

Process Delay Sedimentation – aspects of business transactions analogous to physical conservation laws.

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Sedimentation: noun, the process of settling or being deposited as a sediment. "Sedimentation occurs when the droplets sink to the bottom."

Newton's Law of Universal Gravitation: ... the force is proportional to the product of the two masses, and inversely proportional to the square of the distance between them.

Themes in modern business literature include concepts related to “agile” and “lean” corporations and process optimization via techniques like technology automation, orchestration and machine learning. However, while most business optimizations obviously focus on the reduction of costs, or the maximization of output, there is another process or concept in the business environment, and in everyday life, that often goes unnoticed. A close analogy is to that of computer science where, ultimately, computation, or the optimization of computational processes, involves an improvement in, or savings of, “time.” Now the focus on time as discussed here is not the same as that seen with the reduction of the length-of-time of processes like an improvement in MTTR (mean time to repair) or manufacturing concepts like “just in time” production where the goal is eliminate time that is wasted between steps or with inactivity of staff or machines, but rather on how delays in time in a high-level view of an entire business process or system, often measured down to very small intervals, is pushed down to lower tiers of workers and at times out of the business itself to customers.

This concept, which we can label as process “delay sedimentation” should not be confused with automation where improvements in technology speed-up activities that can include very complex tasks even in high-paying occupations from the analysis of X-ray films by radiologists, to initial triage analysis by emergency room physicians, to legal research done by lawyers and paralegals. Delay sedimentation can be described as the aggregate movement of delays in an overall business process that involves human interactions from organizational positions of higher power down to front-line workers and at times even to the business’s customers. The requirement of human interactions is critical to the concept. It is the limitations of the human mind and body that prevent them from keeping up with the speed of machine transactions, impact them by the amount of parallel processing in the modern workplace deemed “multi-tasking,” and is increasingly leading to more processes driven by M2M (machine to machine) transactions.

A fascinating comparison or analogy is noting the similarities with this model versus the conservation laws in the physical sciences or even Newton’s Law of Universal Gravitation. In Newton’s Law of Universal Gravitation, the force of the gravitational attraction diminishes with distance as an inverse-square relationship where twice the distance has $1/4^{\text{th}}$ the force and three times the distance has $1/9^{\text{th}}$ the force.

Let’s compare this physical law to the act of making an appointment at a doctor’s office. The time and brain-power of the physician is naturally spent analyzing patient symptoms and histories with enough downtime to avoid errors from fatigue or distractions and obviously as another reward for her investment in years of education and her opportunity-of-cost of that time learning specialized and complex medical skills. A nurse and office manager likewise will usually not answer the phone call. The frontline receptionist may not even answer the initial call as some of that functionality has literally been replaced by automation in the form of an IVR computer or PBX/ACD phone system that answers the call, provides prompts to the caller to correctly route the caller, inform the customer, or queue the customer, or even completely handle the customer - if at all possible – to save costs by reducing the amount of receptionist staff and to attempt to reduce the overall transaction time and thus to increase the number of transactions. If the caller does need, and reaches, the frontline receptionist (let’s say at the fourth level of the organizational chart or pay or power hierarchy), the caller may provide their request and symptoms. Now here, often and perhaps too often, the caller may be transferred to another receptionist to create the appointment where it is very likely that the caller again must repeat their information and/or symptoms or their reason for the requested visit. Now of course there is technology like CTI and online appointment webpages or apps that allow for process time

reduction via automation, but that is not the concept being discussed. Rather, it is the delay from the repetition of data that relates to the concept at hand. In this case, that delay is endured or handled by the customer – the caller. We see how this “busy work” has naturally drifted down (i.e. sedimentation) to front-line staff and here, ultimately, to the very customer as the caller. It is the caller that must repeat information and thus holds the innate “delay” in the human involved transaction.

Now I am not seeking to create an equation showing that a specific amount of delay for a receptionist or caller correlates to exactly a given level of an org chart, but the analogy is useful in understanding how the delays and their associated impact “gravitate” or sediment “down” to front-line staff in basically any business process involving humans in a hierarchical business.

Now another physical law of interest relates to thermodynamics or the Law of Conservation of Energy where energy may change form, but it is not lost and ultimately conserved. So, in our caller example, outside of the obvious loss of a small measure of time (the delay from the repetition required from the caller and perhaps the transfer or wait time), there is also the energy lost in the form of mental frustration. While frustration is something that is obviously difficult to measure, it is not insignificant. For excess frustration can ultimately lead to the loss of a customer, which is a direct impact to a business’s revenue and marginal profit. But frustration has additional costs, regardless if it is held by the front-line staff or the customer, in the physical manifestations of stress as exhaustion of fatigue, anger, anxiety, and lower morale or depression, etc...

Now let’s look at a fast-food establishment. Here it is the front-line staff that are now tasked with attempting to multi-task where they literally may be required to perform the work of two or three humans at the same time. An employee may be asked to take an order over a headset, enter order input into a computer, exchange money, and/or communicate or hand-off orders to co-workers. Here not only is the overload held by the front-line employee, but the physical manifestation of the “delay sedimentation” is likely not only in small amounts of time lost for the customer, but also in the form of errors. A special or custom order is likely missed or inaccurate as the attention of the fast-paced team is thrown out-of-sync from the break in routine or the mind of the order taker, who is already attempting to juggle three functions, now must hyper-focus on a special task where we see confusion, frustration, stress and often errors as the result.

Now this delay sedimentation behavior is not unexpected or unnatural as human beings and human minds naturally desire to avoid multi-tasking, stress, confusion, monotony, and extreme changes in routine. Thus, a benefit for those in a position of power is the avoidance of this inherent stress or frustration. What is ignored, however, is the actual physical or health impact of this “trickle down” of stress to the front-line staff. There exists no “hazard pay” or real-time measure of stress and frustration from multi-tasking even though the impact of chronic multi-tasking from functional MRI tests has shown it to be equivalent PTSD from similar brain scans of soldiers at war. In these scenarios the customer obviously has the ability to transition to another vendor although that involves obviously additional delays and its own amount of literal transition costs and potentially hidden costs and risks.

From an economics point of view, customer preference analysis will correlate with the price they will tolerate for additional delays or frustrations, but the key concept here is not about the customer, but rather the business system itself where these delays inherently, akin to the “Plinko game” in the famous television show *The Price Is Right*, ultimately falls down to front-line staff who are, in essence, the human “of last resort.”

Another example of delay sedimentation is software itself, where organizations seek cost reductions of time-to-market, infrastructure ownership, scalability, and flexibility of public cloud environments and the security of VPN, firewall, and authentication checks, but the software user may face the micro-penalty of the new delays that may occur not only from data entry but from processing delays akin to the infamous hourglass symbol or “(not responding)” messages.

The hope is that when a deep analysis of any business process, or even technology process, is performed, this apparent conservation of innate or inherent delay, that is akin to “system friction,” must also be considered as well as how this delay will logically fall to positions at the lowest level of power in an organization. Optimally, the impact of this process delay sedimentation on humans should be evaluated to avoid and reduce errors, to staff teams appropriately to prevent burnout and promote morale, and to establish fair compensation for the unrecognized and unrewarded costs (and sacrifices or damages) of the associated frustration and stress.