is essentially a process of sensemaking, or rationalised social construction, where new cues from both within and outside the organisation are framed in order to update and improve shared understanding. Maitlis & Sonenshein (2010, p. 556), writing about sensemaking in organisational crises and change projects (both consistent with the idea of messy problems), highlight that participants benefit from 'attentional coherence', where people at different levels and across functions are jointly involved in scanning, sharing and interpreting information, whilst Harrison, Bosse & Phillips (2010) note that higher levels of trust lead to the sharing of more valuable information between stakeholders. This chimes with the findings of Rohrbeck & Kum (2018), who show persuasive data that 'vigilant', future-prepared organisations significantly outperform others and have 'a significantly higher likelihood of making it to the group of industry outperformers' (p. 114). However, Rohrbeck & Kum (2018) also caution that firms need to match their foresight activities to the level of environmental volatility and complexity in their industry, given that 'neurotic' firms (those expending too much effort looking for signs of change in a straightforward, stable industry) tend to perform even more poorly than those organisations whose foresight activities are too lightweight.

It seems important that organisations contemplating the development of valuable foresight capabilities, a ‘capacity for perception’, should first assess the volatility and complexity of the environment in which they operate, then map out the broad subject areas of interest. Having done this they should consider the people who will be formally and informally involved and the processes by which insight will be picked up, interpreted and acted on. Delineating the broad subject areas helps to legitimise collective attention or curiosity around particular challenges, whilst low barriers to communication with high levels of trust are an essential element of the social processes that allow value to be captured.

One element that is critical in this process is what Edmondson (1999, 2019) calls the creation of psychological safety. This is apparent within Honda’s concept of ‘Waigaya’ (Rothfeder, 2014), where suggestions from team members, from any level or function, are considered equal when trying to address new challenges. Psychological safely helps team members to work together more effectively and with a more holistic combined viewpoint, leading them to be able to spot, discuss and solve challenges more easily.

> *Insights from 1: Frame foresight activities as an activity for all employees; clarify which environments and subject areas are particularly relevant for the current needs of the organisation; create simple processes for the discussion & sharing of insights; work to create psychological safety so that voices from within the organisation can actually be heard.*

2: Solving the problem as a concept

Having identified that a problem exists, the next phase of the process is to cognitively uncover a viable solution. A number of authors suggest starting this phase by ‘defining the problem’ in some way (Blatt & Stein, 1959; Kepner & Tregoe, 1965; Simon & Newell, 1971; Bransford & Stein, 1984). Based on their research, Blatt & Stein (1959) highlight that a more efficient problem-solver starts by developing a fuller understanding of the problem. Rather than trying to solve the problem directly, they seek to ‘become part of it’ in order to first develop a clearer understanding of how it manifests and to then discover the solution contained within it. Paradoxically, whilst tending to solve problems more quickly and efficiently, they tend to start work slowly, methodically and with time to think within an initial analysis phase, where they also ask a relatively greater proportion of any questions. This allows them to more quickly reach a point of ‘necessary and sufficient information’, which reduces the need for a long lag phase, allowing them to progress more directly to a process of synthesis in order to produce a solution. This view is echoed by Sternberg (2006, p. 88), who suggests that ‘better thinkers recognise that it is better to invest more time up front so as to be able to process a problem more efficiently later on’. However, Rittel & Webber (1973, p. 159) remind us that defining problems and locating ‘where in the complex causal networks the trouble really lies’, can be intractable problems of their own. One simple tool that helps us better understand where the trouble really lies is Toyota Production System’s five-why technique (Ohno, 1988; Ries, 2011) which allows us to patiently interrogate each layer of a complex problem (each set of causes for a given symptom), peeling back or drilling down to understand the root causes that need addressing.

According to Sadler-Smith (2015), the early twentieth century educational reformist Graham Wallas suggested that problem solving consists of four stages: 1, Preparation, a conscious process of deep immersion, accumulating both domain-specific’ and often some form of non-related domain understanding; 2, Incubation, a subconscious process (consistent with Blatt & Stein’s ‘lag’ phase above) which seems to be helped by a combination of distraction, mental relaxation & physical exercise, during which neural networks are gradually activated and connected; 3, Illumination, which is essentially a eureka moment or flash of inspiration, where surprisingly well-formed solutions are often consciously realised, often prefaced by intimation, the fringe consciousness that an idea is approaching; and 4, Verification, a further example of sensemaking, where gatekeepers (such as boards, investors, the market etc), within a contemporary social structure, make sense of and pass judgement on the idea (Wallas, 1926, in Sadler-Smith, 2015). Lubart (2001) provides a useful study of how the academic view of the creative problem-solving process has changed over time; however, despite showing the directions that research has progressed, Lubart highlights that variants of Wallas’ model still serve as the basis for our understanding of this process.

De Reyck & Degraeve (2010, p. 81) present good arguments for improving decision-making within organisations, something that is of relevance here. Their model asks three questions: first, 'what are we trying to achieve' (which fits well with the problem definition stage above); second, 'what can we feasibly do' which forces us to consider more than one alternative; and third, 'what do we have to watch out for' with each of these alternatives. Lafley & Martin (2012) offer a seven-stage team-based process, which shows how this model might be applied to problem solving as it relates to strategy construction: 1, Frame the challenge as a high-level choice that needs to be taken between two or more mutually exclusive options that might resolve it (with each having consequences); 2, Generate possibilities, which might be versions of the high-level choices above or more creative leaps of imagination, and will ideally also include a 'status quo option', essentially the act of 'doing nothing different'; 3, Specify conditions for each option, describing what must be true for it to be strategically sound; 4, Identify barriers to progress for each of the conditions, then rate these from biggest to smallest potential barrier; 5, Design tests for each significant barrier that are valid & sufficient to generate either rejection or commitment from the entire group; 6, Conduct the tests, crucially starting with the barrier condition that the group has least confidence in (to minimise effort on options that won't work); 7, Make an informed choice between those options that are now shown to be viable. Lafley & Martin (2012, p12) highlight three shifts in mind-set that are required within any team following this process: first, that they should ask 'what might we do', rather than what 'should' we do in the early stages of the exercise; second, in the middle stages, ask 'what we would have to believe', rather than what 'do' we believe; and third, ask 'what are the right questions' and 'what specifically must we know to make a good decision' rather than what 'is' the right answer. Implicit in this approach is the idea that the team is not just solving the problem, but they are also considering how the solution might be implemented.

Irrespective of our approach, Ackoff (1981) suggests that there are three kinds of 'thing' that can be done about problems — they can be solved, resolved, or dissolved. Solving a problem results in a solution that can be objectively shown to be optimal, akin to curing a disease. Resolving a problem yields an outcome that is 'good enough' and subjectively 'satisfices' (satisfies and suffices) based on common sense. This is like reducing the symptoms of an illness to a manageable level to make it bearable, though there is a tacit acceptance that a resolution of this kind is likely to be temporary in nature. Dissolving a problem involves changing the nature of the system and/or of the environment in which it exists, so that the problem cannot or does not arise, like creating a lifestyle change so that an affliction is no longer triggered. This distinction is very useful when considering more complex, interconnected, messy problems, especially given that Rittel & Webber (1973, p160) remind us that messy problems are ‘never solved’. Rather, remembering that Ackoff (1997) highlighted that the overall performance of a system depends more on how its parts fit together than how they perform separately, it might be possible to approach the various causes or nodes in different ways to move towards a viable holistic solution.

Blatt & Stein (1959) highlight a really interesting finding in their research, that problem-solvers who have an intrinsic focus on form and harmony (essentially seeking an elegant, aesthetically pleasing solution) have greater freedom from the anxiety associated with an ‘extrinsic task focus’ that might hamper the creative process. This allows them to better appreciate the nuances of the external environment, which seems consistent with the idea of peripheral vision in relation to solving mysteries above. This reminds us that the process of cognitively solving problems has a great number of facets, exacerbated further by the variation in the context, the background heuristics of the problem solvers and so on. It also seems clear that devising a solution of some kind (some combination of Ackoff’s solving, resolving and/or dissolving) does not end our task; the solution still needs to be implemented, which presents challenges of its own.

> *Insights from 2: Spend time to define the problem; work patiently & methodically to understand the causes of each symptom until the underlying root causes become clear; generate multiple options for solving these root causes to improve the chances of holistic success; include consideration of subsequent implementation within this process; strive towards an elegant, aesthetically pleasing solution.*

3: Implementation of the solution

Having started by identifying that a problem exists and then progressed to cognitively uncovering a viable solution, the final step in the process involves the critical task of successful implementation. Balogun, Hope Hailey & Gustafsson (2016, p. 12) state that without ‘implementation action, the process can remain a planning exercise which never tackles the reality of change within the organisation'. In his retrospective on the research of Guilford, Merrifield et al. and Wilson et al. from the 1950s and 1960s, Mumford (2010, p. 274) states 'that there may be as much creativity in making an idea real as there is in the initial generation of the idea'. Mumford (2010) goes on to suggest that the cognitive capacities required for evaluating and implementing new ideas, within a complex, dynamic and ambiguous environment, may be just as demanding as the earlier parts of the problem solving process. Mumford then highlights four relevant 'late cycle capacities': 1, conceptual foresight, where the potential downstream implications of an idea are considered as part of the idea evaluation & implementation planning process; 2, penetration, which, though possibly related to conceptual foresight, allows problem solvers to be able to spot pertinent data and draw conclusions when inundated with information in a dynamic environment; 3, redefinition judgement, where improvisation is used to develop and adapt plans in an opportunistic and flexible way; and 4, problem sensitivity. which includes monitoring of solutions and action plans, as well as the identification of critical new problems that emerge during the process of implementation.

Given the importance of implementation to the process of problem solving, it seems interesting that academic literature covering this critical area is quite difficult to find. This observation is echoed by Mumford (2010, p. 274) with his suggestion that the literature on creative problem solving gives the misleading impression 'that once an idea has been generated, the work is done'. There is an interesting parallel to this within the healthcare field, where Bauer et al. (2015) highlight that those solving problems have historically been academic clinical researchers, for whom the gap between the research that interests them and any application or impact is of little concern. Only in the last fifteen or so years has 'implementation science' developed to address this gap and promote a learning healthcare system.

In their meta analysis of implementation science, Damschroder et al. (2009, p. 52) highlight that implementation is a 'social process that is intertwined with the context in which it takes place', with these 'circumstances or unique factors' providing a backdrop for the task. Their 'Consolidated Framework for Implementation Research' (CFIR) highlights the importance of giving consideration to five domains: 1, the characteristics of the intervention itself, including the source of the thinking, the perceptions of stakeholders or the complexity of the task given the range of both essential and peripheral components; 2, the external context based on macro factors, which might commonly be thought of in terms of political, economic, social, technological, legal and ecological (PESTLE) factors; 3, the internal context experienced by those involved in delivering the implementation, such as cultural factors, networks & communication relating to the organisation; 4, the individuals directly involved with implementation, given that these key people have agency, which is the ability to bring their own experience and perspectives to bear within the process, in positive or negative ways, at a critical point in time; 5, the process by which change is implemented, often composed of a series of both planned and spontaneous sub-processes that effect change in different ways and locations, but with a clear end-goal in mind. Damschroder et al. make the point that each new situation requires careful analysis to fully understand the pertinent factors at a holistic level, cautioning that their model is too detailed to be applied wholesale.

One discipline that has a healthy attitude towards implementation is within entrepreneurship, where the idea of ‘lean startup’ (Ries, 2011) is well understood and contains two elements that are particularly relevant to our discussion: ‘validated learning’ and ‘build-measure-learn’. These elements stress the need to design frequent experiments to facilitate learning about the different facets of the problem, which in this case relate to the design of the products & services and the design of a sustainable business model. The duality of this focus is consistent with the idea of a messy problem, where solutions to both challenges (which are complex in their own ways) need to be carefully considered given that they are interdependent, whilst less obvious yet critical nodes (such as organisational considerations, vital to support the business model) need also to be factored in.

Ries (2011, p. 57) highlights that experiments should follow the scientific model, which ‘begins with a clear hypothesis that makes predictions about what is supposed to happen’ so that learning can occur irrespective of the outcome. Entrepreneurs are seeking to discover a profitable and sustainable product-market fit before they invest valuable time and money in scaling up production. Ries (2011) advocates the building of a ‘minimum viable product’, the cheapest and simplest essence of the proposed design, which entrepreneurs can use to observe & measure user experience. The aim with this approach is to learn from the input, build new insights into a revised prototype and repeat these activities with a fast cycle time until a satisfactory product-market fit has been identified.

The messy-problem-solver has a similar challenge of trying to understand how well the solution might work for different stakeholder groups (those involved or affected) and simultaneously trying to uncover any non-beneficial unintended effects, within or beyond the problem space. In both cases the task can be approached by involving representative members of each stakeholder group in the processes of both cognitively solving the problem and implementing the solution.

> *Insights from 3: Treat implementation as a task in its own right; carefully consider the factors that might impact successful implementation; make clear plans before starting; be deliberate in adapting these plans in an opportunistic and flexible way based on the results of small experiments, where the objective is learning rather than selling; keep measuring & learning as implementation is rolled out.*

Curious Cloud, an integrative conceptual methodology

The conceptual Curious Cloud methodology is formed of twelve discreet elements, sitting within the three phases outlined above (working to notice problems, working to solve them cognitively, and working to implement solutions). The model is explained as if there is one individual acting, but there is more to be gained from treating this as a team activity, with the various stakeholder perspectives represented and those involved at the outset seeing the task through to the end. The phases and elements are summarised below.

A. Radar

This initial phase is open-ended and consists of daily tasks that are sufficiently short in duration (for example, five minutes per day) to be sustainable over time.

Daily Task 1. Mindful discipline of being curious and connected

The general themes investigated are driven by the specific areas of interest relevant to the person or organisation, but within this they are deliberately unfocused in nature. Input might come from journals that report on advances in the field concerned, the trade press of customers, or conversations with colleagues in other areas of the business. Trust is placed in the ability of the curious and connected person to subconsciously develop cognitive links based on the accumulating 'drips' of input over time. A growing understanding of the 'space' enables richer and more nuanced conversations to occur, in turn providing new input.

Daily Task 2. Scanning the external and internal environment for frustrations, opportunities and threats

As a richer understanding of the relevant environment slowly starts to develop, so it is feasible that the curious and connected person will start to notice discreet aspects that have relevance to their unique situation. The model emphasises three key aspects of interest: First, frustrations, either within the organisation or within the stakeholder community (eg customers, suppliers, regulators etc). Organisations tend to have many small frustrations (the author likens these to clouds in the sky, which lend their name to the model), with the more significant frustrations (deep, dark storm clouds) representing problems that would be valuable to solve. Second, opportunities that are emerging on the horizon like mountains of value, which may not have been widely noticed and are thus potentially valuable to take advantage of. Third, threats that are emerging on the horizon like tsunamis of risk and which represent potential value-destruction unless mitigated. When a frustration, opportunity or threat is noticed, then the process of problem-solving is invoked.

B. Creative problem-solving

This phase includes a deliberate set of focused thinking tasks which, unlike the previous drip feed of input, require a more significant investment in terms of time and people. Equally important, they involve holding off from action that might affect the problem space: this is de-coupled into the third phase.

Think 1. Clarifying the challenge to be addressed

It is critical that an involved process of problem-solving starts with a clear statement of the challenge. This element may require significant effort, given that each stakeholder involved may view the problem in a different way and that the final problem statement needs to elegantly capture all these views, if the subsequent solution is to be truly successful. The problem-solver will need to engage with stakeholders in order to gain a reasonable grasp of their perspectives, along with any pain that they are experiencing, before this stage can be completed. This may even entail engagement with a micro version of the whole creative problem-solving phase.

Think 2. Developing a connected understanding of the problem space

Despite the accumulated time spent to date, it is likely that significant further input is required to progress effectively, with the problem-solver seeking both knowledge and experience. Knowledge can be gained by reading around the challenge to see what academics suggest, or how people within the relevant domain and outside of it have solved (or failed to solve) similar problems in the past. Experience can be gained by 'getting feet on the ground' and observing first-hand how the problem manifests, or by speaking to those who have been (or may become) directly affected.

Think 3. Identifying potential elements of a solution

This ‘divergent thinking’ stage is what many people think of when they think of creativity. Here divergent thinking is used in a very specific way, to identify all the discreet elements that might potentially form part of a solution. These elements are not evaluated in any way, and can be as edgy or outrageous as the problem-solver thinks may be relevant.

Think 4. Combining these elements in order to create mutually exclusive options

This ‘convergent thinking’ stage draws on the discreet elements identified in Think 3 above, combining them to form two or more mutually exclusive alternatives, each of which has at least the potential to solve the given problem. Where the challenge is some form of strategy formation, then an additional alternative should be added to the mix representing a status quo, or option to continue as before.

Think 5. Evaluating the options and choosing the best one based on risk-adjusted payoff

A lone solution will probably look like an appealing way to resolve the problem, but the addition of alternatives forces the problem-solver to look more carefully at comparative advantages and disadvantages. For a given problem, these factors may include the input cost, the output value, the realistic chances of success with this solution or the downside risk of failing to implement effectively. Whilst not numerically robust, a ‘risk-adjusted payoff’ calculation should then give a reasonably clear indication as to which option is best, given what is currently known.

Think 6. Optionally honing the choice

If the issue is of great importance or confidence is low, then the chosen solution can be investigated more thoroughly by returning to the Think 2 stage to follow the process a second time, thus creating a series of nuanced iterations which can be re-evaluated.

C. Lean application

This is a deliberate set of focused acting tasks which potentially involve more thorough attention than even the previous stage, given that ill-conceived solutions may have serious negative consequences in other nodes of the problem space and changes may be irreversible once instigated.

Act 1. Creating a relevant 'minimum viable prototype' that represents the essence of the proposed solution

A minimum viable prototype is the simplest possible embodiment of the proposed solution and may manifest in a variety of ways (a model, a synopsis, a role play etc) depending on the problem. A key feature of the prototype is that, whilst very carefully considered and self evident, it is sufficiently rough or rudimentary that the barriers to honest feedback are lowered and the costs of adapting it (based on feedback) are also low.

Act 2. Field testing this prototype amongst those stakeholders who will be affected

The prototype is not being used to 'sell' the idea, but rather to tease out any reasons why the solution might not work. Field testing thus involves giving it to members of the relevant stakeholder groups and initially watching to see how they react. Observing facial or embodied reactions enables the field tester to then ask more searching questions about the perceived upsides and downsides of the proposed solution.

Act 3. Fast iterating the prototype to find the best fit with holistic needs

Based on the feedback, modifications are made to the proposed solution (which may, in extremis, involve going back to Think 2) before the prototype is reworked and retested. This cycle should continue until the feedback is 'sufficiently' good across all affected stakeholders and there is confidence that the solution will thus be effective.

Act 4. Implementing the solution, being mindful that further optimisation may be required

Whilst the problem solver may now have 'sufficient' confidence in the solution, final implementation is still approached with care in recognition of any down-side risks or possible unintended, irreversible consequences. Any roll-out is monitored closely for adverse effects and the solution is optimised as appropriate.

The deliberately simple and playful representation of the model (figure 2) aims to remind curious and connected people that the overall process of problem-solving has more in common with a series of creative tasks than with a formal or structured business process. This in turn aims to reduce the anxiety associated with extrinsically motivated business tasks, allowing the problem-solvers to cognitively relax, better leverage their collective insights and produce a more optimal outcome.

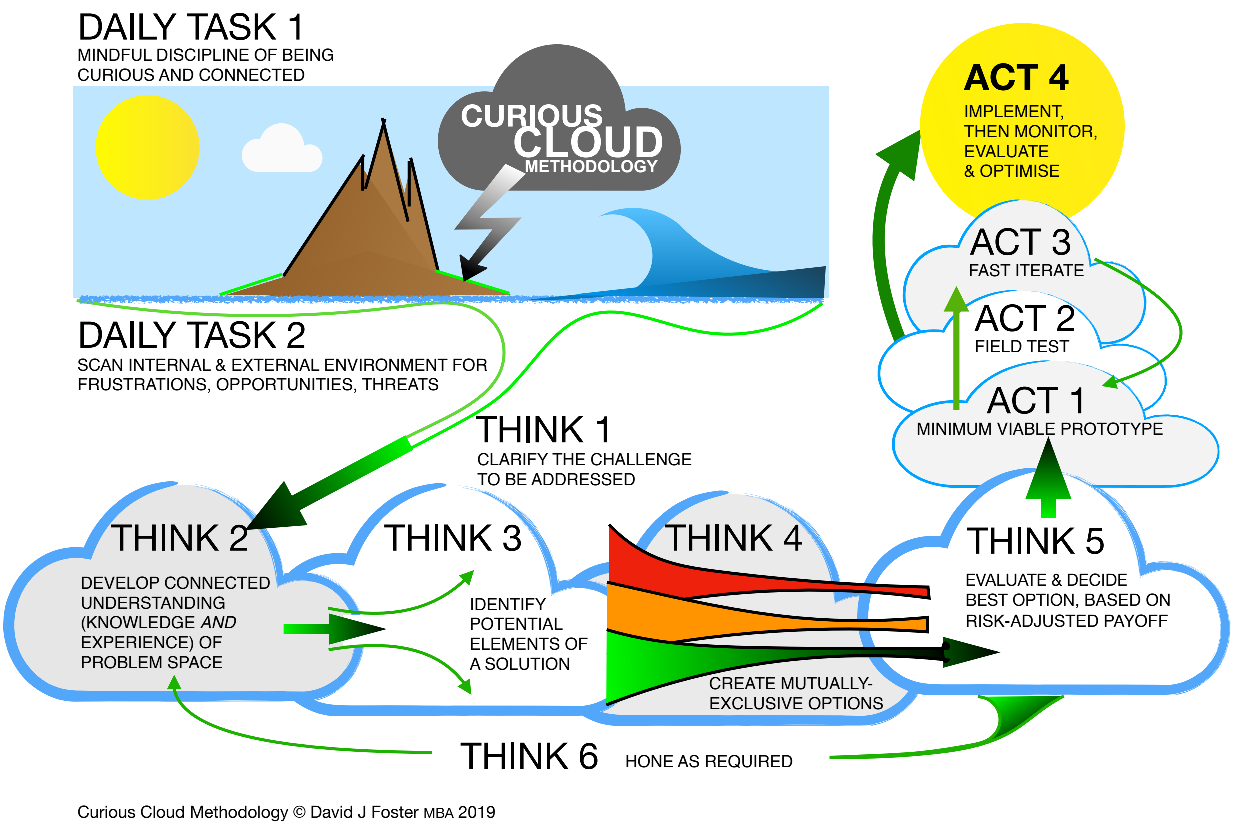

Figure 2.

Conclusion

The article introduces a useful new integrative methodology, designed to help employees at all levels within organisations to more effectively spot problems, involve stakeholders and implement viable solutions. The literature review is offered as a first step for those who are curious to learn more about any of the sub-processes involved. This seeks to add colour to the methodology by more fully describing the nature of the problem-solving challenge, before highlighting mindsets and more nuanced considerations that may be useful within each of the phases. However, the number of disciplines that have relevant insights to add to the task of problem-solving and the sheer volume of work within each of these areas, means that this literature review is inherently inadequate. It is hoped that it simply helps to establish a mindset that is useful for both employees and the organisations that they work for: start by becoming more curious and more connected.

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