A Novel Approach to Measuring the Time-Impact of Oversight Activities on Engineering Work

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Problem

Government contracts require monitoring provisions that enable the government to enforce rules and regulations to properly evaluate the performance its contractors. These activities are collectively called oversight.

Oversight activities are **necessary for monitoring and controlling risk**, but they can **add costs to a program as a second order effect**.

Stakeholders disagree about the scope of the problem:

Necessary part of the process; Relatively cheap

*"mission assurance activities, such as tests and validation work, **cost 2-5%** of the total price of a rocket stack. This, he says, "**is cheap insurance**" in contrast to the price of losing a satellite that could cost more than $1 billion."*

-Brig. Gen. Roger Teague, director of strategic plans, programs and analysis at Air Force Space Command. Quoted in Aviation Week and Space News, April 2013

or

Burdensome, Increases Costs

*"There is suggestive evidence that the cost of government-driven mission assurance and current Federal Acquisition Regulations (FAR) **increase costs by factors of 3-5 times, not just 20- 30%**"*

-Dr. Scott Pace, National Security Space Launch Programs - Testimony to Senate Committee on Defense Appropriations, Dirksen Senate Office Building 192, March 5 2014.

Previous Work, Research Question

Few studies exist to assess the burden associated with oversight related activities

Methodological limitations of previous studies

- Overrepresentation of DoD program offices;
- Biased/non representative cross sample of industries interviewed;
- Rely upon memories to report on time spent performing activities

The real impact of oversight is **extremely difficult to measure**

- Retrospective studies tend to overestimate strongly positive and strongly negative memories
- Many important impacts of oversight are indirect
- Studies based on real-time observation of activities been considered too invasive

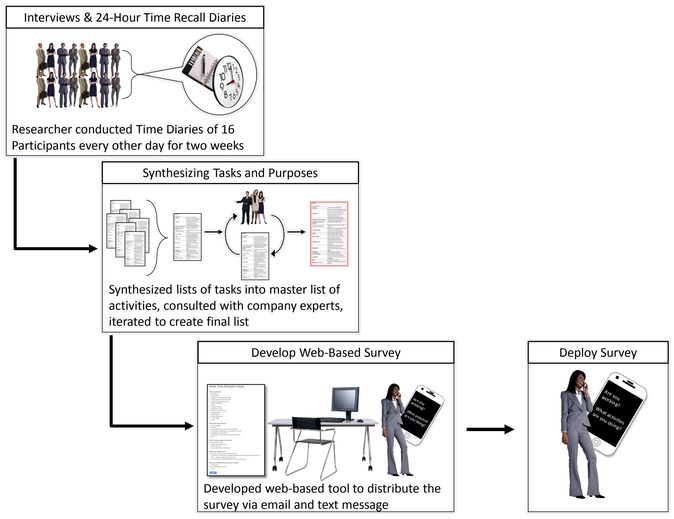
Research Questions:

1. How much time do engineers spend on oversight-related activities?
2. How can we accurately capture the time spent on oversight related activities?

Method

Adapted the non-invasive approach of experience sampling method to study a 21st century engineering organization

- Instantaneous sampling provides a snapshot of the activities performed by an individual at the moment the subject receives a survey prompt. These samples take place over several months over random intervals, in order to generate a **random sample of naturally occurring behaviors in the aggregate**.
- Using prompts from emails and text messages, today's web-based technology makes asking respondents to answer a quick question or two fairly **non-invasive.** Moreover, such short questions make it unlikely for any individual to systematically misrepresent what they are doing



Steps Involved in Developing Survey Method

Steps Involved in Developing this Experience-Sampling Survey:

1. Determine the categories of possible tasks completed by engineers using inductive, time diary approach
   - Participants reported on the activities they performed over the previous work day in 15-minute increments, capturing a detailed description of their activities - capturing the rare and common activities each participant performed
   - Representative sample of 16 individuals from each division of prime DoD contractor (8 working-level, 8 management-level)
2. Synthesize these tasks into a list for the survey
   - Grouped and abstracted the tasks using an open coding approach; final list of of 15 activities
3. Finalized the group task list with consultation from participants and individuals in the host organization who work across all engineering disciplines
4. Developed a web-based survey tool to distribute the surveys and collect the data

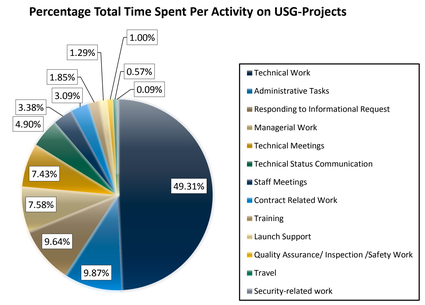
Preliminary Results

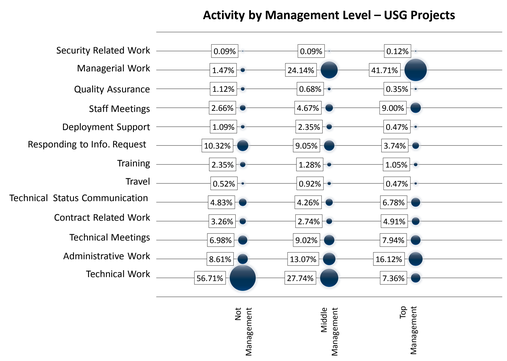
Survey Information:

Phase 1 - Time-Diaries: November 2014
Phase 2 – Survey: May – October, 2015

- Initial sign-up: 450 engineers across 4 company engineering groups (Engineering, Manufacturing, Program Management, Process Improvement)
- Approximately 50 individuals dropped out, 2 weeks had sampling problems

Examples of Preliminary Findings





Future Work

As we continue to investigate the data, we expect to develop a more valid measure of the time-impact of oversight within this company, and we expect to gain deep insights about the nature of oversight's impact.

The method used for this study can also be used in other settings to study the real-time activities of other populations.