REALIZATION[SM]

The Effects of Multitasking on Organizations

Introduction

Nearly two decades of academic research demonstrate the profound negative effects that multitasking has on the productivity of individuals[1], yet job seekers around the world still tout their ability to multitask as a desirable skill. In many organizations, multitasking is worn as a badge of honor. However, research consistently shows that people who attempt to multitask suffer a wide array of negative effects, from wasting 40 percent of one's productive time while switching tasks[2] to experiencing a heightened susceptibility to distraction[3].

Nearly all of the research on multitasking has studied its effects on individuals. Researchers have paid little attention to the effects of multitasking on organizations. There are good reasons to believe that multitasking has similar effects at an organizational level. After all, people do not typically work independently in organizations, but rather depend on others to complete preliminary tasks before they can

start their own work. If individual work is delayed due to multitasking, overall project delays are exacerbated within an organization as delays cascade through the workflow.

Just as individual multitasking takes place when a single person's time is split between too many tasks, organizational multitasking occurs when a group is focused on too many things, and its overall capacity is adversely affected. The end results are delays and interruptions; reduced quality and rework; peaks and valleys in workflow; and lack of proper preparation before tasks and projects.

To examine the effects of organizational multitasking more rigorously, [Realization](), a provider of Flow-based Project Management software and services, studied 45 organizations with between 1,000 and 50,000 employees and an average annual budget of more than $1 billion from a diverse range of industries – including automotive,

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[1] *American Psychological Associattion. "Multitasking: Switching costs." Research in Action. 20 March 2006. http://www.apa.org/research/action/multitask.aspx*

[2] *Ibid.*

[3] *Ophira, Eyal, Nass, Clifford, and Wagner, Anthony D.. Cognitive Control in Media Multitaskers. Proceedings of the National Academy of Sciences, Vol. 106 No. 33, August 25, 2009.*

aerospace and defense, aviation, energy, semiconductors, software and pharmaceuticals – that consciously implemented measures to reduce multitasking in their organizations. This research paper examines the effects of organizational multitasking within these organizations and quantifies its effect on productivity.

A Simple Multitasking Test

Even without referencing the extensive history of multitasking research, it is easy to demonstrate the ineffectiveness of multitasking with a simple demonstration. All one needs is pen, paper and something to keep time. First, write the word "multitask" and once the word is complete, write the numerals 1 through 9 underneath each letter – under "m", write "1", under "u" write "2" and so on. Finally, write the letters "a" through "i" underneath the numbers, with "a" under "1," "b" under "2," etc., all the way through to "i." Time how long it takes to complete the task. When complete, it should look like this:

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multitask
123456789
abcdefghi
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Next, complete the same task, except this time, write the first character of each row in a column (i.e., "m" above "1" above "a" in the first column) followed by the second character of each row in a column beside the first column (i.e. "u" above "2" above "b"), and continuing in that manner until all rows are complete. People who play this game are often shocked by how much more time they take when they are forced to switch between these simple tasks. Typically, it takes 50 percent longer to complete the task while multitasking, but it's not unusual for it to take two or three times as long.

The Effects of Multitasking

For decades, academic research on multitasking has demonstrated that human beings work much more effectively when concentrating on a single task at any given time, and that switching between multiple tasks leads to a host of negative effects.

Mobile phone usage while driving, for example, has been one of the most extensively studied instances of multitasking, and multiple studies show that drivers are seriously impaired while using cell phones. Initially, researchers thought that the physical device manipulation was responsible for the impairment, but later studies demonstrated that even hands-free devices can cause driving impairment equal to or worse than a .08 percent blood-alcohol level – the legal threshold for impairment in most states in the U.S.[4] Simply trying to do two different tasks simultaneously is enough to reduce one's effectiveness severely.

Studies that look beyond the specific use case of mobile devices and driving generally show that multitasking causes serious productivity declines. Switching between tasks can cause a loss of productivity as high as 40 percent when compared to single-tasking[5] and workers who multitask are much less likely to engage in creative thinking than those whose work is not fragmented[6].

Long-term, habitual multitasking appears to have long-term negative effects as well. Habitual, heavy multitaskers are more susceptible to distraction by irrelevant stimuli at work than are habitual single-taskers[7], and multitasking makes individuals less capable of appropriately regulating their work habits[8].

In sum, multitasking makes people less productive, less creative and more likely to get thrown off task by distractions.

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[4] Strayer, D. L., Drews, F. A., and Crouch, D. J. Fatal distraction? A comparison of the cell-phone driver and the drunk driver. In D. V. McGehee, J. D. Lee, & M. Rizzo (Eds.) *Driving Assessment 2003: International Symposium on Human Factors in Driver Assessment, Training, and Vehicle Design.* Published by the Public Policy Center, University of Iowa (pp. 25-30). 2003.

[5] *Rubinstein, Joshua S., Meyer, David E., and Evans, Jeffrey E. Executive control of cognitive processes in task switching. Journal of Experimental Psychology: Human Perception and Performance, Vol. 27(4), 2001, 763-797.*

[6] *Amabile, Teresa M., Mueller, Jennifer S., Simpson, William B., Hadley, Constance N., Kramer, Steven J. and Fleming, Lee. Time Pressure and Creativity in Organizations: A Longitudinal Field Study. Harvard Business School Working Paper, No. 02-073, 2002.*

[7] *Ophira, Eyal, Nass, Clifford, and Wagner, Anthony D.. Cognitive Control in Media Multitaskers. Proceedings of the National Academy of Sciences, Vol. 106 No. 33, August 25, 2009.*

[8] *Hamilton, R., et al. Being of two minds: Switching mindsets exhausts self-regulatory resources. Organizational Behavior and Human Decision Processes. 2010.*

While the negative effects of multitasking on individuals are well documented, little research has been conducted to examine the impact of multitasking on organizations as a whole. This study from Realization aims to provide original and vital research-based information and insight about the large scale impact of multitasking on organizations.

The Effects of Organizational Multitasking

Organizational multitasking occurs when the efforts of an organization are divided among many open streams of work. Major forms of organizational multitasking include:

- *Peanut-butter spreading:* Work-streams require multiple engineers, but only one engineer is assigned to each stream.
- *Unsynchronized priorities:* Instead of groups working together on the same streams in tandem to take them to completion (e.g., a feature, a module or sub-system), each group is focused on different streams that do not overlap.
- *High work-in-process for managers:* Managers are supporting too many work-streams and projects at the same time.

Since most work emerges from collective rather than individual efforts, organizational multitasking causes far greater damage than individual multitasking. The losses caused by multitasking multiply and spread in a number of ways:

- *Idle Time:* Multitasked workers and groups keep others waiting for their output. When people do not have everything they need to take a task to completion, they start their work with incomplete inputs, which requires them to stop work before their task is finished. This, in turn, necessitates rework or causes the team to move on to other tasks, thereby putting more work into execution.
- *Unavailable Managers:* When managers multitask, even small decisions can take days; instead of spending, say, a quality 15 minutes with people, they

can afford only a rushed and ineffective two to three minutes.

- *Loss of Control:* Every task seems equally urgent. The truly critical issues and genuine bottlenecks cannot be identified, and the organization wastes its resources solving the wrong problems.

While changing individual habits is very difficult, all that is needed to stop organizational multitasking is a process for reducing work in progress, and the establishment of clear and simple priorities. This method of planning and execution is called Flow-based Project Management (see Appendix A). With Flow-based Project Management, people can focus on one task at a time and take it to completion without interruptions.

Study Methodology and Results

Realization examined 45 case studies in which organizations implemented Flow-based Project Management software and services. The 45 companies had an average of 20,500 employees and median annual revenue was $1 billion. The organizations came from a wide range of industries, and the following list provides a breakout of those industries.

- A&D: 7
- Amusement parks: 1
- Automotive: 2
- Communications: 1
- Consumer appliances: 1
- Consumer electronics: 1
- Energy: 8
- IT: 1
- Life sciences: 4
- Manufacturing: 5
- Military: 6
- Mining: 1
- Petrochemistry: 1
- Professional services: 1
- Semiconductors: 2
- Steel: 2
- Telecommunications: 1

Organization's Industry	Type of Projects in Execution	Productivity Improvement Six Months After Reducing Organizational Multitasking
A&D	Engineering	28%
A&D	Engineering	64%
A&D	Maintenance	23%
A&D	Maintenance	30%
A&D	Maintenance	15%
A&D	Engineering	42%
A&D	Engineering	20%
Amusement parks	Engineering	26%
Automotive	Engineering	20%
Automotive	Engineering	63%
Communications	Engineering	58%
Consumer appliances	Engineering	84%
Consumer electronics	Engineering	150%
Energy	Engineering	43%
Energy	Engineering	63%
Energy	Engineering	29%
Energy	Construction	40%
Energy	Construction	22%
Energy	Engineering	16%
Energy	Engineering	30%
Energy	Engineering	25%
IT	Software Development	20%
Life science	R&D	83%
Life science	R&D	38%
Life science	Engineering	50%
Life science	R&D	140%
Manufacturing	Engineering	58%
Manufacturing	Engineering	33%
Manufacturing	Construction	33%
Manufacturing	Construction	36%
Manufacturing	Construction	45%
Military	Maintenance	32%
Military	Maintenance	30%
Military	Maintenance	33%
Military	Maintenance	29%
Military	Maintenance	55%
Military	Maintenance	13%
Mining	Engineering	25%
Petrochemistry	Engineering	117%
Semiconductors	R&D	37%
Semiconductors	Engineering	25%
Professional services	Engineering	64%
Steel	Software development	30%
Steel	Maintenance	20%
Telecommunications	Engineering	57%
AVERAGE PRODUCTIVITY IMPROVEMENT		**59.8%**
MEAN PRODUCTIVITY IMPROVEMENT		**38.2%**

Realization examined project throughput (i.e., the number of projects completed) and cycle time (i.e., the time it takes to finish an individual project) during the three-to-six months prior to Flow-based Project Management software and services implementation and during the three-to-six-month period following implementation for each of the 45 organizations in the study.

Once multitasking was eliminated or reduced, these 45 organizations showed tremendous increases in throughput and significant reductions in cycle time. The mean throughput increase was 59.8 percent, and the median increase was 38.2 percent. The median cycle time reduction was 31 percent, while the mean reduction was 35.5 percent.

Organizations annually spend an estimated $5.8 trillion globally[9,10], on projects that include everything from research and development to construction. The 45 organizations Realization examined saw a median increase in productivity of 38 percent. If one assumes that the post-Flow-based Project Management implementation level of throughput is an accurate reflection of true productivity in a non-multitasking environment, then these gains represent reclaimed productivity. A quick calculation (i.e., the change in throughput divided by the final throughput) shows that, on average, multitasking caused these organizations to be 27.5 percent less productive than they could have been. A 27.5 percent loss in productivity from multitasking, with

labor accounting for 32 percent of the total cost of projects, equates to a global loss of more than $450 billion a year.

These results demonstrate that multitasking is indeed a massive organizational problem. However, it typically goes unnoticed because everyone seems busy and appears to be working hard, almost all organizations suffer from it, and the ability to multitask is still widely viewed as a desirable skill.

Organizations that eliminate multitasking stand to gain a significant competitive advantage.

Discussion

Multitasking is perhaps the number one killer of productivity in knowledge work and projects. By reducing multitasking, organizations can not only improve productivity and reduce cycle times, but they get the benefits of better visibility and insight into areas that need improvement. When multitasking is reduced, managers can understand the real status of tasks and projects, see the real bottlenecks and take actions to remove them.

What follows are three examples of organizations from three different industries that successfully reduced or eliminated multitasking, and the productivity gains they enjoyed as a result.

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[9] Global MRO Market Economic Assessment. AeroStrategy Management Consulting, 2009.

[10] 2011 Global R&D Funding Forecast: The Globalization of R&D. R&D, 2010.

Case Studies

Manufacturing – ASAHI Seisakusho

ASAHI Seisakusho, a laboratory glassware and chemical-processing equipment manufacturer based in Japan, faced a serious business challenge, and an opportunity. ASAHI was turning away 30 percent of its new engineer-to-order business (ETO) opportunities, competitors were launching new products faster, and overtime was excessive, sometimes resulting in 80-hour weeks for engineers.

The primary cause of these problems was that the engineering department had too many projects for its people to handle. Sometimes, ASAHI was working on as many as 10 projects per engineer, which caused engineers to constantly switch not only between tasks, but also between engineering work and sales support, which meant they could not focus for an extended period of time on their design work. Delays due to a lack of client authorization, missing components or unclear requirements were constant.

In hopes of turning this situation around and unlocking wasted capacity in engineering, ASAHI turned to Flow-based Project Management to eliminate multitasking. The company aimed to complete 20 percent more projects per month and to achieve an eight hour workday, five days per week for its engineers.

ASAHI set up a help desk to field customer questions so that engineers would not be interrupted, and froze 42 percent of its projects to limit work in progress to two projects at a time. It also ensured that engineers had everything they needed in terms of approvals, design documents and other prerequisites before beginning work in order to keep interruptions and delays to a minimum.

As a result, ASAHI was able to complete 23 percent more projects post-implementation while simultaneously reducing overtime by 35 percent, coming very close to its 40-hour work week goal. Revenue for the quarter immediately following the implementation was 50 percent larger than it had been in the same period the previous year with the highest quarterly profit in the company's 60 year history.

Pharmaceuticals – Dr. Reddy's Laboratories, Ltd.

Dr. Reddy's Laboratories, Ltd is a pharmaceutical company based in India, with more than $1.5 billion in revenues. The development group manages new product development for both the API and generics businesses. Before Dr. Reddy's implemented Flow-based Project Management software and services, the development group had just 20 percent of its projects finishing on time.

Dr. Reddy's first reduced the amount of work in process (WIP), so that people could focus and not multitask. Work had not yet begun on 30 percent of the projects, so they were not added to WIP. In addition, 30 percent of the active projects were also frozen, leaving 40 percent still active.

Next, Dr. Reddy's took steps to ensure that every project team had a "full kit" before starting work, meaning that they had everything required to finish the job before starting it, and created a 12-member project-preparation team to ensure that every team could hit the ground running once they received their project. Again, by ensuring that teams had everything they needed to see a project all the way through to completion, Dr. Reddy's eliminated the need for teams to stop work and wait for prerequisites to be completed, improving flow and reducing task switching.

After just 12 weeks of taking focused measures to sharply reduce its project teams' workload and set clear task priorities to reduce multitasking, Dr. Reddy's development group was able to complete 83 percent more projects than it had in the previous 12 weeks, without adding any additional resources.

Management also saw a substantial improvement in the quality of work, especially development strategy plans, because resources were no longer stretched thin. In fact, Dr. Reddy's discovered that it could now assign half the resources to a project, and it would still finish faster than before, because resources had reduced multitasking so significantly.

Military Aviation MRO – Tinker Air Force Base, U.S. Air Force

In 2006, the 76th Maintenance Wing's 6,500 direct-labor personnel had a significant backlog of B-1, KC-135, E-3, and B-52 aircraft in need of depot maintenance. Commanders were frustrated with late aircraft deliveries and cycle times for depot repairs that sometimes exceeded 225 days. Resources were stretched thin and the back-shops were constantly short of parts.

In 2007, the Wing began a methodical implementation of Flow-based Project Management software and services across the Aircraft Maintenance and Propulsion Maintenance Groups, an implementation that has expanded its scope and improved its effectiveness every year since.

The theme behind all of the 76th Wing's improvements was to refocus teams from attempting to follow a meticulous timeline to synchronizing work so that everyone is always moving forward on the highest priority tasks, instead of focusing on adherence to a preset timeline that was inevitably thrown off course early in the process due to the uncertainty inherent in aviation maintenance.

The 76th began its implementation by putting fewer planes into production at any given time, controlling the active work in progress. They started with the B-1, which resulted in reduced cycle times and increased throughput. The number of B-1 aircraft on station was reduced from seven aircraft to five. Over the next three years the KC-135, E-3, and B-52 teams followed suit.

With reduced work in process, the synchronization of priorities across the entire organization automatically improved. With reduced multitasking, the leadership was also able to identify the work areas that were becoming bottlenecks and could take care of them before they caused delivery dates to slip. To do this, a "constraints-buster" team was put in place to support each production line, and bottlenecks were aggressively attacked.

Within a few months of starting the first implementation, morale improved, deadlines were met, and most importantly, the U.S. Air Force soon had two additional B-1s in the air to complete its missions. As the program expanded, E-3 cycle time was reduced by 36 percent, which allowed the E-3 squadron to take on additional C-130 work as well as a special NASA project. The B-52 squadron increased throughput from 14 to 18 aircraft per year, and the KC-135 squadron produced 19 more aircraft than they did in 2007.

About Realization

Realization provides Flow-based Project Management software and services that help organizations reduce multitasking and manage bottlenecks to complete their projects 20 to 50 percent faster. More than 250 organizations across several continents, and engaged in a wide range of projects, have realized $4 billion in additional cash and profits by implementing Realization's software.

Appendix A: Flow-based Project Management

Flow-based Project Management is based on concepts found in other methodologies that improve organizational productivity, such as Lean, Agile and Critical Chain. However, Flow-based Project Management differs in that it focuses tightly on attacking the biggest cause of lost productivity: organizational multitasking.

The method involves three simple steps:

Step 1: Reduce the number of open projects or work streams by 25 to 50 percent. Working on fewer projects or work streams is counterintuitive, but it works. Fewer projects/work streams mean fewer tasks, and therefore, less confusion about task-level priorities. Moreover, managers and experts can also be more responsive because they have fewer issues and questions to deal with at a time. Simply reducing the number of open projects/work streams by 25 to 50 percent can double task completion rates.

Step 2: Establish a clear rule for task-level priorities. For some projects, a simple rule (e.g., project priority equals task priority) is sufficient. Project priorities are clearly communicated to everyone in the organization and whenever there is a priority conflict, people work on the highest-priority project first. For complex projects, specialized software can help organizations properly prioritize tasks.

Step 3: Don't start a project without adequate preparation. Well begun is half done. If teams have everything (i.e., good design specifications, clear goals and the necessary inputs) in place before starting a project, they encounter fewer questions and issues in execution. The dependence on managers and experts is reduced and work gets done faster.

By implementing these three steps, organizations reclaim productivity that was previously wasted because of organizational multitasking. As a result, they will find that they will do more than simply finish projects on time – they will finish ahead of schedule.