

Background

The aim of implementation research in healthcare is to elucidate approaches for guiding innovations to more consistently achieve sustained practice change. Traditionally, a key measure of successful implementation has been fidelity - the degree to which an innovation is implemented as intended by its developers [1]. Implementing innovations with fidelity is attributed to leading to desired outcomes. Assessing fidelity as an implementation outcome has been seen as important to understanding why innovations fail or succeed [2]. This conception may be well suited in more ordered, constrained contexts where the relevant variables are known, discrete, and measurable. However, healthcare ecosystems are characterized as entangled complex adaptive systems in which variables may be obscured [3-5]. Complex adaptive systems are non-linear: cause and effect relationships are evident in retrospect and may not repeat, solutions may be emergent, and multiple perspectives are needed to perceive phenomena [3]. Thus, complex ecosystems change in unpredictable ways, and the impacts of interventions may produce unanticipated consequences, and will not repeat [6]. As implementation contexts become less constrained and ordered, the conventional understanding and use of fidelity requires refinement.

Assumptions of Fidelity

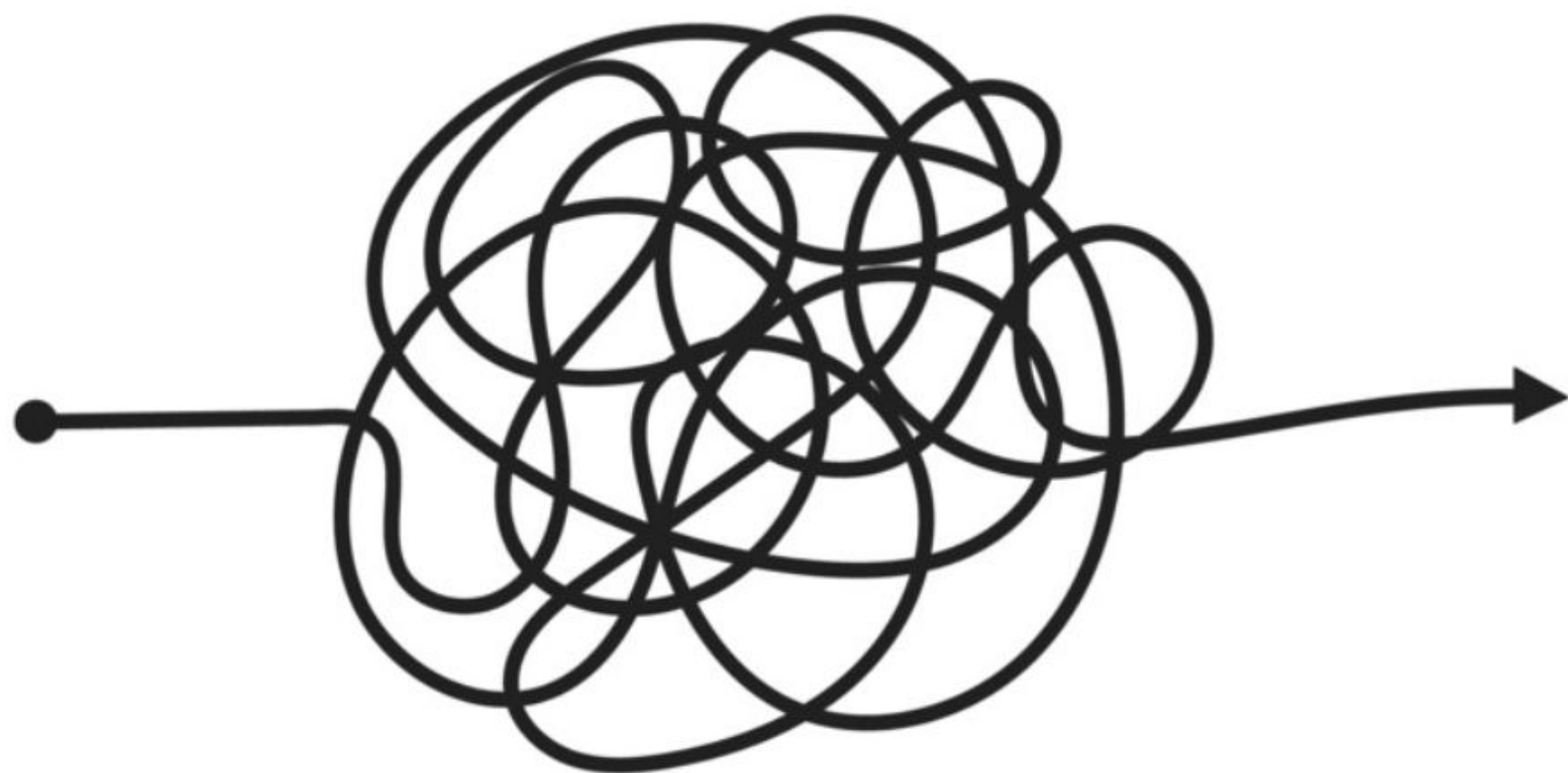
The traditional notion of fidelity has evolved from a desire to simplify the inherent complexity of implementation in order to control confounding variables (known or not) to produce scientifically acceptable cause-and-effect relationships and outcomes believed to be generalizable to different contexts. There is an implicit assumption implementing innovations with fidelity leads to the achievement of intended outcomes, and the outcomes observed in the original setting will be reproduced. This assumption of fidelity also implicitly assumes that systems where implementation is happening can be simplified and the effects of context, time, entanglement, and dynamic relationships can be ignored.

These assumptions ignore the reality of dynamic real-world environments, responsive and adaptive to changing contexts over time through recursive, self-organizing feedback loops that altogether result in emerging behavior. Thus, measuring fidelity becomes increasingly difficult, and adherence to fidelity in designing innovations and evaluating implementation not only limits but may also hinder an innovations' real-world effectiveness.

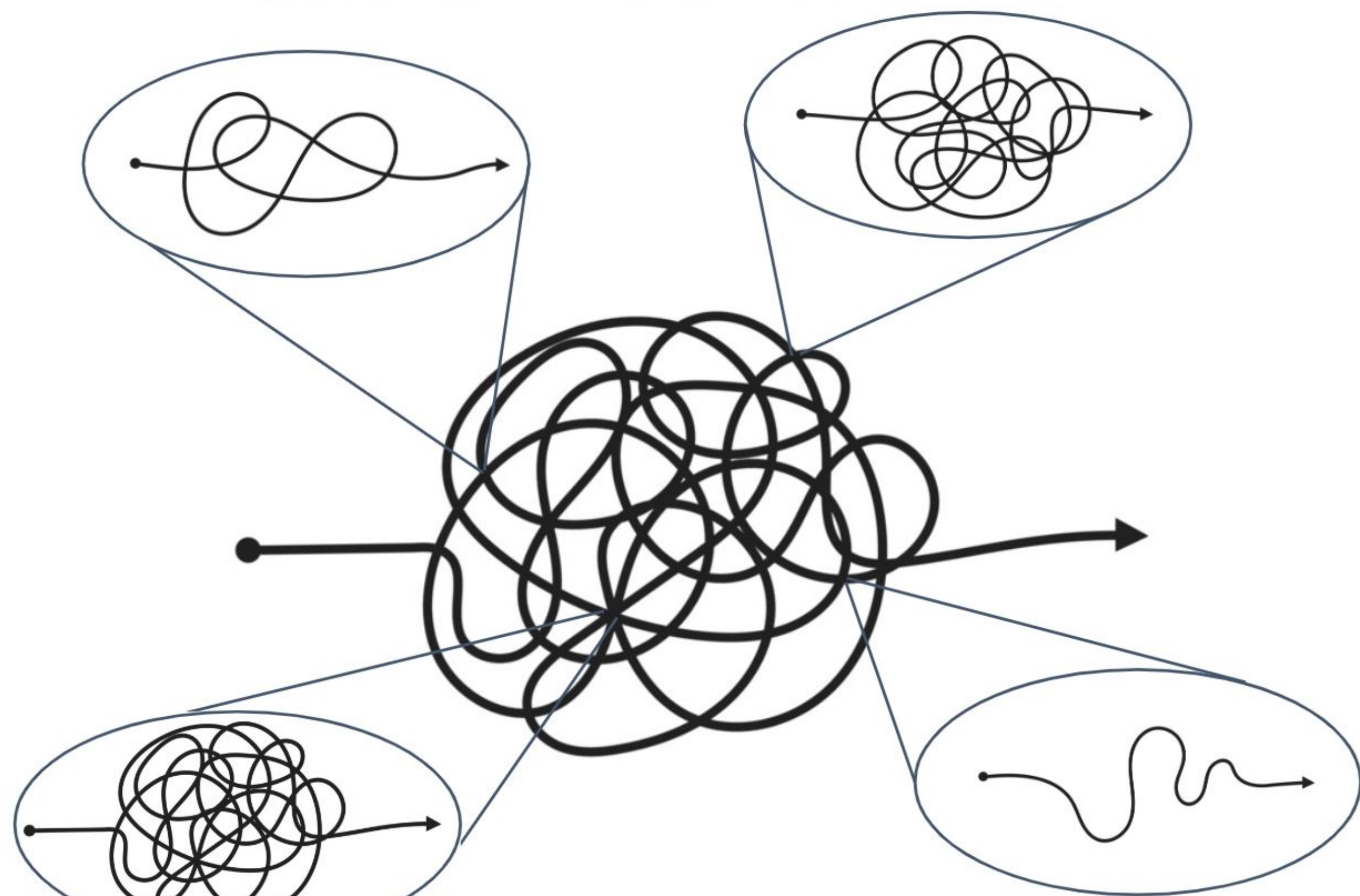
Assumptions inherent in implementation fidelity tell us this is how implementation occurs:



But anyone who has ever implemented anything knows things do not go as planned, with multiple interactions between the system, the solution, and the implementation process resulting in unintended consequences. Thus, the implementation process in complex adaptive systems is more like this:



Each turn and intersection represent interactions between components of the system (humans, structure, nested systems, context, etc.) as they make sense of the innovation. These interactions are necessary to for innovation implementation and working to solve the human problem.



Thus, measuring implementation success (fidelity) this way:



in a complex adaptive system is problematic, and may even inhibit progress towards solving the human problem.

Towards Complexity-Informed Fidelity

Moving towards a complexity-informed approach in implementation science requires alignment with the realities of implementation in complex systems: a temporal process with deliberate actions to attempt to modify dynamic interactions of individuals and context to entrain new patterns of behaviour, interaction, and practice. We monitor the environment for emergent properties that help to amplify these shifts to desired states, while recognizing the need for ongoing vigilance against unforeseen, and undesirable patterns and outcomes. Thus, complexity-informed implementation emerges as a dynamic, flexible, iterative, and recursive process that evolves with the context over time. The conception of implementation fidelity shifts from rigid reproduction as intended, to an ongoing strategic process of nudging system behavior in the direction of desired change through monitoring, sensemaking, and pragmatic, contextually-driven intervention adaptation and implementation actions. From this, complexity-informed fidelity comes to be defined as a strategic process to maintain focus on addressing the core human problem, which continually engages with the people, the context, and the broader evolving ecosystem.

Core principles informing complexity-informed fidelity strategy

- *Complexity thinking in implementation fidelity* - consider innovations and implementation processes in their diverse, evolving contexts
- *Seek out and engage with diverse perspectives and ways of knowing*
- *Respect those doing the work*
- *Enacting meaningful change*
- *Consistent, ongoing monitoring and evaluation*

"We should learn to navigate on a sea of uncertainties, sailing in and around islands of certainty." - Edgar Morin



References

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