Lab 04
Part C – Case Study
Description

In this activity, you will analyze a case study related to floating-point hardware.

Procedure

Using the factors of Promise, Credibility, Differentiator, Price, Risk, and Effort of a value proposition [1], read through the following case study [2], and identify how each of these factors apply to you the engineer, and to the company. Use *structured text* (meaning bullets and/or numbered lists).

Scenario

Your company has designed a chip for a new scientific calculator that features high-precision floating point accuracy to 17 significant digits for all 250 mathematical functions provided. After 1.5 years in development, and after shipping over 500 beta units to key customer, the company discovers a problem with certain calculations. In addition, the company has manufactured 5000 more calculators with this chip that are ready to be shipped.

In order to expedite floating point operations (used in handling scientific notation in mathematical operations) in a computer or calculator, certain tables of values often are used to assist in the speed of execution. (For example, a calculator requiring as long as 3 minutes to perform a tangent calculation would have no market appeal.) These tables can contain up to 100 integer entries. During beta testing, you discover that several of these values were incorrectly entered before they were burned into the firmware.

Further testing concludes that because of the location and use of these table errors, the only mathematical results affected will occur in the 13th to the 17th significant digits for the double-precision floating point operations. Your management is applying subtle pressure to release the chips because of the time and money invested to the project so far. Identify a plan of action.

Analysis

After identifying how the value proposition factors apply to you as the engineer and to your company, use these factors to justify a plan of action. Identify at least 5 (technical and nontechnical, with at least 1 of each) ramifications (i.e., consequences and tradeoffs) of taking this plan of action. The value proposition factors may be helpful in discussing possible ramifications. A few options for the plan of action include (but are not limited to)

1. Release the product as is without notifying the customer
2. Use the chips in a different lower precision calculator
3. Throw away the chips and correct the problem

Deliverables

- Write a reflection following the analysis section. For grading, see the rubric, briefly described here. Think of this list as a checklist. Do all of the following:
  - Provide clear and reasonable arguments how each of the 6 factors apply to **you, the engineer**.
  - Provide clear and reasonable arguments how each of the 6 factors apply to **your company**.
  - Describe a detailed **plan of action** (more than the single sentences provided in the Analysis section).
  - Identify at least **5 reasonable ramifications** (mix of technical and nontechnical) of your plan of action.
- Include your reflection in your **informal report** for Lab 04.

Outcomes

- Use critical thinking and the entrepreneurial mindset to analyze a case study.
- Understand ramifications (technical and non-technical) of decisions (eKSO 2a).
- Consider a problem from multiple viewpoints (eKSO 2f).

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1. Building value proposition, Bhupesh Thapar, https://www.linkedin.com/pulse/building-value-proposition-bhupesh-thapar?trk=portfolio_article-card_title↩
2. Flawed chip design, Texas A&M ethics case studies, https://ethics.tamu.edu↩