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Chapter 1 : From Prussia with love- a history of simulated war and battle games. - Improbable

Virtual reality can come into play early in a soldier's career, beginning with a virtual boot camp experience. Diverse scenarios can be tailored to the different service needs, with programs supporting skill drills, physical fitness and other key boot camp experiences, reducing the number of instructors.

Email For the armed forces, training is time-consuming, costly and potentially dangerous â€" but technology offers a better way. Increasingly, military leaders are turning to virtual reality VR as a means to make training more efficient and more cost-effective. With the rise of inexpensive equipment , highly detailed and customized simulations, VR can provide a full range of immersive scenarios for military training â€" from mission rehearsals to live fire exercises. By being placed in a more hands-on learning environment, personnel can not only gauge more realistic reactions but also have higher retention of information since VR brings training beyond theory. Diverse scenarios can be tailored to the different service needs, with programs supporting skill drills, physical fitness and other key boot camp experiences, reducing the number of instructors. A New Reality for Veterans Learn how disabled veterans are staying active with the help of virtual reality. VR technology is being used to support tactical exercises as well. Army Edgewood Chemical Biological Center, for instance, has been designing immersive experiences to simulate real-life scenarios. Training software can be deployed overseas if needed and can be implemented either in the field or in the classroom. Medical training can also benefit from the flexibility of virtual reality. While it can be difficult in a classroom to simulate the complex swirl of activity a field medic may encounter, VR offers a way to generate realistic battlefield conditions for the purposes of training. This immersive, experiential approach can help prepare medics to better cope with the confusion and chaos of the battlefield, and can also expose them to a range of scenarios not easily replicated with traditional methods. Vehicle and flight simulations provide another application for VR to augment conventional training. With virtual reality, soldiers can learn how to operate a plane or vehicle and can also prepare to tackle emergency situations. Simulators mimic the real motions and sensation of a vehicle, thus helping to prepare troops for actual field experience. Virtual reality is also on the rise as a means to conduct combat training. This is a key for new recruits, gearing them up to obey orders without question and to respond with alacrity under duress. VR can simulate sights, sounds and motions of the battlefield, drilling soldiers to act as effective team members and building their individual resilience. Custom Capabilities One advantage VR has over the conventional classroom training is in its ability to generate highly complex simulated scenarios. The battlefield is comprised of many moving parts: That swirl of activity can be difficult to recreate in a traditional training scenario with limited resources and traditional methods. On the other hand, VR designers can craft an environment that is exceptionally rich in detail, one that gives a high degree of accuracy and includes the diverse range of variables that converge on the battlefield. Additionally, VR also makes it easier to bring the trainings beyond a classroom setting on a military base â€" empowering soldiers with combat skills and the latest tactics abroad or even in the field. Finally, VR speaks to the interests of a new generation of soldier â€" a generation weaned on electronic experiences, with an intuitive appreciation for digital information. Interactive degree training operates in the video game vernacular, while taking that idiom to a new level of depth and intensity. VR technology is highly convenient for recruits in attracting new soldiers. As the armed forces seek to train and equip soldiers, VR offers an affordable and readily available way to bring field medicine, live fire combat, boot camp exercises and a range of other military training scenarios to life. Our government technology solutions are ready to assist government agencies with their digital transformation efforts.

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Chapter 2 : Military & Defence â€“ Virtual Raasta

The psychological devastation of war, both on the battlefield and long after a soldier has left, can be far reaching. Learn how emerging technologies like virtual reality are helping today's soldiers to overcome and combat these experiences.

Helicopters flew overhead, tanks roamed the field and the echoes of artillery fire could be heard. These threats, however, were simulated. The Office of Naval Research organized exercise, which took place in early August, used augmented reality â€" a method of overlaying simulated images onto the real world, usually through goggles or a tablet â€" to create a comprehensive training environment. It represents a growing trend in the Army and Marine Corps as they look to shed some costs associated with expensive live exercises, experts said. AITT is loaded with a variety of scenarios, and in this case, simulated live-fire training, he said. ONR also hosted another demonstration at Quantico in October. It was larger in scale than the previous exercise and included officials from the Army. With both exercises considered successes, the AITT system will soon be handed off to the Marine Corps for additional research, development, testing and evaluation, Squire said. While AITT is the only funded augmented reality effort at the office, Squire said there are plans for future research. Through augmented reality, a user can create a training environment in an area that is not necessarily suited for a live engagement, he said. For example, Lockheed early on in its research and development created a virtual tank that could operate in one of its parking lots. While augmented reality has its advantages, live training is still necessary. The company wants to apply successes in systems, such as Google Glass, to its own customer base. The Army is also making investments in augmented reality, said officials from the National Simulation Center at the U. Additionally, augmented reality gives the military the option to train at a greatly reduced cost, he said. Every virtual round that is fired, or every virtual tank of gas that is burned is less expensive than the real-world version and the overall system is still as complex, he said. The service is closely monitoring the work industry is doing in augmented reality, and Caldwell noted that many systems are coming to maturity. Caldwell stressed that while live training is the best possible kind, augmented reality is an affordable and realistic option. It makes the live training environment better, more complex, more realistic. The Army is also carefully watching the work that the other services are doing, he said. He noted that the Marine Corps is further ahead in the development of augmented reality technology than the Army with its augmented immersive team trainer. On the Navy side, Caldwell said the sea service has begun firefighting training using the technology. Scott Gilman, capability manager for virtual and gaming simulations at U. Army Training and Doctrine Command, said the service is using Oculus Rift â€" a virtual reality goggle â€" to help with Stryker training. Last year, during an army network integration evaluation, Cubic tested augmented reality systems that used Google Glass and goggles manufactured by Epson. Augmented reality gives military officials the option to rapidly change environments and keep soldiers on their toes, he added. Soldiers in such a training scenario may one day turn a corner and come upon a shepherd with a flock of sheep and the next day a Russian T tank, he said. While AR is useful for training purposes, it also has real world applications, Ges said. For example, a soldier might use Google Glass to help him positively identify a suspicious person.

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Chapter 3 : Virtual Reality in the Military - Virtual Reality Society

Soldiers from the UK Royal Irish Regiment and the Norwegian Nord-Ã˜sterdal Home Guard unit conduct a combined operation to defend the village of ElvÃ¥l, Norway during an exercise.

Sign up Subscribe Join our community of Dell Technologies blog readers and never miss another post by subscribing to our email newsletter. Fill out the brief form below and you will get a confirmation e-mail for your subscription. Thank You Almost finished We need to confirm your email address. To complete the subscription process, please click the link in the email we just sent you. Suddenly, the vehicle in front of you explodes and you see insurgents, emerging almost out of nowhere, ready to take your life. Seeing insurgents with loaded guns, hearing shots fired and smelling gunfire in a simulated virtual reality battlefield through a VR headset can be frightening for some. But military veterans are turning to such VR-empowered exposure therapy to confront the trauma of combatâ€”both before they experience it, and afterwards to recover from it, in a safe and controlled environment. They might get anxious at first, but anxiety goes away as they continue. The two programs Rizzo works with confront unique problems. Bravemind , an exposure therapy, simulates experiences reported by soldiers to help them confront and process difficult emotional memories. The pre-deployment resilience training tool known as Strive â€”Stress Resilience in Virtual Environmentâ€”aims to teach effective emotional coping skills and better prepare service members prior to deployment for the stress of combat. By teaching these coping skills ahead of time, researchers hope soldiers will be more able to manage challenging situations as they occur on the field. Several arms of the military are using it to train their soldiers and prevent them from injury. Soldiers at various military facilities, such as Fort Bragg, are entering VR simulations to learn to quickly pop up hospital tents and treat injured soldiers in a tactical environment. These applications immerse officers in a realistic training scenario whereby they have to perform emergency response actions in a virtual world. She explained that the biggest killer on military missions is lack of medical training. First deployed in , the program has only become more sophisticated with time. And while the emotionally evocative experience works for combat-training purposes, Rizzo explained the training also helps mitigate signs of PTSD upon their return home. A widespread epidemic facing veterans, the technology aims to save lives pre- and post-war. One in five military service members who return from Iraq and Afghanistan report symptoms of PTSD or major depression. And while veterans make up close to nine percent of the population, 18 percent of suicides are former military. A widely cited VA report found that in over 7, veteransâ€”20 per dayâ€”took their lives. Beyond Video Games The idea of using virtual reality to salve the effects of medical conditions and pain is not new. Today, hospitals use VR to distract patients from pain or manage stressful procedures, such as childbirth. Doctors also use the technology to help patients cope with emotional trauma. Would you like to read more like this?

Chapter 4 : â€‹How VR is training the perfect soldier

Virtual Soldier Multi-function Workstations allow additional virtual Soldiers, vehicles, neutral or opposing forces to "participate" in the training and is controlled by a keyboard and mouse by an.

Military training through virtually simulated war games 27 March Military training in the virtual environment has grown in popularity over recent years, largely thanks to its cost-effectiveness and safety. Graham McIntyre, chairman and CEO of the European Training and Simulation Association, compares simulations with live training environments and asks how much more can we expect from them. In recent years, simulation tools have become a key part of military training. As the costs of the technology falls, trainee soldiers are spending more and more of their time in virtual worlds. The advantages are obvious. Historically, soldiers used dummy weapons to train against wooden opponents, while drill procedures simulated tactical manoeuvres. In Roman times, commanders used sand tables with soldier icons, enabling them to manipulate a physical copy of the battlefield. However, when we talk about military simulations today, we normally mean the computerised variety. This field, which began to gather steam in the s and 80s, really took off in the late 90s, as the military and entertainment worlds explored areas of convergence. By the turn of the century, training simulators were being credited with reducing the number of US casualties at war. In the s, he explains, simulation technology was developed by individual companies to suit their own needs. On top of this, the image quality has improved, meaning people are more easily able to suspend their disbelief within a virtual environment. This means synthetic environments are not only sharper looking â€” they also have more sophisticated functions. Virtual worlds As might be expected, these advances have led to a wide sphere of applications. While flight simulators first used during the Second World War still dominate the training market, there is also a growing demand for synthetic maritime environments and tools that simulate combat. Its unit-based virtual training UBVT system enables troops to practise their skills in an immersive, graphic-rich environment. After all, there are lots of things that can be achieved in a simulator that would never be feasible in the real world. Simulators enable a single instructor to train large groups together, while quickly flagging up any problems from their instructor operator station. Simulators can also yield improvements in mission readiness. In particular, they can facilitate training in many different kinds of conditions, which would otherwise be hard to conjure on cue. It would be extremely difficult to put them into these situations in the real world. McIntyre thinks there are two main issues, both of which are likely to become less of a problem over time. Many key customers have changed their training syllabi to maximise the benefits, embedding more and more simulation training into their requirements. The future is bright.

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Chapter 5 : Virtual Reality's Potential in the Military - AppReal

Some of the most common uses of VR in the military include the virtual boot camp, flight simulation, battlefield simulation, medic training on the battlefield, as well as vehicle simulation. Though the primary use of virtual reality in the military remains for the preparation of combat, it is by no means limited to just the battlefield.

Posted on 15 December From Prussia with love- a history of simulated war and battle games. Robbie Lee works as a writer for Improbable. How do we prepare our cities for autonomous vehicles? How can we build an architecture to combat cybercrime? Who would win in a fight between 20, chickens and 1, medieval knights? And nothing drives technological advancement quite like war. But could the same be said for simulation technology? After all, the relationship between games that simulate war and the progress of simulation tech has always been a close one. Game franchises like Total War and Civilisation are not just genre classics but cornerstones of the entire medium. Improbable is certainly not trying to build amoral supercomputers, but we do think that the shared lineage between large battle simulators and the games made possible by our SpatialOS tech is fascinating. So why are people so interested in battle simulation? Perhaps the real question is why has warfare been so ripe for simulation? From a broad perspective, you can identify that people just seem to enjoy watching things unfold. What is it about a marble run that we find so captivating? Why do we spend ages setting up lines of dominoes only to knock them over again? Perhaps we like these things because we are in love with cascades of consequences. We take joy in noting a series of expected and unexpected results. This, you could argue, is the most abstract and simple simulation programmed into our minds â€" what happens when I do this? Warfare takes this basic idea of simulation to the Nth degree. Historically, war involved huge numbers of people and things acting in complex or coordinated ways. Being able to control a domino falling over and subsequently what that does to other dominoes in the vicinity is one thing, but being able to control platoons of soldiers or battalions of tanks is another. It is precisely this degree of scale and diversity of entities that makes warfare so compelling to simulate. The more entities within a simulation and the grander the overall spectacle, the more it grabs us. And, as a massive battle simulator like UEBS demonstrates, people enjoy watching things unfold spontaneously in virtual worlds even without large amounts of agency over the simulation. From Prussia with love This is not a modern obsession either. Chess â€" wooden warriors â€" dates back to 6th century India, where it started life as a military simulator. HG Wells brought battle simulation into the anglophone mainstream in with his book Little Wars available for free. The book contains a set of rules that turn inanimate collections of toy soldiers into a complex â€" relatively speaking â€" simulated battle. This employed a special table with wooden counters that represent different kinds of military unit. While both games were designed with children in mind, Kriegspiel quickly took an unprecedented step for a battle sim. The Prussian military adopted it as a training method. I must recommend it to the whole army! Here we see the foundation of a new idea â€" simulations of serious topics can give real world advantages. With such powerful political and military backing, any technology would begin to develop more rapidly â€" battle simulation was no exception. Playing god It makes sense. Simulation offers a godlike perspective and godlike powers. You are given the ability to zoom in and out of a world because you control some or all of its variables. For example, take a look at The Campaign for North Africa. This is a ten-player recreation of the WWII campaigns, which has a suggested playtime of 1, hours. Wooden counters might have solved the problem of scaling armies down so they could be viewed from a higher perspective. However, they do not and by their physical nature cannot replicate the complex behaviours of soldiers in a field. The arms race for high fidelity simulation of war starts here and continues all the way up to technology like SpatialOS. Building better worlds The early-to-mid 20th century saw incremental steps towards increasing the fidelity of war simulation. Little Wars for instance, transposed artillery into a toy catapult or pop-gun that launched wooden pegs â€" a bit like a player kicking a ball in tabletop soccer-sim Subbuteo. It was a stat, but you can imagine how little realism this really adds â€" what about environmental

factors that affect gunnery, like wind or rain? The next step was to move from crude wooden figures to highly detailed and characterful plastic figurines like in Warhammer. Games like this also developed more complex rule sets than their predecessors for terrain and the effect that, say, boggy ground would have on a unit traversing it. But these changes were still largely aesthetic. Nothing could change the fact that inanimate objects do not move on their own and do not behave like the living things they represent. Soldiers in real life, for example, might not want to do the things that you, as a general, ask of them. To simulate more complex behaviours of entity and environment, wargaming needed to find a much greater shift than the move from wooden counters to plastic elves. Computing provided the way. Battle sims in the age of compute With computer power, the ability to scale was easier than ever and new levels of fidelity could at last be attempted. At first, in-game cameras were quite static and war simulations looked more like Google Maps than Gettysburg. Eventually, as processors became more powerful and graphics cards began working their magic, higher levels of realism were possible. Even games with as much complexity as The Campaign for North Africa can now be played by one person in half an hour. But breakthroughs in the field of artificial intelligence are perhaps the biggest single contribution to this. Spartans imbued with computer AI could be programmed to fight like Spartans, with their discipline and stamina allowing them to out-phalanx other Greeks. Romans could be programmed to resort to their testudo formation when appropriate. Mainstream recognition This could all sound pretty niche. Apart from Peter Cushing , not everyone cares who would have won in a fight between Elizabeth I and Genghis Khan, even if you could now simulate it with a mass of historical data. Even primetime TV in the UK at least has been infiltrated. Mobile games like Clash of Clans also show mass appeal. Many people who might not even consider themselves to be gamers enjoy the thrill of battle, even while commuting to work. How can SpatialOS improve battle simulation? SpatialOS enables the creation and cloud-hosting of enormous virtual worlds. It does this by exceeding the power of a single game server or engine. In theory, a world built on SpatialOS could be as big as you like, with as many complex unit types as you need. This is why we feel that our tech could be the next stage in battle simulation. SpatialOS essentially does a lot of the heavy lifting. By leveraging the power of the cloud and distributing compute across multiple cores, the levels of fidelity and detail of this simulation and all of its constituent entities could also increase. That enables developers to focus their time and budget on features like complex terrain and AI. As SpatialOS is multiplayer by default, it has the potential to create a battle sim where multiple players control the same army, to replicate a military hierarchy. Given the current resurgence of interest in battle simulation, it would be good to see how people would react if a developer chooses to build the next hit battle sim with this depth of real-time complexity.

Chapter 6 : Simulated Battle: Soldiers Defend Village During Trident Juncture | www.nxgvision.com

Virtual training technologies create a life-like environment for soldiers to prepare for a variety of scenarios they are likely to encounter on the battlefield at a more reasonable cost than traditional training approaches.

Print Print Simulation is a key tool for military personnel. The tool also allows people to experiment with techniques or strategies that would be high risk. Technology is about to bring simulation to ground warfare through virtual reality, making forces better prepared, more cohesive, and more effective. A couple of weeks ago, I had the opportunity to try a commercially available VR platform with a controller design I had not used before. The game was first-person shooter and the enemies were wayward helper robots. During the tutorial, I used the controller to draw the virtual pistol from the holster, get on target, and fire. Muscle memory from small arms training set in almost immediately after the first attempt. The feeling was fluid and the game reaction lifelike. There were meaningful differences of course. No kickback, for example, so staying on target was easy. The reload function was different as well, but after playing for ten minutes, the sensation had surprising parallels with being on an open firing range and practicing firing from a covered position. There is a word that VR experts use for this: This is the feeling of being there, of a sensation of a virtual experience as a physical one. Jeremy Bailenson discusses this at length in his book, Experience on Demand: Despite knowing that this is just a simulation, about 30 percent of participants will not step off the board. The experience feels real to subconscious parts of the brain. The ability to evoke emotion under simulated scenarios could be a powerful tool for military preparation and unit cohesion. The example that first came to mind was prepping a team of special operations forces for a nighttime raid. Software that combined satellite imagery with drone reconnaissance could possibly create 3D simulations allowing operators to move through a village or city virtually multiple times. This also adds the ability for forces to confront different permutations, such as adversaries, architectural changes, or noncombatants. There will always be unforeseen complications with operations, but this could be a meaningful tool in the arsenal. Elite professionals have already successfully used virtual reality to prepare. Adoption among professional football teams has been relatively rapid. Seeing the defensive formations from behind a simulated offensive line, like a quarterback would see in an actual game, can help prepare for different looks. As the technology improves, time in the simulator might be a new part of the arms race among NFL quarterbacks. Perhaps the more important military application is outside of elite operators. Conventional forces use a variety of techniques to build unit cohesion and improve performance. Virtual reality could be a powerful addition. Facing an emotionally challenging simulated environment with fellow team member avatars may help to prepare forces for what they might see, including the worst-case scenarios. Presence in virtual space could help improve performance, but just as important, mentally prepare forces for strain, sensory overload, and unexpected conditions. All of this will ultimately help improve unit cohesion. VR will never will never be able to really replicate the stress of combat, and some individuals will find the training more valuable and preparatory than others. Nonetheless, integrating these new technologies into training and operational preparation may offer an edge in building resilience for the psychological rigors of conflict, enhancing team cohesion, and practicing complex operations. The views expressed are those of the author s and do not reflect the official position of the United States Military Academy, Department of the Army, or Department of Defense. Markus Rauchenberger, US Army.

Chapter 7 : How Virtual Reality Military Applications Work | HowStuffWorks

The Military Virtual Training and Simulation Summit allows US Military, government agencies, educational leaders, and solution-providers to come together in a town-hall forum to discuss the.

Witcher Feb 8, Not so long ago, head-mounted virtual reality VR displays were beyond affordability. How do you train them at home station? Virtual reality can safely replicate otherwise expensive and dangerous training scenarios, letting trainers repeat and modify as needed. For complex maintenance tasks, machines can perpetually be taken apart and rebuilt in VR without fear of wearing down real parts. And because trainees can train anyplace they can hook up to a computer â€" as opposed to jetting off to a life-size simulator â€" time and travel can be saved. Virtual elements have to not only look realistic, but behave as if tangible, moving behind objects rather than through them. The inexpensive, high-resolution LCD displays developed for smart phones and commercial game engines developed to drive consumer video games can do double duty as military training tools. Those old systems relied on custom software and substantial investments and timelines. The new technology changes the rules and leave the simulation technology development to the experts. Defining Presence One promise of the immersive nature of virtual reality training is what experts call presence: Improved screen resolution provides better realism and clarity. New graphics cards also help. Commercial VR headsets, already not heavy, will get lighter with time. Bandwidth is increasingly capable of supporting multi-user scenarios and wireless connectivity will eventually allow VR users to operate untethered, increase the usefulness and safety of simulations. Resolution and scale create other problems. The Army can take advantage of dynamic terrain programs that alter the performance of a vehicle moving through dirt after it turns to mud in the rain. But while commercial gaming engines might incorporate one square kilometer of terrain, the distances of 90 square kilometers demanded by Army tank training requirements, is too much real estate to render in the highest graphical detail and still display in real time. Feedback of All Sorts Haptics â€" the ability to deliver physical touch feedback to users â€" presents another hurdle. Haptics can also allow users to see their hands in virtual environments, adding an element of realism. Despite progress, however, experts say tactile feedback is still years behind visual or aural response. In some cases this means that an old-fashioned mouse and computer screen may provide superior training to VR. He notes that the forces of both electromagnetism and gravity subtly affect our real world sense of who and what is close to us. As adults, putting yourself completely in this immersive new experience can be very disorienting. Their sense of reality already includes a strong digital presence, and they are more comfortable training with this sort of technology. This is how they learn. If you want to attract the workforce, if you want to retain a workforce, you have to train them in a form that is not only native to that generation but extremely familiar. Even VR is ultimately about real people first and foremost, she explains. Witcher is a writer based in Las Vegas. Submit a Comment Your email address will not be published.

Chapter 8 : How Virtual Reality Is Changing Military Training

Soldiers can go from training in a virtual garrison environment on an IWQ range, to conducting Battle Drill 6 on a virtual Taliban compound in the mountains of Afghanistan. The level of complexity of each training session is completely up to the unit commander.

Market Scenario Military simulation and virtual training are an integral part of military operations. Military simulation and virtual training products are sought after by defense ministries, on a global scale, to provide training for service personnel in the air, naval, and land-based domains. Military simulations connected to combat operations, unmanned systems, medical treatment, and maintenance, allow virtual training to take place on different scenarios. These are expected to increase the market growth. The rise in popularity of operational readiness and diverse battlefield requirements in the military applications is expected to drive the market during the forecast period. However, there are some shortcomings in operating performance of the military simulation and virtual training, such as lack of incentives, lack of interoperability, and requirement of high fidelity regarding meeting customer needs restraining the market growth. The defense ministries across countries are cutting down costs of military expenses, owing to reduced financial resources. Governments are downsizing militaries and cutting down on training budgets, due to which the military is focusing on optimizing solutions for training requirements, which is expected to offer opportunities for the military simulation and virtual training market expansion. Additionally, many countries are reorganizing their military forces, which is resulting in the growth of the military simulation and virtual training market. The emergence of portable simulation systems is expected to provide tailoring solutions for training as per individual missions and specific needs. Simulation and virtual training are capable of enhancing the military techniques for applications related to naval, ground-based, and airborne platform offering strategic experience to soldiers. Simulation training improves the overall understanding of soldiers and training capabilities. Military simulation and virtual training allows the military to enhance the overall capabilities related to knowledge of handling complex electronic equipment and advanced missile systems. Military simulation and virtual training offers the ability to meet various training requirements and enables cost savings and is crucial to reduce the wear and tear of equipment, which is expected to trigger the military simulation and virtual training market growth. The factors responsible for the growth of military simulation and virtual training market is the decreasing average defense budget across countries and rapidly increasing awareness regarding simulation and training methods. Other key drivers expected to contribute towards the growth of the military simulation and virtual training market are the rising need for existing equipment upgrades and orders for new ones. For instance, Bohemia Interactive Simulations developed augmented reality visual system for Textron Inc. Navy to support services, from curriculum development to advanced warfare training. Moreover, Meggitt Training Solutions developed FATS MIL that features a unique combination of capabilities for military users, such as enhanced 3D marksmanship and birds in flight and realistic ballistic effects. The military simulation and virtual training market is segmented based on application, platform, and regions. On the basis of application, flight simulation is widely used and comprises the largest market share. On the basis of platform, airborne is expected to register the highest CAGR during the forecast period due to the rise in the requirement for battlefield operations and border surveillance. For instance, Northrop Grumman Corporation signed a contract with U. The virtual training simulated actual battle scenarios for deployment locations. North America is expected to dominate the market in future due to the existence of established market players in this region. Additionally, there is increased investment in research and development in this region have resulted in aggressive technology development and its adoption, thus, contributing to rapid growth. Europe is second to the North American market in military simulation and virtual training market due to increased investment by the governments of developing countries. Key Players The key players in the global military simulation and virtual training market are Bohemia Interactive Simulations U. The report for Global Military Simulation And

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Virtual Training Market of Market Research Future comprises of extensive primary research along with the detailed analysis of qualitative as well as quantitative aspects by various industry experts, key opinion leaders to gain the deeper insight of the market and industry performance. The report gives the clear picture of current market scenario which includes historical and projected market size in terms of value and volume, technological advancement, macroeconomic and governing factors in the market. The report provides details information and strategies of the top key players in the industry. The report also gives a broad study of the different market segments and regions.

Chapter 9 : Virtual training and simulation: trends and observations - Military Embedded Systems

Augmented reality gives military officials the option to rapidly change environments and keep soldiers on their toes, he added. Soldiers in such a training scenario may one day turn a corner and come upon a shepherd with a flock of sheep and the next day a Russian T tank, he said.

One can readily discover, for example, how long it takes to construct a pontoon bridge under given conditions with given manpower, and this data can then generate norms for expected performance under similar conditions in the future, or serve to refine the bridge-building process. Any form of training can be regarded as a "simulation" in the strictest sense of the word inasmuch as it simulates an operational environment ; however, many if not most exercises take place not to test new ideas or models, but to provide the participants with the skills to operate within existing ones. Full-scale military exercises, or even smaller-scale ones, are not always feasible or even desirable. Availability of resources, including money, is a significant factorâ€”it costs a lot to release troops and materiel from any standing commitments, to transport them to a suitable location, and then to cover additional expenses such as petroleum, oil and lubricants POL usage, equipment maintenance, supplies and consumables replenishment and other items. Moving away from the field exercise, it is often more convenient to test a theory by reducing the level of personnel involvement. Map exercises can be conducted involving senior officers and planners, but without the need to physically move around any troops. These retain some human input, and thus can still reflect to some extent the human imponderables that make warfare so challenging to model, with the advantage of reduced costs and increased accessibility. A map exercise can also be conducted with far less forward planning than a full-scale deployment, making it an attractive option for more minor simulations that would not merit anything larger, as well as for very major operations where cost, or secrecy, is an issue. Increasing the level of abstraction still further, simulation moves towards an environment readily recognised by civilian wargamers. This type of simulation can be manual, implying no or very little computer involvement, computer-assisted, or fully computerised. Graf Helmuth von Moltke is nowadays regarded as the grandfather of modern military simulation. Although not the inventor of Kriegsspiel, he was greatly impressed by it as a young officer, and as Chief of Staff of the Prussian Army promoted its use as a training aid. Manual simulations have probably been in use in some form since mankind first went to war. Chess can be regarded as a form of military simulation although its precise origins are debated. One, known as "rigid Kriegsspiel", was played by strict adherence to the lengthy rule book. The other, "free Kriegsspiel", was governed by the decisions of human umpires. However, its prescriptive nature acted against any impulse of the participants towards free and creative thinking. Conversely, free Kriegsspiel could encourage this type of thinking, as its rules were open to interpretation by umpires and could be adapted during operation. This very interpretation, though, tended to negate the verifiable nature of the simulation, as different umpires might well adjudge the same situation in different ways, especially where there was a lack of historical precedent. In addition, it allowed umpires to weight the outcome, consciously or otherwise. The above arguments are still cogent in the modern, computer-heavy military simulation environment. There remains a recognised place for umpires as arbiters of a simulation, hence the persistence of manual simulations in war colleges throughout the world. Both computer-assisted and entirely computerised simulations are common as well, with each being used as required by circumstances. Such simulations may be conducted over a few days thus requiring commitment from the participants: In this case, the teams will work against each other, their moves and counter-moves being relayed to their opponents by Control, who will also adjudicate on the results of such moves. At set intervals, Control will declare a change in the scenario, usually of a period of days or weeks, and present the evolving situation to the teams based on their reading of how it might develop as a result of the moves made. For example, Blue Team might decide to respond to the Gulf conflict by moving a carrier battle group into the area whilst simultaneously using diplomatic channels to avert hostilities. At this point Control could declare a week has now passed, and present an updated scenario to the players:

Sometimes the computer assistance will be nothing more than a database to help umpires keep track of information during a manual simulation. At other times one or other of the teams might be replaced by a computer-simulated opponent known as an agent or automaton. Most commercial wargames designed to run on computers such as Blitzkrieg , the Total War series, Civilization games, and even Arma 2 fall into this category. Where agents replace both human teams, the simulation can become fully computerised and can, with minimal supervision, run by itself. The main advantage of this is the ready accessibility of the simulationâ€"beyond the time required to program and update the computer models, no special requirements are necessary. A fully computerised simulation can run at virtually any time and in almost any location, the only equipment needed being a laptop computer. There is no need to juggle schedules to suit busy participants, acquire suitable facilities and arrange for their use, or obtain security clearances. An additional important advantage is the ability to perform many hundreds or even thousands of iterations in the time that it would take a manual simulation to run once. This means statistical information can be gleaned from such a model; outcomes can be quoted in terms of probabilities, and plans developed accordingly. Removing the human element entirely means the results of the simulation are only as good as the model itself. Validation thus becomes extremely significantâ€"data must be correct, and must be handled correctly by the model: Various mathematical formulae have been devised over the years to attempt to predict everything from the effect of casualties on morale to the speed of movement of an army in difficult terrain. He expressed the fighting strength of a then modern force as proportional to the square of its numerical strength multiplied by the fighting value of its individual units. Heuristic simulations are those that are run with the intention of stimulating research and problem solving; they are not necessarily expected to provide empirical solutions. Stochastic simulations are those that involve, at least to some extent, an element of chance. Most military simulations fall somewhere in between these two definitions, although manual simulations lend themselves more to the heuristic approach and computerised ones to the stochastic. Indeed, such simulations do not even require a conclusion; once a set number of moves has been made and the time allotted has run out, the scenario will finish regardless of whether the original situation has been resolved or not. Computerised simulations can readily incorporate chance in the form of some sort of randomised element, and can be run many times to provide outcomes in terms of probabilities. In such situations, it sometimes happens that the unusual results are of more interest than the expected ones. Examining those results, it might be found that the average penetration was around fifty kilometresâ€"however, there would also be outlying results on the ends of the probability curve. At one end, it could be that the FEBA is found to have hardly moved at all; at the other, penetration could be hundreds of kilometres instead of tens. The analyst would then examine these outliers to determine why this was the case. This analysis can then be used to make recommendations: It became apparent, in order to model an ideologically motivated enemy in general and asymmetric warfare in particular , political factors had to be taken into account any realistic grand strategic simulation. This differed markedly with the traditional approach to military simulations. Kriegsspiel was concerned only with the movement and engagement of military forces, and subsequent simulations were similarly focused in their approach. Following the Prussian success in against Austria at Sadowa , the Austrians , French , British , Italians , Japanese and Russians all began to make use of wargaming as a training tool. The United States was relatively late to adopt the trend, but by wargaming was firmly embedded in the culture of the U. Navy with the Royal Navy as the projected adversary. Since they are largely concerned with policy issues rather than battlefield performance, they tend to be less prescriptive in their operation. However, various mathematical techniques have arisen in an attempt to bring rigor to the modeling process. It was not until the first modern political-military simulation appeared although the Germans had modeled a Polish invasion of Germany in that could be fairly labeled political-military , [19] and it was the United States that would elevate simulation to a tool of statecraft. During the Cold War , the Rand Corporation and the Massachusetts Institute of Technology , amongst others, ran simulations for the Pentagon that included modeling the Vietnam War , the fall of the Shah of Iran , the rise of pro-communist regimes in South America , tensions between India ,

Pakistan and China , and various potential flashpoints in Africa and Southeast Asia. Participants in the Pentagon simulations were sometimes of very high rank, including members of Congress and White House insiders as well as senior military officers. It is a tradition in US simulations and those run by many other nations that participants are guaranteed anonymity. The main reason for this is that occasionally they may take on a role or express an opinion that is at odds with their professional or public stance for example portraying a fundamentalist terrorist or advocating hawkish military action , and thus could harm their reputation or career if their in-game persona became widely known. It is also traditional that in-game roles are played by participants of an equivalent rank in real life, although this is not a hard-and-fast rule and often disregarded. This is not only due to the unwritten policy of non-attribution, but to avoid disclosing sensitive information to a potential adversary. This has been true within the simulation environment itself as well â€" former US president Ronald Reagan was a keen visitor to simulations conducted in the s, but as an observer only. The latest, MNE 4, took place in early This is especially true for simulations that are stochastic in nature, as they are used in a manner that is intended to produce useful, predictive outcomes. Any user of simulations must always bear in mind that they are, however, only an approximation of reality, and hence only as accurate as the model itself. Validation[edit] In the context of simulation, validation is the process of testing a model by supplying it with historical data and comparing its output to the known historical result. If a model can reliably reproduce known results, it is considered to be validated and assumed to be capable of providing predictive outputs within a reasonable degree of uncertainty. Developing realistic models has proven to be somewhat easier in naval simulations than on land. Historically, there have even been a few rare occasions where a simulation was validated as it was being carried out. One notable such occurrence was just before the famous Ardennes offensive in World War II, when the Germans attacked allied forces during a period of bad weather in the winter of , hoping to reach the port of Antwerp and force the Allies to sue for peace. Generalfeldmarschall Walther Model ordered the participants apart from those commanders whose units were actually under attack to continue playing, using the messages they were receiving from the front as game moves. For the next few hours simulation and reality ran hand-in-hand: The division was mobilised in the shortest possible time, and the American attack was repulsed. One controversial doctrine that arose from early post-WWII simulations was that of "signalling"â€"the idea that by making certain moves, it is possible to send a message to your opponent about your intentions: This was fine in theory, and formed the basis of East-West interaction for much of the cold war, but was also problematic and dogged by criticism. US commanders decided, largely as a result of their Sigma simulations, to carry out a limited bombing campaign against selected industrial targets in North Vietnam. Those signals, however, did not seem to translate well across the cultural divide. Problems of simulation[edit] Many of the criticisms directed towards military simulations derive from an incorrect application of them as a predictive and analytical tool. Tom Clancy , in his novel Red Storm Rising , illustrated this problem when one of his characters, attempting to persuade the Soviet Politburo that the political risks were acceptable as NATO would not be in a position to react in the face of political uncertainty caused by a division of opinion between the Allies, used a political wargame result as evidence the results of a simulation carried out to model just such an event. It is revealed in the text that there were in fact three sets of results from the simulation; a best-, intermediate- and worst-case outcome. The advocate of war chose to present only the best-case outcome, thus distorting the results to support his case. This image was recreated for a later Japanese propaganda film. Although fictional, the above scenario may however have been based on fact. The Japanese extensively wargamed their planned expansion during World War II, but map exercises conducted before the Pacific War were frequently stopped short of a conclusion where Japan was defeated. One often-cited example prior to Midway had the umpires magically resurrecting a Japanese carrier sunk during a map exercise, although Professor Robert Rubel argues in the Naval War College Review their decision was justified in this case given improbable rolls of the dice. There were however equally illustrative fundamental problems with other areas of the simulation, mainly relating to a Japanese unwillingness to consider their position should the element of surprise, on which the operation depended, be lost. In US Naval

exercises in the s, it was informally understood no high-value units such as aircraft carriers were allowed to be sunk, [36] as naval policy at the time concentrated its tactical interest on such units. The outcome of one of the largest ever NATO exercises, Ocean Venture, in which around naval vessels, including two carrier battle groups, were adjudged to have successfully traversed the Atlantic and reached the Norwegian Sea despite the existence of a real strong Soviet submarine fleet as well as their simulated Red Team opposition, was publicly questioned in Proceedings , the professional journal of the US Naval Institute. Knuth, has since claimed two Blue aircraft carriers were successfully attacked and sunk by Red forces. Critics point to the case of military contractors, seeking to sell a weapons system. For obvious reasons of cost, weapons systems such as an air-to-air missile system for use by fighter aircraft are extensively modelled on computer. This might well indicate a very effective system, with a high kill probability Pk. However, it may be the model was configured to show the weapons system under ideal conditions, and its actual operational effectiveness will be somewhat less than stated. In operational use during the Falklands War in , the British recorded its actual Pk as 0.