Peter Schattschneider

The EXODUS Incident

A Scientific Novel

Springer

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Foreword

Of course, a futuristic novel first of all serves to entertain the reader, but it is far from being its only effect. Whether or not the author does it intentionally, science fiction, by taking a look at a possible future, presents a model of tomorrow's society and technological development. In this respect, I am convinced that authors of this genre have a great deal of responsibility, which they may not always be able to live up to. But they should at least be aware of this. I do not intend to say that the occurrence of the future described in such stories is a sign of quality. For I am convinced that the future is not foreseeable. What I am saying is rather that the tomorrow as a model presented should be coherent and based on the facts of modern science and technology, i.e. it should be possible in principle. As a reader, you may or may not like this literary model of the future, and the emotions generated by such reading may even encourage some to make an active contribution to shaping this concrete future of ours. From numerous letters and personal contacts I have learned that my science fiction books and stories have inspired young people to study science or technology. Influencing a person's life path in this way is the greatest praise I can receive as an author for my work.

Peter Schattschneider came to science fiction as a schoolboy—and to an encounter with a comet which seemed to intervene almost fatefully and guide him like the Three Wise Men. This comet appears in the title of my first book published in 1960: *The Green Comet*. This collection of short stories inspired the adolescent for the science in science fiction, as he once told me. Peter later studied physics and is now known as professor emeritus, affiliated to the Vienna University of Technology.

Only later did I learn that there was a remarkable point of contact in both our lives: I had done a doctorate in electron optics, and curiously enough,

decades later Peter chose electron microscopy as a research field. What is even more remarkable is that Walter Glaser, my then very young doctoral supervisor, after his return from the USA became full professor at the very same institute where Peter Schattschneider does research today.

It seems that *The Green Comet* also showed Peter the way to literature. After numerous unsuccessful apprentice pieces he sent me a story manuscript. The year was 1978. Email was science fiction; the text came by mail. I liked it, so I published it in one of my anthologies.

Since then, in addition to many stories, including award-winning ones, he has written an episodic novel entitled *Singularitäten*, published by Suhrkamp in 1984, and more recently, the science fiction novel *Hell Fever*. For the sake of his scientific career, science fiction remained a hobby besides his earnest life as a solid-state physicist at the Vienna University of Technology. He also held guest professorships at the Centre National de la Recherche Scientifique in Paris and in Toulouse. I also remember that he organised workshops on the relationship between science and science fiction, which I find very remarkable.

Now let us turn to his most recent novel, the one before us. Of course, I will not reveal anything about the content, just a few thoughts that came to my mind. The story deals with issues surrounding the limits of human cognition. It also highlights the extent to which science has long since decoupled itself from the reality in which we live every day. The reader may also have thoughts that revolve around the complexity of twenty-first-century science. To what extent do computer representations of processes in nature—a popular understanding tool in science today—actually have the meaning that some people ascribe to them: as a factual representation of reality?

Schattschneider stimulates such *Gedanken* experiments first and foremost with the fictitious scientific-technical appendix, which contains many highly interesting facets on relativistic space travel, Lorentz contraction, planetary physics and also on the error-proneness of simulations. In the interest of the exciting flow of action, the outsourcing of such technical details was the method of choice.

To conclude, the reader is led into a world that appears to be highly fantastic but at the same time stands firmly on the ground of science and technology—just as I imagine good science fiction to be. I am convinced that this work will find a readership at the prestigious Springer publishing house that not only appreciates the sophisticated entertainment but also motivates the curious one to explore the scientific and technical issues raised in the book in some way or another!

PS: Is it pure coincidence that in the last phrase of the novel the Magi, led by a comet as we know, make a brief appearance again? Or are they even a joke that the programmers of our universe allowed themselves?

Herbert W. Franke

Preface

To my knowledge, there is no proper definition of science fiction. *SciFi is everything that can be sold as SciFi*, declared Wolfgang Jeschke, my editor at Heyne, and there is little to object to. In the end, this is a banal case of tacit knowledge—every SciFi reader knows, of course, whether he or she has SciFi on the desk or not.

The definition problem becomes more interesting with hard SciFi, i.e. scientifically based fiction. What, exactly, is a hard SciFi story? How can one safely recognise the science? Giant insects, Godzilla or shrinking people are not among them, not because insects cannot be imagined skyscraper-tall and people cannot be imagined miniscule as a microbe, but because the authors usually are not familiar with the laws of scaling. A tarantula enlarged a hundredfold would collapse under the force of gravity because the fracture strength of the legs increases with the square, but the weight increases with the third power of the enlargement factor. That is why evolution quickly abandoned this idea. And so it goes on—right across topics from all kinds of different areas: superluminal speed, teleportation, time travel…. Exciting, amusing and sometimes enlightening, but on closer inspection they lead to phenomena incompatible with the plot, or to paradoxes as for instance in time travel stories, but this is more than often intentional.

Considering the enormous flood of science fiction literature, there are a few works by a few authors that meet the criterion of hard SciFi: Poul Anderson, Isaac Asimov, Gregory Benford, Arthur C. Clarke, Hal Clement, Cixin Liu, Greg Egan, Robert Forward, Gerard Klein, Larry Niven and Jules Verne, to name the most influentials. Often the scenarios are physically well-founded, but only verbally described. The critical reader of Poul Anderson's *Tau zero* might think: "It may well be that *Leonora Christine's* ramjet engine accelerates

the space ship with 1 g, but if you don't tell us the density of interstellar hydrogen, the scoop radius, the engine thrust and the ship's mass, you can claim a great deal of nonsense."

That said, only a tiny subset of hard SciFi texts can be checked with math and physics. Let me give just one example: the stellar rainbow, that colourful arc of stars which flits about several works of renowned authors. It is fake news. Certainly, the Doppler effect changes the colour of stars for an observer in a relativistically fast space ship, but the subtle details do not lead to rainbow colours. Why this is so will be revealed to the curious reader in the present novel.

The scientific verifiability of SciFi texts was the starting point for a university lecture with the working title "How Physics inspires SciFi", which I developed in the 1990s in collaboration with colleagues from the École Centrale in Paris. We started with a handful of short stories by H. G. Wells, A. C. Clarke and L. Niven and examined the *physics in fiction* mathematically, with at times surprising results. More and more texts were added over the years, so that the course participants were soon able to check selected stories themselves in small groups with basic physics, intuition and creativity. It was great fun.

I have been writing SciFi since the 1970s. The confidence in technology at that time and the later prevalence of dystopia, not accidentally after the Orwell year 1984, provided a fertile ground, the interest of the public was evident, and I was lucky to find friendly editors such as Herbert W. Franke and Franz Rottensteiner. This resulted in the publication of numerous short stories and two novels. Some of them are hard SciFi, but there is little that can be verified mathematically. This is paradoxical in so far as I used such texts in the lecture which I held for many years. The problem is that my topics mostly deal with epistemology: what is real, where does knowledge come from and how can we rely on it? These questions are not far from discussions about an alarming trend of our days: the lure of conspiracy theories. It is not by chance that the *EXODUS incident* touches this sore spot of our days.

When philosophy meets hard SciFi the author has a problem. After all, what should one calculate in philosophy? Which conservation law applies to epistemology? This problem occupied me for a long time until I had the idea of perfidiously entangling the wealth of math experience from the lecture I had held with my colleagues, all that is verifiable and can be calculated, with my more philosophical topic. Here, entanglement can well be understood in Schrödinger's sense, even if only epistemologically. (Trigger warning: this is a double pun.) Out of it the *EXODUS incident* has come into being. In a way, it was the dialectical resolution of a persistent contradiction. The novel can be read as a detective story in search of truth in the abyss of falsehood, or as a

classroom exercise in physics. In fact, the strange phenomena which decorate the plot can be checked with rigid math. The editors at Springer convinced me that so much hardcore physics would go beyond the scope of the series. The interested reader finds the equations and derivations here: https://www.ustem.tuwien.ac.at/exodusincident

During the entire book project I enjoyed support from many sides. I would like to thank my colleagues Pascal Bernaud and Ann-Lenaig Hamon from CentraleSupélec in Paris and Cécile Hébert from the École Polytechnique Fédérale de Lausanne for their careful calculations in reviewing hard science fiction over the years, as well as the students of our lectures in Vienna, Paris and Beijing who critically questioned many texts and gained surprising insights that we ourselves had missed. I would also like to thank Herbert W. Franke—my role model since my first steps as a writer—for his valuable comments, and my agent Franz Rottensteiner who has always given me the best advice. My dear friend Manfred Linke saved me from blathering too much. Lukas Giesinger, good bloke who never says "no" when asked for help, checked the blueprint of the spaceship. His know-how in media design and John Fowler's stunning photograpy made the alien landscape of Atlantis a fantastic experience.

Special thanks go to my test readers Albert Blauensteiner, Herbert "Hörby" Hutter and Brandon Weigel. They discovered a great deal of nonsense in the manuscript. The expertise of Paul Gilster and Al Jackson on the physics of Bussard ramjets was extremely helpful. I am indebted to the team at Springer, especially to Mark Alpert who provided me with excellent support during the phase of translation from German and during proofreading, and to Lisa Scalone for helping me with tedious administrative problems. My thanks are due not least to my partner and all my friends, whom I tormented with tiresome questions and emotional absences during the writing phase. I love you all; you are wonderful!

Vienna, Austria
January, 2021

Peter Schattschneider

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The Novel: The EXODUS Incident

Abstract In the near future, Earth is suffering from climate change, famines, and fundamentalism. A global nuclear war is imminent. Interstellar probes from the Breakthrough Starshot project initiated by J. Milner and S. Hawking have discovered a habitable planet in the stellar system Proxima Centauri, just in time for the exodus of the elites. On board the EXODUS starship, the crew starts to experience strange things. The voyage to Atlantis, the new home for mankind, enters a mysterious and disquieting territory, where conspiracy theories about what is real and what is virtual emerge.

Reality is that which, when you stop believing in it, doesn't go away.

Philip K. Dick

Episode 1 Special Task Force

#No kidding?
The oil wells run dry, and the Gulf Stream's going to die. Two funny hopes for a climate change.

#AliceWonders
EUROFORCE concentrates troops on the Spanish and Italian borders. People are migrating north. Marauding gangs endanger the borders of core Europe.

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Flies buzzed voraciously around the crater. Within 10 meters, the remains of the explosion were scattered in the clearing—tattered clothing, skin fragments, body parts, bone splinters. The body had been ripped apart by a mini-bomb.

Commissioner Oliver Storm wiped the sweat from his forehead and swatted the flies away.

"Damned flies."

"No cursing please!" His colleague Alice Falkenberg insisted. "Speak properly!"

"The flies won't complain."

Disgusted, Storm turned away and checked the area around the bomb crater. They were in a small patch of woodland—gnarled oaks, scattered beech trees, undergrowth, scrub. There, where a tranquil footpath opened to a clearing, lay the victim. The homicide squad's patrol car was visible through the trees and behind it the nearby village: low houses, withered meadows and fields, a church tower.

The forensic robot rolled back to the drone and latched on. The propellers started, the drone took off and disappeared quickly over the woods.

"Do you want to secure anything else?" the Commissioner asked his fellow investigators. The men in protective clothing answered in the negative, closed their suitcases, and set off for the village.

"Okay, Alice, you can send in the street sweepers now."

"Sure thing." She relayed the order to her mobile phone.

Alice poked her foot into the mini-crater that had been torn open by the explosives. Tiny splinters glistening in the sun. Storm bent down, picked up one of the larger ones, and looked at it from all sides.

"Ceramics. Like the others. Same colors, same thickness."

"We'll see. The chemists will tell us exactly."

They circled the site several times hoping to find usable trace evidence. They stopped at the thorax of the torso. The Commissioner pointed at the neck, which was cut clean through. The head was missing.

"Like all the others," murmured Falkenberg. "What's he trying to tell us?"

"Speak properly," Storm mimicked her.

"Huh?"

"How do you know the perpetrator was a man?"

Alice rolled her eyes and said: "All the bodies we've found so far are headless. Is this a signal that his-her victims were too stupid to live?"

"Maybe she's collecting heads. We have, including this one, four female and two male bodies in the series, all decapitated. That's a strong indication of jealousy."

Falkenberg looked at him in astonishment. "Why jealousy?"

"Only if it's a she," he smirked.

"You're so stupid!" She shook her head and trotted to the police car. He followed mechanically.

The analysis of the tracks confirmed what Storm had suspected. Plastic explosives in a ceramic casing had been detonated close to the body. The head was then cut off from the shredded torso. The killer had medical knowledge, as the incisions proved. At the crime scene, neither foot nor tire tracks had been found, only strange indentations like those made by a stick or crutches. Storm pulled the extensive file that Alice had e-mailed him onto the screen. A photo of an attractive woman appeared, including her data.

"Marie Rückert, thirty-two. Saleswoman in a health food store, childless, no ties." Storm nodded. "That's quite something."

"What?"

"Progress. We got this information after only two hours today."

"It's faster when we have a good DNA sample. And it helps that everyone's required to link their personal data to their DNA. When did that become a law anyway?"

"Before your time." *The kids have no idea what it was like before*, he thought. Back when you could go on vacation in Spain. When you could buy a car. Back when things were better.

He wiped the sweat from his brow. "The heat is killing me."

Alice turned the table fan on in his direction. "Patience. The Gulf Stream's going to die. It'll cool down in a couple of years."

"I'll buy you a beer on that." He unbuttoned his shirt collar and leaned into the lukewarm airstream. "Let's go over it again," he suggested weakly.

"We have a saleswoman, a biologist, a nutritionist, an architect, a gunrunner, and an IT expert. The victims are between thirty and forty years old."

"Same age group. The Lost Generation, that's what it was called during the Great Confusion. Not very helpful. The series started with Lorraine Bisset..."

"...the architect. Three years ago, that was. Six months later, Roland Petrides, bachelor's degree in computer science. A week later, Sandra Eckermann, master's degree in biology. Then there's a break—almost a year—until Kelly Clark, the nutritionist, she has a degree from Kings College. Not bad."

Alice continued to scroll through the dossier. He watched her while he turned a pencil between his fingers. Attractive, active, empathic (probably). Everything that he was not. What a handsome couple we'd make—*until you teach me the ins and outs*, he thought in disillusion. At her age, there were two possibilities: career or child. Both would end in pair annihilation. It would be worth it, though, if she was good in bed. A few tricks to get the better of life's dreariness for a short time. No dramatic break-up scenes. When the case was solved, he would leave again. Maybe something could be arranged.

"And six months ago, Otto Freissler," she interrupted his daydream.

"What?"

"Otto Freissler, your old friend."

"The gunrunner. He was actually quite okay. It's a shame it can't be considered an honorable profession."

"All the crime scenes are in the Vienna area. No usable traces except foreign DNA, always the same. Matching the DNA against the sequence database is negative, no match with older hospital or forensic records either. Time of the crime is always at night."

"Witnesses, observations?"

"Nothing useful. Victims met with friends, acquaintances, family, lovers, prostitutes prior to their disappearance. No similarities, no motives, no strong suspicions." Alice shook her head. "The victims disappeared just before the murders. We found abandoned cars on country roads and in parking garages, backpacks on hiking trails, clothes in gardens. The video surveillance analysis was inconclusive."

"What about that case a year ago, what was it called? You know, that upper-class hotel—"

Storm scrolled through the dossier, muttering incomprehensible things. "Kelly Clark, the nutritionist. Worked in London, traveled a lot, some anti-junk food convention in Vienna. Yeah, the four-star organic-mental dingus at Kahlenberg. Security cameras show her entering her room at 10:16 pm. And never coming out. But the next day, the room was empty."

"Was that on Rue Morgue?" Alice asked.

"What?"

"Aah, forget it. Edgar Allen Poe. First crime story ever."

The Commissioner hid behind his display. Literature wasn't his preference. "Well, the patio door was open. She must have climbed down outside, or someone threw her down."

"Looks like the perp knew about video surveillance. An IT pro, a nerd who plans everything down to the last detail."

"What do we know about the procedure?"

"We believe the victims were abducted. Medichip logs show all the victims' heart rates significantly elevated some time before the crime."

"Maybe they weren't abductions. My heart rate also goes up when I see you unexpectedly."

She didn't respond. After a pause for embarrassment, regretting his idiotic remark, he asked, "What about geotracking?"

"That's even stranger. The Galileo data shows no change in location."

"Just before the murders, the chips fail. It's also interesting that we only found the unknown DNA on the victims, not on the items left behind."

"The killer wore a protective suit. Maybe the victims fought back during transport and the suit was damaged."

"Or—this is gonna sound crazy, but did you see the report on the robot army? They use it for border patrol. Maybe it's a Robby behind it."

"I like crazy hypotheses. And I'm sure EUROFORCE isn't telling us everything. Suppose the Terminator abducts the victims, but the killer is human. And he's not in the sequence database. So he's not from Europe. It's not very conclusive, but what the hell with our data situation. What else?"

"The victims didn't know each other, as far as we know."

They were pondering … the decrepit fan rattling in their minds. Air conditioning was only found in the ministry, not in the subordinate agencies.

Everything went to hell. The restrictions, the budget cuts, and one case where they were stalling. The heat wave, the damn tiger mosquitoes, Lassa fever in Europe, Finnish red wine—I shouldn't have postponed my summer holiday in Hammerfest, Storm thought.

"We have two victims who work in the organics sector," he noted. "Three if we include the biologist."

"So maybe the perp is someone who's fed up with the organic stuff." Her voice brought him back from his frustration. She was the only ray of hope here.

"Sure. There's a lot of people who hate that stuff. Pick me."

He held his wrists out for the handcuffs and regretted it at the same moment.

She rolled her eyes in feigned despair.

Three months ago Storm had been appointed Chief Inspector of the Special Task Force called *Headless*, officially because one of the victims, Otto Freissler, had been tracked down by him years ago and put behind bars. The head of a gang that supplied weapons to resistance fighters in Ireland. The man had spent three years in prison. It was suspected that he was the victim of a gang war in which the opponents fought each other with bizarre rituals. The bombs matched those used by both the Irish resistance fighters and their suppliers. It was hoped that Storm's experiences with the victim's entourage would provide new insights into the serial killings, but apart from a further link to arms dealers involved in the Latin American civil wars, nothing came of it.

In fact, Storm had asked to be transferred to Northern Europe, preferably to Sweden, away from Vienna, before his past caught up with him. A past that had to do with the arms dealer in question, with cocaine, and with therapy. He was now clean, but for his former colleagues, there would always be a stigma attached to him. It came to pass that a new leader for the Special Task Force *Headless* was being sought. For Storm it was a stopover on his escape from the past.

Alice had inquired about him in advance. She had been the active head of *Headless* until the departure of Storm's predecessor, who had only been

waiting for retirement. She was afraid that the newcomer would mess up her work, and she couldn't stand that. She loved her freedom and was used to making her own decisions. His dossier revealed that he had an above-average success rate in solving relationship killings. His colleagues described him professionally as persistent to obsessive, and socially closed. He had an excellent reputation as a sniffer dog who made crazy guesses. Up to now, he hadn't made any good guesses about the *Headless* case, but what could he do after such a short time, especially considering the fact that they hadn't found out anything useful in three years? The most important thing was that he accepted her as chief investigator and let her work as she wanted. He played the role of listener and keyword provider—a satisfactory cooperation, she found.

Storm shut down the computer. The panorama screen on the wall turned off.

"I've had enough for today. Want to come for a drink? Maybe the Gulf Stream will start turning sooner."

Alice was tall and slim, dark short hair combed across her forehead. Guarded amber eyes. Attractive by any standards, as well as his. An affair was not out of the question. Fragments of his daydream shot through his head. When the case was solved, he could leave again. The question was how to make her understand. She had been careful and reserved until now. Maybe it was his sarcasm that was rarely well received.

Their conversation didn't stop after one drink. It was the first time since he ran the Task Force that she revealed a little of herself. She talked about her bachelor's degree in forensics, the unexpected opportunity to work in homicide, then the first serial murder three years ago, after which the former boss had surprisingly appointed her as the main investigator; the frustration due to the lack of success in the investigation, contrasting so strikingly with everything else in her professional life, which was clear-cut, unspectacular and mundane. She had a sister who had moved north with her mother years ago to escape the heat. When she went away on holiday, she spent it like so many in the north, often with her family. She took the train to Oslo, because a plane ticket was prohibitively expensive and cost ecopoints. She had no partner; occasional affairs seemed to be enough for her, as he concluded from casual hints from her colleagues. She was considered disciplined. She talked in a conversational tone as if she was not talking about herself but about a good friend. *She's tough*, he thought. Six cases in three years. She hadn't actually made a step forward, and yet she seemed ambitious and determined.

He, for his part, told her about his law studies, the job at the ministry, the advanced training courses in criminology, some successes in murder investigations. He was sure that she already knew this from his personnel file. He didn't mention his student days, the wild parties, his only love Carol, the deep depression, and his crash after her disappearance. Actually, Alice hadn't

revealed anything he didn't already know, but he still felt he'd learned something about her. She was a disciplined, persistent, attractive woman who wasn't averse to a drink after work.

The next day it turned out that the first victim, the architect, was a specialist in timber construction. Alice perked up at the news. "Now we have four murders connected to organics."

"Why four?"

"Well, wood is organic, right?"

Storm sighed. "Actually, a whole lot of things are organic. Even concrete, oil, and plastic."

"To me it's significant," Alice said.

"And the biologist?"

"Marine biology. Algae as a source of protein. Real organic, vegan, etc."

After a pause, Storm jumped to a momentous conclusion. "So we're looking for someone who hates organics so much that he kills anyone involved in producing them."

"Maybe the killer doesn't hate organic products, but the people who promote them. Maybe he's been talked into an ineffective organic cancer treatment, or his kid had developed a vegan protein deficiency."

That wasn't enough. They had to know more about the victims' environment.

"Did you interrogate the acquaintances of this Marie Rückert?" Storm asked. "I need all the transcripts."

"We scanned her private and professional life. There are two work colleagues she had relatively good contact with, and an acquaintance who was pretty messed up when he found out; probably the boyfriend. The transcripts are in the file."

"Parents?"

"The mother is dead. The father and a cousin are on the to-do list. And then, of course, there are residents, shops, bars and restaurants in the area. It'll take some time."

"Good. Would you please give me an analysis of the statements we have? I'm going to visit her father."

Episode 2 Sweet Memories

#No kidding?

Microplastic rehabilitated! It lowers the sea temperature by almost one degree, reflecting the heat of the sun, Canadian researchers say. Waves and feelings are rising because Canada now dumps shredded plastic in the North Atlantic.

#AliceWonders

The armed conflicts on the Polish–Russian border escalate. The Ministry of Peace reports heavy losses by Polish militias, EUROFORCE troops have been bombed. ESA denies rumors of a project EXODUS to evacuate important decision-makers to the Clarke moon base in case of war.

Marie Rückert's father lived in a suburb. Staff cars were only available in acute cases, so Storm took the nearest subway. He crossed the Naschmarkt, that run down former belly of the city, which was no longer even attractive to tourists, leaving behind the gold-crowned Secession, the exhibition hall of the avant-gardists of the early twentieth century. He always found the chiseled dome roof inappropriate and kitschy, and yet he admired the urge for freedom, the spirit of optimism that had permeated everything at that time. But all that was over now, buried under rules and decency.

He got off at the last stop. A drone hovered over the station. The times were restless, so surveillance was the order of the day. Storm questioned his smartphone. It was a twenty-minute walk to Rückert's residence. That's how much he walked each day. He was well within his typical mileage. If he kept going like this, they'd raise his health insurance premiums.

On the way, he met a protest march of the doomsday people. The leader of the procession held a crucifixus automaton close to his chest. Serious faces, mutterings, crosses. The crowd moved as if through invisible mist, a sad line of people. The crucified robot's face was distorted by simulated pain.

"Behold the signs, Armageddon is near! Repent and pray. For nothing will remain but love." The robot spoke in a deep voice that did not fit the tiny size of the machine at all.

Four young people came to confront them. They wore the Thunberg adepts' sign of hope on their linen jackets. Their leader planted himself in front of the crucifix bearer. The parade came to a halt.

"Why are you people talking about love? Love is for fucking. You want to do something good? Save the planet!"

The crucified puppet looked down sadly at the planet saver.

"The Lord gave, the Lord hath taken away."

"What a shit!" The boy began to jockey with the cross-bearer. He and his friends tried to snatch the praying machine. Soon the formerly peaceful demonstrators pushed the young people to the ground and started kicking them. Storm ran toward them and tried to stop the kickers. When they didn't react, not even when he called "Police!" several times, he intervened in the fight by trying to break up the tangle. Several men dragged him to the ground. With