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Adopting Agile Principles In Health Care

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The ever-increasing pace of technological advancements, rising costs, and new entrants into the health care marketplace are part of the challenge health care incumbents face today. With no alternative but to adapt, health care organizations must find effective methods to embrace innovation, which we define as the delivery of new patient and clinician value. Embedding and accelerating innovation in health care, however, has proven to be difficult. In health care, most current processes of governance, business planning, and information

technology implementation are designed to minimize risk to organizations and are often inflexible to adapt quickly to new technological changes, netting incremental changes that fail to deliver much needed transformation.

To address this complexity and speed up effective innovation, we propose that health care organizations critically look at adopting a novel set of principles, initially promulgated within the software industry, called “Agile.” We have found that using Agile for important transformative projects has enabled several health care organizations, including ours, to begin to effectively adapt and adopt innovation in patient experience, clinical workflows, and digital health technology with the ultimate goal of improving care. Because the core tenets of Agile include addressing the needs of customers and embracing change, we see Agile being useful beyond projects related to information technology to other health care domains such as organizational strategy and clinical operations.

The History Of The Agile Principles

The blueprint for Agile comes from the software industry. Before the advent of Agile principles, most software engineering was typically organized in a top-down approach, similar to the processes used in health care organizations today. Customer needs were gathered and outlined as specifications, and architects created highly detailed project plans that were then passed to engineers for development, to quality assurance teams for testing, and then released to the users. Projects followed this linear stepwise approach, often called “Waterfall.” Since all customer needs were intended to be captured during the specification phase, software engineers were often separated from users. Furthermore, any subsequent deviation from the initial specifications was considered a failure of the process. Teams lost the flexibility to adapt to changing situations and needs, or to incorporate new knowledge, tools, and technology. Engineers

themselves were demoralized, "being viewed as resources rather than valuable participants." Our experiences as clinicians, team leaders, and team members in health care are comparable and shown in alarming rates of burnout. From such frustrations grew principles that radically changed the way software is now built.

In 2001, thought leaders in software development outlined a set of principles, known as the *Agile Manifesto*. The document described four core values supported by 12 principles that would guide future work. The value statements are at the heart of the Agile movement:

- Individuals and interactions over processes and tools
- Working software over comprehensive documentation
- Customer collaboration over contract negotiation
- Responding to change over following a plan

While both the left and right sides of these statements are important, traditional business processes generally have focused on the right side, such as following a plan and a structured process. Those who wrote the *Agile Manifesto* noted, "While there is value in the items on the right, we value the items on the left more."

From these principles have grown multiple tools, techniques, and implementation methods, but all reflect back to these four core values and guiding principles. Agile has been credited with accelerating innovation not just in the software industry but across several others as well, including manufacturing, entertainment, and logistics. Regardless of the specific use case, Agile helps companies move from a method in which everything is meticulously and painstakingly planned to one that acknowledges, plans for, and embraces change.

Adopting Agile In Health Care—An Example From Innovation

Organizations may initially incorporate Agile methodology within their innovation portfolio as a starting point. Innovation centers or teams are often working on strategically important but high-risk projects. In our experience, the transformational buy-in from senior leaders is critical to developing space for Agile teams to form and collaborate. To be successful, separate units within organizations, such as business planning and information technology, must give their staff freedom and flexibility to join these teams. Recruiting patients to be part of these teams ensures that the focus remains on the people receiving services.

Indeed, innovation centers within health systems can be the initial spark for Agile. For example, the Froedtert and the Medical College of Wisconsin Health Network, where two of us (Crotty and Somai) practice, created Inception Health in 2015 as a vehicle to accelerate innovation through more rapid cycle project management, contracting, and dedicated investment for innovation. The intent of Inception Health is to catalyze and support innovation, supporting its health system partners in areas of digital transformation, consumerism, and precision medicine. While structured as a separate limited liability company, the work Inception Health does is part of the fabric of its member organizations, working with operational leaders, key advisers, and front-line staff in a participatory process. Inception Health has adopted Agile as its backbone, forming teams of health system staff dedicated to each innovation project.

A core tenet of our approach is that for each innovation, Inception Health establishes an Agile team composed of clinicians, engineers, managers, data scientists, and user representatives. Each team establishes an iterative cycle to improve outcomes and the value to patients, to the health professionals, and to the system overall. While the core team comprises a handful of employees, several hundreds of people from member health care systems have participated in

these Agile projects. By embedding Agile principles in the integration process of innovation in the member health care systems, Inception Health has been able to integrate innovations and iterate quickly. In the past two years, Inception Health has implemented 26 innovation projects at Froedtert and the Medical College of Wisconsin Health Network, including online tools for behavioral health, diabetes management, patient engagement, campus wayfinding, and remote monitoring.

To enable clinicians to prescribe digital applications at the point of care, Inception Health partnered with a company called Xealth to create a digital health formulary, tying in third-party digital health applications with the electronic health record and clinical workflows. Inception Health implemented the software through Agile methodology. An Agile team was created from members of Inception Health to lead and manage the work, including care redesign and informatics leads, analysts from Froedtert health information technology (IT), and Xealth engineers. The team self-organized, diagrammed workflows, and developed tests for the software and implementation. The Froedtert health IT managers enabled the analysts to work directly on this team, highlighting the role of individuals and interactions over processes. Rather than being viewed as a software vendor, Inception Health viewed Xealth as an integral partner to building the future of its digital health capabilities, highlighting customer collaboration over contract negotiation. Clinicians in the “virtual care team” that would review alerts and conduct remote monitoring participated in the design to ensure that the system matched the idealized workflow. The team met weekly to have “stand-up meetings” to review progress and active roadblocks. The team frequently reviewed user experiences to respond to their feedback. When system load times were not meeting expectations of clinicians, Xealth and Froedtert engineers were able to understand the problem and create a solution that would precompute digital health recommendations based on the patient profile, decreasing the

latency experienced during a clinical visit. As new technologies were added to the digital health formulary, requirements changed, including the requirement for integration into the scheduling systems. The Agile team responded to these changing requirements by extending the technical integration to meet these needs, highlighting how the team was able to respond to changing requirements rather than holding to the original proposal.

Traditional waterfall planning is not feasible for many projects such as this because rapid iterations are required before achieving a viable and scalable innovation. By shifting to Agile, teams work directly with users for design and feedback, IT team members persist with initiatives rather than moving off of projects after initial go-live, and budgets and strategic plans are kept as flexible as possible to account for uncertainty inherent in the process. All these initiatives were woven into the fabric of the health system using the Agile methodology.

The values of the *Agile Manifesto* are fundamental to the team-based work led by Inception Health. The teams do not follow prescriptive practices or set tools, although do employ some organizational frameworks such as scrum to plan work. Prototypes, or minimally viable products, are prioritized to enable early launch and experience; often, these are initially implemented in a small area to enable improvements and gather data. Documentation in the forms of workflows, training materials, or code development are created as part of the innate process of collaborating, promoting sustainability but with the initial intent on communication. For many of the external partners, the teams aim for a partner relationship rather than being simply a customer. Being built in a way that promotes agility, with dedicated legal support embedded within the teams, Inception Health offers a laboratory for companies to co-develop solutions. In these ways, collaboration is prioritized over getting the most favorable contract terms. Lastly, teams focus on vision and goals,

both short and long term, define key metrics and performance indicators, and engage in iterative cycles of work. Teams pivot when data and user reports show that tools or services are not being used as initially conceptualized, or when user needs change.

The Broader Case For Agile Methodology In Health Care

Given their complexity and constraints, health care organizations have more to gain from adopting the Agile methodology than other industries. Health care organizations are inherently complex adaptive systems, with several medical and non-medical professions working in tandem with technology to serve the needs of almost any patient who comes through their doors, within a constantly changing regulatory and reimbursement system, and with rapidly accelerating medical knowledge. Health care rarely, if ever, reaches a steady state, resists reductionist analysis, and interacts with a constantly changing environment. For these reasons, waterfall approaches are often inadequate for achieving meaningful and sustained change in health care delivery, something we see born out in the continued suboptimal results of health care delivery improvement efforts, which are expensive and cumbersome.

Most health care organizations today favor the right side of the *Agile Manifesto's* values statement. Organizational processes have been developed out of need and experience, sustainability is paramount, and budget and planning cycles often mandate that requirements and contracts be stipulated far in advance of implementation. The case for Agile is to find new planning and management processes that are capable of being responsive to changing needs while being disciplined and accountable.

Health care organizations can accelerate the incorporation of new ideas and the adoption of new knowledge through the following key elements derived from the Agile principles: using user-centered

design to clarify the problem(s) to be solved, key metrics, and potential solutions; empowering a team to develop a rapid useable prototype using a collaborative, disciplined approach and testing the initial implementation of early work; and embracing new insights from the users, external tools, and knowledge. Agile embeds "testing" and "validation" as an integral part of the process. In software engineering, Agile methodology led to the development of a test-driven development, known as Test-Driven Work outside of software, in which design and the development is guided by first establishing micro-tests that are validated perpetually.

For example, tests based around the design work and requirements are created before the new program component is built, whether it be software code or a new clinical workflow. Only after passing these pre-specified quality checks would the program be deployed, ensuring that what is built meets the specified user needs, integrates with other components, and functions as intended. Tracking pre-specified key performance indicators can then determine whether a program component should be expanded or rolled back and adjusted. This approach leads to more rigorous innovation that is informed by a continuous evaluation. By embracing these principles and a focus on providing value to the patient, Agile approaches could help health care organizations capture and incorporate new knowledge more rapidly and wisely. For those working in quality improvement who are familiar with the Improvement Model, or Plan-Do-Study-Act (PDSA) cycles, these concepts of measurement and iteration will look familiar.

Redesigning Health Care

Importantly, Agile methods are not limited to technology and innovation projects, but are also valuable for clinical care redesign. Agile could be used by teams to rethink the care model, starting from and working closely with patients, their families, and communities to

ensure a care experience that is tailored to their goals and needs. The Agile approach provides means to explore, integrate, and adapt to new and emerging scientific knowledge and tools, as well as the chance to respond to changing patient and family needs and expectations to create a truly adaptive, responsive caring system. This Agile approach is used by innovative health care organizations to deliver a patient-centric experience. An example is Iora Health, a primary health care organization that focuses on building a team-based primary health care service. Iora Health recognizes that health care practice design is a dynamic process and uses an Agile approach to iterate quickly to uncover better ways to design its health care services. For instance, Iora Health built its own electronic health records to respond to its Agile and team-based approach to coordinate care. Iora Health's leadership has written that "the selection of Agile software development matches [its] clinical innovation philosophy." Geisinger's "Innovation Architecture" provides another example. Geisinger uses a methodology that resembles Agile, incorporating cycles of testing and refinement to achieve results that measurably improve care. Geisinger used this approach for its medical home work as well as its ProvenCare program that bundles services around a particular episode of acute care.

At the Brigham and Women's Hospital in Boston where one of us (Carlile) practices, teams within the Phyllis Jen Center for Primary Care have begun using Agile to improve the patient experience. Staff used an "Agile Clinical Innovation Practice" to reimagine annual wellness visits for patients. The clinic empowered a team, focusing on responsibilities rather than roles, to lead this work. Redesign started using prototyping techniques, sticky note workflows, role-playing with patient advocates to design the care pathway for patients. The process underwent continuous rapid testing with clinician leads who gathered feedback and iterated over all aspects of the process. The design changed based upon testing and feedback, including the testing of centralized and virtual pre-visit

planning services and processes to ensure inclusion of shared decision making into visits. Agile facilitated these changes by empowering a team to create the best experience for patients and clinicians, doing rapid testing, and welcoming changes based upon feedback, demonstrating how Agile enables a whole new experience of designing, integrating, and improving care delivery. How was this different from a tradition Plan-D0-Study-Act cycle? Instead of trying to achieve an initial known goal, we pursued rapid innovation with the intention of discovering—over the course of our work—the best approaches to improving patient experience.

Role Of Leadership

Cultural adoption of Agile and related concepts are paramount to both speeding the delivery of innovation and gaining acceptance of processes that are not traditional within health care. To that end, Inception Health has been focused on spreading a culture of innovation throughout its organizations. Partnering with the Kern Institute for the Transformation of Medical Education, more than 400 students, faculty, and staff have received formal training in design thinking. Through initiatives such as an Innovation Faculty Fellows Program, and in partnership with a local business school, Inception Health has begun educating clinicians in additional concepts such as lean launch and Agile. Design thinking and lean launch are building blocks that use empathy and research to define problems and create solutions. Agile methodology wraps around these concepts to ensure that they have a disciplined and effective process to move projects forward. Visible support from leadership critically supports organizational cultures that not only tolerate but welcome new frameworks such as Agile and the use of their related processes.

Addressing Roadblocks In Health Care

Several barriers challenge health care organizations seeking to adopt Agile, but they are not insurmountable. Cultural changes are required to enable Agile teams to form and collaborate, which can be accelerated through visible support of senior leaders. Furthermore, tensions can arise between the desire to close out projects and the need for iteration and optimization. Paradoxically, these are not mutually exclusive, and rapid, low fidelity prototyping using Agile approaches can quickly bring clarity to the specifications testing and optimization of care services. Agile can coexist with traditional business processes and be used at large, not just within innovation centers or microsystems. Flexibility in deliverables and budget can help Agile projects be plugged into annual business planning cycles. For the Froedtert and the Medical College of Wisconsin joint strategic plan, tactics that will use Agile are crafted to have built-in flexibility. Leaders are accountable for achieving the strategic objective rather than a specific deliverable.

Conclusion

Agile principles compose a blueprint that could be adapted and applied depending on the organization structure and philosophy. Beyond internal projects, the Agile principles could be applied to redesign the overall care experience. To fully grasp the value of innovation and technology, we recognize that the redesign of the health care practice is paramount. This integration could be achieved through linking the process of care redesign and of the technology innovation using Agile methodology. The Agile approach—if embraced by health care organizations—will enable new Agile health practices, allow care to be more adaptive and responsive to new knowledge, improve care processes to deliver more value, and more effectively adopt new technologies to improve the care of their patients.

Authors' Note

Dr. Crotty reports being an adviser for Buoy Health, a digital health company. Drs. Crotty and Somai report working for Inception Health, affiliated with their primary employer the Medical College of Wisconsin. Dr. Carlile is employed at Brigham and Women's Hospital and is a minor shareholder in ACT.md. Inception Health is an investor in Xealth.

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