

14.1 Human Factors – career capabilities



Flight controllers monitoring airspace.

More than 175 million people take off or land every year at German airports. Their safety is in the hands of the pilots who fly the planes and the air traffic controllers who monitor the airspace. Due to the high level of responsibility, people working in these professions enjoy particularly high standing in society and are paid high salaries.

Working as a flight controller requires continuous high levels of concentration and rapid responses, so it is not surprising that the demands on personal, mental and social competence are particularly high.



Mental performance prerequisites	Knowledge	Personality / Motivation
<ul style="list-style-type: none"> • Concentration • Vigilance (alertness) • Memory retention • Spatial imagination • Numeracy • Ability to react • Cognitive multi-tasking 	<ul style="list-style-type: none"> • English language 	<ul style="list-style-type: none"> • General motivation • Professional motivation • Balanced personality • Teamwork

The following learning modules deal with the personal skills (“human factors”) that are generally required for a successful professional career. Using practical exercises, you can test and improve your own skills. We will also use the work of a flight controller to illustrate specific situations in which these skills are required.

Working as a flight controller is a profession for high-school graduates; it is very demanding, but also offers job security and above-average income.



Training means practising and improving one's skills.

14.2 Mutual respect and disregarding your own feelings

It is important for team work (and for other things) that we don't just think of ourselves and our own needs but that we take an interest in our partner and do not try to compete with him as a rival. Thomas Harris' principle "I'm OK, you're OK" is helpful here. Harris described four possible relationships as follows:

I'm OK – You're OK

People who think of themselves and others like this can assess situations realistically and make their own decisions independently. They can also assess the results of their decisions and bear the consequences.



I'm OK – You're not OK

If someone has this basic attitude, he is really telling other people what is right for them and what they should do (although these suggestions may not be taken kindly), but he is often incapable of recognising his own problems and solving them.



I'm not OK – You're OK

People in this group regard themselves as inferior to others; they have little self-confidence, feel unsure of themselves and are not inspiring partners who one likes to work with. They often acknowledge the achievements of others uncritically and do not give realistic feedback.



I'm not OK – You're not OK

If someone takes this attitude over a lengthy period, he may take little or no pleasure in his work or contact with others – in fact in life in general. Since he is unable to appreciate other people, he isolates himself and runs the danger of sliding into depression or getting other illnesses.



A good way of regarding yourself and others as OK is to use your own initiative (see 14.3 Human performance). This leads to appreciation and genuine interest in our fellow men and women. If I don't put myself under constant pressure to make everything better or more perfect but am still proud of my own achievements, then it is easier for me to acknowledge the achievements of others without envying them.

The idea of describing human relationships in terms of these four basic attitudes is attributed to Thomas A. Harris (1910–1995). He was an American psychiatrist, author and doctor, best known for his book "I'm OK, You're OK", which was published in 1969. This book was a bestseller in the seventies, and its title has been quoted over and over again all over the world.

14.3 Human performance

Spatial imagination

A flight controller operates in a three-dimensional environment in which planes move at high speeds. But the most effective way to illustrate the data is in two dimensions. Aircraft position is indicated graphically as a blip superimposed on the “air map” shown on the radar screen, but the height is shown digitally. That requires a considerable ability to envisage spatial information.

Besides, the instructions on direction must always be correct. This is difficult for the flight controller because he sees flight movements in “plan view”, in other words from above.

An aircraft approaching from the north and turning left is moving to the right on his monitor.

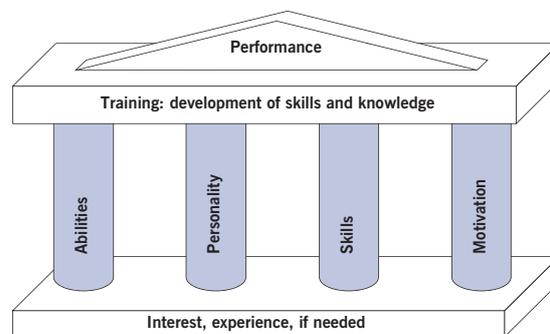
What each of us can achieve (including you as a student), depends on our capability and on our motivation. You can be as brilliant as you like – but if you are not physically capable (e.g. due to illness) or psychologically motivated (e.g. due to reluctance or frustration), your achievement will be well below what one might expect on the basis of your capability. It is therefore important to keep one’s level of motivation as high as possible. Curiosity, interest, strong motivation, as well as the ability to put defeats behind you and remain steadfast in pursuing your goals, are characteristics that can help you to achieve a great deal.

Task 14.3.1

Which motivation killers are you familiar with from experience? Strong motivation is important for the ability to perform well and for success, but motivation alone does not guarantee success as we will see with the example of the flight controller.

Task 14.3.2

Look at the following graphic on the characteristics needed by trainee flight controllers and discuss with your neighbour what skills and abilities are required of a future flight controller. What is specifically expected for the three pillars (apart from motivation)?



Suitability aspects

Some of the most important mental characteristics needed by flight controllers (which are examined intensively using aptitude tests), are:

- **Vigilance:** This is the ability to maintain concentration and alertness over a long period. Even if very little is happening (e.g. if there is not much air traffic), it is important to be alert and aware of even minor changes.
- **Multitasking:** This is by far the most important attribute of a flight controller.

Example of multitasking

An air traffic controller works almost exclusively with digital information displayed on monitors and with information exchanged by radio with pilots or by phone with neighbouring sectors. For example, a pilot must “read back” certain instructions of the flight controller (especially if they relate to changes in direction or altitude or altimeter setting). Often the controller is already thinking about the next step after giving an instruction to a pilot (e.g. “clearance”), but must still pay attention to the pilot’s “readback”; obviously there could be serious consequences if the pilot misunderstands a course or an altitude. The controller often receives a lot of information simultaneously over the radio. For example a pilot may announce that he has no flight plan, so the controller must then write down or capture electronically all the information on the airport of departure as well as the destination, aircraft type, route navigation etc.

Several aircraft may call in at short intervals e.g. when they fly into the sector or if they request deviations from the allocated route. At that point the controller must note which pilots he still has to answer.

Task 14.3.3

Work out your “retention span” in pairs. Each student should write down 20 terms from daily life on a piece of paper. You should then swap papers for 45 seconds and try to memorise as many terms from your partner’s list as possible. Write down all the terms you can remember on a fresh piece of paper. Then work out the number of remembered words for the whole course.

Intense concentration, absolute focus on the task in hand and an ability to tolerate frustration are essential prerequisites for success with this test and with training to become an air traffic controller – and for other achievements as well! But even if young people have these qualities, some of them are afraid to make the appropriate job applications, since they are unsure of their abilities or do not have enough self-confidence. Even from people who have landed their dream job, we hear such statements as “I never thought I could do it!”.

Responsiveness

Apart from making rapid decisions, one must also be able to translate decisions into action rapidly and accurately. Commercial aircraft fly at speeds of around 400 kmh, so a lot can happen in a minute. The controller must be so familiar with the operation of his technical support systems that he could almost do it in his sleep.

14.4 Body language – self-assurance – resilience

In general:

- Your body language should be consistent with your character.
- Body and soul should be in harmony.

Body language is enormously important, not just for presentations, oral exams and similar situations, but because it constitutes more than half of the impression you make on other people.

Examples

- It is not consistent if someone cheerfully says: “Things aren’t going well for me.”
- You do not give an impression of self-assurance at a job interview if your hands are shaking.

First impressions are important!

When we meet someone for the first time, we form that famous first impression within 150 milliseconds to 90 seconds and decide whether or not the person is likeable or competent.

Behaving confidently: posture – gestures – facial expressions – eye contact

Posture is seen as self-assured if the head, neck and back are upright, with the shoulders relaxed and pulled slightly back. Distributing your weight solidly on both feet gives an impression of strength. If you are giving a lecture or presentation, it may be more comfortable to stand with your legs slightly apart and to shift your weight occasionally from one leg to the other.

If you sit upright and lean slightly forward, you give an impression of calm and concentration. To show that you are interested and involved, lean your upper body a bit further towards the speaker or the table during the conversation. This gives a friendly impression and shows that you have nothing to hide.

Many people use gestures a lot. Fiddling, fumbling and fidgeting show nervousness and uncertainty. Sometimes we don’t know what to do with our hands: a pen in the right hand works wonders. You can let your hands hang loose or clasped in your lap when sitting.

A friendly facial expression and an open smile are seen as extroverted (convivial, active, interested) and pleasant. Intensive eye contact (without staring) is essential if you want to appear self-assured and give an impression of self-confidence. Look the other person in the eye, or glance at everyone if you are in a group. This keeps their attention and ensures their support.



Do you believe this little kitten when it says “I know I can defend myself”?

Task 14.4.1

Find a partner and take turns to adopt the following postures. Then note how these postures are perceived:

- a | Shoulders hunched
- b | Raised eyebrows
- c | Sitting upright, knees at right angles, hands on thighs
- d | Upper body leaning back, legs crossed
- e | Upper body leaning far back, head back
- f | Upper body bent slightly forwards, eye contact with the person you're talking to
- g | Upper body bent well forwards, feet under the chair, no eye contact
- h | Upper body bent forwards, hands on the chair
- i | Shoulders slumped forwards, hands clasped and feet together, looking at the floor
- j | Index finger or pen pointing at the other person

Showing initiative

Are you a perfectionist and seldom satisfied with yourself? Do you sometimes slump your shoulders, bow your head and think: "Oh God, what next!" or: "I hope I can manage to revise everything before the exam!"?

Such negative self-assessments are always an obstacle to success, but this will improve if you work on taking the initiative.

Negative personal statements	Positive initiative
How am I going to do all that?	I'll take this step by step.
I'm definitely going to fail.	I've managed everything so far, so it will go well this time too.
I'm so nervous.	Stay calm, I'll take this slowly.

Examples

If you change your posture at the same time, pull your shoulders back, sit up straight and smile, you are already half-way up the mountain. And if you then relax and deal with issues one step at a time, you will be able to look back and be justifiably proud of yourself and what you have achieved. Armed with this knowledge, try to recall previous situations in which you felt uncomfortable and think about how you would approach them now.

Task 14.4.2

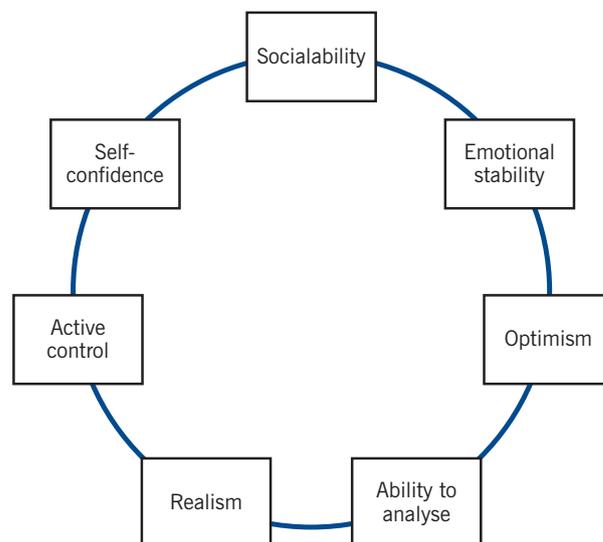
Imagine this situation: you are suddenly called to the blackboard in class and everyone is looking at you. But you are taken completely by surprise by the request, your heart is in your mouth and for a moment you are speechless.

When you do speak you are not satisfied with your comments and blame yourself afterwards, since you could certainly have done better. With two or three good friends, discuss how one could write a new script for this situation so that you are pleased with how you handled it, and act this new version out for the members of your small group. Important: members of the group should regard this as a private matter and treat it as confidential.

Resilience

But what happens if you don't achieve your goals due to circumstances beyond your control? This is when you need true resilience, i.e. the mental strength to learn from a "defeat" and carry on, strengthened by experience.

Resilient people know that crises are not insuperable hurdles or the end of the line. They try to find reasons and focus on the possible solutions that they have discovered. The seven qualities in the diagram below will help you to overcome crises successfully and continue with increased strength and motivation.



Seven properties that help one to overcome crises

The extent of a person's resilience is shown by his confidence in dealing with an emotional crisis and whether he grows from a painful or difficult experience, and learns from it to deal better with future setbacks. Being a good communicator and having a supportive social environment are essential for this. It is very difficult to overcome life crises by yourself, so cultivate your friendships and develop new ones wherever possible. A good network is always useful – not just when your resilience is challenged.

Task 14.4.3

Discuss the qualities needed for crisis management.

The term resilience comes from physics and is used in materials science to describe highly elastic materials that resume their original shape after being stretched or deformed. In behavioural science, one is resilient if one has the mental strength to make the most of a misfortune (a crisis, a disaster or "just" major stress), learn from it and grow as a person as a result.

"Crises are not unusual in people's lives, in fact they are normal"

Bruno Hildebrand,
Sociologist,
University of Jena

14.5 Stress management

Stress activates a response system in the body that helps it to cope with anything that could be classified as a challenge or threat. It is therefore a vital process that has been essential for survival since primeval times. In seconds it mobilises all energy reserves for maximum performance. Some stress is actually necessary to activate people's physical and mental performance. This level of stress is known as eustress or positive stress.

Stress in flight controllers

A flight controller must constantly keep an image in mind of the current air traffic situation and its future development and then implement his plan rationally and consistently. This means working under stressful conditions for periods of up to two hours. For outsiders a typical high-stress job, but for the controller it means dealing with challenges – positive stress.

It gets difficult for a flight controller when the stress levels get too high. The limit varies and depends on many different factors, including the fitness of the air traffic controller or how he or she is feeling on that day. For example, traffic situations that pose no problem on a normal day may turn into a complex, apparently insoluble problem as a result of stress in his private life. Such a situation can also arise if the traffic suddenly increases without warning to such an extent that there is a feeling of slowly losing control. If the safety of aircraft is actually endangered in a critical situation, any flight controllers involved will be severely stressed. Specially trained “peer helpers” are available who can advise and supervise the controllers when needed to prevent the negative effects of such situations.

Because flight safety is a 24-hour service, a controller must work in shifts, which interferes with natural biorhythms. The human body can cope with sustained stress for some time, but without any countermeasures negative consequences become apparent (usually years later), such as an increased risk of heart attacks or stroke, chronic digestive problems and high blood pressure. This means that relaxation, even during working hours, is very important. Facilities at many air traffic control locations are designed accordingly. Controllers can also attend a health resort at regular intervals and must have regular health check-ups with a flight doctor.

Task 14.5.1

Write down the physiological reactions to danger that you are aware of from your knowledge of biology. The stress reaction was originally vital due to its reflex fight or flight mechanism. The prehistoric hunter fought or fled, depending on the size of the threat, and after dealing with the situation he had time to recover. However, if he was under constant stress due to a continual state

What is stress ?

This is an English word that was originally used to designate tension and deformation of metals or glass. The term was first applied to humans in the middle of the last century.



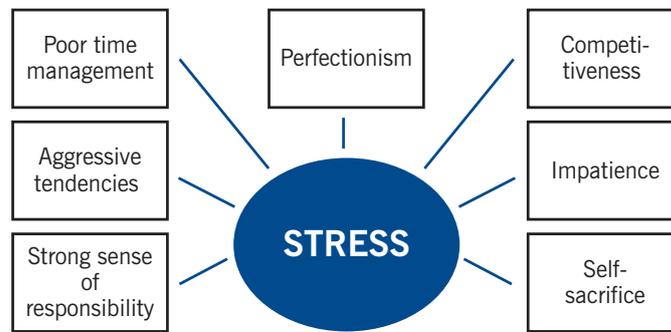
Stress – the body reacts immediately.

of alert, the result was overload and exhaustion – as is still the case for us. Flight controllers try to prevent continual stress by working for no longer than two hours at a time under normal conditions. After that, it is important to relax as quickly as possible.

Task 14.5.2

- a| Which stress-related illnesses do you know of?
- b| Which options do you know that help you to relax?

Stress is positive at first – it is only when it becomes excessive that we become ill. Typical symptoms of personal overload are intense reactions to minor stress, slow recovery from stress, and early symptoms of stress such as headache, back pain and high blood pressure.



Seven stress factors

One's personal outlook determines what is experienced as stress. For example, many people get a lot of pleasure from riding motorbikes, but for others it is pure stress. Stress is often self-generated!

Task 14.5.3

In which situations at school do certain behaviour patterns create stress? Discuss and write them down.

Ways of avoiding stress

Are you a perfectionist? If so, you can help yourself with positive initiative (see 10.6 Body language and Initiative). Any negativity should be avoided: "I just can't do it!" is reworded as "I can do that step by step!" and then put into effect. If one is very competitive it is often enough to be aware of one's strengths, be proud of them and accept one's weaknesses (see 10.4 Self Analysis). When we are at peace with ourselves, we can accept the success of others without envy and be happy with them. Aggressive tendencies can be minimised by listening in the right way (see 10.2 Team Ability). We can then feel quite differently about comments that used to irritate us.

An illustration of aggression avoidance: your parents are complaining again that you do far too little school work and waste your time on electronic games. Try to see this statement as an expression of caring rather than as a complaint. This will cure your immediate urge to give the wastebasket a good kick.