

Fish and Beer

PHIL 385: Engineering Ethics

1 Fish n' Beer Part 1: Problems as How-questions

B is a young engineer, not yet graduated, working a summer internship with a small and struggling engineering firm called Neptune Dynamics (ND). The survival of ND has depended almost entirely on a single machine which can detect the presence of roe (fish eggs) inside live fish and sort the fish on that basis. Fish are fed through the machine at fairly high speed (3 fish / second) and directed into two different hoppers or holds, or even over the side of the boat, depending on whether roe is present or not. Since this machine can operate at high speeds, in difficult environments (cold, salt-water, moving platform), it can be installed on vessels fishing for roe and used at sea to effectively double the catch with which a boat returns (since the hold only carries fish with the desired roe.) Hence the profitability of the machine. Since it is the females which possess roe, the machine is referred to as the fish-sexer.

The principals at ND understandably wish to diversify their income streams. The core technology of their fish-sexer is the sensors and software which can measure the opacity of an object. A local brewery has been having trouble with the manufacture of their cardboard cases (which hold 24 beers and have built-in handles.) The plastic reinforcing strip which is embedded into the cardboard to give the handles strength has to be precisely placed when punching (die cutting) the handles in the cardboard. If the handle is punched too far from the strip the handle is weak; too close and the strip itself can get punched and strength is again compromised. The strip which runs through the cardboard is not visible to the naked eye and not very reliably placed. When it's being placed in the cardboard it can sometimes twist, wander, or even break. More reliable cardboard is available, but the price is prohibitive.

The brewery has been looking for a system which can control, or at least monitor, the location of the strip as the cardboard is fed through the machine for cutting. The position of the cardboard could be easily (i.e. cheaply) adjusted on the fly. Engineers at ND think their fish-sexing technology can be adapted to the task,

and marketing thinks they see an opportunity to get R and D investment from the brewery.

1.1 Ideas for discussion

Identify problems. Who has a problem? What problem are they trying to solve? (Remember that problems are how questions. State your problems as such.) Pick one of the problems you've identified and "drill down": come up with a very precise and actionable statement of their problem — i.e. one where the how question practically contains its own solution.

Is your statement of the problem also a solution? How likely is it that the solution will succeed? What kind of expertise would be required to assess before hand whether it will succeed, and to help make it succeed?

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2 Fish n' Beer Part 2: Professions, professional, and expertise

[The setup is the same as Fish and Beer I. The scenario carries on here . . .]

B's supervisor P gives B the task of carrying out some measurements on a sample of the cardboard which the brewery uses. The detector of the fish-sexer is essentially one LED and a photoreceptor, placed on opposite sides of the object. The sensitivity of the receptor and the strength of the LED can be set by exchanging various resistors. P wants B to run a series of tests with a bunch of different resistors, on a sample of plain cardboard, and a sample of cardboard + plastic strip, while recording the current through the photoreceptor. The "trick" is to find the right combination of brightness (of the LED) and sensitivity (of the receptor) such that a strong discrimination can be made between whether plain cardboard is present or cardboard + plastic.

B has a different idea. He knows of a device in a lab at school used for scanning materials at a range of wavelengths and intensities and measuring how much electromagnetic energy passes through. His idea is to just take a sample, run it through the machine, get a kind of image, and then calculate the optimal configuration of resistors. He mentions this, over a morning coffee, to T in marketing, but still sets about preparing to perform the tests P has asked for.

At a (pretty small) meeting of the engineering and marketing teams that afternoon, T brings up the issue of testing the cardboard, specifically mentioning B's idea,

and very, very strongly urges P to get the lab test done. T has been convinced (on the basis of what B has said) that this will take less time, and the window on the opportunity for selling to the brewery might be closing. P resists, and disagrees that it will be quicker.

2.1 Ideas for discussion

Discuss professional behaviour in this case. Who acted unprofessionally?

Give precise descriptive statements of what a particular person did that was unprofessional. You will need to be precise in two ways: be precise in your *description* of what they did; AND be precise about is unprofessional about what they did. This will require a definition or rule about what it means to be professional. What should they have done that they didn't do? Or what shouldn't they have done that they did do?

Give a 3 sentence short-answer justifying why that person was unprofessional. (One sentence defining precisely either what it means to be professional (or unprofessional). A second sentence describing precisely what the person did in a way which makes clear that they have violated (or met) the definition you gave in the first sentence. The third sentence will then state your conclusion.