You are working with a Halifax-based startup that applies deep learning models in underwater environments. *DeepBlue Informatics (DBI)* has grown quickly since its formation in 2018. Company founder Felix Apponi believes its rapid growth has come from his formula for success: the best science applied by the best people. You are very pleased to be a part of the company.

Your project team is creating a new system for the next generation of underwater species detection and classification. The eventual product will address problems in two markets:

- Public policy: The need to monitor acceptable levels of sustainability in all forms of biomass

- Commercial: The opportunity to maximize species-specific harvesting while adhering to sustainability regulations and targets

Most monitoring systems rely on either video or audio signals. Both have significant limitations. The underwater environment is filled with sources of noise that interrupt the fidelity of information gathered. This is made more difficult by species characteristics. Some have their own camouflage abilities, others have only subtle variations in physicality, All are more difficult to discern in motion.

Training with deep neural networks has been showing promising results. These networks are producing greater accuracy in identification together with probabilistic representations of movements over time. The limitations of current models are (1) the training time required per location and (2) the computing resources required. Both add costs.

Your *DeepBlue* team has come up with a way to reduce the training time and the associated compute resource so that the system can become affordable for commercialization. The possible benefits have already attracted an investment of $4.5 million from an industry leader, *Offshore Seafoods International (OSI).* The company is eager to use the DBI system to make its operations more efficient. It also wants to show customers that OSI is using the latest science to help ensure sustainability of ocean species. The investment is made in stages. Each stage is tied to DeepBlue meeting or exceeding certain milestones.

Your team had been scheduled to show progress results from field tests three months ago. That presentation was postponed because the system was not performing to expectations. The milestone target was to achieve consistent performance over 33% with the rarest species. The results were showing only 27% accuracy on rare fish, with inconsistent results for camouflaged fish and three other species with similar colouring.

This was a serious setback for DBI. The investment from OSI is tied to meeting certain milestones. Not being ready on time for the last milestone delayed DBI receiving a progress payment of $1M. It also put the remaining balance of $2M in jeopardy.

Your team has worked on crunch time ever since. Augmented data was generated for the rare fish, with additional labelling of training data for the camouflaged and similar species of fish, together with new biologist data. Further hyperparameter tuning optimized the model architecture. The combined efforts took longer than anyone had expected. The model is now performing to targeted expectations, with consistent results of 36%-40% accuracy on the rarest fish. It is possible that, sometime in the future, this might even improve to 50%.

Your team leader is Sania Tuli. Sania has been with DeepBlue since it began. She is proud of the company's reputation, committed to DeepBlue's growth, and has been fully engaged in trying to resolve the issue. She comes to you and says, "This tooth infection is getting worse. I need to have it looked at. I have no idea when I'll be back. It's essential that we tell OSI we're ready with these new results, and to show them as soon as we can. Please contact Mike and give him the background so he can set something up. Better let Helen Barrett know we're ready, too." You ask if there is any specific time to suggest. "Just let them know we're ready and want to show them whenever they can meet with us," replies Sania, noticeably getting ready to leave.

Helen Barrett is the Chief Financial Officer for OSI. She is the second-most senior person in the management of the company. You've never met. Helen is responsible for the financial aspects of the company, including managing its risk. She will not want a lot of detail, but enough to put her mind at ease about the project - this is a big investment for OSI. Helen's experience is in management and finance and she has no knowledge of computer science beyond her everyday use of a laptop and mobile.

Mike Wei is the Director of Operations. He is the product manager for this project inside OSI. He's been in several meetings with your team throughout the project. His reputation inside OSI has been at stake for backing the project since the beginning. He's been anxious while waiting to see if DBI could solve the issue. In the meantime, he has been dealing with several enquiries inside OSI about whether their investment was a good idea or not. Others will want his opinion about whether this new turn of events will work. He will want details. Mike is a biologist by training.

1. Write a memo about the situation to Mike Wei.

2. Write a letter about the situation to Helen Barrett.

For the office address for OSI use:

Offshore Seafoods International, PO Box 1343,
6175 Almon St,
Halifax, NS B3K 6R8

For an office address for DBI use:

The postal address for the Goldberg Computer Science Building

For emails use the conventions

OSI lastnamefirstinitial@osint.com
e.g. *weim@osint.com*

DBI firstname@deepblue.ca
e.g. sania@deepblue.ca