

MIT STUDY: NOBODY EVER GETS CREDIT FOR FIXING PROBLEMS THAT NEVER HAPPENED

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Source: Nobody Ever Gets Credit for Fixing Problems that Never Happened: Creating and Sustaining Process Improvement by Nelson P Rpenning and John D. Stermann, Sloan School of Management, Massachusetts Institute of Technology, distributed by [Harvard Business Online](#), CMR208.

Why We Don't Always **Work Smarter**

- **We all know**

- One hour work = One hour output
- One hour process improvement
= Improved output for all subsequent hours

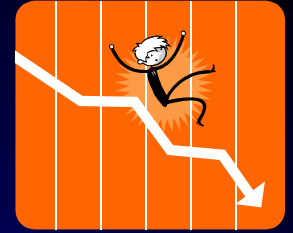
- **In practice**

“Because working harder and taking shortcuts produce more immediate gains and help solve today’s problems, managers unaware of the inherent “better before worse” trade-off are likely to choose them over working smarter.” *

* MIT Study

Working Harder

“Better-before-Worse” Dynamic



- Performance temporarily rises
 - but this is short-lived
- Time spent improving falls immediately
 - but capability does not
- Capability [and morale] gradually erodes
 - to eventually offset additional time spent working

“Worse-before-Better” Dynamic



- Increasing the time spent on improvement reduces output
 - in the short run.
- Eventually capability rises
 - more than enough to offset the drop in work effort
- ...And performance is permanently higher

Organizational Consequences



- “Engineers routinely neglect to reveal the existence of serious design issues for fear of retribution from managers.” *
- In one firm the motto of the development engineers was “never reveal you have a problem until you also have the solution.” *

Simulations of Working Harder and Working Smarter Strategies

- A short-term assessment indicates that capability improvements reduce output
- Long-term assessment tells a far different story

Getting Out of the Trap

- **Working harder results in**
 - Trap of increasing stress and declining process capability.
 - Rewarded by immediate gains and ability to solve today's problems
- **Breaking the cycle**
 - “Once the cycle of self-confirming attributions is broken, any number of process improvements tools and methods can help improve capability. Without this shift, new tools and techniques, no matter how great their potential, are unlikely to succeed.” *

Conclusion

- **“The most important implication of [MIT’s] analysis is that our experiences often teach us exactly the wrong lessons about how to maintain and improve the long-term health of the organization.” ***

The Ultimate Product Nightmare



Airbus A380:

- 2 year unexpected project delay
- \$6.0 billion in lost profits
- \$10.0 billion in lost orders
- “A Trillion Dollar Engineering Error”
- Root cause: unable to manufacture the wiring system due to mechanical CAD problems

Situation Analysis

- **Top-down, market-driven schedule**
- **Distributed multi-national engineering and manufacturing teams**
- **Last minute spec changes - copper to aluminum wiring**
- **“Concurrent Engineering” to allow end-user customization during manufacturing**
- **Low priority on re-tooling and re-training engineers**

Cost containment drove decisions

- The cost to train the engineers in Catia V5 may have been the sticking point for Airbus management that led to the A380's multibillion-euro design flaw. "Airbus made the decision not to migrate Germany to Catia V5 because it would have meant a complete retraining," says Geoff Haines, managing director of Cenit Ltd. in Oxford, England. "They decided not to do it for budgetary reasons."

– Baseline Magazine

- Why wouldn't Airbus factories all clamor to switch to the latest software? Some local managers apparently balked because of the time and expense involved in retraining engineers to use new design tools. Still, Airbus' top management could have insisted on the changeover...but it didn't.

– Business Week

Attempted to solve problems by “working harder” ... but failed

- To try to keep production on schedule, the company imported engineers and mechanics from its factory in Hamburg, Germany, to toil round the clock in Toulouse. But the extra manpower has not been enough: In June, the company revealed that wiring difficulties would delay deliveries by six months. Then, in October, it shocked the aviation world by announcing still more delays, this time up to a year.

– Popular Mechanics

Airbus CEO's Recovery Plan

- **Right Tools, Right Training, Right People, and Right Oversight by Management**

“Under the leadership of the new Airbus President and CEO Christian Streiff, strong measures have been taken, which, in addition to management changes, include the implementation of the same proven tools on all sites, as well as the creation of multi-national teams to better use the best skills available.

Simultaneously, training is being organised to swiftly bring the employees using those tools to the optimum level. With the right tools, the right people, the right training and the right oversight and management being put in place, the issue is now addressed at its root, although it will take time until these measures bear fruit.”

— Airbus Press Release Oct 06

Solutions for:
Management



- **Empower and recognize engineers for process innovation**
 - Reward those who take initiative to advance design methodologies and learn new skills
 - ... Rather than the ones who simply work overtime to bail out delayed projects
- **Schedule time between projects to improve capabilities**
 - Evaluate and select new design tools
 - Train engineers before production work begins

Solutions for: Engineers



- **Voice schedule and risk realities assertively and persistently**
 - Take the initiative to advance design methodologies and improve capabilities
- **Understand that senior management needs to hear the engineers' good *judgment***
 - Vs. an abundance of *data* - on design, schedule, and EDA tool alternatives.

What DOES Work



- Long term productivity gains happen when organizations make a conscious effort to retool their engineers and reward process improvements.
- The result is sustainable innovation in electronic design.

