



DAYBLINK

Time & Motion in the Age of Agile

John Morris, Justin Whitaker, & Zachary White

April 2019

“Measurement is the first step that leads to control and eventually to improvement. If you can’t measure something, you can’t understand it. If you can’t understand it, you can’t control it. If you can’t control it, you can’t improve it.” – H. James Harrington

INTRODUCTION

Velocity Overlooks Measurement

In modern business, there has been an increase in projects that are executed using new development and management methodologies such as agile, lean, and six-sigma. While these new methods have become more widely adopted, we have observed a decline in the adoption of the underlying studies – more traditionally known as Time and Motion or Methods-Time Measurement – that historically have been the foundation for ensuring the most valuable practices are the focus for optimization and automation.¹ This decline is driven by the perceived rigor required, and associated time, to conduct these studies. Combined, the upsurge of fast-paced agile projects and reduced focus on measured results has created a “get more done faster” mentality and as a consequence has resulted in lower quality products and practices that realize far less value in terms of return on investment (ROI) than projected. To combat this issue, time and motion techniques should not be rejected in today’s high-velocity business landscape, but instead should be adapted to increase the velocity in how these studies are executed. Furthermore, time and motion can enhance agile projects by ensuring ROI is not disregarded in lieu of velocity. As agile methodologies continue to be adopted by business units in varying functional areas, time and motion studies, if accelerated, can provide product owners and managers the data required to evaluate performance throughout a project and become truly agile. This paper will demonstrate how time and motion studies can be used to enhance lean and agile methods and enable teams to realize the promised value from projects.

History of Time and Motion

1900s

- **Taylorism**

Frederick Winslow Taylor’s theory of scientific management becomes popular within manufacturing industries, influencing the shift to mass production.

1910s

- **The Ford Motor Company**

Ford employs time and motion to understand how to standardize the product creation process by decomposing it into simple tasks that can be completed by unskilled workers.

1950s

- **Inception of Kanban**

Taichii Ohno, a Toyota engineer, develops the Kanban approach using time and motion to measure lead and cycle times during product delivery.

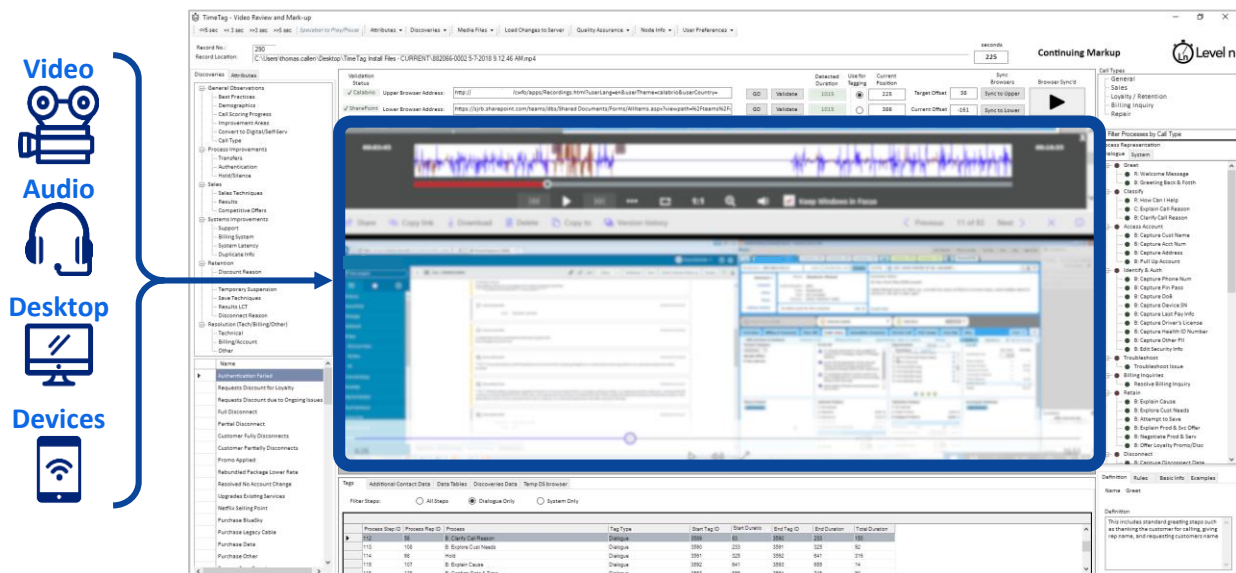
¹ <https://eandt.theiet.org/content/articles/2010/12/moving-on-from-time-and-motion>

TIME & MOTION – EVOLVED

Time and motion studies are an integral tool of scientific management, a theory developed by Frederick Winslow Taylor around the turn of the 19th century. Taylorism, as it became known, analyzes process workflows to improve economic efficiency by increasing labor productivity. These methods were popular in industries that require heavy manual and repetitive actions such as manufacturing, and later, in education and healthcare.² Originally, time and motion studies were highly manual and time-consuming requiring many hours of observation from scientists using paper, pencil, and a clock to record the duration of each activity in a process. Over time, the scientific management practices developed by Taylor were adapted by others, such as Henry Ford and Taiichi Ohno, to exploit efficiencies created by new technological capabilities. As technology continued to advance, practitioners were afforded the ability to measure and capture data points without overseeing each activity of a process – making time and motion studies both simpler and cheaper simultaneously.

In today's digital world, time and motion studies have evolved even further to include new technologies such as screen capture and speech analytics, which have accelerated how quickly studies can be performed. Namely, they allow analysts to “score” processes in a fraction of the time and drill down to target specific sub-processes of interest. For example, customer service call centers in all industries

Figure 1: Example of Screen and Voice Capture Technology



² https://www.jstor.org/stable/4227120?seq=1#page_scan_tab_contents

require their agents to follow a variety of call handling processes to determine their customer's pain points and provide solutions. Particularly for large enterprises, agents must swivel between many applications (e.g., CRM, billing, knowledge-bases, etc.) while discussing the symptoms of the issue and articulating a resolution with the customer. In the past, it would be challenging and time-consuming to understand and measure where wasted time exists in this process as agents are juggling multiple activities, systems, and conversation. But today, tools exist that capture synchronized video and audio recordings that can be analyzed at an accelerated playback to calculate the duration of each activity regardless if they overlap with others. While this example may seem narrow, it can be applied to any process performed on a computer screen making it particularly applicable for many back-office operations. With the new tools modern technology provides, time and motion can be performed at greater velocity to test a larger number of hypotheses while maintaining its surgical accuracy.

THE RISE OF AGILE AND SCRUM

The Shift from Waterfall to Agile

Agile was originally created as an alternative approach to the traditional waterfall methodology used in software development. When leveraging waterfall, a project is planned using a linear sequence of events where each event must be completed before beginning the next (as seen in Figure 2). This construct can be beneficial for projects that are well-defined and require judicious planning, design, requirements, and

financing at the start (e.g., building a skyscraper). However, its rigidity can be problematic for work products that begin as concepts with unclear end-states. Applying a waterfall-based project approach often consumes its budget before any tangible product or improvement is produced for evaluation. For example, in software development, product requirements can often start with insufficient details and must be refined later as more information is gathered. The waterfall methodology creates all requirements and

Figure 2: Visual Representation of The Waterfall Model

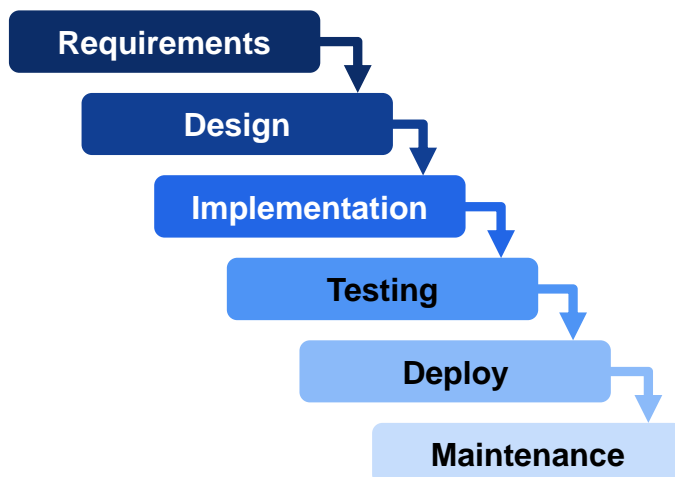
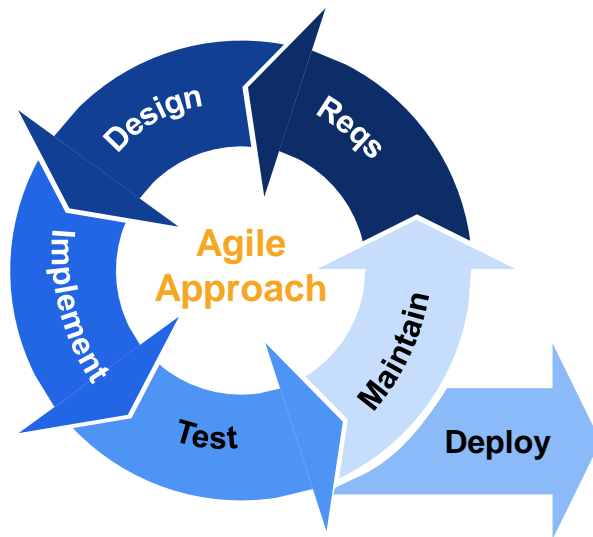







Figure 3: Visual Representation of Agile Methodology



designs the product before any testing commences. Once the design phase is finished, it can be costly to change the product which can lead to a solution that does not satisfy customers' needs. In contrast, agile corrects the flaws of the waterfall model by iterating through the project stages to continuously gather feedback and collect input from stakeholders.³ To do this, the most popular agile framework, Scrum, breaks down projects into smaller components called "sprints" that focus on completing specific tasks over a short period of time. In many ways, the agile methodology is very similar to the concept of prototyping

because it allows you to tests ideas quickly then make improvements. Some of the differences between agile and waterfall can be seen in the comparison below.

Agile and Waterfall Comparison by Characteristic

Agile Adaptive solutions can be developed by small teams through continuous improvement based on rapid feedback	Project Characteristic	Waterfall Solutions are fully specifiable, predictable, and can be built through meticulous and extensive planning
People-centric	 Control	Process-centric
Self-organizing teams	 Role Assignment	Individual
Informal	 Communication	Formal
Critical	 Customer's Role	Important
Guided by product features	 Project Cycle	Guided by tasks or activities

³ <https://www.seguetech.com/waterfall-vs-agile-methodology/>

The Benefits and Challenges of Agile

Benefits

Agile's benefits were quickly realized in software development and are now spreading to new functions across different industries. The benefits provided by agile can vary based on its application, but there are two common benefits that relate to time and motion studies.



INCREASED VELOCITY

Agile drives the execution of project tasks because it breaks apart final deliverables into components that are completed over iterative cycles. Each cycle, or sprint, has clearly defined requirements which provide workers a straightforward path to efficiently complete assignments. Furthermore, each sprint (or group of sprints) results in a quantifiable improvement or component of a product that can be measured.



ABILITY TO PIVOT

As its name suggests, an agile approach makes it easier for teams to pivot during a project. Again, this is enabled by the iterative design of agile projects that allow stakeholders to provide feedback at the conclusion of every cycle. This approach involves stakeholders early and often in the project allowing them to inspect and adapt as requirements and external factors change.

Challenges

While the benefits of agile are well documented, its implementation in functional areas beyond software development shows that drawbacks may exist. To understand the application of time and motion, it is important to recognize these potential concerns.



IMPACT TO QUALITY

Over time, agile's focus on velocity and driving towards short-term goals can make it easy to ignore the 30,000-foot view and goal of a project. Resources and delivery managers become engrossed in completing their everyday tasks for each sprint, while underlying problems with the overall process are missed and never addressed. After many iterations, this can create a backlog of unnecessary tasks in every sprint.⁴



LACK OF MEASUREMENT

Agile's ability to accurately measure the value added in each iteration is insufficient in many cases. Agile does not have a strong mechanism to produce many of the decision-making drivers that managers and executives rely upon such as cost-benefit analyses, ROI, and customer satisfaction. Rather, agile teams provide soft observations on narrow problems and potential benefits that are difficult to quantify.

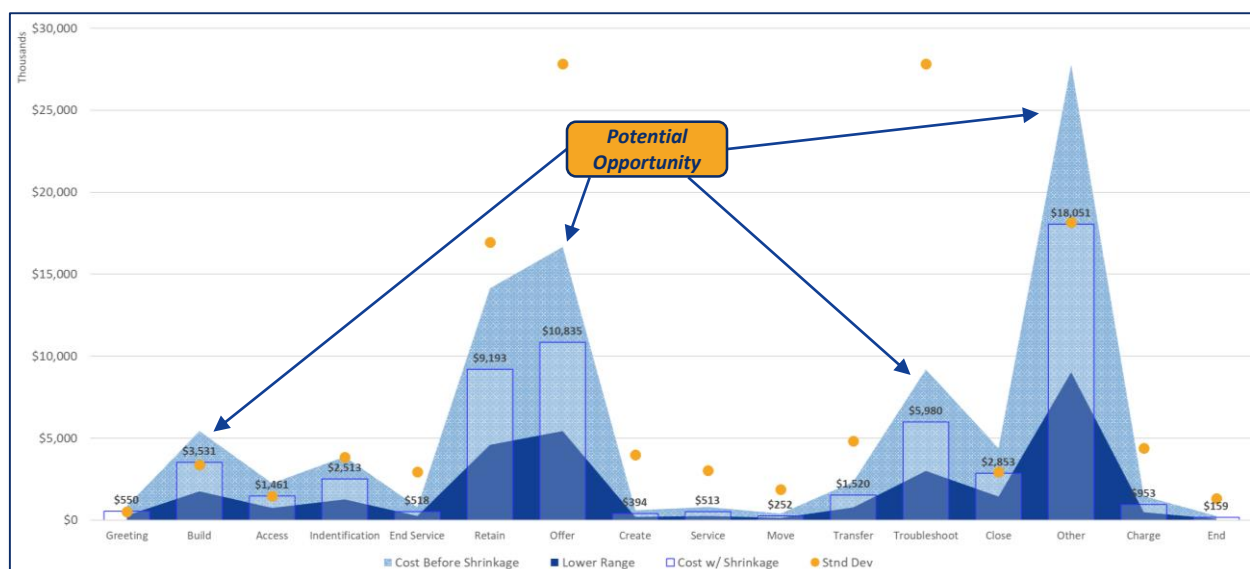
⁴ <https://www.agilealliance.org/resources/experience-reports/agile-six-sigma-mix-together>

AGILE AND DMAIC INTEGRATION

Using Data to Drive Opportunity Identification

How do managers, team members, and product owners gauge the quality of a deliverable produced by a sprint or group of sprints if they do not have the data they need to compare? It may be difficult for teams to understand how the outcome of each sprint (or group of sprints) in an agile project may affect the overall final product without measuring the value the component adds compared to expectations. As project velocity becomes the emphasis, the too-fast adoption of agile can cause teams and organizations to disregard the practical necessity of measuring ROI to ensure continued investment is worthwhile. Time and motion techniques help steer process improvement and are primarily used as a measurement tool that points to where big benefits can be derived. To better understand how time and motion integrates into agile, it is important to consider process improvement methodologies that employ time and motion. One popular concept used in process improvement is the DMAIC Model (Design, Measure, Analyze, Implement, and Control). Derived from teachings in both lean manufacturing and six-sigma, the focus of DMAIC is to remove waste from a process by identifying the most inefficient activities. Oftentimes, a time and motion study is the optimal tool to measure and analyze the current-state process to determine which activities should be targeted for improvement, and at the same time, build a benchmark for comparisons. Figure 4 shows the results of a time and motion study performed in a call center to identify the largest opportunities for automation and digitization.

Figure 4: Results of a Time and Motion Study

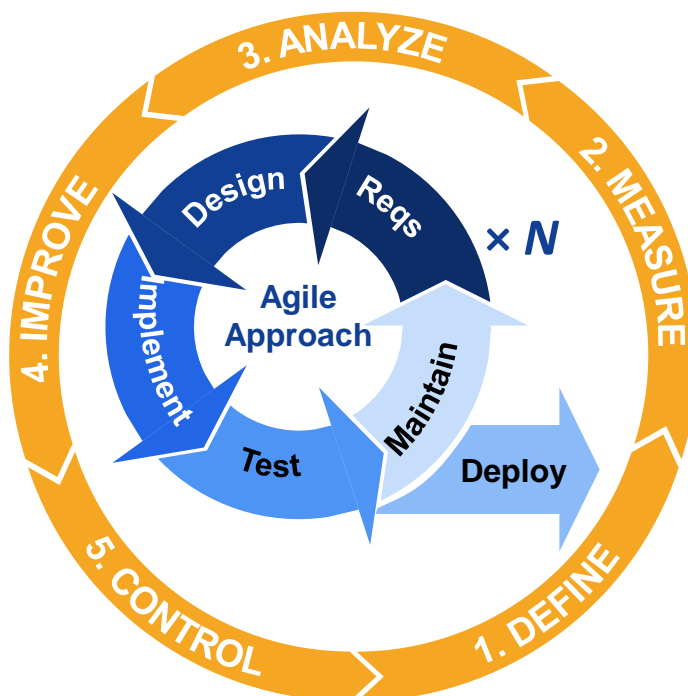


Without establishing a baseline, it becomes difficult to quantify improvements to ensure that teams are achieving their goals for cost reduction, hours returned to the business, or lowering error rates. For many firms that are adopting agile, the focus has shifted away from the measurement and analysis phases to implementation. This may be advantageous for some types of projects, but for many, the mentality of “getting more done faster” is clouding the benefits of process improvement and total program yield.

Lean Time Studies

Despite the potential for uncertainty in ROI, agile is accelerating progress and allowing teams to compress timelines. As this happens, agile creates changes and improvements that can be measured. The DMAIC cycle can help calculate and quantify these changes in terms of ROI by ensuring the results are measured and analyzed throughout the project. By performing “lean time studies” at various points, managers will understand if they are tracking to achieve the expected returns. These lean time studies leverage the DMAIC process to measure ROI while agile sprints produce the changes to be measured. The nested sprints in the DMAIC structure are visually represented in Figure 5 where N is the number of sprints completed between lean time studies. As incremental sprint outcomes are achieved, they can be used as inputs to the second step (measure) of the DMAIC process.

Figure 5: Integration of Sprints into the DMAIC Cycle



While these time studies will require some project resources to be expended, the amount of effort has been greatly reduced by new techniques and technologies, such as improved data collection and speech recognition, that simplify capturing the required data to measure performance. Furthermore, proper planning can allow these time studies to be even leaner by making them highly surgical. It is important to identify where to inject lean time studies into the sprint cycle to ensure that your measurements provide as much insight as possible. Traditionally, projects that use a waterfall approach will conduct two

time and motion studies for the full end-to-end process: one at the beginning to establish a baseline, and a second to measure the benefit provided at the conclusion of the project. The main disadvantage of this strategy is that there is little that can be done after the second time study if the anticipated improvements do not meet the requirements or expectations. Conversely, with the advent of agile, there is an opportunity to measure specific data points at multiple times throughout the project reducing the effort and amount of time spent to gather this important information. Moreover, having access to this data as soon as each incremental improvement is complete provides the ability to accelerate as needed, bolstering a project's efficiency and likelihood of success.

Time and Motion Benefits

- Requires low level of effort
- Benchmarks current production or efficiency
- Provides frequent benefits realization
- Flows easily into agile process

In addition to the diminished effort required by lean time studies, another reason coupling time and motion with agile provides benefit is that it enhances the ability to pivot by benchmarking performance at the conclusion of an increment. Many business process reengineering or automation projects are excellent examples where time and motion can elegantly enhance this benefit. In this scenario, a time and motion study would decompose target processes into sub-processes, then measure the duration of each action necessary to complete them. Based on this information, a practitioner could determine the expected cost savings for each individual sub-process or action. Using

an agile approach, the project would be structured to optimize or automate one of these processes over a collection of sprints. As each improvement is completed, a simple comparison exercise would indicate whether the expected return was realized. This allows stakeholders to track progress with reliable data and confidently make any changes necessary to meet the project's goals or add to its total yield.

Enhancing Agile

- Generates quantified performance feedback
- Ensures focus is on ROI rather than velocity
- Improves ability to pivot
- Enhances data-driven prioritization

Not only are time and motion studies symbiotic with many of the advantages of agile, but they can also reduce some of the risks. As

previously discussed, a concern with using agile in functional areas outside of software development is its ability to accurately measure the value gained during each sprint cycle. Building on the last example, consider a case where process improvement will be used to reduce the average call time in a customer service call center. This requires a team to analyze a sample of calls and re-engineer how the service agent simultaneously interacts with systems and the customer. Once again, completing a lean time and motion study will provide the baseline needed to understand the time reduction achieved as each process is adjusted. Additionally, agile practitioners will not only be able to measure the value added from each improvement, but they will also be able to prioritize the highest value components beforehand to significantly increase ROI. The ability to quantifiably identify opportunities and prioritize projects is one of time and motion's greatest strengths.

SUMMARY

The rapid adoption of agile outside of software development has caused the art of measurement, one of the key principles of six sigma and the DMAIC Model, to be overlooked. Many teams are now being indexed on their velocity rather than realizing positive ROI and higher quality outputs. While agile can successfully drive the execution of projects, it does not identify the highest value options, nor does it quantify the value provided between iterations or after project completion. However, lean time studies can be completed with a fraction of the effort – allowing them to be integrated into agile sprint cycles to provide more frequent and timely visibility. With the new information gained from measuring results, teams will be able to make savvy decisions that are driven by data rather than qualitative observations.

ABOUT THE AUTHORS

John Morris is a Partner and DayBlink's Business Automation Center of Excellence Lead. John is a U.S. patent holder for a Dynamic Process Measurement and Benchmarking technology and is based in Evanston, Illinois.

Justin Whitaker is a Partner and DayBlink's Cybersecurity Center of Excellence Lead. Justin is a U.S. patent holder for a Dynamic Process Measurement and Benchmarking technology and is based in the Vienna, Virginia office.

Zachary White is a Consultant within DayBlink's Business Automation Center of Excellence and is based in the Vienna, Virginia office.

Please direct questions and comments about this report to rpa@dayblink.com.

ABOUT DAYBLINK

Today's accelerating technology and explosion of data have created opportunities for organizations to explore new ways of working to increase efficiency and agility. Forward-thinking companies must leverage automation technologies to enable more productive employees and satisfied customers.

The landscape of quickly evolving automation technologies can be intimidating. DayBlink works with clients to help make the right automation choices to meet current and future business needs. We determine the optimal way to automate processes based on client needs, costs, benefits, culture, and scalability.



For more information:

Visit: <https://www.dayblink.com/services/technology/business-automation/>

Email: rpa@dayblink.com

Call: (866) 281-4403