

HYPER-BATTLE

By: Charles W. Bissett

21ST CENTURY HYPER WARFARE; THE NEXT WAVE IN TECHNOLOGY

As we round out the first quarter of the 21st Century and face the onset of the 4th Industrial Revolution (figure 1)^{1,2}, the military community at large finds itself asking a basic question: how will this affect us? Considering events to date, there is no way that further weaponization of 4th Industrial Revolution technology can be avoided. It is because of this trend in the weaponizing of 4th Industrial Revolution technology that the United States military has devised the term, “*cyber domain.*”

Yet, cyber is not a comprehensive way to address this threat. The term “*cyber*” strictly applies to digital computational characteristics of the computer sciences domain of activity. This is really a term that applies to the 3rd Industrial Revolution. Although cyber is a precursor to the 4th Industrial Revolution, it is not singularly something that is original to, or a defining nature of the new paradigm. In the near future, we can expect to see a physical domain that has been modeled after the biological which is expressed as the virtual (figure 1), merged together and taking a place on the battlefield.

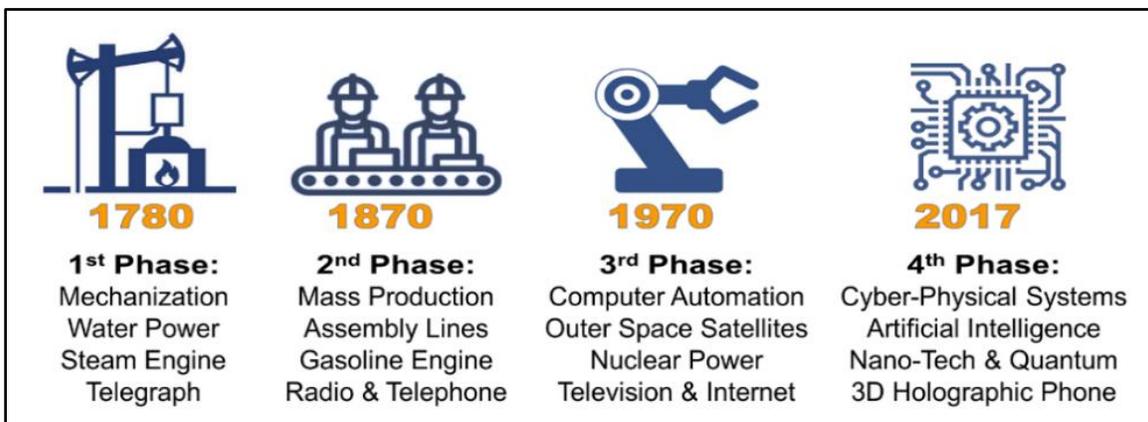


Figure 1: Progression of industrial revolutions.

Military policy, strategy and doctrine needs to really understand and correctly express the new paradigm (or else, not pretend it does understand, at all). Without the correct understanding, it's impossible to conceive or articulate future challenges and opportunities. This new paradigm is beset with disruption that if improperly perceived makes trying to address it, unmanageable.

¹ Klaus Schwab, The Fourth Industrial Revolution, Crown Publishing Group, Jan 3, 2017

Dr. Schwab is the founder and executive chairman of the World Economic Forum, describes a world where individuals move between digital domains and offline reality with the use of connected technology to enable and manage their lives.

² Xu, Min & M. David, Jeanne & Hi Kim, Suk. (2018). The Fourth Industrial Revolution: Opportunities and Challenges. International Journal of Financial Research. 9. 90. 10.5430/i

THE OBSTACLES TO SECURITY IN THIS NEW PARADIGM

First Point: For the United States military to focus any substantial portion of its structure on large scale combat operations is, an expectation without a home. The battlefield is no longer the center of gravity, as it was during the classical period of the second agricultural evolution. That type of crude simplistic thinking only leads to nuclear war. As the world progresses through successive industrial revolutions, the fight is increasingly in the shadows, fought in the enemy's rear. Yes, there is a place for the conventional maneuver forces, but let's not bloat its value; or ignore it, either.

Second Point: The doctrinal organs of the United States military (or the whole of Government) have not been able to create a standardized definition of the 4th Industrial Revolution. The OODA loop basically infers by corollary that if the commanders can't observe the threat in this disruptive global technological and economic environment, they won't be able to address that threat, effectively. To many of the military's leaders and analysts think of artificial intelligence (AI) as being a beefed up computer, constrained by the coding of a programmer. This misconception foretells that planning of future developments will only be an evolution of technologies from the last epoch (3rd Industrial Revolution, information age). This misinterpretation of events is obscuring both the risks and opportunities that are otherwise leading into synergies for the coming revolution.

Third Point: With the above factors in mind, it should be evident that the foremost obstacle to America's security is Americans. Russians and the Chinese are only opportunists waiting to exploit cracks in the wall. The environment is changing due to the paradigm shift. We have all the needed technologies in their constituent parts. Nonetheless, without a cohesive public resolve, we will never be able to merge enough of them into the next generation of technology that America needs to protect itself. We can't make America great again by holding on to a past that never was. Those who seek a peace dividend, need to look around and accept that there are hostile forces in the world still waiting for Americans to let down our guard. We can't just say, we don't know how that threat will materialize. The writing is already on the wall.

WHAT'S NEXT

No one will ever invade Fortress America. They will just barricade us financially; estranging us from the opportunity to affect our own global future; watch us turn against each other thrashing about; and leave America to wither on the vine. And our allies will just shake their heads, and walk away to fend for their own futures.

It doesn't have to be that way, though. All of the preceding discussion is going to be hard for most people to accept without president. This discussion brings up very human problems that most people have subconsciously resolved to live with and tolerate; limitations due to data overload and the limited band width of having an organic nervous system.

The following vignette is a story that illustrates the application of 4th Industrial Revolution technology to warfare. All of the following technology depicted already exists, or working prototypes have been built. One can expect that with serious desire, this technology can be infused into the military in less than eight to ten years. The threat of war as presented is, in the author's opinion, both real (methodologically) and probable.

HYPER-BATTLE

ARRIVAL AT SKY SENTINEL FIRES OPERATIONS CENTER

The war was going badly for NATO forces since the sudden attack across the Latvian and Ukrainian borders the night before. Gulbene, Rezekne and Daugavpils had been immediately overrun as about eight Russian armored brigades (figure 2) stormed across the frontier between Russia and Latvia. Fighting was not limited to Latvia as Russian forces also moved into southern Estonia and northern Lithuania.



Figure 2: Baltic Sea war battle lines at the beginning of the second day

The only saving grace was that Belarus wanted nothing to do with the fighting. They were worried that if a war turned against NATO, the western powers would go nuclear and that NATO would not hesitate to attack threats emerging from Belarusian soil. For ten days, the Belarusian intelligence agencies and police apparatus provided NATO with detailed information on Russian preparations for war. But once the fighting began, Belarus's information went silent, and it closed off its borders. This denied Russia its intended lines of advance to Poland through the Suwalki Gap.

Twelve hours later, the war went global when China declared itself to be neutral, and then began to seize American assets in the China Sea. They erected blockades around Singapore, Vietnam, South Korea, and Taiwan. The rapidity of China's movements suggested that they were actually working in collusion with the Russians.

By noon of the first day, the Russian advance became stalled at eighty miles into Latvia when the Latvian National Guard, an irregular force called the "Zemessardze" appeared within the rear of the Russian formations. It was led by officers who were specially trained by the United States Special Forces in guerrilla warfare. Although originally 8,000 strong, its ranks became swollen with over 17,000 volunteers fighting as partisans. They operated predominantly in the east, but could be found throughout the country.

In terms of conventional forces, the Latvians only had one brigade of mechanized infantry. To reinforce the Latvians and Lithuanians, NATO had moved a Polish division in through the south around Panevezys. The British provided a division that had been stationed in Latvia for just over a year, and assumed a defensive line forty-five kilometers east of Cesis, along the Gauja River, down to the eastern ridge of the Gaizigs Mountain. The Americans provided an armored infantry brigade flanked by the Latvians fighting to hold Jekabpils, and the Lithuanians fighting south of Akniste. Behind the combat line forces, the Americans had two brigades; a theater sustainment brigade running supplies throughout the region, and a maneuver enhancement brigade with combat support troops; such as engineers, military police, military intelligence, and air defense artillery (ADA).

This was new ground for the Americans. During the 1990s, the Americans had sought to save money by exploiting a perceived peace dividend from the end of the Cold War. The non-belligerence of the post-Soviet state proved to be a fantasy as the new Russian Federation began anew by waging low level hybrid warfare against its neighbors and the NATO alliance. The Americans were finally forced to accept that they couldn't fulfil their NATO treaty obligations from their home bases at the other side of the Atlantic. The first and second Persian Gulf wars demonstrated that large scale conventional wars would only last a few weeks, at most. It became obvious that if war broke out, Europe would be overrun before an expeditionary force to relieve the Europeans could even sail from port. So a year earlier, Latvia concluded a status of forces agreement to host British and American troops on its soil.

CHECKING INTO THE TACTICAL ADA CONTROL SYSTEM "TA-DACS" AI

Ronnie had been up for two hours before her 4:00am shift was set to begin. Some calisthenics, a brief shower, dressed, breakfast, and a briefing from her AI through her augmented reality glasses left her ready to begin. Under the cover of the camouflage net, she passed by the sleeping tracked vehicle crew, a sergeant and his driver of the M4 command and control vehicle (figure 3).



Figure 3: An M4 command and control vehicle

Capitan Veronica Novikova was a fourth generation American, whose great grand-father was a Latvian that had immigrated to America after the Second World War. Now, she was back to defend her ancestral homeland. She had been in country for seven months. Using the accelerated help of the TA-DACS (theater air defense artillery cyber system), the system's artificial intelligence had rapidly made her fluent in both Vidzeme-Latvian and Russian. The TA-DACS had its own character that manifested itself as an avatar called, Tadakas.

What made this possible was a neuromorphic based computer mix of intracranial electroencephalography and deep brain stimulation for a neural-cyber interface network that had been surgically implanted into her brain, and across her body for differential surface electromyography. Twelve hundred neural sensors in her cranium made of thin gold strands were connected to two hundred silicone based processors in the lining of her skull.

A nickel-copper based alloy mesh surrounded her skull to create a Faraday cage which insulated the system from any type of electromagnetic interference; up to and including the aggressive electromagnetic pulse of a nuclear blast. The interface also directly monitored her sympathetic and parasympathetic nervous system, along with her endocrine system by means of chemical detectors and fiber-optics.

At the base of her skull sat a photon based network synth-ganglion collator that communicated through her skin to the receptor in the helmet she carried. She had all of this surgical enhancement, without any cosmetic indication of what had been done to her. The whole cyber interface system allowed her to read the analytics and convey instructions to the AI in almost real time without a need for the computer to be slowed to match the human neural encoding that she would normally be using to see, hear or speak. She was now, part of a new generation of enhanced hyper-warriors.

The TA-DACS crew of the 2nd Battalion, 8th Regiment of Air Defense Artillery (abbreviated, 2-8th ADA) "Sky Sentinels" were located in a wooded park twenty kilometers east of Ogre near a village called Suntazi. The battalion controlled the weapons systems of three area support combat batteries.

Each battery was equipped with two short range Iron Dome rocket launchers, three medium range Patriot missile launchers, six multi-range M286 Catapult laser augmented railguns, and two phase array radar units. The battalion's tactical fire control crews themselves, operated from within two M4 command and control vehicles, while the computer servers of the AI were housed in an M88 Hercules chassis. In the rear compartment of the primary M4 were six seats for the battalion's tactical cyber operations control center crew.

The sheer mass of raw data that the AI could consume and process was beyond that of a human being who was not enhanced. For the un-enhanced, the AI processed raw data hundreds times faster than a human could keep up with. In the time that it took a commander to receive, process and make a decision, the underlying information was already obsolete; depending on how one measured the speed of thought. With the enhancements of the direct neural interface, the hyper-warriors could ride on top of the AI, and withstand the on-slot of combat at the speed of thought. This was what is meant by, hyper-war.

The second M4 contained the signals crew from the S-6, the battalion's electronics staff section. Although they were not enhanced, they kept the tactical-operations center connected with all weapons platforms and regional command elements for battle coordination. The vehicles were armored to protect the soldiers from the shrapnel of exploding bombs, near miss artillery, or small arms fire.

Standing next to the back door to the tac-ops stood Chief Warrant Officer-3 Arthur Chaudhry from the S-6. He was the AI Signal Tech, a level-1 enhanced hyper-warrior who would during symbiotic union with TA-DACS monitor the AI, all the network infrastructure, and the platform sensors of the vehicles within the battalion. His thought processes would be accelerated to three times normal by the neural harness that he had been fitted with. Yet, speeding up the pace of thinking wasn't only benefit to being enhanced. His level of technical knowledge was increased by four fold by direct access to the AI's library of information. With the Tadakas looking over his shoulder so to speak, feeding any information he needed, he had an almost never probability of making a technical error in judgment.

She climbed the steps at the back of the tac-ops followed by Art Chaudhry. As she entered the near darkness of the vehicle cabin, the "cave" as the crews liked to call it, she heard the whisper of, "Good morning, ma'am," from Staff Sergeant Samantha Fuller. Then she said, "Hello Chief."

Sam, as she was called, was the neuro-psych medic on duty in the cave. The technology was new, and there was concern about the effects that the enhancements could have on a person. Her job was to monitor the crew, especially the level-3s like Ronnie who could accelerate to seven times normal thinking speeds, as they drifted in the virtual reality of the AI. Since Sam wasn't cyber enhanced, she only wore augmented reality glasses with a build in non-evasive bi-directional brain-machine interfaces. The glasses were fed information on the status of crew members as they worked in the virtual reality of the drift, and while she did her college studies on biochemistry from a hologram presentation.

The cave was lit up with three blue night lights, overhead. Along the port side of the vehicle there were five semi-reclining seats, with a sixth seat at the far end for the medic. Six seats in the rear compartment of an M4 was crowded, but no one would notice once they passed into the drift. Three of the seats had someone drifting in them. Each seat was covered with a woven fabric to optimize skin respiration and comfort. The AI could monitor her wellbeing and block any physical disruptions while she drifted. Unlike regular soldiers who wore heavy load bearing combat equipment, the crew wore a light jump suit and a cool light weight mukluk like boot. She took off her holster with the Cal.45 and stowed it behind her seat. Then she pulled her cyber helmet out of the bag and replaced it with her combat helmet. Everything in her pockets that she didn't need in the drift went into the bag, which then went into a basket under the seat.

Ronnie got into the seat and started strapping on her seatbelts. The belts went over both shoulders and between her thighs as well as around her waist. The battalion moved at least twice a day, often cross country to avoid being discovered and attacked by the Russians. By being securely strapped down into her seat, she could continue working from within the drift while the vehicle moved.

Sam can over to where Ronnie was seated. "Let me strap your legs down, ma'am?"

"Thank you." Ronnie replied.

Then Sam moved over to where Art was strapping in. "Are you ready for me to belt your legs down, Chief?"

"Yep, go ahead." He replied.

Ronnie looked around, one last time as she plugged the connector into her cyber helmet. Then she sat back and silently whispered, "Okay Tadakas, take me in...."

THE INSIDE THE DRIFT

Capt. Novikova opened her eyes virtually, to find herself overseeing the virtual battlespace in and around Latvia. In total, the battalion had ten enhanced soldiers that were divided into two teams; an AM team, and a PM team. Ronnie was part of the AM team. She worked from 4:00am until 2:00pm. Each team of five had two AI signal technicians, and three air defense combat controllers. At any given time there were two hyper-warriors on Sky Sentinel duty in the cave working in the drift. Time in the drift for the combat controllers was limited to a watch of four hours followed by a two hour break, and then a second four hour watch. Next to her were the avatars for the other four hyper-warriors who were in the drift from her battalion.

"Hey Ronnie, there you are," Capt. Terrance Farmer grinned. He had been on duty objectively for the last four hours, but it felt subjectively like a twelve hour day. It was now, his turn to take a two hour break. For the last two objective hours, he had been the assistant at the helm controlling the battalion. When Terrance returned from break, hopefully refreshed, he would take the lead from Ronnie. Capt. Henry Largo, who was now the lead at the helm could step down from the lead to be her assistant. "You ready to take over the helm?" Terrance asked.

“Yes, sir!” she responded enthusiastically. “Let’s rock an’ roll....” However, her apparent enthusiasm masked the lugubrious feeling she still had from the day before. Her grief at the death of a close friend had turned into an anger that burned for vengeance.

The day before; the first day of fighting, the air defense systems of the Latvian military and the German navy provided air cover in the skies over Latvia. In the battles of that first day, the Latvians had lost half of their air force. It took the Sky Sentinel tactical air defense artillery battalion six hours to fully deploy and set up for action. She only got five hours in the drift, the day before. It was during her second shift of the previous morning, at about 10:05am, while working lead with Henry in support, that a personnel tragedy hit Ronnie.

PERSONAL TRAGEDY

During that first day’s battle, she virtually witnessed a missile rise up from the ocean and take out the British AWACS (airborne early warning and control system) that had been controlling the skies behind her. The data from that flying eyes in the sky were fed directly into Ronnie’s TA-DACS, along with the radar imagery from every radar in the region. Tadakas then translated that information into an image in Ronnie’s brain by the direct neural link, which allowed her to visualize the situation at processing speeds which exceeded what her biological eyes and ears could perceive. As a level-3 enhanced hyper-warrior, Tadakas could through symbiotic union, expand the objective two seconds for a cannon round to hit a target into fourteen subjective seconds, for her. Yet to her, the virtual reality inside of TA-DACS was just as real and just as much fact as any perception derived through her biological senses of reality; and it wasn’t a game.

Ronnie, along with every other hyper-warrior connected to the Baltic Sea Matrix of the drift could see the AWACS try to evade the missile. Within fractions of a second, the AWACS filled the sky with chaff and flares, as it labored to misdirect the missile. Four of the plane’s anti-missile missiles launched horizontally off their rails, but they couldn’t reorient down fast enough.

In that plane was Maj. Adrian Samford, Ronnie’s cyber battle buddy. They had trained together in the drift. Ronny and her fiancé had dinner at Adrian’s house with her husband. Worst of all, Ronnie was learning via the AI that with 86 percent probability that Adrian was newly pregnant.

In the six objective seconds it took for the missile to reach Adrian’s plane, Ronnie spent thirty virtual seconds holding the hands of her best friend, both knowing the inevitability of what was about to happen. There just wasn’t enough objective time to interdict the missile. As the final micro-seconds counted down, the avatars of soldiers, sailors, and aviators from the region appeared next to Adrian and Myranda. They were joined by network administrators from the United Kingdom and the military agencies of NATO. In that final fleeting micro-seconds, over three hundred cyber enhanced people had merged together to console their friends who were about to die.

As Ronnie held her friend’s hands through the matrix of the drift, Adrian and Myranda abruptly blinked out of existence.

Suddenly, a cry of deep anger rose up within the drift that almost overwhelmed the AIs of the collective allied forces. In that moment, not just Ronnie, but the entire hyper-warrior corps along the Latvian war front had witnessed and deeply felt the death of two of their own. They were the first of their kind to die in combat. No one knew, and no one was trained for what to expect from the cyber enhanced in this type of experience.

Ammunition expenditures jumped by forty percent as all the hyper-warriors of the combat battalions reached deep into the limited reserves of ammunition. They through everything they could figuratively lay their hands upon, at the Russians. The infantry and armored hyper-warriors spurred their units into more aggressively finding and attacking the Russians. Helicopters ranged farther out to find artillery targets. Five teams of NATO military intelligence hyper-hackers stormed through the fire walls of three Russian AIs, turned their weapon systems against them, before shredding the program coding. Using the hacked information on the Russians, artillery began raining from the sky decimating their ranks. There was no plan, no decision making process; just vengeance.

Within thirty minutes after the hyper-warrior lead rampage had begun, the Russian advance was ground to a halt. Disruptions due to both the loss of officers and the command and control network sent the Russians reeling. The enhanced capabilities of the hyper-warriors were accelerating the tempo of battle to speeds which had never before been seen.

However, the NATO J4, logistics chief of staff, Col. Herbert Daimler became alarmed as the computer network for his common operating picture told him that in two hours, given the rate of consumption, they wouldn't have enough supplies to execute the counter offensive planned for the next day.

Gen. Randel Delany had to go over the command network and ordered all battalion commanders to relieve and remove from the drift, all hyper-warriors who had witnessed the downing of the AWACS. He further ordered that mental health medical staff assess the stability of the hyper-warriors before their being returned to duty.

Tadakas had worked hard to moderate the crews' emotional distress. But there were ethical limits that the AI had to observe. Abruptly, Capt. Farmer had jumped into the drift. And then, without warning Henry, Ronnie and then Rick were brought back to objective reality. As they became conscious, they began fighting against their straps.

"Where's my gun!" yelled Henry. "Someone, give me my gun! I'm going to KILL those Mother Fuckers. I'm going to KILL them." Two medics restrained him, while Sam hit him up with a sedative.

Next, Ronnie came to consciousness and started howling as she fought to get out of her straps. A big medic sat on Ronnie to restrain her, while Sam administered an auto-injector containing a mild sedative into her thigh. As the sedative took hold of her, she started sobbing and shaking uncontrollably.

Then, Chief Warrant Rick Hall was brought out of the drift. He immediately began fighting with his straps, shouting, "Leave me alone! Don't touch me... don't touch me!" Again, two medics restrained him, while Sam hit him up with a sedative.

Gently, the big medic had carried Ronnie out of the cave to a group of waiting medics with gurneys. As they rolled the three hyper-warriors over to the aid station, she cried herself to sleep. The sedatives kept her asleep for the next six hours.

When she woke up, Ronnie learned that the automated neuro/psych-comp had found no lasting damage, and it had recommended a grief counselling session. She had dinner while skyping with her fiancé, stationed in Poland. At the end of the visit, she promised to learn French from Tadakas so that they could holiday in the western Mediterranean after the war. After leaving the field mess tent, she went to the chaplain, and together they shared a moment of prayer. Then, it was off to the medic tent for her grief counselling session. As she arrived, she passed Henry who gave her a thumbs-up, and said, "I'm cleared for duty. See you, tonight." After a half hour with the therapist, she was cleared for duty, also.

WORKING IN THE DRIFT

It was now day two of the war. She was standing in the drift with her colleagues doing a watch handover. "Before I go," Rick asked, "what's for breakfast?"

"Shit on a shingle," Ronnie answered. This was the traditional name for roast beef and gravy on toast.

"Is that all?" asked Terrance.

"No'p," Art answered, "You can get coffee, also, if you hurry...."

"Oh, you're funny..." Terrence mused as he rolled his eyes, "Remind me to laugh, later."

"Tadakas, get me out of here." Then, Terrence disappeared back to objective reality.

"I don't know what Terrence is whining about," Rick said. "The coffee's not that bad."

"Have a good tour, and kick some ass." Rick wave his hand in a mock salute. "Tadakas, take me out," and Rick was gone.

Art shifted his presence over to the battalion's first vehicle platform in Alpha Battery. For the next four objective hours, he would do diagnostics on all the communications systems. From Art's subjective perspective, it would feel like twelve hours.

It was ten subjective minutes, or three objective minutes into the shift when Maj. Frank Young from the sustainment brigade appeared in front of her. "Hello, sir," she said. "How can I help you?"

"Hello, captain," he began. "We need to plan an air convoy. Would you join us?" In the virtual space of the drift operating at level-1 symbiotic union speeds, Maj. Young assembled the key combat tactical coordinators for the resupply mission. Warrant Officer 4, Nancy Campbell, Chief of Space Reconnaissance, Captain Mark Rushford, Chief of Artillery Fires, and Captain Andre Giessen, Chief of

Aviation Ops. For this type of a mission, the aviation hyper-warrior would have tactical control as the service provider. As the mission initiator, the logistics hyper-warrior would have operational control.

“Okay team, we need to run a supply drone convoy out to Rezekne for the partisans. Can you set me up with a safe corridor?”

“Sure, it’s do-able, sir.” answered Andre. “We have five canisters of swarm drones left from yesterday. We can swamp their TOR and Pantsir air defense artillery systems. But sir, that’s the last of our stock in the front. Any idea when we can get some more?”

“Well sir, GCSS-AI (Global Combat Support System is a web-based automated logistics system, for use by U.S. Department of Defense) says that there are no other stocks in country. But, there are four cargo ships due into port in the next few hours. The manifest says, seventy-two canisters of swarm drones.” Maj. Young was level-1 enhanced. He was connected to the logistics AI for the Department of Defense. As he talked to Maj. Giessen, the AI was rummaging through the global data for the optimum answer. “We can deliver resupply by late this afternoon.”

“Mark,” Frank began.

“Yes sir.” Mark answered. “If the drones can distract their ADA, have we got anything left to reduce the threats to the corridor?”

“It depends on the gap,” said Frank. Then he turned to Maj. Campbell. “So Nancy, where is their coverage the weakest?”

“It’s right up the center,” she said matter of factually. “Four of the Russian brigades are stopped for reorganization, and one is being pulled back for regeneration.”

“If it’s that bad for them, we should finish them off, so we can go home,” quipped Ronnie.

“I wish we could,” said Frank. “But, we burned through too much of our supplies, yesterday. Right now, we are relying on the partisans to keep the Russians distracted, until those cargo ships arrive. We’ll be lucky if we can get the front rolling by tomorrow.”

Then Andre turned to Nancy. “Well Chief, where do you suggest we open the corridor at?”

“I would say, at Madona. Give me three hours to schedule a sub-orbital recon mission, and I can tell Mark were to focus his artillery.

“Good, that will give my helicopters and drones time to load up, and get to the corridor start point.”

Andre turned to Ronnie. “Will you be able to hold the corridor open? How’s your ammo supplies?”

Ronnie quarried Tadakas, then answered. “We can keep the corridor open for an hour. Will that be enough?”

“Great, that should be good enough.”

Andre turned to Frank. "Can we get the cargo to Idaho Air Base (a make-shift field base outside of Koknese) within the next thirty minutes?"

"Yah sure, the cargo trucks are ten minutes out, right now."

For the next fifteen subjective minutes, the team worked out the details of the mission. During the planning session, the collective AIs took notes on what was decided. Where the AIs had a divergent interpretation of the plan, an AI avatar would appear and prompt its patron to ask a question. From the AI notes, an operations order was developed; the blue print for the mission. The whole planning session lasted five objective minutes. Half a minute longer than it needed to last.

GOING HYPERSONIC

Ronnie began the resupply security coverage mission by sending out FRAGOs (an abbreviated version of a formal operations orders, it was only fragments of the orders relevant to the element or weapon system crew) to Bravo Battery, located near Madona. Then she notified the commander of Charlie Battery to send one truck load of missiles over to reinforce Bravo Battery. Ronnie understood that for the un-enhanced working in objective reality, it would be fifteen minutes before they could react to reset for the mission. For her in subjective time, that would feel like almost an hour.

Then she turned her attention to the sky. One of Nancy's people in the intelligence staff had done a little spear phishing and hacked into the radar system at some airports west of Moscow. Joined with the collective information from the NATO radar systems, she could see all the air traffic between the Baltic Sea and Moscow. She could see this because she was surgically enhanced to interface with an AI. The Russians did have those who were surgically enhanced to interface directly with their AIs, but really couldn't compress the objective time to compete with a NATO level-1; neither were they shielded from an EMP burst. So, they were none the wiser that the Americans had hacked them.

She could see that the Russians had a few aircraft patrolling up to about thirty kilometers from the border with Latvia and Estonia. That was the distance out to the horizon, times two and a half. Their planes didn't dare come closer. Earlier that evening, a flight of fighter planes had wandered within thirty kilometers of the border. It took the PM crew three Patriot missiles to bring two of them down. During her rage the morning before, she was taking out planes at almost forty kilometers. The Russians got the message. No one could claim air superiority in the air space over Latvia, Estonia, and western Russia. The ground based anti-aircraft systems on both sides were just too powerful.

At about three hundred kilometers from the border Ronnie spotted a MiG-31 Foxhound flying across Novgorod toward Pskov on the north side of Rdeysky. "Henry," she intoned. Instantly, Henry's avatar appeared, because he was connected into the Tadakas. "Henry, tell regional command that we have a hyper-sonic threat, inbound (figure 4). I think the Russians want to take out the inbound supply ships going into Riga. And, tell the Navy to be ready if I can't stop that missile."



Figure 4: MiG-31 aircraft carrying Kh-47M2 Kinzhal. (Source: Shutterstock)

“Yes, ma’am,” he said, and he vanished.

“Tadakas,” she intoned. “Sound the launch alert sirens, and take me to level-2” A brief wave of dizziness passed over her as the world slowed down for her even more. The AI would begin feeding her inputs at five times her natural speed of perception. If Ronnie’s suspicion was correct, she had about five minutes of subjective time to plan a response. The air-defense crews only had 96 objective seconds to get ready. The time to act was being compressed to almost inhuman speeds.

Capt. Veronica Novikova watched as Kh-47M2 Kinzhal (dagger) separated from the MiG-31 at 2900 kilometers per hour (kph), and accelerated to 8600 kph. At 2.38 kilometers per second, the missile was racing the 230 kilometers toward the gap between ADA batteries at Smiltene and Madona. Now, began the “OODA loop.” She had “observed” the threat based on virtual information. Based on that observed flight path, she was “orienting” on the direction of the threat. It was her “decision” on how to respond, due to her enhancements. Through a series of operational level orders, she would lead the “action” against the threat. The OODA loop was an abbreviated decision making cycle that was fundamental for all combat leaders.

“Tadakas, FRAGO all brigade Stinger teams, weapons hold fire for the next ten minutes.”

“Ma’am, message sent...”

“Tadakas, FRAGO Alpha Battery, launcher A-3, three Patriots, orient due west at 100 degrees, four second intervals, first launch at Phase Line Alpha-Alpha, second launch at Phase Line Alpha-Echo, third launch at Phase Line Alpha-Juliet, right limit Phase Line Bravo-22” The PATRIOT could match the speed of the Kinzhal. However, with the flight path being at such a distance, and the likelihood that the Kinzhal would try to maneuver evasively, facts suggested that PATRIOT would not catch the Kinzhal. Her goal was to trick the missile into turning south.

“Ma’am, Alpha Battery auto-reports, eyes up (radar was trained on the area). Launcher A-3 auto-reports, ready to fire.”

“Tadakas, FRAGO Bravo Battery....”

GUN CHIEF

Staff Sgt. Kevin Elattar was standing outside of his tent after just getting up and relieving himself. He was debating whether to start making a cup of coffee or to see how his night shift crew was doing. It was almost 4:30 am and still dark outside. Seven of the troops were still sleeping; two were on guard, and Sgt. Cynthia Turner was on sky watch in the turret of the cannon.

They had taken two steps in retreat the day before followed by a sudden surge forward. In the process, they found themselves at the front lines going direct fire against Russian tanks; something they weren't supposed to be doing; and that he didn't want to repeat. In the fight to evade the tanks, one got off a round, which hit one of his big generators being pulled by an armored artillery tractor. He was just thankful the crew made it out alive. Sadly, in the chaos of combat, no one had seen the First Sgt. and his driver since yesterday afternoon.

Staff Sgt. Elattar made up his mind; coffee first.

Walking into his tent where the rest of the crew was sleeping, he grabbed the propane stove and a five gallon jug of water to take outside so he could boil some water. Once at the field table, he flipped on his augmented reality glasses to check his command text messages; a military internal e-mail application. The commander had left a message on yesterday's totals: four aircraft, three helicopters, thirty-five intercepted artillery rounds, and oh, there's that tank I shot.

As he got to the table and put the stove down, a message flashed across his glasses, “ALERT, FIRE MISSION!” Then all of the vehicle horns let loose with a three second blast. As he turned toward the east, his augmented reality glasses created a virtual sky overlaid upon the darkness. Overhead was Longitude Phase Line Romeo. Five kilometers east, he could see Phase Line Quebec, followed by Phase Line Papa, and then just over the horizon was Phase Line Oscar. In latitude, he was parked at Phase Line Bravo 24.

Through his cranial microphone Tadakas announced, “FRAGO, Bravo Battery: Hyper lance (the code phrase for hypersonic missiles) in forty-three seconds, no decoys. Iron Dome fires at Phase Line Papa, barrage wall, linear target, forty kilometer spread tactic. Manticore fires at Phase Line Quebec, plug the hole tactic. PATRIOT fires at Phase Line Romeo, no limits. Good hunting, Bravo Battery.... Tadakas, out.” Then in his glasses a bright red opaque path ran across the sky designating the most probable flight path of the missile. The path stretched five kilometers to his north, reaching about thirty-five kilometers over the horizon, to his south.

Off in the distant east a red flashing spot appeared in his glasses. Since the actual missile would not yet be visible to the naked eye, Tadakas had assembled the sensor data and created a tactical graphic display in his augmented reality glasses. The flashing spot in his glasses was the icon for the incoming missile. Sergeant Elattar pressed the talk button on the side of his helmet. “Sgt. Turner,” he intoned silently through his jawbone sensor microphone, “are we good to go?” At the bottom of his display, he could see that each of the capacitors had reached the 95% power levels. Having one

generator shot up meant he could only put three salvos down range, before he had to wait for a recharge.

As each of the ADA battery's weapons platforms became ready its target window appeared in his glasses. All of the battery's soldier could see a visualization of the FRAGO in the sky to the east. First in the furthest east appeared four gold target points with left and right limit markers along Phase Line Papa. This was the icon markers for each of the Iron Dome missiles squads. Next, at Phase Line Quebec appeared three bright blue target points with left and right limits markers. This was the window for the Manticore railgun squads. The marker for his own target point was ringed in red, on the north side of Bravo Battery's forty kilometer wide engagement field.

As he ran toward his railgun track, he could hear the three big diesel engines cranking up to prime the capacitors of the dual five inch rail guns, which was at the heart of his anti-aircraft artillery armored vehicle. Looking in the back hatch of the cab, he could see Sgt. Turner at her station. Aside from having a human in the decision cycle to target and kill another human, the Manticore's firing system was fully automated. Although Sgt. Turner was holding the launch trigger, Tadakas was controlling the aiming and firing based on the regional commander's rules of engagement and Capt. Novikova's FRAGO. Still, Sgt. Turner had oversight on the weapon system's execution of the mission. If she let go of the trigger, Tadakas would abort. Through his cranial microphones, he heard her say, "Good to go, sergeant."

The red opaque projected path of the missile started getting narrower as it came across Phase Line Oscar, leaning to the north. With excitement, Staff Sgt. Elattar realized it was heading for him; his crew might be the one getting to shoot down the missile.

As the hypersonic missile came upon Phase Line Papa, two supersonic missiles from the Iron Dome system screamed over his head. The air thundered as the sound barrier was broken. In less than five seconds, the Iron Dome missiles exploded in the sky. The hypersonic missile jumped up and slipped between the exploding gases and shrapnel of the Iron Dome missiles.

The phase array S-Band radar on top of the Manticore artillery vehicle captured the subtle adjustments that the hypersonic missile had made, and was keeping a solid-state phase arrayed coherent LADAR (laser detection & ranging) using intra-pixel quadrature detection focused on the missile. Tadakas captured the missile exiting from behind the cloud of expanding gases. The burst of released energy from the chemical explosion was never really sufficient to obscure the LADAR's view of the missile.

Every three centi-seconds, Tadakas redefined the location of the missile in time and space. Then it calculated the probable location of the missile over the next two seconds. The level of accuracy was to approximately twenty centimeters. Within the Manticore vehicle cab a Tadakas GPU module was processing the missile's probable locations at the most likely incident of impact for projectiles from the rail gun. Using those calculations, Tadakas was moving the turret in conjunction with the target.

A cylindrical armature sabot round sat in the breach of both helical coil electromagnetic rocket assist cannons (HCERAC [hese-rac]), waiting. In a tenth of a second after the Iron Dome explosion, the hypersonic missile crossed Phase Line Quebec. A digital circuit opened the breakers releasing the electrical energy to charge the rails in the first barrel. In microseconds, a Lorentz Force field picked up the armature at the base of the first projectile and slammed it through the barrel at Mach 3. As the armature reached end of the rail, it entered a smooth bore tube, sealing the sidewall compression ring against the bore.

Then a LASER blast from the base of the barrel was fired straight up the center to ignite an eighteen ounce plug of potassium chloral oxide propellant at the base of the projectile armature. The burst of propellant energy pushed the projectile to even higher speed.

As the sabot round accelerated through the bore, the combination of friction and burning propellant snapped the inside of the barrel temperature to about 220 degrees Celsius. A jacket surrounding the barrel filled with grade-3 bio-based hydraulic fluid (BHF-3) that refrigeration units held down to -20 degrees Celsius was thrust up to 210 degrees Celsius as the fluid struggled to bleed off the heat.

The sabot round exited the barrel at Mach 5.

As the sabot's outer shell fell away, it revealed ten tungsten steel flechettes with a vaned tail for a stable flight. Each flechette was eleven inches long and just shy of an inch in diameter. As the flechettes flew through the air, temperatures at their tips reached 900 degrees Celsius. The flechettes' impact against the air caused a friction ablation where the hydrogen atoms broke up into plasma that glowed a radiant white blue against red glow of the heated metal. The flechettes spread out as they sped through the sky in a pattern that was two feet in diameter.

No sooner than the first round had exited its bore, than the second round exited the second bore.

In less than a second, three flechettes struck the missile. One flechette hitting the four hundred and eighty kilograms of octa nitro cubane. The explosion was deafening for Staff Sgt. Elattar, even though it was four kilometers away. The concussive force from the explosion was so great, it broke the glass widows of most houses that were within ten kilometers of the missile's defeat.

AFTER ACTION REPORT

For her success at downing a hypersonic missile, Sgt. Cynthia Turner was awarded the Meritorious Service Medal with "V" Device. By the end of the war, she would also earn a Bronze Star.

Shortly after the first missile was intercepted, the Russians launched eight hypersonic missiles, covered by twenty eight armed decoy missiles, followed by eight Su-57s and twelve MiG-35s. At about 4:30am the man wing of the Russian assault entered Latvian air space.

At the same time a similar air wing came out of Saint Petersburg, and made a run for the Gulf of Riga.

The resulting battle between the Russian air wing out of the East, and the 2-8th ADA “Sky Sentinels” lasted for almost a half hour as the Russians mounted an attack to reach the port of Riga where four cargo ships were arriving from Germany, and two more from Great Britain were entering the Gulf of Riga. In the course of the battle, six French destroyers provided the last line of defense for the ships.

During the battle, to be known as the “Battle of Gaizinkalns,” the enhanced hyper-warrior, Maj. Veronica Novikova (a captain at that time), operationally fought the battalion from level-3 symbiotic union with the battalion’s AI. To her credit, not one missile or plane made it to the arriving supply convoy. All missiles and decoys were shot down within seconds of entering Latvian air space. For almost fifteen minutes, Russian fighter craft were able to avoid destruction before the last one was shot down, from the ground.

At the end of the battle, Maj. Novikova succumbed to the stress of over exertion for a prolonged time operating at level-3. When she was brought out of the symbiotic union with the artificial intelligence, she lost consciousness, and had to be hospitalized. She spent three days in a medically induced coma while she recovered.

The afternoon after the Battle of Gaizinkalns, NATO Command released a video compiled by the AI of the 2-8th ADA (Tadakas) representing events of that morning. It went viral on the internet. By that night, Maj. Kovikova was an internet hero, being compared to the likes of China’s Mulan, Britain’s Boudicca, and France’s Joan of Arch.

Due to the successful arrival of supplies, NATO ground forces used that day of the sky battle to resupply, and reorganize.

At 6:00am the next day, NATO forces launched a counter offensive that in less than twenty-four hours, expelled the Russians from Latvia.

Upon awakening, Maj. Novikovia (newly promoted) learned that Latvia had been liberated, and that she was an international celebrity.

Maj. Novikovia was awarded the Congressional Medal of Honor.

As a special tribute to NATO forces fighting on Latvian soil, Maj. Novikova (along with five others) were awarded the new Medal of Heroism by the Latvian Minister of Defense.

The 2-8th ADA was awarded the Presidential Unit Citation.

LtCol. Edward “Ed” Montoya, Commanding, and Capt. Henry Largo, Tactical Operations were awarded the Distinguished Service Medal.

Five officers of the 2-8th ADA were awarded the Silver Star.

Twenty-six members of the 2-8th ADA were awarded Bronze Stars.

IN SUMMERY

DEFINING THE DOMAIN OF THE 4TH INDUSTRIAL REVOLUTION

The preceding short story is intended to help the reader see and feel just how profound an impact the 4th Industrial Revolution will have on how wars in the near future will be fought. Although large scale combat operations are not that likely, it could happen. If large scale war happens under the parameters of the 4th Industrial Revolution, it will be short and violent. The defenders will have to be all-in and ready to go, or they will capitulate rapidly. During the one hundred hour First Persian Gulf War the coalition had seven months to organize for war. In a peer-to-peer hyper-war of this new epoch, it will be a, “ready or not, come-as-you-are,” war. That means that if Americans are going to be an asset to our allies, everything; equipment, personnel, and infrastructure; will have to be in place, beforehand.

Our heroine in this story meets the definition of a 4th Industrial Revolution soldier whose biology has been augmented to act at what are otherwise inhuman speeds. Such enhancements don’t need to be surgically embedded to meet the new age criteria. Just so long as it involves a merger of the material, biological and virtual in a way that the net effect exceeds the sum of its component parts, thereby enhancing human accomplishment. It must be emphasized that all the technology presented in the story already exists as a prototype or proof of concept. In the arena of hypersonic technology, the United States was the leader in the early 2000s. But due to a lack of interest and investment, our competitors have jumped ahead of us.

If the peer-to-peer war portrayed in the “Hyper-Battle” were to occur today, what would the fate of Latvia, or even Europe be? Both in terms of maneuver deployment, and in terms of technological deployment, the United States Army is completely out of position. Allegorically, this is a pattern that has become all too indicative of Americans during the early part of too many wars. A pattern for being under-prepared and out of position at the national strategic level. This is not a failure of technology, but a failure to appreciate the dire position America is in, a failure of resolve, a failure of polymath mental agility, and a failure of vision. As General Sullivan was keen to say in the early 1990s, “*No more Task Force Smiths*” (referring to the decimation of the 1-21st Infantry during the Battle of Osan in 1950). Although many individuals are talking about the 4th Industrial Revolution, American government and the organs of national security have no uniform or unified policy.

America needs to change.



Mr. Charles Bissett is a Logistics Military Analyst who was on contract to the US Army, Sustainment Center of Excellence, Training & Doctrine Command. He writes concept and doctrine documents, and supports as a graphic artist. He is a graduate of Florida Institute of Technology with an MBA, and a second master’s degree in Systems Analysis. He retired from the US Army as a Multiple Launch Rocket System crew chief, before becoming an Army contractor.