Resolving Complex Problems

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Introduction

John Warfield was engaged in research on complexity long before it became popular. His ground-breaking work included the application of complexity to pragmatic areas of design, and the resolution of complex issues involving human organisation.

Through the pioneering efforts of Bill Rodger of Complexity Solutions, the algorithms created by John have been converted into pragmatic processes and software for real-world application.

Living in a world of increasing complexity

Being able to live successfully in a world of increasing complexity requires competence in two distinct areas. One is the capacity to increase complexity for the purpose of generating innovation, adaptation, growth and continual development. The other is the ability to take something that is too complex for us to understand and reduce it to a level where we can be effective. This applies to problems that have got out of hand, or where our current understanding leaves us with solutions that are ineffective, too costly, or even aggravate the problem.

Often problems develop slowly over time, and we fail to notice that they are becoming more complex and unruly. We pass them off as *the way things are* and are half willing to accept them as human problems which can't be solved. We invest time, energy and resources both in attempting to resolve these problems, and in finding ways to live *with* them - yet we remain resigned to the notion that they are going to be around anyway.

If we are able to see complexity as a function of our level of understanding, it allows us to cut the Gordian Knot of these problems. Problems dissolve when met with responses that recognize the nature of complexity. Such solutions include reducing the problems to understandable proportions, to the point where action can be taken.

Today's executives and managers are continually being confronted with problems that are too complex to deal with effectively using any of the currently popular approaches. We're applying our old-fashioned linear remedies to new, complex problems, and instead of coming up with solutions, we're ending up with bigger problems and more confusion. Growth of markets, technologies, and

uninformed regulations are escalating the complexity of our operations, and we're moving further and further away from the possibility of resolution.

The complexity is not the problem. We have simply gone beyond *effective complexity* into chaos and confusion. The world has not spun out of control. But our own thinking has. We have failed to understand certain relationships. We've applied simplistic solutions to complex problems. Plus, we have maintained organisational designs and information flows that cannot manage the complexity of our new world. Clinging to the inadequate models of the past, we've lost our ability to make meaning of our social, economic and corporate worlds. To work effectively with the problems that we have created for ourselves, we need an intellectual shift, as well as systems of support that will remove confusion and bring complex problems back to a scale that we can make sense of. Our actions must transform confusion to *effective complexity,* rather than continue to expand it beyond our comprehension.

Effective Complexity

Surely our systems and institutions were designed to match the world we live in, so how have we come to this impasse with problems? After all, we created the world in which we live by inventing more and more new ways to use the natural world, and tenaciously developing ways to adjust to whatever presented itself. But recently, we seem to be failing to meet many of the challenges that arise out of our own creations. Fortunately, there is a common thread, namely that we no longer seem able to work collaboratively towards effective action.

Whether the challenge is in productive endeavours, new technology, unemployment or environmental issues, our biggest messes come from our inability to understand these areas at workable levels of complexity, so that we can move groups or communities towards effective action. Bringing in experts to solve problems is not going to work any longer; in fact, it often makes things worse. We must become masterful at creating and participating in dialogues that are supported by technology. The first step into the messiness is to realise that complexity is a matter of mind, not of the physical world. Complexity is a way of understanding things. It's not the inherited linear, cause-effect thinking that most of us use — the kind of thinking that we apply inappropriately to complex situations. We need both a new approach in our thinking *and,* information tools that will reduce the complex to patterns which can create sufficient meaning for effective action. These tools must assist in retaining *effective complexity,* and not attempt a simplistic reduction of the situation.

Complex problems are the result of people and their interactions, which are mostly made up of information and communication, and can only be resolved by the interaction of the people affected. Our day-to-day individual lives are not too complex for us to understand. But the situations that we continually fail in, or even make worse, are in a world composed of communities and large groups of people with interwoven interests.

What causes an increase in complexity so that it exceeds the competence of most people and most organisations? A problem exists because something has gone beyond the capacities of an individual or unaided group. The nature of information, communication, and mind in individuals is that each of us makes sense of things based on our own thinking, our personal experiences, and our immediate contact with the environment. *One of the most significant factors in our problems is the people with whom we share the problems.* What are we actually dealing with when we deal with people? We are

not dealing with something *out there,* but instead the information, communication and thinking of other individuals.

We frequently have to keep track of countless items having countless connections, making it impossible to sort out the specifics of their relationships, interactions, and their resultant effects. Individually, it's impossible for us to keep track of all this, so we depend on others for understanding — and thus find ourselves back in a situation where other people are the most significant part of our situation. Such situations can't be dealt with effectively in the same way as the simple affairs of day-to-day living where cause-effect is easily visible.

The complexity of the world has increased beyond our unaided capabilities. We must acquire new understanding and new tools that reduce complexity to effective levels without removing the complexity altogether. Attempting to reduce complexity to linear simplicity removes vitality, learning, and the possibility of something new arising from the rich interplay of elements. If we are unable to master this process, most of our efforts will fail within our organisations, because we end up removing the full possibility of intelligence that each and every person involved in the organisation brings to the endeavour.

John Warfield's contribution

John Warfield, now retired from the faculty at George Mason University, developed some simple metrics for working with complexity. He has also coined very useful phrases which apply to groups that do not understand complexity. According to Warfield, complexity can be measured by multiplying the number of elements involved by the number of possible interactions between those elements, and then multiplying that figure by the number of people (and hence interpretations which can be made of each clement and combination). It's easy to imagine that most issues requiring group resolution will result in a fairly high index number. These types of problems call for carefully designed processes that are typically supported by computer processing and display techniques.'

John Warfield has coined the phrase "spread think" which captures the condition of differing opinions within a group in regard to complex issues. He has also developed an index which shows that the number of interpretations of any item will vary significantly, and that this variation makes aligned assessment impossible. He refers to our typical response to such a condition as "group think". Namely, the group compromises when choosing which action to take, and reduces the decision to the lowest common- denominator. The choice is often strongly influenced by political factors, and is most likely to aggravate the condition which it is attempting to resolve. Countless studies have been done on the mind, on psychology and on the functioning of our senses, all of which suggest narrow limits to the amount and variety of information that can be handled at any one time by unaided human intelligence." Perhaps the most familiar of these studies is Miller's, in which he states that a human mind can deal with only seven (plus or minus two) bits of information at a time. This agrees with most of the other studies. Warfield concludes from this that if we are to reduce complexity to manageable chunks, we can only manage three items because the relationships that occur between those will take us to our limits. From this, he developed a theory and algorithms which provide a basis for handling enormously complex issues. The information resulting from these studies has been around for many years, but little has been done with it. The burgeoning interest in complexity may focus more attention on research such as Warfield's.

Towards Solutions

The complexity that is confronting today's organisations does not result so much from a complicated physical environment, but instead finds its roots in the areas of human communication and information processing. The problem is distributed across a variety of people and cannot be located in any one person. Numerous individuals are part of the problem — and part of the solution. That is, there is added richness and possibility due to the involvement of diverse perspectives and knowledge.

One would then naturally think that it's a simple matter of getting the right people together to talk about the situation, and they will be able to resolve the problem. Such an approach comes from an incomplete understanding of complexity as it applies to groups, and individuals within groups. When the number of variables moves beyond a certain limit (which is very small), and the variables are distributed amongst individuals, then the possible number of relationships explodes beyond a level that can be dealt with solely by our human minds.

But what about all the experiences that we have had that suggest otherwise? At times, we have all been able to compile the relevant information about a situation, and resolve a remarkably complex problem. We are able to accomplish this using a tool that is designed for such integration — our own mind. So it is possible. We have solved complex problems on our own; but we still over-estimate our ability in this area.

These types of experiences leave us with a false notion that any group should be able to resolve its own problems by gathering enough information about a problem and solving it by decree or direction. What we fail to realise is that the complexity of problematic situations is a result of being distributed throughout numerous people. And each of these people is unable to express the diverse elements of their portion of the problem unless aided by a process specifically designed for that purpose.

A process can be facilitated within a community, team or organisation which resolves the complexity to a level which allows effective actions to emerge. These will improve the problematic situation. In examining the nature of the process, we can see that it is a pragmatic application of the theories of complexity, expressing our understanding that it is a function of our thinking and language ability, rather than a condition of the external, physical world. Conditions that call for a complexity-based approach are those in which there is a problem that significantly disrupts the productivity or intentions of an organisation; a problem which still continues even after persistent change initiatives. Some of the signs to look for are:

- When a number of individuals with different perspectives, complaints, or solutions are involved in a common problem.
- When there is a breakdown in productivity or performance that results from numerous areas of the business, and the location of the problem is not immediately obvious.
- When a process to produce something has evolved over time, and the process or product has become increasingly complex (namely, developed more steps, more parts, or more participants with increasingly intricate connection to one another).
- When a process involving various sources of expertise, different physical locations, or the distribution of product is not meeting competitive benchmark standards.

- When strategy or tactics are not obvious to the group of people who are to be integrated and aligned with them (such as in merging two cultures).
- When resolution is apparently blocked by political positioning or conflicting personal interest.

In recognising that a situation is complex, we begin to understand ways of working with such situations using complexity-based approaches. Initially, these approaches are best applied in problematic situations. As our understanding of complexity blossoms and we become competent at applying it, we will see countless opportunities to use these skills in creative and future-generating ways.

Practical Processes

It's important to realise that a well-designed process, such as that of Bill Rodger's Synplex, makes the job a lot easier.

Group choices and statements are displayed, using the technologies designed to support groups dealing with complex issues. Support is given both for doing what can't be done unsupported, and not doing what *can* be done adequately through thinking and dialogue, display of group choices and summary statements. The technologies for this calculate the implications of relationships between elements, contributing factors, and causes and effects when there are too many to keep track of internally or even with manual representation. There is a surprisingly low threshold point, beyond which computer support is valuable.

The technology is a valuable enabler, but the key to success lies in the ability to work with a group process consistent with an understanding of complexity. Because neither the problem itself nor the operations of the group are simple or linear, the approach of the facilitator must also not be simple or linear. The processes must match one another. A facilitator's greatest skill is their ability to understand and create this match.

The process takes place over a number of iterations in which there is an on-going development and display of the factors that contribute to the situation, and their relationship to one another. This process involves careful listening, a great deal of respect, and learning that will challenge everyone on all fronts.

Once the situation is displayed in a manner that has reduced it to an *effective* level of complexity, the group creates projects or actions with people accountable for specific areas.

By developing a thorough understanding of complexity we gain access to resolving many problems that had previously proved intractable. We no longer need to feel resigned to such situations, nor live in hope that some outside experts may have the answer to our problems.

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