GOAL CONFLICTS IN HELICOPTER SAFETY: DILEMMAS ACROSS MAINTENANCE, PILOTS, AND MANAGEMENT

da Mata, Thiago F.,[1] Santos, André G., [1] Abech, Marcos P.,[2] Gomes, José O., [1] Huber, Gilber J.,[1] Woods, David D.[3]

[1] Universidade Federal do Rio de Janeiro, Brazil
[2] Universidade Federal do Rio Grande do Sul, Brazil
[3] The Ohio State University, USA

> *[...] every system is stretched to operate at its capacity; as soon as there is some improvement, for example in the form of new technology, it will be exploited to achieve a new intensity and tempo of activity.*
> (Woods, 2002)

This paper examines goal conflicts in the helicopter transport system for the oil fields of the Campos basin in Brazil. The study team carried out and analyzed over 50 hours of interviews with pilots, co-pilots, managers and human resources personnel of some of the main helicopter companies. About 80% of the oil extracted in Brazil comes from this Basin, located 3 hours driving north of Rio de Janeiro city. The main oil company, Petrobrás, hires 8 helicopter companies for the transportation of about 40,000 people who work on ships and platforms every month.

The main goal of this project is to analyze discover how the transport systems is resilient and brittle given the workload demands and economic pressures. The analysis uncovered goal conflicts that arise at the boundaries of the organizations and how people in different roles adapt to these conflicts.

From a management perspective, each helicopter being operated can be treated as a business unit given the need to keep costs low to ensure profitability. The helicopter companies work for and compete to win and keep contracts with the oil company, Petrobras. The Brazilian government through the Department of Civil Aviation (DAC) enforces regulations to ensure safety including those governing maintenance and inspections.

As each pursues their own goals given their area of responsibility, goal conflicts arise, in particular, for helicopter pilots who have to report potential maintenance problems but can undermine their own pay and the helicopter company's profitability because the timing of inspections delays the return to service. Both the company and the crew earn more money when the aircraft is flying (Petrobrás just pays the company for the hours that the helicopter was flying or, at least, eligible to fly). If a helicopter removed from service for maintenance, the helicopter companies do not earn income and have reduced capability to provide the service requested. Furthermore, officially reporting technical problems grounds the craft until the next DAC inspection (carried out by a contractor) which occur every 15 days. As a result, helicopter can be out of service extra time waiting for the next inspection to release the craft for further service.

The organizational and financial relationships create pressure to keep helicopters flying. Under this pressure, pilots face a dilemma when considering if a problem is major enough to initiate the official maintenance cycle. Pilots may notice problems that are early indicators of future in-flight failures and can report symptoms of problems to maintenance to catch problems before they become a safety threat (plus the substantial direct and indirect financial losses associated with in-flight failures). But sending the helicopter for maintenance removes it from service, losing flight time against a demanding schedule, and the lost flight time directly leads to lost earnings given the financial pay and incentive systems in place.

This is an example of a sacrifice judgment created by pressure to be faster, better, cheaper (Woods, 2005; Woods, 2006). Discovering the sacrifice dilemma allowed the team to investigate how the systems has adapted formally and informally to cope. Figure 1 uses a flowchart structure to capture the basic character of the sacrifice judgment pilots face. The system adapts to categorize problems into two classes: those severe enough to go directly into the official process including waiting for an inspection after the repairs have been completed and others which can be reported directly to maintenance staff for investigation.

The dilemma faced by the pilot refers to whether reporting their claims officially or not. The unofficial route may keep a vehicle in service while maintenance evaluates the information or orders parts or it may decreases the vehicle is unavailable to fly. It is the pilot's responsibility to report officially or not; however, they may not be maintenance experts able to interpret the seriousness of the technical problem.

The room to maneuver arises in part because there is a difference between two rule sets. The regulatory rules (from the DAC) are stricter than the Minimum Equipment List (MEL) rules (an internationally defined list of items that must be functioning in order to for an aircraft to be eligible to fly). Thus, problems can be evaluated and if they fall short of the stricter rules those problems can be reported directly to maintenance independent of the official process.

The analysis uncovered a point of brittleness that leads the overall system to be operating riskier than any party realizes. Identifying a specific naturally occurring sacrifice dilemma allowed the team to critically examine concepts about resilience and brittleness in a specific system. For example, the case involves cross scale interactions as pilots and maintenance adaptations influence and are influenced by management policy decisions in a competitive business environment. Another theme examined concerns—does recognizing a point of brittleness help anticipate how the system can fail and help define interventions? The dilemma arises in part due to gaps at organizational boundaries. How can multiple groups or organizations coordinate roles to ensure resilience?

References

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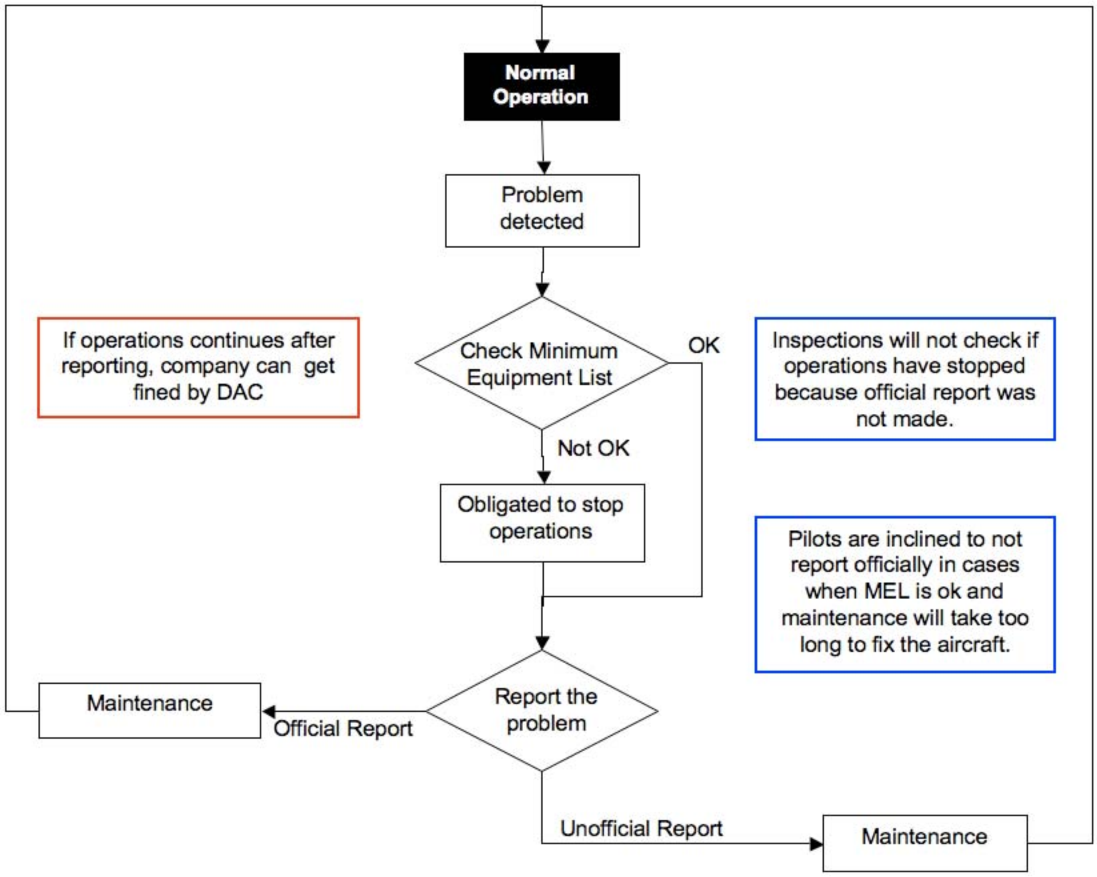

Figure 1. Flowchart of pilots sacrifice judgment.