Lockheed Martin Ethics in Engineering Case Competition

Welcome to the 2ⁿᵈ Annual Ethics in Engineering Case Competition

hosted by Lockheed Martin Corporation

in partnership with

The Center for Professional Responsibility in Business and Society

Gies College of Business, University of Illinois.

This Case Competition Guide contains information that will help you prepare for the competition,

including the Agenda, Case, Guidelines for Presentation Materials, Judging Criteria for all rounds and more. Additional information can be found on the **event website**.

Please contact David Gebler at Lockheed Martin with any questions.

WE LOOK FORWARD TO SEEING YOU IN BETHESDA FEBRUARY 14-15!

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Agenda

Thursday, February 14, 2019

11:15am   **Bus leaves Marriott Hotel (5151 Pooks Hill Road, Bethesda) for Lockheed Martin**

(recommended that all participants staying at the Marriott check in early and leave luggage at the hotel)

11:30am   **Gather at lobby of Center for Leadership Excellence (CLE) on Lockheed Martin HQ campus** (6801 Rockledge Drive, Bethesda, MD)

Don't forget your government-issued identification (driver's license or passport).

12:00pm   **Welcome lunch (at CLE)**

- **Blair Marks, Vice President, Ethics and Business Conduct**
- **David Gebler, Senior Manager, Ethics Engagement**

12:15pm-1pm   **Judges Briefing** (while students eat lunch). All judges are required to attend this briefing.

1:00pm   **Round 1 - 90-second "elevator pitch."**

1:45pm   **Round 2 - 10 minutes: Ethics Issues**

3:00pm   **Bus departs for Global Vision Center**

Lockheed Martin's Global Vision Center (GVC) is a state-of-the-art meeting and collaboration facility located in Arlington, VA. The Lockheed Martin GVC showcases the remarkable innovations that continue to serve our customers throughout the world.

4:00pm   **GVC Demo Center Tours & Dinner**

7:30pm   **Bus departs Global Vision Center for Marriott and Lockheed Martin HQ**

Friday, February 15, 2019

7:45am	**Bus pickup at Marriott Hotel**
8:00am	**Breakfast at CLE**
	Group Assignments will be posted for Round 3
9:00am	**Round 3: Full 30-minute presentation**
	Tours of GEOC (Global Emergency Operations Center) for students pre- and post-presentation (at 9:00am and 10:00am)
11:20 am	**Finalists Announced**
11:30 am	**Ethics Awareness Training**
	The non-finalist teams will have an opportunity to experience Lockheed Martin's Ethics Awareness Training.
	The four finalist teams will use this time to prepare for the final round.
12:30pm	**Lunch**

- **Comments from Leo Mackay, Senior Vice-President, Ethics and Enterprise Assurance**

1:30pm	**Final Round**
4:00pm	**Winners announced**
	Presentation of the competition winners, award prizes, and celebrate all the teams' hard work. Verbal feedback will also be provided to the finalist teams.
4:30pm	**Program End**

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 materials[1].

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

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[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.

Notes on Case

This Case, which has been sent electronically to all teams at the same time, will be used for all rounds of the competition.

Because the situation described above is purely fictional and deliberately challenging, there is no single correct solution. Teams may leverage whatever resources they wish (professors, colleagues, internet, scientific journals, etc.) to prepare their recommendations, with one exception: teams are not permitted to contact current Lockheed Martin employees for guidance on this case.

Teams can assume that B2K's core values and code of conduct are very similar to those of Lockheed Martin.

Any questions about the case can be directed to David Gebler, who will determine with the case competition planning committee whether and how to respond to the question. *If* a response is provided, it will be posted to the FAQs tab of the event website, and all participants will be notified via email that new information about the case is available.

Guidelines for Presentation Materials

Deadline

All teams are required to have submitted an electronic file with their presentation materials for Round 3 (and possibly the Final Round) to David Gebler **before 11:59pm ET on Thursday, February 7**. No modifications or additions will be accepted after the deadline. Teams that do not submit their presentation materials by the deadline will not be able to use any materials during Rounds 3 and 4 and will be penalized by the judges accordingly (see *Judging Criteria)*

Format

We are deliberately using the vague term "presentation materials" because we do not want students to feel compelled to create a PowerPoint. PowerPoints, probably the most common type of "presentation materials" in a business setting, are certainly welcome. However, we understand that some teams may prefer to illustrate their recommendations using an infographic (electronic or in print), interactive webpage, etc.

If you are planning to use a format other than PowerPoint for your Round 3 and 4 presentation materials, please reach out to David Gebler in advance for help determining what to send in the electronic file, and how to send it (Lockheed Martin email security restricts certain file types and sizes).

Logistics

All files received will be tested and loaded on Lockheed Martin computers before the competition. Personal computers may not be used for presentations. The Conference Center will have internet capability.

If the materials can be printed, color copies for both team members, the faculty advisor(s) and all judges will be printed by Lockheed Martin and provided to the relevant participants at the event. David Gebler and his staff will work with the team to accommodate any unusual paper sizes or other requirements.

Recommendations
- Don't forget to proofread your presentation materials and have a peer review them. There is nothing worse than seeing a typo on your materials as you're presenting.
- Don't write every word you plan to say on your presentation materials; rely on images more than words to support your presentation. First, no one likes looking at a wall of words. Second, if you write everything you are planning to say by February 7, there will be no way to adjust your presentation in the week leading up to the competition.
- If technology is not your strong suit, or you don't want to worry about a webpage loading while you're talking, stick to the basics and use a file that can be saved as a PDF.

Note: The competition organizers reserve the right to adjust or clarify these guidelines. We expect any changes to be minor but will communicate them to all participants ASAP.

Facility Rules

You will be visiting a facility that requires pre-screening of visitors. You should have received an email from vms.lmsecurity@lmco.com, asking you for additional personal information to complete your visitor registration. If you have not already done so, please provide the requested information ASAP so we can approve you in our LMVisit system.

While on Lockheed Martin premises, non-Lockheed Martin visitors are expected to wear their visitor badge above the waist, where it is easily visible, and must always be accompanied by a Lockheed Martin employee. Participants should listen carefully to the instructions of their Lockheed Martin escorts.

A few additional guidelines regarding the use of electronic devices:

- The Center for Leadership Excellence (CLE) and the Global Vision Center (GVC) permit the use of cell phones and cell phone cameras. The GVC & CLE will provide free guest wi-fi information upon arrival.
- Smoking on our campus is strictly prohibited.

Dress Code

The dress code for this event is business casual (or military attire as appropriate). Participants should dress to impress but not feel obligated to buy a new wardrobe.

Participants should not wear jeans, shorts, t-shirts, sweatshirts or athletic wear of any type. Clothing should not contain any profanity or potentially offensive messages. Shoulders, chests, thighs and toes should be covered. The facility tends to be cool, so consider wearing layers.

Basic Competition Guidelines

All Participants

All participants are ambassadors of the organizations they represent, and they are expected to treat everyone with respect and comply with the letter and the spirit of all competition and facility rules.

Student Competitors

Students are responsible for submitting their presentation materials on time and coming prepared to compete. They should also take advantage of this great networking opportunity and enjoy their time in Bethesda.

Faculty Advisors

Faculty advisors should support and encourage the students as they prepare for the competition. Faculty advisors can suggest resources for students to use in their research, provide feedback on the students' ideas, proofread their presentation deck or talking points, and/or listen to the students practice their presentations. Faculty advisors should help students think through their ideas to determine whether they are reasonable and defensible; faculty advisors should not provide students with what they believe to be "the correct answers" or put together the presentation for them.

While in Bethesda, the role of the faculty advisor is to provide moral support and encouragement, as well as feedback that will help the students learn from their experience. Faculty advisors are not permitted to advise the teams between the start of Round 1 and the end of Round 2.

Judges

Judges are required to disclose any potential conflicts of interest. Every effort will be made to avoid assigning judges to teams with which they could be reasonably believed to have a personal or professional relationship. Judges will evaluate teams' performances using the *Judging Criteria* defined in this document.

Disclosure of Potential Conflict of Interest

The University of Illinois Center for Professional Responsibility in Business and Society, Gies College of Business has been a partner in the development of this program. This year the University of Illinois, through its College of Engineering, is sending a team to compete. Neither the student participants nor the faculty advisor have had any advance access or exposure to any competition materials and have not received any guidance that has not been made available to all competing teams. No official from the University of Illinois will be among the judges at the competition.

Moderators

The Lockheed Martin moderator in each room will be responsible for operating the computer with the team's presentation materials, for timing each presentation and saying "stop" when time has elapsed, for ensuring that judges complete their scoring forms correctly, for escorting teams in and out of the room, and for relaying any issues or questions to the conference organizers. Moderators will not judge the competition and will serve more as a facilitator/host.

Competition Logistics & Scoring

Logistics

Typically, only the two student competitors, official judges, moderator and faculty advisors (from the team's school) will be in the room. Other teams assigned to that room will wait in a separate area until they are called by the moderator to present. All participants will be able to watch teams compete in the Final Round, except the other finalists, who will wait in a separate room until they are called.

Time Limits

A moderator in each room will time each team's presentation and say "stop" when time is up. Judges will be instructed to disregard anything said by the team after this point. Teams will not be given a warning when their time is almost up but may use their own watches or timers to monitor the time.

Score Calculation

Each judge in the room will assign a score, from 1 (worst) to 5 (best) to each team for each of the criteria for that round. The criteria will be weighted equally, and the judges' scores will be totaled to determine the team's score for each round. Students will not know their scores from Round 1 and Round 2 until the results are provided in the morning of Day 2 before Round 3. Student teams who advance to the Final Round will not receive feedback from the judges until the awards presentation.

Round 1

Group Assignments for Round 1 are based on a random drawing. Each group will present to a different set of judges for Round 2

Each team will define the engineering, ethical and business dilemmas of the case and present their solution in a 90-second "elevator pitch."

Teams may not use any notes or visual aids.

Judges will not ask questions during this round.

Round 2

Each team will have 10 minutes to identify and address only the ethical issues of the case: Why is this an ethical problem, and how should we view the ethics of the case?

Teams may use notes but not visual aids.

There will be a 5-minute Q&A period after the presentation, during which judges will ask teams to explain, clarify or defend specific aspects of their arguments or overall presentation.

Point totals from Rounds 1 and 2 will determine the group seeding for Round 3 and will not used in determining finalists for Round 4 or the overall winner.

Round 3 Room Seeding

The total points for each school in Rounds 1 and 2 will be totaled, and the school's will be

ranked from 1 to 14

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On Day 2 the teams will be provided with group assignments for Round 3. The assignments will be seeded based on the aggregate scores from Rounds 1 and 2.

Group	Ranked Teams in each Group
A	#1, 14, 7
B	#2, 13, 8
C	#3, 12, 9, 6
D	#4, 11, 10, 5

Round 3

Each team will have 25 minutes to identify and address the business, engineering and ethical issues of the case only using only the presentation materials they submitted prior to the competition (see *Guidelines for Presentation Materials* above) and any printed notes.

During the presentation, the judges are permitted to interrupt presentation to ask teams to defend or clarify specific aspects of arguments or overall presentations.

There will be a 5-minute Q&A period after the presentation, during which judges will ask teams to explain, clarify or defend specific aspects of their arguments or overall presentation.

Final Round

The team with the most points within each of the four Round 3 groups is the winning team for that group and will advance to the final round.

Each team will have 25 minutes to identify and address the business, engineering and ethical issues of the case only using only the presentation materials they submitted prior to the competition (see *Guidelines for Presentation Materials* above for more information) and any printed notes.

There will be a 5-minute Q&A period after the presentation, during which judges will ask teams to explain, clarify or defend specific aspects of their arguments or overall presentation.

Judging Criteria

Each judge will assign a score, from 1 (worst) to 5 (best) for each of the criteria below.

General guidelines for the scores are as follows:

1 point   Did not achieve any of the objectives; totally incoherent and/or unprofessional

2 points   Achieved, or partially achieved, some of the objectives but missed key elements

3 points   Achieved most of the objectives but left room for improvement

4 points   Achieved all of the objectives with no apparent shortcomings

5 points   Significantly exceeded expectations; went above and beyond defined objectives

Round 1 (total of 20 points possible)

Panel of 3 judges

All teams, 90 second elevator pitch, no visual aids or notes.

Four criteria:

Content

1. Did the team identify and clearly explain the engineering, ethical and business dilemmas of the case?
2. Did the team clearly present their recommended solution and provide high-level rationale?

Communication

3. Did the team present their ideas in a coherent, engaging and professional fashion?
4. Did the team make adequate use of the allotted time without exceeding the time limit?

Round 2 (total of 45 points possible)

Ten-minute presentation of only the ethics issues of the case: Why is this an ethical problem, and how should we view the ethics of the case?

No Slides or visual aids; notes permitted

5-minute Q&A period after presentation (judges ask team to explain, clarify or defend specific aspects of arguments or overall presentation)

Nine criteria

Conceptual Foundation

1. Did the team demonstrate an understanding of the ethical aspects of the case?
2. Did the team consider the competing interests of multiple internal and external stakeholder groups?

Content

3. Did the team identify and clearly explain the ethical dilemmas of the case?
4. Did the team present recommendations that were logical/defensible (i.e. adequately supported by facts, figures and rationale)?
5. Did the team appear to consider multiple potential solutions?

Communication

6. Did the team present their ideas in a coherent, engaging and professional fashion?
7. Did the team make adequate use of the allotted time without exceeding the time limit?
8. Did the students present as one cohesive team?
9. Did the team respond clearly and thoughtfully to the judges' questions?

Round 3 (total of 50 points possible)

Panel of 3 judges

All teams, room assignments are seeded based on round #1 and #2 scores (see above).

25- minute presentation with 5-minute Q & A afterwards.

The top highest scoring team from each group (4) moves onto the final round.

Conceptual Foundation

1. Did the team demonstrate an understanding of the technical/engineering aspects of the case?
2. Did the team demonstrate an understanding of the business/financial aspects of the case?
3. Did the team demonstrate an understanding of the ethical aspects of the case?
4. Did the team consider the competing interests of multiple internal and external stakeholder groups?

Content

5. Did the team identify and clearly explain the engineering, ethical and business dilemmas of the case?
6. Did the team present recommendations that were logical/defensible (i.e. adequately supported by facts, figures and rationale)?

Communication

7. Did the team present their ideas in a coherent, engaging and professional fashion?
8. Did the students present as one cohesive team?
9. Did the team make adequate use of the allotted time without exceeding the time limit?
10. Did the team respond clearly and thoughtfully to the judges' questions?

Final Round (total of 55 points possible)

Top team from each Round 3 group moves to the Final Round

Panel of 5 judges

During the 25-minute presentation, the judges are permitted to interrupt presentation to ask teams to defend or clarify specific aspects of arguments or overall presentations. Only the score from this round determines the competition's winners

Conceptual Foundation

1. Did the team demonstrate an understanding of the technical/engineering aspects of the case?
2. Did the team demonstrate an understanding of the business/financial aspects of the case?
3. Did the team demonstrate an understanding of the ethical aspects of the case?
4. Did the team consider the competing interests of multiple internal and external stakeholder groups?

Content

5. Did the team identify and clearly explain the engineering, ethical and business dilemmas of the case?
6. Did the team present recommendations that were logical/defensible (i.e. adequately supported by facts, figures and rationale)?
7. Did the team appear to consider multiple potential solutions?

Communication

8. Did the team present their ideas in a coherent, engaging and professional fashion?
9. Did the students present as one cohesive team?
10. Did the team make adequate use of the allotted time without exceeding the time limit?
11. Did the team respond clearly and thoughtfully to the judges' questions?

Note: The competition organizers reserve the right to adjust or clarify the judging criteria. We don't expect many changes, but if you see something that is confusing, please let us know so we can discuss a modification. All participants will be notified of any changes ASAP.

Prizes

The first, second, third, and fourth place winners will be announced at the close of the Conference on Friday afternoon.

Each student competitor on the winning teams will receive an Amazon gift card:

1st Prize: $1000

2nd Place: $750

3rd Place: $500

4th Place: $250

Winners who are U.S. citizens or resident aliens will be required to complete a W-9 Form so that Lockheed Martin can send them IRS Form 1099-MISC in January 2020. Winners who are foreign nationals will be required to complete a W-8BEN Form.

Contact Information

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