5 Piloting your plan

I may say that this is the greatest factor – the way in which the expedition is equipped – the way in which every difficulty is foreseen, and precautions taken for meeting or avoiding it. Victory awaits him who has everything in order – luck, people call it. Defeat is certain for him who has neglected to take the necessary precautions in time; this is called bad luck.

From *The South Pole*, by Roald Amundsen

Summary

In this chapter we:

- Explain what we mean by a pilot
- Discuss the importance of piloting solutions prior to full implementation
- Explain how to choose a good pilot
- Explain how to run a pilot.

Introduction

You should now have a good marketing plan brimming with growth programs ready for implementation. However complex your plan and its programs, before you commit all the resources required you should conduct a simple pilot test first to ensure that the proposed solution will work with your intended audience. This will give you valuable feedback and confidence before you proceed to full roll out. In this chapter, we explain the steps involved.

Key principles

- Walk before you try to run
- Use lab testing and prototype thinking
- Build the solution dynamically
- Improve your navigation instruments
- Recalibrate as you progress.

Case story: piloting a new idea

In the shallow waters of Gijon harbour, in northern Spain a large yellow fish cuts through the waves. But this swimmer stands apart from the marine life that usually inhabits this port: there's no flesh and blood here, just carbon fibre and metal. This is robo-fish – scientists' latest weapon in the war against pollution. This sea-faring machine works autonomously to hunt down contamination in the water, feeding this information back to the shore.

In Spain, several are undergoing their first trials to see if they make the grade as future marine police. The port at Gijon is being used as a testing environment.

'The idea is that we want to have real-time monitoring of pollution, so that if someone is dumping chemicals or something is leaking, we can get to it straight away, find out what is causing the problem and put a stop to it,' explains Dr. Luke Speller, a senior scientist at the research division of BMT Group, a technology consultancy.

The company is part of the Shoal Consortium, a European Commission-funded group from academia and business that has developed these underwater robots. 'At the moment, in harbours, they take samples about once a month,' says Mr. Speller. 'And in that time, a ship could come into the harbour, leak some chemicals somewhere, then it's gone, all the way up the coastline. The idea is that we will use robot fish, which are in the harbour all of the time, and constantly checking for pollution.'

Ian Dukes from the University of Essex, England – another partner in the consortium – says that nature was an obvious inspiration for their robot. He explains: 'Over millions of years, fish have evolved the ultimate hydrodynamic shape and we have tried to mimic that in the robot. They swim just like fish; they are really quite agile and can change direction quickly, even in shallow water.'

But the researchers say there are other advantages to a fishy design compared with some other autonomous underwater vehicles (AUVs). 'Traditional robots use propellers or thrusters for propulsion,' says Dr. Dukes. 'What we're trying to do is use the fin of a fish to propel ourselves through the water.'

Can robo-fish serve the public well? Tests like this should give some idea. 'The fin does lend itself for a really useful tool in shallow waters especially where there is a lot of debris. We can work in environments that are very weedy, and would usually snag up propellers.' The fish use micro-electrode arrays to sense contaminants. In their current form they can detect phenols and heavy metals such as copper and lead, as well as monitor oxygen levels and salinity.

The team has tried to build in flexibility. Dr. Speller explains: 'We have designed it so you can pull out the chemical sensor unit, and put in different ones for something else, such as sulphates or phosphates, depending on the environment that you are monitoring.'

Once they've sniffed out a problem, the fish use artificial intelligence to hunt down the source of pollution. They can work alone or in a team, communicating with each other using acoustic signals and they can continuously report back to the port.

The trials at Gijon have been designed to put all of this technology to the test to so they can finalize the design of their robots. 'When we have our prototype, then we'll know what needs to be done to make this a complete commercial system. We hope it could happen in the next few years,' said Dr. Speller. 'In the future, what I'd also like to see is not just a single task robot, but robots that can multi-task – robots that can do search and rescue, monitoring for underwater divers, at the same time as tracking pollution.'

Water pollution is an expensive business. The UK's Department for the Environment, Food and Rural Affairs (Defra) has estimated that in England and Wales alone, cost of water pollution in rivers, canals, lakes and coastal waters came to £1.3billion per annum.

But it may be some time before robotic fish become permanent fixtures in our waters. Prototypes currently cost about £20,000 each, although Mr. Speller says costs will drop once more are produced. Battery life is also an obstacle. At the moment, the fish need to be recharged every eight hours.

But, says Richard Harrington from the Marine Conservation Society, if the fish could overcome these barriers they could have a future. 'Ports, harbours and estuaries can be challenging places to routinely monitor for