

2019 Ethics in Engineering Case

Bentley Karma is the CEO of B2K, an innovative small business that has utilized Small Business Innovative Research (SBIR) government funding to advance its new unmanned aerial vehicle (UAV) operations. Bentley grew up in the small town where she started B2K after completing her PhD. B2K's work on previous government contracts has not only positively impacted and helped revitalize the town, but B2K's technologies have caught the eye of government officials, including Senator O'Neill.

Thanks to a successful SBIR Phase I program, B2K secured a Phase II program to fund development of a new sensor and control algorithm that operates on their new extreme temperature processor, which will control a swarm of small covert UAVs autonomously. The novelty of B2K's new processor is that it can satisfy the Pentagon's -55°C to 125°C long-term operating temperature requirement due to its use of a unique combination of rare raw materials¹.

The Phase II funding has permitted B2K to manufacture 50 UAVs, which the company hopes will help it to secure Phase III funding to increase production. If successful, B2K expects the federal government to purchase several billion dollars' worth of this model UAV. This increase in production will lead to tremendous growth and job creation for B2K. Senator O'Neill, who has based his campaign platform on the creation of new jobs, has highlighted B2K as a critical example of the job growth he is promising. Unknown to the Senator, failure to procure the Phase III funding will lead to substantial layoffs across the business, resulting in an increase of unemployment rates in the district and negative publicity for his re-election campaign.

In the last step to secure Phase III funding, B2K must conduct a high-profile customer demonstration, which has been scheduled for two weeks from today. One week ago, Emma Elliott, an engineer and recent college graduate, discovered abnormal test results while completing environmental temperature qualification testing of a UAV. During testing Emma identified that processors in five of the 50 UAVs were not performing reliably outside of a narrow temperature range, and therefore risked potential failure during the demonstration.

B2K does not have any spare processors in stock. B2K's processor manufacturer, MicroBG, told B2K that due to a natural disaster that impacted their primary supplier's ability to obtain the required rare raw materials, MicroBG would not be able to supply additional processors until B2K would be well into Phase III of the program. This would not only impact the demonstration, but the entire schedule of planned Phase III deliverables. However, to meet the demonstration deadline, MicroBG did identify an alternative source of these rare raw materials, but they could not verify the legality of the source.

Thanks to the team's diligence and persistence over this past week, they were able to find online other processors that appear to be compliant with all requirements. However, some of the processor's

¹ When standard processors approach their maximum operating temperature and power ranges, they begin to throttle processing performance and capabilities by as much as 50%-100% to account for environmental constraints. The UAVs require a minimum 85% of the overall processing capabilities to successfully meet mission requirements.

required specifications weren't included in the seller's datasheets, including data on the temperature range, making operational performance uncertain. Nevertheless, Emma is confident that B2K could satisfy all the demonstration needs since the testing will not be performed at the extreme temperature ranges. All 50 of the UAVs B2K has built are needed to perform a successful demonstration in order to cover the area predefined in the statement of work.

Over the past week B2K was also informed that not only would a successful demo lead to Phase III funding immediately, the Department of Defense would like to immediately deploy the existing UAVs for initial operations in the Middle East due to an urgent government need.

Feeling the pressure of the upcoming demonstration, Bentley met with the entire B2K team to talk about the issues and the desired path forward. The team, passionate about the product and excited about the future of B2K, offered differing opinions and options for what could be done. However, as of today, there is no consensus for a definitive path forward.

Yesterday Bentley received a call from Senator O'Neill who enthusiastically told her that he will be at the demonstration advocating for her company and product. He mentioned that he's been working with a large aerospace prime contractor to try to solidify a teaming agreement with B2K, which would maximize future production capabilities. The Senator reinforced to Bentley that a successful demonstration is not only important to B2K and its community, but also his reputation within the state, his re-election hopes, and the effectiveness of the American military abroad.

After the call ended, Bentley dismissed the team from the brainstorming sessions and took some time to reflect upon B2K's dilemma. She would like to ask for a postponement and rescheduling of the demonstration, but the customer program manager told one of her engineers that the demonstration site's range schedule was booked for the next year and the current date is the only availability.

Bentley, worried about her and B2K's future, has contacted your team, a trusted outside advisory board, to provide an urgent independent review of the situation and recommendations for B2K's next steps. You are tasked with presenting to Bentley and the entire B2K team prior to the upcoming demonstration with an analysis of the ethical, engineering, and business issues at play. They are seeking a clear path forward that will provide the best outcome to B2K and the customer.

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