High-Flying Management Development

Here's how an Australian airline developed crew members—generally only thought of as technical specialists—by honing their management skills.

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You will be paid a very high salary to sit in front of lights and dials monitoring information for eight hours at a stretch. From time to time professional colleagues will give you information and ask for your opinion. You also will communicate with people who are distant in space and time from you to gather technical data on environmental conditions. You are surrounded by highly sophisticated technical equipment. There are times of high mental work activity and critical decisions have to be made quickly, but little physical effort is required. For long periods the job is routine with few major decisions to be made. Automated systems require well-developed monitoring, vigilance, and judgment skills, but when they occasionally fail, you must fall back immediately on your experience and motor skills.

The job description you just read details many of the skills and qualities typical of today's high-tech managers. The job is that of a modern airline pilot.

Over the last year we have had the opportunity to fly with the crews of Boeing 727s, DC9s and Airbus 300s as part of an investigation into the managerial work of aircrews. We have flown thousands of miles in the cockpits, talked to the captains, the first officers, and the flight engineers about their work and learned firsthand what it means to be a member of a highly trained flight deck team.

Our observations indicated to us a considerable portion of an aircrew's work involves managerial activities. The captain and his team are accountable for the safety of more than 300 passengers at a time. In addition there is the enormous amount invested in the plane itself together with all of the ancillary equipment and materials on board. It is a huge responsibility, demanding managerial skills in leadership, planning, problem solving, delegation, motivation, conflict handling, priority setting, and all of the other managerial skills to which we refer when talking about management development.

The captain and crew of the modern jet airliner are not alone in being high-tech managers. People in many other industries have similar kinds of managerial responsibilities—industries where technology is so advanced that, most of the time, the operation will go smoothly and the role of the manager is to monitor and control operations. We have found similar types of high-tech managerial work on the bridges of ships, in power stations, in oil refineries and oil rigs, in the security industry, and in various parts of

engineering, particularly where there is a process industry operating. These are just some examples of what we believe to be an increasing and expanding area where technology and automation are reaching very sophisticated levels and are changing, if not reducing, the technical demands of jobs for which people have been exceedingly well trained.

People who qualify for high-tech positions such as airline pilots are invariably not only very intelligent but highly motivated. They have a professional commitment to their work and wish to be stretched and challenged as part of their personal growth and development. This is particularly true in the airline industry. We have found that pilots have taken a considerable interest and involvement in the managerial aspects of their work once they have had the opportunity to understand the wider context of their job.

Until recently, little attention has been paid to the management development needs of people who manage highly technical operations. Hence, we have begun to look closely at the work these people do and, specifically, at their management development needs. We have called this process high-tech management development.

The cost of poor management

Of the 163 passengers and 13 crew members aboard Eastern Airlines Flight 401 on December 19, 1972, only 77 survived. The regularly scheduled flight took off from JFK International Airport for Miami.

While approaching the destination, the crew tried to lower the nose landing gear. But the green indicator light on the instrument panel, which confirms that the landing gear is in position, failed to go on. The captain tried the procedure again, but he still could not be sure he had his landing gear in position. The indicator light stayed off.

At this point major management problems began to appear, compounding the technical problems the crew was having. See Figure 1 for an abridged record of the cockpit dialogue.

The crew had become so preoccupied with the technical problem of the light that no one was flying the aircraft. For some reason, the automatic pilot that had been put into operation had become disengaged, and no one had noticed the unplanned descent. The plane crashed 18.7 miles west-northwest of Miami International Airport. One hundred and one people lost their lives.

Figure 1—Cockpit dialogue

First officer:	No nose gear.
Captain to airport:	Well, ah, tower, this is Eastern, ah, 401. It looks like we're gonna have to circle. We don't have a light on our nose gear yet.
Miami tower:	Eastern 401 heavy, roger. Pull up, climb straight ahead to two thousand, go back to approach control, one twenty six.
First officer:	We're up to two thousand (to captain). You want me to fly it Bob?
Captain:	What frequency did he want us on, Bert?
First officer:	One twenty eight six.
Miami tower:	Eastern 401, roger. Turn left heading three six zero and maintain two thousand, vectors to nine. Left final.
Captain:	Left three six zero.
Captain:	Put the . . . . auto pilot here.
Second officer:	Alright.
Miami tower:	Eastern 401 turn left heading three zero zero.
Captain:	Okay. Three zero zero Eastern 401.
Captain:	Hey, hey, get down there (in the nose wheel well) and see if that damn nose wheel's down. You better do that.
First officer:	You got a handkerchief or something so I can get a little better grip on this (warning light)? Anything I can do with it?
Captain:	Get down there and see if that, see if that damned thing . . . . .
First officer:	The light won't come out, Bob. If I had a pair of pliers, I could cushion it with a Kleenex.
Second officer:	I can give you pliers, but if you force it you'll break it, just believe me.
Captain:	To hell with it, to hell with this. Go down and see if it's lined up with the red line. That's all we care.
First officer:	Bob, this (light) just won't come out.
Captain:	Alright just leave it there.
Second officer:	I don't see (the wheel) down there.
Miami approach:	Eastern 401, turn left heading one eight zero.
Captain:	Huh? (We did) something to the altitude.
Captain:	What?
First officer:	We're still at two thousand, right? Hey, what's happening here?
	SOUND OF IMPACT

This case illustrates clearly the importance of team management in the cockpit of the modern jet airliner. The team had not managed its work priorities, and as a consequence the crew members were all involved in solving the technical problem. In the meantime, no one was flying the aircraft. Clear delegation and monitoring could have prevented the tragedy.

Collecting data

While this case is exceptional, it is by no means the only one of its kind. In a 10-year study conducted by NASA, over 47,000 incidents of cockpit management problems have been reported voluntarily by crew members. While every incident did not result in a crash or accident, there is

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enough concern to make team management a focus of attention to improve safety.

Trans Australia Airlines was alarmed by aviation statistics that indicate that no matter how technically sophisticated airplanes become, they will still be vulnerable to human error, causing incidents and accidents. The airline invited us to work with aircrews and design a management development initiative that would help them improve cockpit team work. The airline began by conducting a survey in various countries to see what was being done to help aircrew members manage their cockpit and flight operations effectively. Surprisingly it was found that very little had been done, particularly in the area of team management.

We conducted various interviews with captains, first officers, and flight engineers and with union representatives, senior managers, and check pilots and engineers who are accountable for examining their colleagues and licensing them to fly. Initially the aircrews expressed skepticism about the relevance of management principles to their work. They emphasized the high technical requirements of their jobs.

We listened carefully to the issues outlined by the members of the aircrews. We asked them what they felt were the major issues that they had to confront when they were flying. Interestingly, after voicing little interest in managerial matters, they went on to relate, chapter and verse, a number of incidents which indicated major management problems. Examples of these are shown in Figure 2.

Developing the program

It became clear that pilots and flight engineers *did* recognize management problems in the cockpit but could not see how these could be rectified other than through a technical approach. We agreed to work with them to produce a prototype management development workshop focusing on team management.

This was proposed not as a cure-all but as one way in which crew members could assess their own skills and examine a wider context within which they did their technical work. This led to the formation of a steering group involving members of our own team, management, and union representatives of the airline, which outlined policies and principles. Then technical advisory groups were formed consisting of pilots and flight engineers. These groups collaborated to produce the detailed materials required for the team management intervention. We acted as designers.

Figure 2—Critical issues in aircrew team management

Factors	Examples
Teamwork (lack of support and information sharing)	• First officer (F.O.) failed to ensure compliance of captain with checklist procedure • Crew failed to back up captain during high workload period • F.O. failed to monitor captain's actions • F.O. failed to assert when unsure of captain's actions
Ignoring standard operational procedures	• Captain failed to complete checklist items under time pressure
Lack of judgement skills	• Crew demonstrated difficulty in deviating from a set pattern under novel conditions • Crew had no previous exposure to an emergency situation
Performance decrement under stressful conditions	• Poor management of distractions in cockpit • Poor delegation—load-sharing under conditions of information overload
Inappropriate reactions to emotional stimuli	• Failure to report unusual actions of a crewmember who is a friend • Domestic problems intruding into cockpit • Demonstrating feelings at inappropriate times • Allowing development of a tense cockpit atmosphere • Allowing emotions to compromise standard operating procedures • "The wrong stuff"—failing to convey urgency when an emergency exists
"Get-home-itis"	• Cutting corners in order to complete a task expediently
Management pressure	• Captain's inappropriate deferral to higher authority in order to expedite departure
Lack of cockpit discipline	• Complacency leading to poor monitoring • Nonoperational conversations resulting in poor monitoring and support
Communication problems	• Insufficient information passed between crew members
Leadership	• Lack of delegation and clear instructions together with motivation and example

Over the next year we produced a wide range of resources. We were able to create a learning design covering key aspects of the management of flight operations. The program uses a variety of techniques, including the following:

■ specially designed videos illustrating incidents and examples cited by the aircrews;

■ role play situations simulating specific incidents that the crews had to manage;

■ group decision-making exercises forcing aircrews to reach decisions under pressure and learn the principles involved;

■ group discussion relating key managerial principles and ideas to the technical aspects of flying;

■ a team management index specially adapted for the airline that allows the aircrews to gather personal feedback on their own team management style.

The result has been the production of an intensive cockpit management development workshop under the name Aircrew Team Management. During the workshop the pilots and flight engineers deal with issues common to normal management courses: group decision making, planning and priority setting, delegation, communication, and a variety of other similar

topics. However, the nature of the program concentrates specifically on the high-tech aspects of these managerial functions in the cockpit.

Decision making

We realistically simulate a number of potentially disastrous situations. One of these involves the outbreak of a fire on board at 30,000 feet. The crew first has to decide whether they can bring the fire under control. It soon becomes apparent they cannot. They then have to decide how they can best land the aircraft, choosing between three airports fairly equally distant, each with its own advantages and disadvantages.

During the simulation aircrew members try to apply the principles contained in a team decision-making model called SADIE. The letters in the acronym stand for sharing information, analyzing information, developing solutions, implementing solutions, and evaluating performance.

Although SADIE looks like a rather simple model, aircrews have found it to be extremely useful. Under pressure the captain tends to become a "one-man band" who may develop and implement solutions before adequately sharing and analyzing information with crew members. But given the time—usually only two or three minutes—in which crew members have to act when there is an emergency, it is vitally important that they have a systematic approach to decision making and a common language through which they can clarify issues. This is particularly so in a command structure where the captain has the ultimate decision. The SADIE model provides such a system.

Conflict resolution

The program also emphasizes communication issues. This is particularly important in the cockpit where crew members must work very close together for more than eight hours at a stretch, resolving any differences of opinion and conflicts as they go. We found that the aircrews had received little training in conflict resolution. Accordingly, another model was developed which they have found extremely helpful in simplifying the differences between assertiveness and aggressiveness and being supportive rather than submissive.

In poorly functioning teams, captains sometimes become too aggressive, and other members of the crew tend to be too submissive. We gave opportunities for people to practice responding in difficult situations using the conflict resolution model's approaches. We have since found that, throughout the airline, the model's terminology has become accepted, and the crew can communicate more effectively during pressure situations.

Crew reactions

Numerous crew members have reported their views: "I wish I had attended such a program when I joined the airline 16 years ago. I was taught the technical aspect of flying but received no guidance in how to be an effective team member."

"I found the Aircrew Team Management workshop practical and relevant. Flying an aircraft is a team operation, and it is vitally important that we learn the management principles and practices to reinforce and support our technical skills."

"Flying today is no longer a one-man-band operation. It is a complex job where we need to work together in order to ensure the safety of everyone, and training in team management is essential not only for the captain but for all crew members."

These typical comments and views indicate the widespread understanding that aircrew members have of their job and its demands. Our view is that they are not alone. Increasingly the job of the technical specialist is no longer a one-man operation. Such people are part of a team operation. But invariably technical training has not provided them with guidance on the managerial and, particularly, the interpersonal aspects of teamwork.

In the future there must be far more emphasis on high-tech management development and particularly the training aspects. It is important that our training technologies keep pace with the changing demands of jobs. The educational designer is critical in preparing tailor-made materials in a practical way, enabling professionals to build on their experiences and develop a high-tech management focus to their jobs.

Interpersonal understanding

One critical aspect of high-tech management focuses on the relationships between people in work situations. Because technology tends to be the dominant feature of the work environment, team members sometimes pay insufficient attention to interpersonal relationships. We were asked to look specifically at this issue and give guidance in how aircrew members can improve their understanding of their own strengths and weaknesses as well as those of their colleagues.

We introduced the Margerison/McCann

Team Management Index, which had been well tested and developed for use in other management development programs in the oil, manufacturing, banking, and service industries. The index provides a personal profile based upon an understanding of four major factors: how people relate with each other at work, how people gather and use information, how people make decisions, and how people organize themselves and others.

The aircrews initially perceived the index as a psychological measure, and they were skeptical and cynical about its use as an integral part of the program. But after it had been assessed and reviewed by union members, it was agreed that it would be a valuable contribution if adapted to the needs of high-tech specialists such as pilots and flight engineers. Each person in the workshop receives a 3,000-word personal profile based upon their completion of the 60-item index.

The results have been positive. Aircrew members have begun to understand more clearly their own approaches to the job and gain a better understanding of how other people approach it. Aircrew members can now discuss with each other how they prefer to work, and greater tolerance and understanding has begun to emerge between crew members. In short the index and the profiles have provided a catalyst, facilitating greater interpersonal understanding among crew members. This can only enhance communication and safety in the cockpit.

High-tech specialists as tutors

A major feature of the Aircrew Team Management program encourages pilots and flight engineers to tutor their colleagues. We developed a train-the-trainer module in which pilots and flight engineers learn to facilitate the program. This has been a tremendous success because high-tech specialists such as pilots and flight engineers often respond more readily to colleagues who have similar job experience than to outsiders such as academics or consultants.

We have had numerous reports from aircrews that the workshop has been very effective, and a large measure of this is attributed to the way in which operational aircrew members have been able to communicate, as leaders and facilitators, the nature of the program. This is a major point and shows that line managers and specialists can be highly effective as trainers if they have a program which is skills-based, well written and designed, and provides a sound structure. ⬥ 41