How do computer games aid the modern day military?

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1.1 Introduction

Since the dawn of time man has waged war. The first recorded war according to N.S. Gill, a Latinist and lifelong student of Ancient History,

> "...was in c.2700 BC between Sumer (in modern Iraq) and Elam (a region that is now part of Iran), and was fought in the area around Basra (just like the Iran-Iraq war of the 1980s). Of course, tribes, cities, etc., had been fighting each other for thousands of years before that, but there are no records of these earlier conflicts as writing wasn't invented until a little before 3000 B.C.[1]"

Since then there has been thousands more, but the only difference between that war and any modern day war, for example the War on Iraq in 2003, otherwise known as 'Operation Iraqi Freedom' in the U.S. and 'Operation Telic' in Britain, is the technology.

War is a major force in driving technology forward, as the side with the greatest technology is usually the victor. Throughout history many examples prove this, with the Roman and British Empires both built on a foundation of superior equipment and tactics compared to their opponents. One of the greatest periods of discovery was during World War 2, where several new technologies were created including nuclear weapons, radar, jet engines, primitive computers, and several new medical techniques and drugs.

We may think in this modern day not many wars occur, but since I was born in 1983, there have been 84 recorded wars in the world [2]. That's on average 3.6 wars a year, and explains why America, the current global super power has a defense budget of in excess of US$ 532 billion, which is US$ 466 billion more than the United Kingdom. This budget finances the entire U.S. Department of Defense, and that includes research and development.

The R&D department is responsible for keeping America's military forces ahead of the rest of the world, and I'm going to investigate how computer games are helping the U.S achieve this goal. But before I discuss how the military can benefit though, I'm going to investigate America's history and culture to learn how the modern day military has been formed over time, and how its civilians perceive their armed force.

1.2 America's History

In 1775 the Continental Army was formed with George Washington as its leader to fight the British for independence. The war was a resounding success but the army was later disbanded by the Congress as it didn't believe in standing armies. This decision was later changed in 1791 when the Legion of the United States (the first U.S. trained standing army) was created to fight the native Indians as settlers moved west. As the might of the army increased, the U.S. tried to invade the British held Canada in 1812 but were roundly beaten.

The next 40 years up to 1860 saw many skirmishes involving the U.S. Army fighting Native Indians and the Mexicans in the south, as American settlers expanded across the country. Then in 1861 America's most costly war began; the Civil War between the Confederate States of America (southern states) and the United States Union (northern states) led by Abraham Lincoln. The war lasted 4 years ending in 1865 with the U.S. Union the victors.

After the Civil War America consolidated and enjoyed nearly 35 years of peace until they invaded the Philippines in 1898, to firstly evict the Spanish, and secondly put the Philippines under American rule. This was the last war America was involved in until World War 1 in 1914. After Germany was defeated America once again enjoyed a period of peace up until World War 2 in 1941, and then it took the Japanese bombing of Pearl Harbour to force them into conflict. The period between 1940 and the late 1980's saw America involved in what is commonly known as the 'Cold War'. This period of time saw America moves millions of troops into Eastern Europe in anticipation of a Russian assault.

This attack never came but did give rise to the 'Domino Theory', in which America believed that if one land came under the influence of Communists then more people would follow in a domino effect. This belief led to the Korean War between 1950 and 1954 and the Vietnam War between 1965 and 1973. The Cold War eventually ended in 1991 as the Soviet Union ceded power and eventually dissolved.
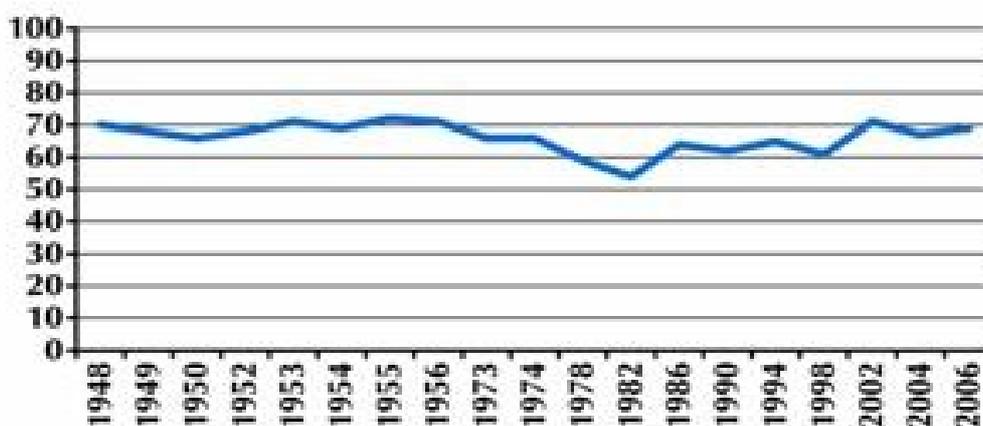
Immediately though American troops were thrust into another war in 1991 (Gulf War) when Saddam Hussein invaded Kuwait, and the United Nations sent a coalition of forces (including the U.S.) to liberate it. This war was followed by the 'Global War on Terror' in 2001 which saw American troops invade Afghanistan to overthrow the Taliban regime, and capture Osama Bin-Laden, the leader of the terrorist group al-Qaeda.

This war eventually led to the second invasion of Iraq in 2003 codenamed 'Operation Iraqi Freedom', where Coalition forces (including the U.S.) invaded Iraq to disassemble weapons of mass destruction and capture Saddam Hussein. Although Saddam Hussein has now been trialled and executed many troops are still present in Iraq.

1.3 America's Culture

As we have seen throughout America's short history it has been littered with wars between other nations, other cultures and civil wars, but all of these conflicts have either been decided by the President or the Congress of the United States. So I'm going further investigate how the American populace perceives their modern day military actions, and whether they agree or disagree with them. To do this I'm going to use the data from several surveys provided by WorldPublicOpinion (WPO) [4], which was launched in 2006 by the Program on International Policy to provide a source of in-depth information and analysis on public opinion from around the world on international issues.

Fig.1 [4]

The first survey (shown above as Fig.1) shows the percentage of Americans who think it best that the U.S. take an active part in world affairs. As you can see the survey shows figures from 1948 up to 2006. The data has been collected by several organisations over the years and ranges from face-to-face surveys through to internet surveys. The most up to date survey shows that ~70% of Americans believe the U.S. should take an active part in World Affairs through the military. This opinion is further backed up by other surveys offering similar views, with:

- 55% agreeing that military superiority should be an important goal of U.S. foreign policy;
- 53% thinking that the U.S. should keep most of its long term overseas bases. [4]

Both these figures show that the majority of the American public are in favour of strong military action and give some evidence to why President Bush was re-elected

in 2004, as the American public wanted a strong military leader following the 9/11 terrorist attacks.

Alternative surveys also proved conclusive regarding America's military might with:

- 71% thinking that the U.S. should stop a government committing genocide;
- 66% believing the U.S. should intervene to deal with humanitarian issues;
- 74% wanting the U.S. to counter the spread of nuclear weapons;
- 60% believing the US have the right to use force to prevent potentially hostile countries from acquiring nuclear weapons. [4]

Also all of the above figures rose several percent when the UN had sanctioned the above proposals. This data shows that the majority of the American public are in favour of military operations involving U.S. forces, but there are some people who disagree.

Pulitzer-winning investigative journalist Seymour Hersh, who was made famous for reporting about the My Lai Massacre in 1969, in which hundreds of unarmed Vietnamese civilians were killed by U.S. soldiers, gives his opinion:

> "In Vietnam, our soldiers came back and they were reviled as baby killers, in shame and humiliation. It isn't happening now, but I will tell you – there has never been an [American] army as violent and murderous as our army has been in Iraq." [5]

He made this comment after he saw a video depicting three U.S armed vehicles drive through a village, when the first vehicle exploded. After the bomb attack soldiers were told to shoot anybody that ran, which included the children by the side of the road playing a football match. After the carnage bodies were piled up and weapons dropped by them. After this it was reported that 20 or 30 insurgents were killed that day.
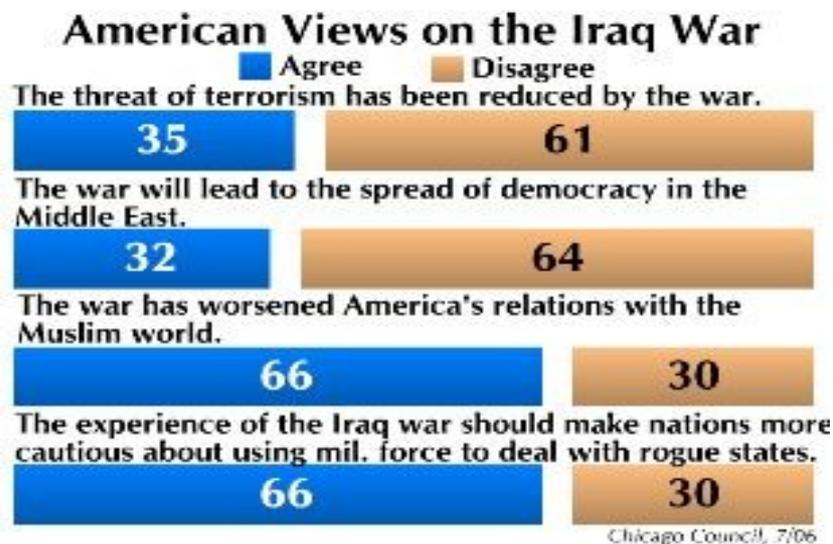

Fig.2 [4]

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This view on the modern day military isn't only thought by Hersh as Fig.2 (shown above) gives some views from the public on the current War in Iraq, with:

- 61% believing the threat of terrorism has not been reduced by the war;
- 64% believing the war will not lead to the spread of democracy in the Middle East;
- 66% thinking the war has worsened America's relations with the Muslim world;
- 66% thinking the experience of the Iraq war should make nations more cautious about using military force to deal with rogue states. [4]

All these views show that even though the American public want a strong military force, they don't believe in some of the wars that they have been involved in, which is proved by the current Presidents approval ratings which have fallen from 85% in 2001 to an all time low 34% in 2006 following the Iraqi War according to CBS News [7].

The strong consensus for the U.S. to take a hand in world affairs though is in stark contrast to the population's willingness to serve. Since the 1990's and the end of the Cold War, the U.S. has undergone a 'drawdown' period cutting its military population from 2.13 million to 1.36 million. But despite its downscale the U.S. military was having major problems with trying to fill its yearly quotas of recruits. With all 3 departments (army, navy and air force) failing to meet their recruiting goals despite loosened standards.

This is not a new problem either, as since President Reagan left office in 1989, there has been an increasing reluctance to join the military from the public. Propensity to enlist dropped from:

- 34% to 26% in the 16-21 year olds;
- 54% (in 1989) to 30% (in 1998) in African-American men (the lifeblood of the all-volunteer service). [6]

During the drawdown secretary of defense William Cohen in 1999 noted,

> "A sufficient number of young men were interested in the military to allow the Services to meet the reduced recruiting goals." [6]

But with the drawdown complete and the recruitment quotas up 5% since 1998 according to Andrew Bacevich (the Director of the Centre for International Relations at the University of Boston) [6], this is no longer true, and so the Department of Defense turned to the Defense Advanced Research Project Agency (DARPA) for help.

1.4 DARPA

DARPA was formed in 1958 in response to the Russian satellite Sputnik (the first artificial satellite to be put into geocentric orbit), with the mission of keeping the U.S.'s military technology ahead of its enemies. DARPA has been responsible for funding technologies that have had a major impact on the world; one being ARPANET, a computer network that eventually grew into the Internet. But more recently (early 1990's to present) it has been given the task of aiding the U.S. military with recruitment issues and soldier training. This has been in the form of computer based programs that simulate real life situations.

The early simulations concentrated on tactical combat with Marine Doom being the first in 1996, which was a modification of the commercial game Doom II and was used as a tactical training tool. The following year the U.S. Marine Corps contacted MAK Technologies for the development of Marine Expeditionary Unit 2000, which was another combat simulation. But a report in 1997 by Prof. Zyda of the National Research Council deemed that the Department of Defense's simulations were lagging behind their commercial counterparts.

Then in 1999 when the U.S. recruiting point hit its lowest in 30 years, the Congress of the United States decided to carry out aggressive innovative experiments in military recruitment, and raised its budget to $2.2bn. This extra money led to the overhauling of the U.S. Army's image, with the sponsorship of a NASCAR racing team (with the slogan: 'Army of One') and the development of the Army Game Project.

1.5 The Army Game Project

The Army Game Project more commonly known as America's Army was born when Lieutenant Colonel Wardyski (a professor at the U.S. Military Academy West Point), took the idea of an online Army based computer game to Deputy Chief of Staff for Personnel, and the Deputy Assistant Secretary of the Army for Military Manpower.

Once he had convinced them the project was contracted by the U.S. Army and developed at the MOVES (Modelling Virtual Environments and Simulation) Institute at the naval postgraduate school in May 2000. America's Army is a tactical multiplayer online first person shooter, and pits a team of players against another team of players over the internet in a military situation. It was released in 2002 as a global relations project to help improve the U.S. army's image and recruitment problems, and since then has undergone 24 iterations, with the latest being America's Army: Coalition released on December 21st 2006.

Fig.3 [9]

In the game all of the players must have undergone 4 training missions to access the online section, and a further 13 training missions to specialise in one of the advanced classes (Combat Life Saver, Special Forces Operator, Squad Designated Marksman, HMMVV driver, CROWS gunner and Javelin Missile Operator). Also every player is depicted as a U.S. soldier, as Fig.3 (above) shows a player seen on the left by his team mate and on the right by an opposing team member. The success of the Army game project was apparent to see as 19% of the 2003's freshman class at the U.S. Military Academy stated they had played the game and enlistment quotas for the next two years after its release were also met.

Since the release of America's Army, several computer games have been developed to offer different uses to the Department of Defense. There are 5 areas that are of particular note, and I am going to further discuss these in more detail with a case study for each subject: Assessment – NTE: Strike and Retrieve; Combat and Tactical Training – Steel Beasts Professional; Language and Cultural Training – Tactical Iraqi; Artificial Intelligence – Ingenuity Technologies; and Psychological Studies – Full Spectrum Warrior.

1.6 Assessment

Naval Training Exercise: Strike and Retrieve was developed by Whatif Productions and published by the U.S. Navy in July 2005. It was developed to help the U.S. Navy assess current applicants to see if they had the necessary skills to become a successful navy recruit, and to help potential candidates to see what life in the navy is like. The game is a first person submarine simulation and tasks the player with finding some confidential documents from a downed plane in the sea.

The player starts off by viewing the Mission Briefing screen which contains the mission objectives, information about the surrounding environments, and equipment available. Once the player has read the Intel they must then select two mech attachments to attach to their Nmech (the remotely operated deep-water submersible vehicle). There are various attachments (Timed Explosives, Remote Scout Camera etc) that can be used but they will only be useful on certain missions. After this selection the player must then decide which propulsion to use depending on whether speed or fuel efficiency is needed in the mission.

Once all of this has been decided upon the player can start the level, which involves navigating the sea bed terrain in the Nmech whilst also fighting off a number of sea creatures using their mech attachments. Once the player has arrived at the wreckage site; to obtain the 'Gorgon Box' which contains the documents they must break the security mechanism on the plane. This part of the game called Circuit Cracking, takes the player into a top down view of a circuit board separated by two metallic plates. The player must solve the puzzle so that the two plates touch and the security mechanism is deactivated. Once this has been done the player must pilot the Nmech back home but at much greater speeds, as once the 'Gorgon Box' is retrieved the self destruct mechanism on the plane activates, and this explosion creates a powerful current that propels the Nmech at greater speeds through the trench.

The completion of the mission is very difficult with the main website showing 6832 total missions logged and only 520 of them successful [10]. If the player makes it back they are taken to the Mission Evaluation screen where the player is rated on 15 different categories including Mission Timing; Fuel Management; Overall Strategy; and Overall Score amongst other things. These ratings then provide data to the Navy to decide on whether your mental reasoning and quick reactions are good enough to be given a place in the Navy proper.

1.7 Combat and Tactical Training

Steel Beast Professional was published in 2000 by eSim Games to provide high quality armed vehicles training for the military. As it states on its website:

> "Steel Beasts Professional has been tailored to the demands and high standards of professional military training. It models the gunner's and commander's position of various armoured fighting vehicle in a virtual 3D environment, allowing both networked and solitaire training of single-vehicle, platoon, and reinforced company scenarios with a high level of tactical confidence." [11]

It was released in two versions, SB Professional and SB Pro Personal Edition, with the Professional edition designed for use in a simulation lab under the direction of a dedicated operator, and the Pro Personal edition meant to be deployed on individual's soldiers' notebooks.

While SB Professional cannot replace proven and tested conventional training within the field, it can certainly augment it. By offering soldiers the chance to easily repeat important lessons over and over can help build confidence and give the users the tactical expertise that they need in combat. Both these qualities form a good basis for quick decision making, which is necessary in today's fast paced operations. Along with the ease of use of the product, the actual cost benefit is significant, with no collateral damage to the environment from vehicles; no accidents or injuries; and reduced maintenance and repairs.

SB Pro offers several benefits to the modern day military with small or large scale tactical training exercises at minimal cost; familiarisation with the vehicles and

complex tactical situations; an improved knowledge of vehicle, platoon and support unit coordination on the field; real time voice communications using 3rd party voice over ip solutions; and an increased perception of a soldiers individual role within the framework of the company.

All of these benefits come without any risk and provide training without any safety regulations having to be put into place. The audio-visuals of SB Pro have also been purposely designed to create stressful situations using an information overload technique to create a more realistic environment. The fact that SB Pro is also a computer game also increases the motivation between soldiers to beat each other increasing training productivity.

1.8 Language and Cultural Training

Tactical Iraqi is part of the Tactical Language and Culture Training System developed by Alelo Inc which has been funded by DARPA. The system was integrated into the U.S. Army training regime in 2005 after DARPA awarded it the Most Significant Technical Achievement award in the same year. Tactical Iraqi (there are several other versions for different countries) helps soldiers learn the language and cultural etiquette of the people of Iraq, by using an interactive course based in a 3D environment simulating everyday tasks and communications.

DARPA Program Manager Ralph Chatham was inspired to develop the program after he heard a story of one the first soldiers who went to Afghanistan. The captain told how his platoon entered a rural town totally relying on the communication of their Northern Alliance escorts who only spoke Pashto and a little broken Russian. The U.S. soldier could only speak English and a little spoken Russian and when the town's people came out of their houses in large numbers, the soldiers had no clue to what they were thinking by their gestures or demeanour.

Dr Chatham then decided he never wanted an American soldier to enter a combat zone without knowing any of the cultural background or etiquette of the country so that no misunderstanding ever occurred.

To this aim Tactical Iraqi focuses on teaching soldiers the native language of Iraq, but also the non-verbal gestures and norms of politeness and etiquette that is needed to communicate well with the population. The lessons are designed to simulate everyday tasks that a soldier may encounter and teaches the skills relevant to overcome them. The trainees complete the game by correctly speaking the language to the non playable characters (NPC) in the world. If the trainee follows the cultural etiquette and speaks the language successfully, they will slowly win over the confidence of the NPC, thereby allowing them to receive the necessary information to continue on in the game. If they do not though, the NPC becomes uncooperative and offers no answers.

Tactical Iraqi offers a unique immersive experience allowing soldiers to have the full understanding of the culture before they even set down in another country, and as one soldier states,

"I learned more in one day with the program than I learned in my whole tour in Iraq." [12]

1.9 Artificial Intelligence

Engenuity Technologies Inc originally named Virtual Prototype is a company specialised in offering commercial-off-the-shelf solutions. One particular solution is AI-Implant which accurately simulates crowd and vehicle behaviour within urban environments. Due to the need for highly realistic artificial intelligence within real life simulations the Institute of Creative Technology (which is funded by the U.S. Army) has decided to use AI-Implant in its Integrating Architecture Initiative as of 20th November 2006. This initiative is to build a partnership between the entertainment industry, military and academia with the goal of creating the most compelling and realistic simulations.

As its website states:

> "Through its ability to accurately simulate crowd and vehicle behaviour, AI-Implant is especially suited for urban environments & simulation projects
>
> requiring realistic and dynamic environments for urban warfare training. Offering 3D entities capable of non-doctrinal, complex, and unpredictable behaviour, AI-Implant is the smart way to make any existing simulation better." [13]

This bold statement is backed up by the fact that AI-Implant offers enhanced physics-aware pathfinding for entities in the world, whilst also featuring an obstacle traversal and vaulting option to allow the AI to navigate any terrain or environment. Couple with the fact that AI-Implant also offers the user the ability to simulate large scale crowds with autonomous and group behaviour, offers the military a tool with which to create very realistic simulations.

These simulations will then be able to realistically simulate how people would react to certain situations i.e. how a terrorist guard or Iraqi guardsmen would react to a civilian or soldier. Another use is to simulate how a large number of civilians would react to certain terrorist attacks in an urban area, and then plan for escape routes and defense mechanisms based on the results, offering an increase in security and lives saved in the actual event. There are several different models available but none have been released to the public domain yet as the partnership between Engenuity and the U.S. Army has only recently been confirmed.

1.10 Psychological Studies

Full Spectrum Warrior is a third person real time action war game developed by Pandemic Studios and published by THQ. It was commercially released on 1st June 2004, but the game was primarily developed as a serious game training aid for the U.S. Army. The game was slightly tweaked by Virtually Better Inc (based in Georgia),

and is now being used by the Institute of Creative Technology psychologist Albert Rizzo to simulate a living breathing combat zone, that recreates the sources of combat stress to treat military veterans suffering from post traumatic stress disorder (PTSD).

The patient wears a helmet, goggles and earphones to fully immerse themselves into the 3D world and then a therapist guides them through the environment using a touch pad that controls all of the environment and patient interactions. This method is then used to slowly build up the personal flashbacks the patient may have encountered in the past. The theory is by reliving these experiences the veterans can slowly come to terms with what happened until the memory no longer incapacitates them. Eventually the 3D simulation will allow for vibrations and smells to be incorporated into the experience to better recreate the patient's memory.

Commander Russell Shilling, the Office of Naval Research's program officer for medical science and technology also noted that,

> "...due to the gaming aspect of the therapy it helps eliminate any stigma with receiving psychological help, especially for a younger generation which grew up playing video games." [14]

The benefits of this program are invaluable as Lieutenant Commander Robert Mclay, a Navy psychiatrist explains,

> "The customary forms of exposure therapy for trauma may require visits to actual locations, such as returning a rape victim to the scene of the assault. You don't want to send someone who is traumatised back to Iraq, and so this allows us to bring someone back, but within a controlled situation here." [14]

Many patients also find it very difficult to recall memories within consultations unless they have visual stimuli or something similar like a smell or sound, to bring the memory to the forefront of their mind. But as with this technique many patients don't need these stimuli as the program aims to totally recreate those memories therefore solving the problem. According to a study in 2004 by Walter Reed Army Institute of Research up to 15% of combat personnel suffer from a form of PTSD returning from Iraq, and so this program could help many of them.

1.11 Conclusion

As we can see computer games can offer the military a great variety of experiences and uses in the modern day. With further development into artificial intelligence and an increased cooperation with the entertainment industry and the Institute of Creative Technologies' Initiative the realism of the simulations will only become better and better. Two quotes best sum up what benefits the military receives: one from a soldier involved in the Army Game Project states,

> "It is better that a soldier gets killed 1,000 times on a training device, than once in real life." [9]

And the other from Dr Ralph Chatham of DARPA saying,

> "The idea is to put behind every steering wheel and behind every trigger finger in a foreign country a little bit of that culture and language....I'll be happy if this could save just one life by preventing a misunderstanding." [12]

Both these quotes embody the ideas and reasons why video games are being used in the manner they are. They offer a serious solution to several problems the modern day military face. Some may argue that is also bringing in more violent games (America's Army, Full Spectrum Warrior etc) into the games industry but the truth of the matter is that the simulations that are actually used by the military are so different and far more advanced that the computer games they were originally based on are of no comparison. Another factor to take into consideration is that games that are directly being funded by the army comprise a very small percentage of the violent games already present in the market.

Computer games and the military is an unorthodox combination, but the reality of the matter is it's saving lives. Either by helping soldiers become better soldiers; or preventing a misunderstanding with the local population; or even helping them overcome horrible nightmares of war. This combination is a vital one in today's complicated world.

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