Discovering value leaks and service imperfections in business processes
Peters, E.M.

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Preface

Improving process performance has always been of utmost importance in my professional life. From my first position as a supervisor of back-office lottery ticket processing and accounting to my current day efforts at improving process efficiency for large organizations through packaged software products, I have been focused on reducing waste and improving efficiency. At the same time, I have always been amazed at the number of decisions that are made, risking untold millions of Euros, US dollars, and other currencies, based on best guesses, media-driven industry myths or beliefs that are held without any supporting evidence. One hundred and one years ago, in 1911, Fredrick Winslow Taylor published his groundbreaking monograph; *Principles of Scientific Management (Taylor 1911)*. Taylor pioneered the application of the scientific method to the area of work (described as human labor or skill) to improve what he saw as inefficient methods of accomplishing a task. His approach, which is sometimes called task management, was one of observation, recording of data about how something was being done, analysis (finding a hypothesis about the “one best way” to perform a task, testing (measuring), and then implementing and re-measuring to ensure that the result was obtained. Taylor focused on eliminating guesswork, what he called rule of thumb, and replaced it with systematic analysis of work tasks that could be optimized, thereby improving productivity. His analysis attacked the very notion of what was valued, that of a supposed difference in skills possessed by various laborers. Through observation and analysis, Taylor refuted the idea of “skill” and showed that the efforts did not contain any specific knowledge but rather could be seen as a series of repetitive motions, that when analyzed, could yield a “one best way” to perform the task. That best way, when replicated by many workers not only produced increased output per worker, but also allowed for the task to be completed with fewer workers, thus reducing the overall labor components of the task.

His work was mostly performed for large manufacturing organizations (e.g., Bethlehem Steel) and often seen as an icon of the industrial era where the production for manufactured goods with little or no service component, was the primary output. Since then, the world has changed in ways Taylor could never have imagined; ICT-enabled processes have revolutionized both productivity and the role of labor in new and dramatic ways ranging from manufacturing to services. A central premise of this PhD Thesis is that just as in Fredrick Taylor’s day, it is the systematic and scientific lack of knowledge about the current work process, what I refer to as knowledge gaps, and the intrinsic nature of service-based work itself, that must be re-examined in order to establish a new paradigm for productivity improvement.

While “observations” about the current environment remain central to the establishment of a baseline about the current work reality, making those observations in an ICT-enabled work process, where the actions cannot readily be seen, requires a new approach than those in common practice. Specifically, current improvement methods either use manual observations
about digital environments or capture digital data to build a generalized model of the work environment. The first instance relies on techniques that place the veracity of the data in question while the latter factors out “noise” or exceptions in order to gain an overall understanding. It is precisely these two issues that need to be addressed in order to capture information in an ICT-enabled, digital method as well as to have the correct mathematical techniques to most effectively and unambiguously discover both the source of and reason for loss of process value.

With my work at OpenConnect, my initial hypothesis was that since the actual observations were indeed being recorded and captured by the technology itself, if it could be stored and re-created, it would be an actual or fact-based representation of the actual activity rather than what amounted to a best guess. Also, the recorded sequence of actions would represent an actual flow of the process, not an idealized flow or something based on inference, speculation or opinion. In essence, the event logs generated could be used as the basis for reconstructing actual processes around applications.

As this effort was to be based on captured data, it would be a “bottom-up” approach. This would be different from the normal “top-down” modeling effort where the taxonomy is given at the start the process. I was clear the effort needed to be based on an “emergent” paradigm since the data would be at the lowest (atomic) levels and the groupings would need to be found or “discovered” rather than imposed at the start. At this point the work of Cook and Wolf (Cook and Wolf, 1995) became important. They had coined the term “process discovery” while working to uncover processes in the software development effort. They suggested three techniques that could be used; Neural Networks, algorithm-based techniques and Markov Chains. The use of Markov Chains was the best fit since it showed the probabilistic nature of the work process as well as the issues inherent in the model. Specifically, the model contained a level of ambiguity in truly understanding the root cause of the any deviation from the main path, (e.g., process anomalies). This was a key moment since it was now clear that it was more than the main process that had to be “discovered” but also, it was the exceptions (or the noise) that were of key interest. Just as noise leaks information from a communication channel, process variations (or noise) are the source of leaks from an ICT-enabled process. Understanding from field experience that it was the process exceptions (noise) that were the root cause of process productivity issues led to the focus on finding which mathematical techniques were most suited to understand and represent value leaks in business processes. This understanding would form the basis in providing actionable information to management on how to deal with these value leaks and improve process performance.

The structure of this PhD Thesis can be understood as follows; chapter 1 provides an introduction to the subject of process improvement and describes issues with its implementation in ICT-enabled environments. In chapter 2, mathematical techniques are explored. Additionally, the methods for unambiguously discovering and representing process variations are described. Chapter 3 discusses the methodology and tooling that implements the concepts described in
chapters 1 and chapter 2. It describes the platform that will be used to collect, analyze and represent process and their variations. The technology was developed by OpenConnect Systems, Dallas, Texas, USA, and is named Comprehend. With one exception, it is used as the platform for the case studies described in chapter 4 and chapter 5. Here it is interesting to note that two different environments for case study research were chosen. Specifically, chapter 4 addresses productivity issues in administrative environments where the activities are highly transactional in nature whereas chapter 5 addresses situations that are highly interactional as well as transactional. In all cases, discovering the true nature of value leaks led increased process performance. In chapter 6 conclusions are discussed as well as areas for future research.

Overall, while I learned much through the researching and writing of this PhD Thesis, I am continually humbled when I think of how much there is yet to be done and, in that context, how little I actually know. It would be egotistical to think this is even a first step. At best, I hope it has cracked open a small window into an area where further research, and other researchers, can shed light into an area of darkness. I feel there is much to be done and sincerely hope others may find this work useful in their efforts to improve businesses processes as we move into the post-industrial, ICT-enabled service dominated economy.