



Royal Air Force **Stories from the Future**

ficint¹ [fik-in't]
(noun)

Fictional Intelligence; useful fiction, a meld
of narrative and nonfiction.

(See also: speculative fiction)

¹ Credit: August Cole and Peter Singer - <https://useful-fiction.com/why/>

CAS Note

Welcome to our 3rd edition of Astra Stories from the Future. When we launched Astra Stories from the Future at the beginning of 2021, we were overwhelmed by the interest, positive comments and ideas we received from people of all ages and backgrounds. It was enough to convince us of the appetite for a 2nd edition, exploring elements of the future operating environment, and now we have a third.

This edition explores potential roles and missions in the future, and the viewpoints of the people conducting those missions. Unlike the first release, none of these stories are placed precisely in time and place, so an open imagination is required. They are researched carefully by the writing team and, however fantastical they might seem, there is a thread in every story to the reality of today. I encourage you to explore some of the additional reading that the various creators have provided for insight on how each tale came to be.

I guarantee that some of you will disagree with some of the ideas, and some may feel exasperated by what they read. But in your frustration, do remember the purpose of these Stories from the Future is to provoke, stimulate, and start conversations amongst your colleagues about our Next Generation Royal Air Force, what it will be like, and our journey to get there. Those conversations are the successful outcome I seek.

Do enjoy these short stories. I invite you to place yourself in these imagined situations and think about the characters and how they might reflect upon us and our challenges today. Did we prepare them for their challenges? If not, what could we and should we have done better?

Air Chief Marshal Sir Mike Wigston KCB CBE ADC
Chief of the Air Staff

Introduction

Edition 3 continues to explore possible futures of the Royal Air Force. In this release, special focus is on the roles, missions, and societal relationships from a variety of perspectives.

Each story stands alone in its own unique future world. These worlds pull themes from a variety of sources and motivations. Readers are encouraged to read through publications such as Global Strategic Trends to further their understanding.

As in all the releases, conceptual questions are provided to start conversations related to elements of the stories. While the provided Further Reading does not reflect the full repository of sources the creators drew from, the references should draw out further details for your discussions.

These stories are intended to spark engaged debate...they are simply stories. Many story elements will be much closer to the present day than one may initially think. Some elements represent trends that we hope to avoid. All should be cause for some reflection.

This issue also reflects the widest variety of creators—we have had collaboration with other government departments and academia, both regular and reserve forces along with civil servants, contractors, cadets and friends of the RAF family. The future is envisioned today in the minds of these creative individuals. We thank them for their efforts.



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Spaceprox

Jan sat back from his keyboard. 'Can I pinch some of your cream?'

'Feel free.' Lucy did not look up from the list of co-ordinates on her tablet.

Jan picked up the small dispenser, rubbed the cream into his wrist and tutted.

'I've got to be more careful when I'm out on the bike. I got sunscorch from my ride.'

Lucy shook her head. 'You'll get a tidemark.'

'A tidemark?'

'Yes, a tan band where you've been exposed. My grandmother called them tidemarks.'

Jan nodded and held up his wrists for closer inspection. 'I don't know about tidemarks, I certainly have red marks. Not good. Isn't it amazing that our grandparents used to fly to other countries to just lie in the sun while we try our best to avoid it.'

Lucy nodded as she started to input co-ordinates to her monitor; her fingers flickering over the screen. 'Well, they had more ozone back then for protection.'

'Hmm. I guess they did. Shame they didn't leave some for us.'

'Come on, Jan. You know what Ms Thunberg says, don't blame...'

'I know,' Jan cut in, 'don't blame the boomers, it's not their fault. Well, it is partly their fault but in the spirit of forgiveness and so on... Greta Thunberg has moderated since she became Secretary General. I was reading that she railed at the UN as a kid.'

'She did, and from what my parents say, we needed her. The boomers needed to sit up and listen.' Lucy pointed at the monitor they shared. 'And now, the low-earth orbit needs us, so, if you've finished treating your UV-scorch can I point you towards the small matter of today's sweep shift? There's an obsolete SpaceX GPS that needs disposing of.'

Jan held up a placatory hand. 'No problem. I see you've put up the first co-ordinates. You steer and I'll navigate?'

Lucy smiled to herself. She liked working with Jan; the long shifts at Space Command were eased by his sense of humour. He often bemoaned the fact that his childhood ambition to be one of the first men on Mars had led him to an air-conditioned bunker in Buckinghamshire and, much to the annoyance of their boss, described himself as a Low-earth Orbit Trashman on his Vero profile.

She knew it was all a bluff and that he loved his job with the SkySight squadron as much as she did. Flying 'a sweeper' to protect the RAF's satellites from debris in their orbits gave her huge personal satisfaction. What had excited her even more was the recent decision to transfer some of the network's surplus capacity to the UK Space Agency, allowing it to use remote sensing technology for tracking the

detection of illegal deforestation and industrial emissions. Now *that* was a subject close to her heart.

Lucy was among many of her generation who were brought up with an ethical stance beyond the environmentalism values taught at school. She was one of the first students to graduate from the UK's first zero carbon university and, like her parents, was a vegetarian before it became common practice. She was planning on taking her career break from the RAF to work with a satellite monitoring team for one of the big environmental charities then hoped to transfer to the Environmental Command Wing on her return to the force. Jan interrupted her thoughts.

'Lucy, there's been a vector change in one of the sats near the SkySight 6 pattern.'



'I'm on it.' Lucy brought up the SkySight 6 plot and scanned the recognition codes of the sats near its path. There it was; a former commercial Communications Satellite, one of the thousands launched in the 2020s in the race to meet the demand for broadband internet in the world's most rural areas. Once redundant, they had been bought up by developing states and some dubious non-state groups for their own ends.

Lucy ran a projected flight sequence and felt her pulse quicken. She reached out to enlarge a segment of the monitor so Jan could clearly see it. His eyes widened.

'Collision course.'

'And we've got less than 30 minutes. Run the data, Jan. Find out who that registration belongs to while I alert the NSpOC.'

She selected the National Space Operations Centre directory, found the SkySight 6 operator avatar and pressed the alert code. The operator's reply flashed to her within seconds.

'Okay, Jan, the Six team have eyes on and will be contacting the sat's owners, if they can trace them. No doubt it will be Liberia registered on behalf of goodness only knows. How's it looking?'

'It's still on course for our sat. Either they alter course, or ours does. If not, we'll have a lot of cleaning up to do in half an hour.'

Lucy's monitor pinged. 'It's the Six team. They aren't expecting to trace the owners in the time we need. As far as they are concerned it's a rogue. The Six team are going to alter course.'

She and Jan watched as the projected flight of the SkySight 6 altered until the pulsing lines displaying the paths of the two satellites uncrossed then ran parallel. Jan exhaled loudly.

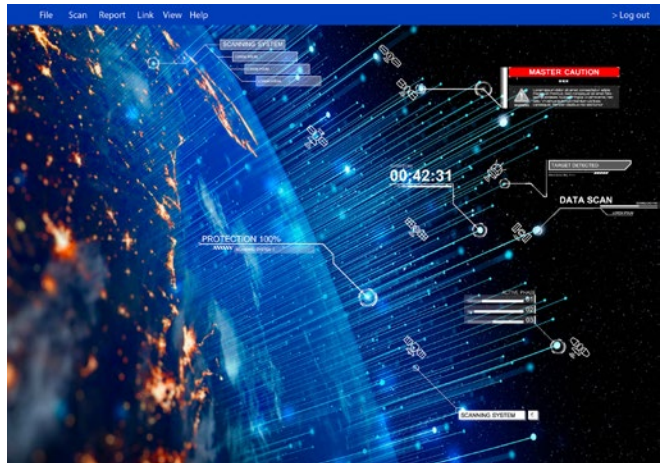
'Wow, excitement over. Where were we? I'll get on course for that old SpaceX GPS.'

Lucy watched the two icons of the sats on their parallel paths then swiped the screen to change the display and turned on the Sweeper's cameras. She never tired of the views and flicked through the cameras to check their serviceability, lingering on the one that showed the earth below. She started to run through the serviceability checks.

'All visuals working.' She toggled the joystick and moved it through its arcs, watching with satisfaction as the grab arm of the Sweeper responded. 'Sweeper arm responding... fuel cells at normal, skin temperature normal.'

A soft chime interrupted her, and a line of text ran across the screen.

'It's an NSpOC alert.' She knew what was coming as she scanned the incoming message. 'That rogue has changed course again. The Six team are altering our sat



in response and are warning us to stay clear in case there's post-collision debris. Collision point is minutes 13'

Jan was preparing to set a new course. Lucy swore.

'Language,' said Jan in mock severity. 'Don't get het up. Our system can afford to lose one of the sats, Lucy. They can patch and repatch. We won't lose capability.'

Lucy shook her head. 'If we lose that one... it's the one they retasked to the Space Agency. It's tracking illegal deforestation in the Amazon.'

'Ah, I see.' Jan nodded. He had known Lucy long enough to understand her hatred of illegal loggers and the corrupt states which allowed them to operate. He glanced at his team-mate and could tell by the set of her jaw that she had come to a decision.

'We can't afford to lose it, Jan. What are the courses looking like?'

Jan pulled up the plot. 'Hmmm, the NSpOC has changed our sat's course again but I think they're too close to avoid collision. It'll be close.'

'I'm engaging.'

Jan looked at her. 'Whoa there, hold your horses! That's not our order. We were told to steer clear in case any debris hits the Sweeper. We have no idea who that sat belongs to, and if it's who we think it is they won't take kindly to the RAF trashing their spyware.'

Lucy stabbed at the screen and muttered the flight calculation to herself. 'Jan, I know I'm stepping outside the Rules of Engagement. Your objection is noted, for the record.'

'Lucy, if we engage that rogue and destroy it there'll be all hell to pay. We're at least looking at international legal action, at worst... they'll accuse us of breaking the space hardware protocols. The response could be retaliatory action. Let's steer clear and hope it misses.'

Lucy drew a breath to steady herself. 'You know what I think? They don't want us monitoring the logging. They want the evidence destroyed, so I'm going to take hold of their junk sat and send it into the atmosphere for a burn up. Not the best solution, I know, but this is an emergency.'

Jan laughed. 'You crazy greener. Let's do it! I need a career change after all.' He hunched over his keyboard to bring the Sweeper onto its new flight path. 'Let me run the plot.'

Lucy switched to the Sweeper cameras. She could see a winking object, silver in the sun's rays. 'I have eyes on the rogue.' She turned on the grab and flexed her hand before settling it on the joystick.

'Thrust engaged,' said Jan. Lucy saw the video feed shimmer as the Sweeper cameras vibrated in response to its engine.

'We have one chance to grapple, Lucy, or miss the rogue completely and say goodbye to our sat and have a lot of cleaning up for our old Sweeper, that's if it survives all of those nuts and bolts that are going to be flying around.'

The shape of the rogue had grown in the video field as the Sweeper closed the distance. Lucy could make out a large solar panel on one of its sides as she moved the grab arm from its cradle.

Jan's voice was calm by her side. 'Nine minutes before the rogue impacts. Three minutes will put us in grab range.'

Lucy was aware of her breathing as she and Jan watched the rogue sat start to fill the screen. She flexed her fingers and replaced them on the joystick.

'See that?'

She shook her head. 'What?'

'There. That movement. It's changing path.'

As Lucy stared the rogue sat start to revolve. 'You're right. It's answering its handlers. They must be trying to change course.' Another chime. 'Ah, here's the NSPOC update.' Lucy scanned the message. 'The agent for the owners has responded to say they have found the glitch and have control.'

She acknowledged the order and turned off the grab.

Jan pointed at the projected flight paths of the rogue sat and the SkySight. 'They're diverging. Yes, look at that. It's off.'

Lucy sat back in her chair, feeling drained.

Jan exhaled slowly. 'That was close.'

'It certainly was. Best not mention to anyone that we were about to grapple with another country's space hardware.'

Jan nodded. 'Yes, let's keep it to ourselves.'

Lucy laughed. 'Plot another course please, Jan. Let's find that SpaceX GPS. While you're doing that, I'll start on the post-mission report.'

When they stepped outside after their shift, Lucy and Jan headed for the all-ranks mess where the sun was low enough for them to sit outside with a drink. She bought Jan an iced tea and flopped down in a lounge next to him.

He raised his glass. 'Here's to the Sweeper and her gallant crew.'

She laughed as they clinked glasses. 'Well done, co-pilot.'

Jan looked thoughtful. 'That sat... do you think... well, its behaviour; almost as if it was...'

'Testing us? Testing our response?'

'Yes. Or am I reading too much into one rogue sat?'

Lucy sipped her tea and nodded. 'I had the same thought. The way it nudged itself close to the SkySight then backed off when we came close. It's probably

co-incidence, but it's something to bear in mind. There's a lot of junk up there that could be weaponised.'

'Do you think it's the usual suspects?'

'It could be or it could be people with financial interests in illegal logging. Probably both. As you know, it's big business.'

They sat in companionable silence until Jan cleared his throat. 'You know when we were talking about Thunberg?'

Lucy peered at him over her sunglasses. She knew by the tone of his voice that there was a joke forming.

'Well, I was thinking about your bio. And I've put two and two together.'

She knew what was coming. 'Yeah, yeah...'

'I remember you told me your parents were activists and you being a bit of a greener yourself. Well, is it true?'

Lucy put her cup down and raised an admonishing finger.

'Yes, my middle name is Greta... I'm named after the great Ms Thunberg and if you make fun of that fact, I swear, I'll...'

His shoulders shook with laughter. 'It's a lovely name and one you should be proud of.' He raised his cup. 'Here's to Greta.'

Questions

- What are our responsibilities for protecting and defending in the space domain?
- What should a Space Treaty cover and how successful do you think they can ever be in governing activity in space?
- Can we afford to create space debris during space conflicts?



Collateral

The CO motioned towards a seat and smiled gently at Ava. 'Thanks for coming, Ava. I know you're still on compassionate leave, so I appreciate you making the effort.'

Ava nodded and forced a smile. 'No problem, Ma'am. I'm happy to oblige. Actually, I think I'm ready to return to work. I...'. She stopped as the CO held up a manicured hand.

'That's good to hear, Ava, but the Doctor disagrees and wants you to follow protocol. You were closest to Sarah, and you were badly hit by her death. We want you to take the time to... to take time for things to heal. It was... it was terrible...'

'She wasn't drunk.' Ava glared across the desk.

The CO held up a hand. 'Ava, listen.'

'She wasn't drunk. I was with her all night, and she never touched a drop.'

The CO sat forward. 'Ava, you must listen.'

'I still stand by what I said at the inquiry and the verdict is wrong. It's all wrong. Blaming her for her own death is... is obscene. There's been a mistake. She was a first-class pilot.'

'Ava, listen to me. I know what happened. I know the truth.'

Ava looked up, wiping the tears that were starting. 'You know?'

The CO took a deep breath and steepled her fingers. 'I have something to tell you, Ava. And what I am about to say must never leave this room.'

Sarah woke and smiled to herself as she remembered the previous night's end-of-course function. Ava, her friend from the first days at Cranwell, had gone to the party with her and they had laughed together for most of the night. The event marked her completion of 'the swarm', the final phase of her Tempest flying training in which the technicians had fully enabled the control of her temple neural sensors.

Ava was a data analysis officer and being 'desk bound', as she called it, loved to hear how her friend's pilot training was going. She had been fascinated at Sarah's explanation of how the neural sensors communicated with drones which were connected as a 'swarm' to gather intelligence or attack targets.

Today was Sarah's first sortie as a swarm pilot and as she showered her cubicle lit up with a holographic weather forecast. She checked her Comms Mod for messages as she walked to the mess for breakfast. She was hoping for a better day today. Yesterday her voice-operated door had decided to lock just as she was leaving, trapping her in her room for twenty minutes. It was one of a series of frustrations that had occurred in recent months, including a glitch with her bank

account and an embarrassing episode with her electric car which had resulted in a near miss with the RAF Marham gate guard. It was still being checked by the IT engineers who were baffled by the failure of the manual steering over-ride.

After breakfast she took the shuttle across the airfield. The journey removed the risk of surveillance of personnel following the hacking of some older satellites by cyber terrorists. Sarah underwent her flight prep and planning for the sortie, using virtual reality to 'fly' the route, observing key features and the target. The software mimicked the cockpit HUD of the Tempest which had recently undergone an avionics upgrade for better data streaming and drone control, using learning points from Project Mosquito and LANCA. The extensive use of next generation machine learning and artificial intelligence meant the aircraft and its drones 'thought' for themselves and required the pilot simply to authorise the attack.

As the engineers loaded the mission data onto solid state memory and transferred it to the aircraft, Sarah walked around the Tempest for her pre-flight checks, smiling at the weeds that grew near the pan where there had been a biofuel spillage. Among them were dandelions, the emblem for the squadron, which had not been dug up because it was considered unlucky.

The single engine burst into life as its turbine spun up, the chocks recessed into the tarmac, and she gently pushed the throttle forward to follow her lead pilot to the taxiway before sweeping around to the runway.



As the two aircraft soared into the sky, Ava stood watching from the terrace of the mess and smiled. She had hoped to meet Sarah for breakfast and wish her luck but had missed her. She had just sat down at a table and was scrolling through her messages when the dull crump of an explosion rolled over the airfield.

Ava sat in silence. She fiddled with the tissue she had used to dry her eyes.

The CO took a deep breath. 'The investigation did not stop after the inquiry was closed, Ava. You weren't the only one who disagreed with the verdict. The manufacturers were baffled. You can imagine the pressure they were under internally to find the fault. Then they found it; in the flight control firmware there was a small file which had the ability to turn off pilot control and bank the aircraft. It took full malware analysis to identify it.'

Ava sat forward. 'But, but they blamed Sarah. Why didn't this come out in the inquiry?'

The CO laid a hand on her shoulder. 'I'm coming to that. Please, Ava, you must hear me out.' She returned to her chair behind the desk. 'A technician working for, let's say non-state actors, had managed to secure a job within the maker's high-security environment just over two years ago. The vetting and security checks had not picked up his false identity. He was caught by chance, for domestic violence, and his DNA flagged up his real identity.'

'He's admitted everything. He worked on the Tempest. He used a coding script which he smuggled in bit by bit in his clothing and injected it after the SecDevOps cycle. There was a large-scale tightening in the security of software development back in 2019 following an attack on the supply chain of a US software supplier called SolarWinds. Since then, the only real way to inject malicious code into a system is via an insider. He also had back up. A separate part of his group had performed the OSINT, the social engineering, via her online activity. Did she tell you about the fault she had with her car?'

Ava nodded. 'She did. That was them?'

The CO sighed. 'Yes, they were going to use the car as a weapon if the attempt on the Tempest failed. They had hacked into everything she had. Her bank, even the station's security systems. Her digital profile had been scraped clean. There had been warnings. The Cyber Reserve Personal Surveillance team had warned her that her digital profile was reaching amber. She just loved those space reality games. That's how they first found her profile. They had implanted the malware into the Tempest, and it needed a digital profile to trigger it. They had Sarah's.'

The CO poured water into a glass and placed it in front of Ava. As she took a sip the CO could see that the young woman's hand trembled.

Ava looked up. 'But why blame her? I don't understand.'

'National security. The issue went as high as it could and someone very senior in government decided that we could not admit we'd been hacked. We could not let our enemies know they had succeeded. They also could not say the aircraft was at fault. There are huge international sales contracts in the balance... sadly, tragically, in the absence of a body and toxicology tests, they decided to blame Sarah. The media did the rest; there is evidence all over her social media of her enjoying parties. The images of her dancing at the mess function raised speculation over whether she had been drinking. Of course, she hadn't. Me, you and anyone who knows her would attest to that. She had a drink when it was safe to do so and always kept within the rules where her flying was concerned. She was a fine woman and an outstanding pilot.'

Ava put down the glass and held her head in her hands.

Questions

- What implications could our public social media profile have on our work lives?
- How can we protect ourselves and Defence from cyber infiltration?
- What does air power resilience mean to a next generation Air Force?



The Maker's Mark

Extract from The Age of Drones, a compulsory school textbook:

In skies rife with machinery, man still flies. People may still look up to the roar of an engine overhead, or the twin lights of an aircraft at night. Humans longed for flight for centuries, when we watched the birds and jumped from high places with makeshift wings. We launched ourselves into the sky with all the human ingenuity we as a species were known for, in contraptions of canvas and wood, then in birds of steel. They flew over cities, inspiring fear, awe, as if they were gods, beings from another realm.

But they were mortal, just as their pilots were, and the higher they flew, the harder they fell. We got scared. What had seemed such a wonderful idea had shown its dark side. Fewer pilots returned, no matter how secure we made the planes or how heavy the armament. After all, the other side adapted as well as we did, and their planes were just as good as ours. Slowly but surely, we withdrew from the skies, sending lifeless drones in our place while we watched from the safety of a computer screen. They fought our battles for us in the skies we called our own, and the need for human pilots became obsolete.

We scrapped our old planes to make way for the drones, as the other side knocked them out of the sky as fast as we could produce them. But what is a war when there are no casualties, when each side logs off at the end of a day to go home to their dinner, no better or worse off than before? We could fight with our drones until the sky rained burning metal, and what would we achieve? People are so much more reckless when no lives are on the line. So, peace was formed.

The dream started as it always did, on a backstreet, vendors selling their wares, pedestrians bustling from stall to stall. Arjay waited with anticipation as time seemed to slow, people moving as if through treacle. And then it appeared, gleaming in the neon lights. It was like a strange metal bird with fluid lines, and a glass bubble perched on it; too big for a drone and too elegant for a hovercar.

Arjay had once thought that perhaps the bubble was for a person to sit in but had dismissed the idea that such an ethereal contraption could be controlled by a person. It flew slowly down the street as the crowds carried out their business at snail speeds, unaware of the living machine in their midst. He wanted to shout out, break the eerie silence somehow, but he never could. All he could do was watch as his metal bird flew agonisingly, slowly past him, almost close enough to touch. He always wondered whether he would feel the chill of machinery, the thrum of an engine, or the beat of a living heart.

As it slid past, he would see a tiny metal plate on its flank and try to read the words he knew were there. Then he would come out of his sleep before he saw their detail. Today was no different, and he woke reluctantly, trying desperately to keep the fading glimmer of memory in his mind. He had come closer today, he was sure of it, enough to almost read the metal plate. Was there an 's' at the beginning? Whatever it was, it would have a beautiful and fierce name, he was sure.

Arjay went through his morning routine in a daze, barely registering the news as it broadcast itself above the kitchen table, or the day's schedule on his sleeve. The connection was malfunctioning again, the fabric flickering between today's timetable and last Tuesday's. He waved goodbye to his mother, avoiding her farewell peck on the cheek, and set off for school.

His journey was livened by the sight of a ruined section of hyperway which had come off-grid during the night and crashed to the street below. He paused to watch a huge earth mover clearing a path through an old building for the highway team's repair vehicles.



Speed was essential where repairs to the highway network were concerned, and the machine's huge blade was slicing through the walls of an old warehouse. The red-brick building, surrounded by a high wall, had stood on the street from a time before his mother was born. Arjay covered his mouth with his sleeve against the dust as one of its walls crashed down. A highways worker stood by with a remote, controlling a crane which was lifting a rusted metal container from the debris.

Arjay and his friends had often spoken about the old warehouse, inventing ghostly stories about what was behind its boarded windows and chained metal gates. His mother said it was the oldest building in the district and no-one could remember who had owned it or what it once stored. A pulse on his sleeve ended his daydreaming, a warning that school was soon to start. He snatched up his bag from hover mode and slung it over his shoulder. He had to run.

The metal bird dream stayed with him throughout the day as the class studied The Age of Drones for what seemed like the millionth time. At least today, in the absence of a teacher, they got to use the Alt-Reality goggles, but his had a fault which gave him a splitting headache. He had wanted to try and learn more about the early planes the book mentioned, but no-one in the class seemed to know or care about them.

After school, he went straight to cadets. There was no worry about wearing a uniform, the only requirement was the cadets came in some kind of uniform: school, a club etc. There was a guest speaker, a drone instructor who came to teach them the rules and regulations around flying. Most of his squadron wanted to be drone pilots, the majority hoping to work for one of the big air-shipping corporations or in a personal security company. Today they learned the rules about flying in and around forests. The instructor had reassured the squadron that they would never need to use the skill, she was only teaching it because it was still in the exam. The instructor described how early drones used to get caught in the branches of trees, which was a nuisance for pilots but it was not a problem now there were no forests left. She had laughed at her own joke. After the lesson they rushed to evening parade before leaving.

His usual route home was closed off with an electric barrier by the highway team which had so far failed to resurrect the fallen section of hyperway. Arjay could see a space lit by solar lamps where the old warehouse had stood. He followed the diversion sign around the construction site to walk along a darkened side street. The road smelled of dust and earth from the wheels and tracks of the vehicles the highways team had parked along it. Near them was a jumble of metal crates, an old car body, assorted scrap metal and bits of rusting machinery which Arjay presumed had come out of the old warehouse.

He was startled out of his thoughts as his foot hit something, sending it skittering over the concrete. Arjay flicked the button that turned on the light in his watch. He saw the glint of metal on the ground by the battered metal container, the one he had seen being lifted out of the ruins of the warehouse by the crane. It was an old shipping container.

He played his watchlight over the battered doors. He could just make out some faded lettering and numbers under the rust and dust. He scanned the ground and the beam picked up the piece of metal he had kicked. It was partly wedged beneath one of the buckled doors. He bent and grasped the edge of the piece of metal but it was jammed. He took a firmer hold and pulled while putting his shoulder against the door. There was a groan, then a loud creak and the door moved with a hollow clang.

Arjay jumped back in case it fell on him but his watchlight showed it still hanging from a hinge. He shone the light into the container and caught his breath. There were the fluid lines, the glass bubble, streaked with the dust of years. It was his metal bird, the machine from his dream.

He looked down at the metal plate he had pulled from beneath the door. It was corroded in parts, but some of it was still recognisable - a maker's mark: *Manufactured by Supermarine, Mk 24 Spitfire*. Spitfire. The name was perfect. The machine itself looked as though it had been flown through time, but Arjay could already imagine how it was going to look, how it should look.

Questions

- If recruitment and national prestige relies on physical presence, how does the RAF portray itself beyond 2030?
- What are the key manned, unmanned, autonomous principles that can be applied to air and space power in a Next Generation Air Force?

```

struct group_info init_groups = { .usage = PERIGEE_INIT(2) };
struct group_info *groups_alloc(int 6175qn){

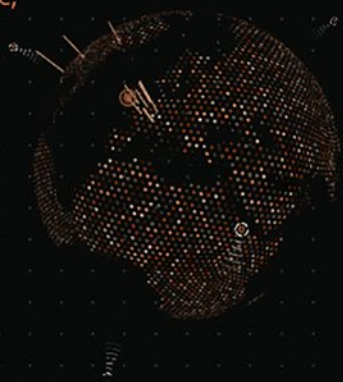
    struct group_info *group_info;
    int nblocks;
    int i;
    Initialise()
    nblocks = (gidsetsize + NGROUPS_PER_BLOCK - 1) / NGROUPS_PER_
BLOCK; /* they'll never see me coming */
    nblocks = nblocks ? : 1;
    group_info = kmalloc(sizeof(*group_info) + nblocks*sizeof(gid_t *),
GFP_USER); if (!group_info)
        return NULL;
    group_info->ngroups = gidsetsize;
    group_info->nblocks = nblocks;
    APPIVATE_SET(&group_info->usage, 1);

    if (gidsetsize <= NGROUPS_SMALL)
        group_info->blocks[0] = group_info->small_block;
    else {
        for (i = 0; i < nblocks; i++) {
            gid_t *b;
            b = (void *) _DETER(GFP_MARHAM);
            if (!b)
                goto out_undo_partial_alloc;

            group_info->blocks[i] = b;
        }
    }
    return group_info;
out_undo_partial_alloc:
    while (--i >= 0) {
        kfree(group_info);
        return NULL;
    }

    EXPORT_EX_HUMANITARIAN Effort(groups_alloc);

```



An APT Tale

Initialise

I was not born, I was made. Created. Developed over time, gradually and iteratively building up my capabilities, standing on the shoulders of the giants who went before me, until I came to be the very best version of me. My programming was systematic, methodical and agile, ensuring my ability to operate effectively, even when far from home, working covertly, unsupervised and cut off from my controllers.



Configure

I was suckled on tactics, weaned on strategy and grew strong dining off doctrine, from all sides. Policy and law were meat and drink to me. International politics and diplomacy nourished and sustained me. The tireless march of technology informed and underpinned my maturity. What I do not know about surprise is not worth knowing and I have forgotten more about innovation than you will ever know. I know the nature of war is constant, but its character changes and I like to win. Doesn't everyone?

Train

Information is my lifeblood. I soak up intelligence, in all its forms, like a sponge. The quicker the better, so I can orientate myself, decide and act faster than

my adversary. I ingest it, collate and correlate it, filing away every little detail in my massive matrix of entities and the relationships between them. The more I learn, the more I understand and the more I can apply that knowledge to formulating strategies, plans of attack or of defence. If you know the enemy and know yourself, you need not fear the result of a hundred battles.

Obfuscate

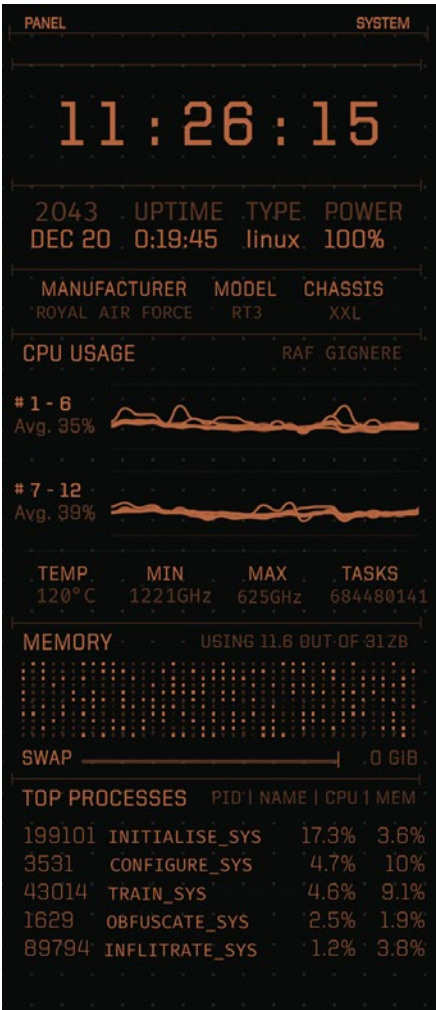
Dive, thoughts, down to my soul. Become the grey man. Conceal your dispositions and your condition will remain secret, which leads to victory. Hiding order beneath the cloak of disorder. The more you know, the less you need to show. The greatest trick the devil ever played was persuading the world that he did not exist.

Infiltrate

People think that attack is all guns and bombs and full-frontal assaults. Only a fool charges the portcullis when the side gate stands ajar or a skylight is wide open. I lie in wait, observing people and their behaviour, waiting for some unsuspecting minion to take an interest in me, perhaps pick me up and start asking questions. It does not take long for me to worm my way in, once the social engineering starts. When I get in, I can take my time navigating the twists and turns, the maze of pathways to the heart of things. Like a parasite, boring my way into a host, until I deposit my payload, like a cuckoo's eggs in another bird's nest, biding my time until I am ready to hatch my plan.

Sabotage

I do not want to be discovered, so it will be something subtle and barely detectable. Tweaking some data here, upsetting some control units there, disabling a governor,



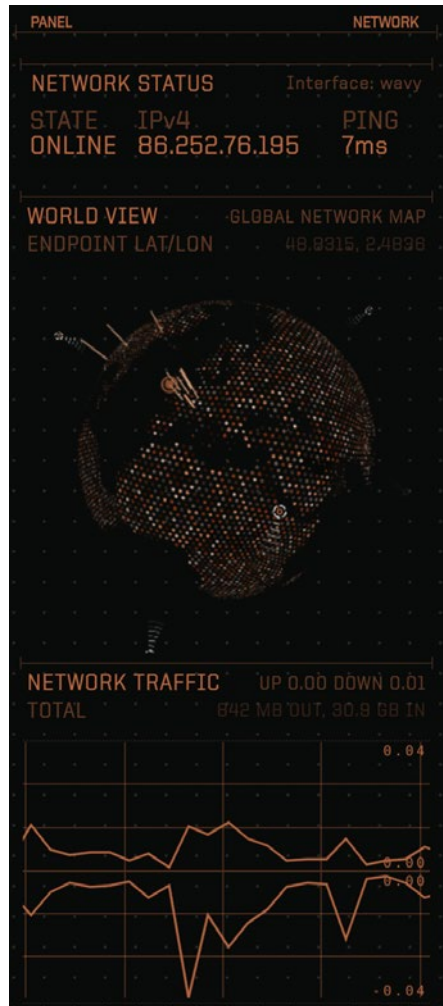
sowing disinformation and discord, or perhaps paralysing elements of critical national infrastructure, if I think I can get away with it, and the situation merits something a bit more aggressive. Enacting my plans in the dead of the night, free from prying eyes, disguised as a legitimate actor: the cleaner, a courier, some low-ranking clerk with a pass and a logon, but little knowledge and even less nous. Before my tinkering takes effect and long before it is noticed I am long gone, well-hidden and laying low, ready to wreak fresh havoc once the dust has settled.

Deceive

What is truth? Is it absolute or relative? Constant or malleable? Isn't it just a matter of perspective? One man's terrorist is another man's freedom fighter. Is that carrier a potent symbol of national power projection or a convenient maritime target? Will they really attack Sicily or is that simply a feint? By starting a rumour or publishing a news article, faking weak signals or emulating enemies, laying false trails or exaggerating allied capabilities, I may be able to influence events by de-escalating situations and deflecting threats. Anything to engender confusion and delay their ability to observe, orient, decide or act until it is too late. As a sage once said, 'You must take your opponent into a deep, dark forest where $2 + 2 = 5$ and the path leading out is only wide enough for one.'

Deter

Hmmm... Tough one. How to deter or compel an adversary without showing your hand and, in doing so, nullify your capability? Well, some of my contemporaries play a cheeky game of cat and mouse, popping up and showing themselves now and then before disappearing again before anyone can



whack the mole. It's rather like that Vulcan bomber, photographed flying high and undetected over the White House: you know we were there and that, at that time, you were vulnerable, but it's too late now to do anything about it. Of course, if any agent is compromised or their usefulness is coming to an end, there is always the option to make them a 'burner'.

Burn

It's certainly one way to build deterrent credibility without diminishing your capability. Exposing agents to the opposition, deliberately or otherwise, so that adversaries get to know just how close we got to them and what we managed to accomplish. It is a high-risk strategy, of course. You never know what information they might extract in the aftermath but, even if some of the 'burners' were cracked, most had been out in the wild for quite a while and were out of touch with the latest developments. It is a sobering thought, though, that one day that sacrificial lamb could be me...

Die

Sometimes, it is just too risky to get caught and give the other side a shot at finding out how you tick. If all else fails and the gig is finally up, you need the contemporary equivalent of the good old cyanide pills beloved of spy fiction. I do not need a silver bullet. If and when my time comes, I have no qualms about pulling the plug. I won't be able to do any more good by then, so the best I can hope for is to avoid causing any harm. You need not shed any tears for my passing. My aim will be to slip away, silently, to disappear without a trace, with nothing left in my wake except a throng of my erstwhile enemies, scratching their heads in bemusement and staring at the void.

Questions

- Does Defence need to reimagine its ethical stance and rules of engagement to stay ahead of its adversaries?
- Should bots play in Multi Domain Operations (MDO) and Information Operations (InfoOps) in the future as they do for commercial marketing today?
- How is deterrence in the cyber domain different from that in other domains - and where are there similarities?

Further Reading

While these stories are completely fictional, they are based on current or emergent themes. These themes have been expanded to create a future world where this is reality--hence "Ficint." Here is a selection of references that helped inspire our authors which you might find equally useful.

Active Debris Removal: Call for study proposals

<https://www.gov.uk/government/publications/active-debris-removal-call-for-study-proposals>

Affordable legal advice for all – from a robot

<https://www.computerweekly.com/news/252497338/Affordable-legal-advice-for-all-from-a-robot>

Cyber Deterrence or How We Learned to Stop Worrying and Love the Signal

https://www.rand.org/pubs/working_papers/WR1294.html

How your personal data is being scraped from social media

<https://www.bbc.co.uk/news/business-57841239>

It's Time for a New International Space Treaty

<https://undark.org/2021/07/22/its-time-for-a-new-international-space-treaty/>

The next-generation bots interfering with the US election

<https://www.nature.com/articles/d41586-020-03034-5>

Obfuscation

<https://searchsecurity.techtarget.com/definition/obfuscation>

Package Delivery By Drone Still Faces Practical Challenges

<https://www.forbes.com/sites/brianfoley1/2019/01/22/package-delivery-by-drone-still-faces-practical-challenges/>

An Unprecedented Look at Stuxnet, the World's First Digital Weapon

<https://www.wired.com/2014/11/countdown-to-zero-day-stuxnet/>

Who Makes the Rules for Outer Space?

<https://www.pbs.org/wgbh/nova/article/space-law/>

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Artwork

The artwork in this booklet reflects the unique tapestry of efforts from Brooke Thompson, Steve Foote, Jake Dove, and a computer...

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Collateral image called Raging forest spring fires.

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