

‘I calculated in my mind how long we would survive’

In Star City near Moscow fighter pilots and scientists become astronauts and cosmonauts. And they become heroes. They may increasingly reject the role, but it is dictated by place and tradition. A visit to Alexander Gerst and his Russian colleagues.

By Eva Wolfangel

1. Emergency in the “Soyuz” capsule

Just short of the safety of the station, the system fails. The International Space Station, ISS, is only a short sprint away. On Earth, Alexander Gerst would cover the distance in a few seconds. But here on Soyuz, just a few cubic metres of air and a thin layer of aluminium separate him from the hostile environment of space. Now, nothing must be allowed to go wrong. So far, the flight from Earth to the space station has been unproblematic, but now, on the last few difficult metres, the automatic system lets them down: Gerst and his Russian colleague, Anton Shkaplerov. The two astronauts engage another system: the one in their heads. They have practised this situation innumerable times so that, if it happens, they respond like robots. They control the spacecraft by hand. Gerst uses field glasses to direct the laser measuring device at a fixed point on the space station. ‘200 metres,’ he says. Shkaplerov responds: ‘And now?’ ‘200 metres.’ ‘Now?’ ‘200 metres.’ And so it continues for an interminable three minutes. Shkaplerov controls the spacecraft, Gerst does the measuring. Nothing moves. Then: ‘195 metres.’ 190. 190. 190. ‘Repeat every 20 seconds,’ Shkaplerov orders. Gerst does. For minutes on end. 180, 180. 180. 175. The cosmonaut flies intentionally slowly. At such close proximity, the danger of ramming the station is enormous. With life-threatening consequences both for the astronauts in the capsule and the crew on board the ISS:

175.

174.

170.

Then a voice off: ‘Okay, next scenario.’ The Soyuz capsule is not flying through space but standing in a huge hangar near Moscow. Next to it are three tables with monitors being studied by the three men who thought up the emergency: trainers at the Russian Space Agency Roscosmos. The emergency felt real but is only simulated. We are not in space – we are in Star City.

Here in Star City is where all the current western manned space missions begin. And in contrast to the journey from Earth to the ISS that only takes six hours, this preparation lasts years. During this time, people change. Pilots, military pilots and scientists become astronauts and cosmonauts. And they become heroes – even before they have left the ground. At least in the eyes of their milieu. Here, they are exclusively referred to as “heroes” – after all, they expose themselves to great danger, the argument runs. And this danger is omnipresent. Every emergency that could occur in space, every eventuality, is played through here. Countless times.

All that practice! ‘Some astronauts call this place the “space camp,”’ says Alexander Gerst, grinning. He leans against a wall with countless switches and buttons in the Russian ISS module. Or, to be precise, in its twin in Star City. The models are as close to the original as possible so that the astronauts feel at home when they really start out. ‘You sometimes forget that you’ll soon have a real rocket carrying 300 tonnes of fuel beneath you.’ All of a sudden, the game gets serious. This rocket can be dangerous, not only when the automatic system fails. Most accidents occur during take-off and on the return to Earth: when re-entering the atmosphere.

Isn’t he scared? Alexander Gerst looks as though he’s fed up with hearing this question yet again. ‘Lots of people ask me that, but no, during my last flight I had a healthy respect for my surroundings, but I wasn’t scared.’ Alright, well, perhaps if he wasn’t prepared. He has a very rational explanation for fear: it arises when you are unprepared for a situation and lose control of it. ‘We run through the worst cases umpteen to hundreds of times to minimise the probability of losing control.’

For that, he spends a lot of time in this closed-off little town near Moscow that started up in the 1960s when the first cosmonauts were trained here. If you want to get in outside the official guided tours for tourists, you need powerful supporters, an official invitation from Roscosmos or relations living locally. It used to be a restricted military area and, to this day, the town with its 6,000 inhabitants is closed to the public. The population largely consists of former and active cosmonauts with their families and relations together with the staff at the training centre.

2. Alone amongst heroes

You soon notice that the buildings are showing their age. Star City was built at the beginning of the Sixties. Yuri Gagarin was not only the first man in space, he was also one of the first inhabitants of the secret city and the first cosmonaut to be trained in the town’s training centre that is now named after him. And he is still the hero of this place today. His statue rises up into the grey skies far above the heads of the people walking the same way he used to. And this is the way his statue seems to be heading, too: from the apartment blocks to the astronauts’ training centre. ‘It’s as though he were still with us,’ says one passer-by, wistfully. The stone Gagarin is very upright, his left arm hidden behind his body, a flower in his hand. Legend has it that

the flower was meant for his wife who still lives in the flat they used to share. Looking out of her window she can see the back of her over-dimensional husband every day.

In every building, the visitor is greeted by a Gagarin statue, a portrait or a mosaic. The hero hovers over everything, including Alexander Gerst as he hurries past Gagarin's plane in front of the training centre enroute from Soyuz training to Russian lessons. 'You can feel the spirit of Russian space travel here,' he gushes. All these statues, but also the old "Mir" modules and "Buran" orbital glider used in training, are an inspiration. He enthuses about the fascinating training setting. But life in Star City does have its downsides: every astronaut has to learn Russian which, Gerst admits, is arduous.

A short while later, he is sprawling in a chair like a tired schoolboy, with an iPad instead of an exercise book, opposite him the Russian teacher with a long pointer in her hand standing in front of a screen, very upright, with a rather stern expression. She checks his knowledge of the Soyuz's new automatic docking system with which he will go into space in 2018. She discusses the correct terms for oxygen cartridges and commands, and, above all, the right grammatical cases of which there are six in Russian instead of the four in German. The language is difficult and here, too, Gerst has to know the right words for all eventualities, be able to decline all the emergencies in his sleep. Because the official language in the Soyuz capsule is Russian, without exception.

This has been going on for years. Every week, Russian lessons, sport at least every second day, simulation training in the Soyuz capsule three times a week, drills in the various ISS modules. Preparation for a space flight takes four years. 'One year is spent training just for the six hours on the spaceship,' says Gerst. Then there is emergency training for all kinds of incidents on the space station itself – from dental operations to dealing with fire, pressure loss or failure of the life-support systems. Gerst commutes between Moscow, Houston and Cologne. He has long since acquired his basic wardrobe in triplicate and is at home everywhere and nowhere. 'I have friends everywhere,' he says. The astronaut community is small. In the evenings he meets up with American colleagues for a beer or shares a sauna with Russian veterans. Some of the first-generation cosmonauts still live in Star City.

Before going into quarantine prior to setting off for Baikonur, there is a traditional farewell breakfast in Star City. Before Gerst's first flight in May 2014, Alexey Leonov, one of Gagarin's former colleagues, took the young astronaut to one side and told him what to do if he felt nauseous during take-off. Gerst is only too familiar with the story of how Leonov, during the first ever extra-vehicular activity in the history of humanity back in 1963, nearly didn't get back into his spaceship because his space suit had inflated in space. It was only thanks to an idea that contradicted all the rules that he was able to save his own life: he reduced the pressure in his space suit, endangering his life at the same time. Luckily, he didn't go into details at this breakfast; the point about nausea had already sufficed to make Gerst feel twitchy.

Whatever, at the end of his stint in Star City, Gerst knows precisely what can happen and what he's doing. He is familiar with every single one of the countless buttons and switches in the Soyuz spaceship. He knows whole chunks of the manual off by heart, even though it is as thick as a church Bible and twice as big, but the crew still conscientiously studies it page by page at every training session and on every genuine flight. It describes every single manual action. When everything goes well, the crew is mainly responsible for monitoring this system. That's the hardest thing, Gerst admits, the enormous concentration of permanently reporting to ground control and still reacting immediately if something unexpected happens. 'We only have a few seconds to notice and respond.'

A problem with the launcher, a hole in the fuel tank, a leak in the oxygen supply: for most conceivable errors there is a plan B, a tiny change of routine. 'It gets difficult when several problems occur at once,' Gerst explains – a situation he knows only too well from his training. Then he has to keep track of exactly when he changed from Routine A to Routine B and how that pans out two hours later if a part of the journey follows Routine C and, at the end, the crew revert to Routine A once again – which, however, has its gaps because of the previous change in Routine. And then there are all these buttons that he must on no account press at the wrong time. For example, the one that separates the space capsule from the rocket. 'You can cause a disaster with just one button,' he says, 'on the spaceship you can make a lot of mistakes when you're overworked.'

3. Switching off the fear, switching on the mind

Fear of the wrong button is something Alexander Lazutkin knows all about. He flew to the Mir Space Station in 1997. Now 59, the mechanical engineer only spent a total of six months of his life in space – and that was 20 years ago. None the less, that is what defines his life. He will always be a former cosmonaut and a "Hero of the Russian Federation". Even though he doesn't consider himself very heroic, not today, let alone at the beginning of his mission, as he unashamedly admits: 'I did feel afraid when I reached the space station. I was scared of pushing the wrong button, scared of breaking something.'

And then one of the worst possible accidents that can happen in space did happen, in an enclosed capsule where no air exchange is possible: Mir caught fire, just a few days after Lazutkin arrived. The crew were sitting together celebrating, as far as celebrations were possible amongst all the cables and devices. It was 23 February, "Defender of the Fatherland Day" in Russia, and the cosmonauts had even brought caviar with them in honour of the occasion. Lazutkin wanted to increase the oxygen ration because with six astronauts on board the Mir was full – Lazutkin's crew had just arrived, the old crew hadn't yet started back to Earth. He was the first to discover the fire that was spreading near the oxygen generator.

He tries to remove the oxygen tank that is already feeding the fire with oxygen, but the fire is too big. 'Then the fire alarm went off, the others appeared, and I saw the horror in their eyes.' The astronauts try to quell the fire with all the available fire extinguishers, but it keeps spreading. Thick smoke everywhere, the astronauts can't see further than the length of their own arms. The smoke is too thick to breathe, they pull on oxygen masks. Lazutkin starts to prepare for evacuation but the spaceship the crew want to use to return to Earth is full of smoke, as well. The path to the other one is barred by the fire. 'I was suddenly very scared,' Lazutkin admits. 'After all, there were no windows and no fire brigade. I thought, "If we fly off now with all that smoke, we'll all die."'

So, he turns back and continues to fight the fire which, finally, miraculously, does get smaller. When the astronauts can see again, the main thing they see is soot. Many parts of the station are blackened, cables charred, but all the important systems are still functioning. It takes days though before the filters can remove all the smoke from the air. 'It would've been a shame to abandon the station if we'd left,' says Lazutkin today, soberly. And it did have a good side: Lazutkin had overcome his fear. 'I thought, well, if we can cope with fire, we can handle anything.'

4. There is no such thing as complete safety

Alexander Gerst also experienced a fire on his first stint on the ISS. A water heater in the Russian part of the station burnt out. The crew only noticed little clouds of smoke around the device when the fire alarm went off. Gerst admits that it initially sent a shock wave through him. 'In the first few minutes, you just don't know what's going on. Fire in an enclosed space is a very serious thing.' When he reached the point in question, the smoke was already under control, the fire had not broken out properly. 'We reacted very well,' says Gerst. Exactly according to plan.

Whilst the fire in the Nineties could have led to a life-threatening situation, by 2014, this kind of event is hardly worth mentioning. The perpetual repetition of eventualities, the many back-up plans, modern technology: Is today's space travel less dangerous than it used to be? Do perhaps today's young astronauts reject the idea of being heroes simply because space travel has become far less threatening? 'Gagarin and Co. set off on an almost untested rocket,' says Gerst. 'Today, we have more safety systems, but there are more places where you can trip up.' People shouldn't imagine space travel is safe. But he is philosophical: You have to assess the risks very precisely and be clear about the residual risk. Then decide whether you want to expose yourself to it. 'We are discoverers, space travel is not an end in itself. And for that, it's worth taking a certain amount of risk.'

Lazutkin says almost exactly the same. He sees himself as a discoverer, too: To see the world from the outside and tell people about it, that's worthwhile. 'The job has become more routine,' he adds, 'but when it comes to actual safety, it's hardly got any safer at all.'

The new confidence he feels after the 1997 fire is soon put to the test once more: in a collision only four months later, the unmanned space freighter “Progress M 34” rips a hole in a Mir module. Pressure in the station immediately drops. If the crew doesn’t fill the hole up quickly, they will all suffocate. Lazutkin has already felt the loss of pressure when the system reports it. And, again, that switch in Lazutkin’s brain engages: ‘At that moment, my head was only there to see what my hands were doing.’

The astronauts try to separate the affected part of the station from the rest. This means closing a hatch, but it is blocked by multiple cables. Lazutkin conscientiously reads the instructions: In this event, the cables are to be cut with a certain knife. The place where this knife is to be found is also described. Lazutkin goes looking for it, but there it isn’t. He finds a smaller knife, takes it with him, but fails: the cables are too thick. Finally, he unplugs every individual cable by hand. The clock is ticking. All the while, the commander is taking the readings and Lazutkin hears how the pressure in the cabin is continually falling and counts the minutes. ‘I calculated in my mind how much time we still had, how long we would survive.’ He finds a key, but it doesn’t fit. He flies through the station again and finally finds the right one. The whole procedure takes 15 minutes instead of the three given in the instructions. Lazutkin holds the door shut like one possessed, he can’t let go even when his commander tells him the pressure is back to normal. ‘I hear what he says and understand that the pressure is no longer falling, but I can’t leave the door.’ Only on the third announcement does he drag himself away from the door.

The crew had been saved. They subsequently survive two power cuts during which they have to withdraw to the spaceship. At which point, the station begins to revolve around itself. Lazutkin and his colleagues hold it on course by counteracting it with the spacecraft from the outside. ‘Of course, the life-support systems had switched off, too,’ Lazutkin casually remarks. Of course. After the fire, almost nothing could frighten him. And after the experience of being completely alone in space. And that is the crucial difference to training on Earth. ‘There the trainers were always around and told us whether we were doing things right or wrong,’ he says, ‘but up at the station I realised nobody could help me.’

All this training and state-of-the-art technology is intended to ensure that nobody dies. ‘But sometimes somebody does die.’ Like the seven astronauts who lost their lives in explosions on the US space shuttles “Challenger” and “Columbia” in 1986 and 2003 respectively, like the three cosmonauts who suffocated in a “Soyuz” spacecraft in 1971, or in 1967 during the first manned Soyuz mission when the parachute failed to open during landing. Lazutkin can quote all the space disasters with dates and casualties from memory. ‘You have these thoughts before the start, but not at the front of your mind.’

5. Hard ride through the atmosphere

Alexander Lazutkin is sad when he has to return to Earth after six months. Right up to his last day on Mir, 14 August 1997, he hopes for a miracle, that they will ask him to stay on longer after all. 'I had just got used to it and experienced the station as a living being, I finally knew where everything was.' In the end, all that is left is the hard ride back to Earth. With a heavy heart he enters the spaceship, not yet knowing that he will never fly again. When the spaceship enters the Earth's atmosphere some hours later at a speed of several thousand kilometres per hour – one of the riskiest moments of a mission – Lazutkin feels the enormous force of the thick layers of air acting as a brake. They push him back into his seat and take his breath away. 'It was an unusual feeling, but I wasn't afraid.' Then he floats down the last few metres to Earth by parachute. 'When I was standing back on the Earth again, I suddenly had the feeling that I wasn't threatened by a drop in pressure anymore. It was the realisation that I hadn't felt afraid in my mind, but I had in my soul. I felt that the inner tension had gone.'

These last few metres are now facing Alexander Gerst. Huddled together like an embryo in the womb he lies in the Soyuz landing capsule, Anton Shkaplerov next to him. Four hours ago, the spaceship undocked from the International Space Station, the astronauts wear spacesuits with an integrated air supply, they can barely move. They have velcroed their notebooks to their knees, Shkaplerov holds a long stick he uses to press the buttons he can't reach in the confined space. Both concentrate on their screens that are divided up into lots of little squares, the retro graphics reminiscent of the game Minesweeper.

The spaceship has one hole in the fuel tank and one in the oxygen tank, a pressure sensor has activated in error and reduced the pressure to practically nothing – this had almost given rise to a deadly vacuum and there had been a number of other problems, too. The astronauts had to resort to various back-up strategies to survive the flight up to this point – and now, at the end, they need to keep track of everything in order to push the right buttons at the right time. If they are out by just a few seconds, instead of landing as planned in the steppes of Kazakhstan where rescue teams are awaiting them, they might end up in the Pacific or Aleppo – places one would certainly prefer not to land.

Soyuz enters the atmosphere where it divides into three parts, the instrument module flies off – only the landing capsule with its heat shield survives the blast of several thousand degrees Celsius of plasma that are produced by the friction with the air layers. Gerst and Shkaplerov have to consider up to 20 different parameters concurrently and decide how they are going to react within seconds. The spacecraft is moving at eight kilometres per second – if you wait for ten seconds, you are 80 kilometres further on. But not even once do they hesitate too long. They float the last few metres down to Earth by parachute, lie there in their capsule, hands folded, eyes almost shut – it almost looks as though they are asleep. The Earth has reclaimed them.

Whilst Alexander Gerst, sweat-soaked, is climbing out of the capsule in the knowledge that he has come a little bit nearer to his next flight and is equipped to deal with many other emergencies, Alexander Lazutkin is standing next to the “Exhibition of the Achievements of the People's Economy” in Moscow, looking a bit lost. He is surrounded by the narrow landing capsules used by the first generation of cosmonauts, historical and contemporary space suits, reproductions of parts of the Mir Space Station. ‘I always wanted to fly to the moon,’ he says and looks somewhat wistfully at the moon rover that resembles a four-legged robot with a huge spherical head. ‘But that wasn’t to be.’ When the Americans won the race to land on the moon in 1969, the Soviet Union’s top-secret moon programme was discontinued.

What has remained for Alexander Lazutkin? The honour of being a “Hero of the Russian Federation.” But this gets on his nerves most of the time, especially how people treat heroes. He describes trying to make an appointment with a civil servant and being ignored by his secretary. Only when she discovers that he is a “Hero” does she ask him to sit down and offer him a cup of coffee. ‘How can it be that, as a person, I’m only worth a kick in the pants, but as a hero, I have the right to a cup of coffee?’ he asks, sounding bitter. ‘And what is a hero anyway? I was only doing my job.’