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In the decade from 2000 to 2009, the four services produced eight different types of camouflage patterns. The Marine Corps developed a pattern call Marine Pattern (MARPAT) and started the digital camouflage craze in 2000. Their Marine Corps Combat Utility Uniform (MCCUU) was very popular amongst Marines, functioned well in intended operating environments, and was unique to their service (at the request of then Commandant General James Jones). The uniform was unveiled before 9/11 and set the Marine Corps apart from the other services. After 9/11, the nature of the Global War on Terrorism affected all of the services dramatically, with some searching for their new identity in the post-Cold War world. One of the ways they attempted to do this was by adopting new camouflage uniforms, especially since the Nation was at war. Unfortunately, their requirements were based on service identity, instead of any operational requirements like the MCCUU. The results were poorly received uniforms that negatively affected service culture and identity and failed to function appropriately. The situation eventually required the intervention of Congress after service members complained that their uniforms failed to adequately camouflage them in Afghanistan. It was determined that the Army Combat Uniform along with its controversial Uniform Camouflage Pattern (UCP) was not even testing prior to fielding. Congress mandated that all services operated under a common combat uniform in 2014, and the Marine Corps refused to allow the other services to adopt MARPAT. There are still policy and fielding issues that have not been resolved, but the services are working towards placing operational requirements over service identity when it comes to camouflage/combat uniforms.

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TITLE:

The Digital Camouflage Fiasco of the 2000s: How the US Military Attempted to Combine Fashion with Function and Manufactured an Identity Crisis

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Executive Summary

Title: The Digital Camouflage Fiasco of the 2000s: How the US Military Attempted to Combine Function with Fashion and Manufactured an Identity Crisis

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Thesis: The services' attempts at blending form and function lasted until 2014, when Congress put an end to the services' dangerous foray of turning camouflage into a fashion item. This experience should serve as an example of the dangers of placing service identity over the functionality of uniforms and equipment.

Discussion: In the decade from 2000 to 2009, the four services produced eight different types of camouflage patterns. The Marine Corps developed a pattern call Marine Pattern (MARPAT) and started the digital camouflage craze in 2000. Their Marine Corps Combat Utility Uniform (MCCUU) was very popular amongst Marines, functioned well in intended operating environments, and was unique to their service (at the request of then Commandant General James Jones). The uniform was unveiled before 9/11 and set the Marine Corps apart from the other services. After 9/11, the nature of the Global War on Terrorism affected all of the services dramatically, with some searching for their new identity in the post-Cold War world. One of the ways they attempted to do this was by adopting new camouflage uniforms, especially since the Nation was at war. Unfortunately, their requirements were based on service identity, instead of any operational requirements like the MCCUU. The results were poorly received uniforms that negatively affected service culture and identity and failed to function appropriately. The situation eventually required the intervention of Congress after service members complained that their uniforms failed to adequately camouflage them in Afghanistan. It was determined that the Army Combat Uniform along with its controversial Uniform Camouflage Pattern (UCP) was not even testing prior to fielding. Congress mandated that all services operated under a common combat uniform in 2014, and the Marine Corps refused to allow the other services to adopt MARPAT. There are still policy and fielding issues that have not been resolved, but the services are working towards placing operational requirements over service identity when it comes to camouflage/combat uniforms.

Conclusion: When corporate image is the main requirement of camouflage uniforms and lacks any sort of functional attributes, it fails as an effective combat uniform by placing the wearer at undue risk while simultaneously damaging the service's corporate image.

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Preface

This topic first interested me in 2010, when I realized that I had been issued least four different types of camouflage, but they were all different from the Army units that I was supporting in Iraq. I encountered fellow EOD techs in Iraq who were wearing AOR1, MultiCam, and UCP, all while I was still wearing the legacy DCU tri-color pattern. The peculiarity of that instance stuck with me and would become glaringly apparent again when I deployed to Afghanistan in 2012. Before my deployment, the types of uniforms we would wear on deployment was a contentious topic and was not resolved until we were already in theater. We wore MultiCam on missions but had the NWU Type II for when we were "inside the wire," and the Type III (which too closely resembled the uniform worn by the Afghan National Army) for when we returned back home. When I returned and packed up all of my gear for a PCS to Guam, the number of different camouflage uniforms I had was astounding, and was purely based on who I was supporting, instead of what was the most effective uniform to wear into combat. I have followed this topic as a spectator for years and am glad to see that common sense is starting to take hold.

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In 2009 the Department of Defense (DOD) had eight different types of camouflage patterns in service, but only four of the eight were designed and tested for combat use. Instead, the services had made the choice to design camouflage uniforms for service identity and prioritized looks over functionality. This debacle would eventually require Congressional involvement after complaints from sailors, airmen, and soldiers regarding the functionality of their uniforms reached a crescendo in 2009. The departure from the camouflage utility uniformity of the 1980s and 1990s began in April 2000, when Commandant of the Marine Corps General James Jones mandated the development of Marine Corps Combat Utility Uniform (MCCUU) to distinguish the Marine Corps from the other three services. It looked modern, with a newly developed digital pattern that set it apart, while the other three services were still wearing a variation of a pattern that was developed in 1948 by the Army's Engineer Research & Development Laboratories (ERDL). Inspired by the success and popularity of the MCCUU, the other services quickly pursued their own digital camouflage uniforms. Instead of basing them on form and function as the Marines did, they were mostly based on establishing a unique service corporate image. These new camouflage patterns performed marginally in the field and operating environments, the timing of which could not have been worse. The Global War on Terror was reaching new levels of violence and the joint force was heavily employed overseas and needed functional and effective camouflage. The services' attempts at blending form and function lasted until 2014, when Congress put an end to the services' dangerous foray of turning camouflage into a fashion item. This experience should serve as an example of the dangers of placing service identity over the functionality of uniforms and equipment.

The concept of a camouflage uniform is relatively new to the history of warfare and was specifically developed to improve survivability on the battlefield. Traditional combat uniforms

first appeared during the Hundred Years War, when the English and French wore distinctive combinations of red and white tunics to identify themselves on the battlefield. This was the first time that a uniform was worn other than use of nondescript clothing combined with shields or flags with identifying symbols for respective armies. The Peace of Westphalia in 1648 created the modern concept of sovereignty and the nation state, and by the end of the seventeenth century, armies were utilizing uniforms with colors primarily derived from their nation's flag. This was also the beginning of the distinctive British Redcoat, and the reputation that it carried throughout the British Empire. The Redcoat was developed as part of the British New Model Army in 1645 and was selected for multiple reasons, but primarily for uniformity throughout the army (which wore a variety of colors) and distinctiveness on the battlefield.[1]

The practice of standing out in battle would change as European nations found themselves engaged in increasingly guerilla type warfare in their colonies. One of the first true uses of camouflage occurred when British soldiers dyed their white tunics and belts tan, or khaki (which means "dusty" in Hindi), to blend in with the environment in India in 1857.[2] The standard service khaki uniform for the British was not officially adopted until after the Second Boer War in 1902. The French soon changed their uniforms during WWI after sustaining heavy casualties at the Battle of the Frontiers, in part due to the blue and red colors of their uniforms standing out in trench warfare. The French are also credited with the first bureau of camouflage, established in 1915 and was commanded by an artist.[3] As warfare became increasingly lethal and engagement ranges started to expand, the use of camouflage quickly became a critical characteristic of a combat uniform.

The US military in the last century has typically been pragmatic about combat uniforms, and each service was free to develop and test their own uniforms and camouflage patterns. This

was true of the War in Vietnam, which saw multiple types of camouflage patterns and uniforms, ranging from the traditional olive green, to tiger stripe, to the precursor of the woodland pattern that was simply called ERDL (named after where it was developed, the Army's Engineer Research and Development Lab). At the same time, uniforms fabrics and cuts improved significantly in practicality and function, with the US military devoting resources to the actual science of camouflage, along with increasing wearability and longevity of combat uniforms.

Camouflage development was initially accomplished with the help of artists that would attempt to draw and paint patterns and colors that would help the wearer blend into their operating environment. Today, camouflage has expanded to a scientific process that has objective measurable results. According to Johannes Baumbach at the Council for Scientific and Industrial Research in South Africa, camouflage disguises and obscures the wearer by utilizing a combination of blending and disruption. Blending is the use of similar color palettes to match the surrounding environment. Disruption blends the use of colors and shapes "to change the telltale outline or shape of an object, in order to reduce probability of detection."[4] Aside from blending into the environment, camouflage in modern military uniforms has three primary roles: increasing survivability by decreasing the probability of detection, identification of friendly forces, and corporate image.[5] All three roles would be highly debated in 2009, when a Congressional inquiry into camouflage effectiveness was started due to the development of identity driven camouflage instead of functional camouflage.

Starting in 1981, all four services within the US military had adopted and were wearing the same combat uniform. It was called the Battle Dress Uniform (BDU) and used the Woodland camouflage pattern (unofficially known as M81). This was an evolution on the ERDL pattern that was originally developed in 1948 that saw limited use in Vietnam. It was extensively tested

by the Army prior to its adoption but took approximately thirty years to be adopted due to internal disagreements over the use of solid colors or camouflage patterns for combat uniforms. Each service had their own use for the uniform, but it was primarily worn by the Army and Marine Corps in the field and within a garrison environment as a type of service uniform. Modern militaries typically have three sets of uniforms, ceremonial dress, a service uniform (typically a type of working uniform for daily duties), and a combat uniform.[6] There has been a recent trend of utilizing combat uniforms for service uniforms, with all of the services opting to wear their camouflage utility uniforms in place of their traditional service uniforms. This left the US military with the problem of balancing service identity and uniqueness while wearing a combat uniform. Aside from the Marine Corps, the other services developed combat or camouflage uniforms in the early 2000s based primarily on corporate image while sacrificing operational effectiveness. This was a break from 20 years of uniformity across the armed forces and would devolve into a fashion competition based on service identity instead of survivability of the wearer.

The Marines Lead the Revolution with Marine Pattern (MARPAT)

In 2000, the Marine Corps started the development of MARPAT and the Marine Corps Combat Utility Uniform (MCCUU). This deviation from the BDU status quo and was directed by then Commandant General Jones with a priority placed on not only functionality, but distinction from the other services (App. A, Figure 1). In an April 27, 2000 interview General Jones said, "I believe that it would be a good thing for United States Marines' utility uniform to be distinctive. Something that is distinctively Marine would be attractive to me, and I think any service chief would tell you that."[7] This was also part of a larger initiative by General Jones to put the “combat back in the word ‘Marine’,” at the start of his tenure as Commandant. This

initiative also included the adoption of the Marine Corps Martial Arts Program (MCMAP) and increased emphasis on *The Crucible* (the culminating event at Marine Corps Boot Camp).[8] The development and fielding of the MCCUU and MARPAT was led by Marine Corps System Command (MARCORSYSCOM) and a uniform task force was created and staffed with active duty Marines.[9] MARCORSYSCOM would conduct several field trials and tested multiple types of camouflage patterns, uniform cuts and sizes, and utilized an extensive feedback loop with active duty Marines for alterations. Additionally, different fabrics and features were wear-tested, such as zippered sleeves that could rapidly change a blouse from long to short sleeved (App. A, Figure 2). Users also tested variations of pocket shapes and sizes, types of closures, and various boots and hats. The Marines were also the first service to replace the black leather boots in favor of no-shine tan boots for wear in both uniforms. Feedback from these field trials would be used to develop the final sizing and functionality of the MCCUU. As far as the camouflage pattern that would adorn the MCCUU, MARCORSYSCOM conducted testing on several patterns and color combinations. By the time field testing was reached, a tiger stripe pattern and a digital pattern were the two finalists. General Jones' preference was for the tiger stripe pattern as it was based off of his combat experience in Vietnam. He was quoted as saying "the ROK [South Korean] Marines wore a unique uniform (tiger-striped fatigues), that distinguished them from the other soldiers in Vietnam," and that he "observed that the ROK Marines' reputation and dress so intimidated the Viet Cong and North Vietnamese Army that they actively avoided ROK forces during combat."[10] This desired result of battlefield distinguishability was repeated several times by spokespersons throughout the testing and evaluation process. Despite his desire to use the tiger stripe pattern, the pixelated pattern was selected due to its superior performance in field testing and named Marine Pattern (MARPAT) according to the GAO.[11]

MARPAT was based off of the Canadian development of Canadian Disruptive Pattern (CADPAT). CADPAT was developed as part of a Canadian Armed Forces modernization program in the mid 1990s. The digital[1] pattern was developed by the Danish company DADCON and was eventually copyrighted by the Canadian government.[12] Canada developed a temperate woodland and arid version of CADPAT which were all extensively performance tested in those projected environments. Canada spent five years developing and refining techniques for printing the digital pattern, as well as the color palettes necessary to achieve ideal camouflage. Due to copyright laws, the Marine Corps could not adopt CADPAT wholesale and would conduct their own testing on different color combinations.[13] However, since a vast majority of the groundwork had already been performed, the Marine Corps was able to take advantage of Canadian research and development to save costs in developing and producing MARPAT. The GAO reported that it only cost the Marine Corps $319,000 to develop the MCCUU.[14] MARPAT was initially developed in woodland, desert, and urban camouflage versions with optimized color palettes. The development of the urban camouflage was based on the new operating environment that the Marine Corps had frequently found itself in the post-Cold War era (App. A, Figure 3). The Marines extensively tested multiple versions of urban camouflage in the 1990s based on the increased frequency of Military Operations in Urban Terrain (MOUT) and future warfare estimates. It was predicted that 70% of the world's population would live in cities by 2020. One major exercise based off these estimates was Operation Urban Warrior in 1998, which was developed by the Marine Corps Warfighting Laboratory and incorporated experiences from Somalia and Chechnya.[15] During Urban Warrior, the Marine Corps tested a grey urban uniform that resembled Tetris blocks to break up outline of Marines in urban environments (App. A

[1] The more commonly used term, "digital camouflage," will be used instead of the more technically accurate term, "pixelated camouflage."

Figure 4). The MCCUU was only fielded in woodland and desert versions however, and the deliberate decision was made so that both patterns contained coyote brown, so that Marines' Organizational Clothing and Individual Equipment (OCIE) (eg. boots, body armor, belts) would match both patterns.[16] This was not done with other services' camouflage patterns and would result in either increased costs to field camouflage specific OCIE or degraded performance during testing. This was in contrast to the Army, who was still utilizing the BDU and Desert Camouflage Uniform (DCU) and was still struggling to equip forces with matching OCIE while forward deployed well into 2005.

Aside from its effectiveness in the field, one of the unusual aspects of the MCCUU was the requirement that it be service unique and distinguishable from the other services as mandated by General Jones.[17] While this was not the first time that the Marine Corps had sought differentiation from the other services (such as adorning Army issued helmets with the EGA during WWI, and wearing of distinctive helmet covers during the Korean War), the timing and methodology set it apart from previous instances. The Marine Corps had pursued not only a superior performing and functional uniform, but one that would distinguish themselves from all of the services that wore the BDU. The development of MARPAT as a digital pattern was also a shift from previously fielded uniform camouflage patterns, which had few straight lines and hard edges and corners. Digital camouflage was not a new development as the Army had previously experimented with it in the 1970's to camouflage vehicles. Its utilization in a service's field uniform was the first of its kind in the United States. It was so distinct that the Marine Corps incorporated their symbol, the Eagle, Globe and Anchor (EGA) with USMC underneath, into the pattern and trademarked MARPAT and the MCCUU.[18] This unique distinction drew positive interest in the Marine Corps and the MCCUU from future recruits and other members of the

armed forces. It was very well received amongst the uniform testers and active duty Marines when it debuted.[19] The Marines were enthusiastic for its development, and it was fully embraced by the testers and researchers. The departure from the M81 woodland pattern also played into the Marine Corps' desire for differentiation from the Army. "Marines tend to feel strongly about their uniforms. Since this is a move to a Marine-specific uniform, rather than the current service-wide uniform, I predict that Marines will feel just as strongly about this uniform as they do about their current one," according to Mary Boyt, a civilian program manager for the Marine Corps Uniform Board during MCCUU testing.[20] Of note, because the Marine Corps is part of the Department of the Navy, sailors who were assigned to Marine Corps commands would also be issued the MCCUU.

The MCCUU also provided a unique look to Marines and gave a modern appearance due to the digital camouflage.[21] The use of a digital pattern seemed to match the "dot com feel" at the time according to the *Los Angeles Times*.[22] The debut of MCCUU was coincidentally in the months following the September 11th attacks on 17 January, 2002, and provided the right image for a force that was determined to set itself apart from the other services and showcase its warfighting capabilities. The adage "the Marine Corps wins battles, the Army wins wars," as characterized by the Commandant of the Marine Corps, was being actively discussed throughout the DOD. There was a push to develop the Marine Corps into an expeditionary fighting force and for Special Operations support, instead of a purely amphibious service, as detailed in articles within *Joint Forces Quarterly* in 2000.[23] While the Marine Corps would have to wait approximately a year for the MCCUU to see combat, it was already being worn by Marines, and projected the corporate image that the Marine Corps desired.

The Army Develops Their Own Digital Camouflage and Rushes to Failure

The Army began development of the Army Combat Uniform (ACU) to replace the BDU and DCU in 2002, the same year the MCCUU entered service with the Marine Corps. The ACU was officially fielded to soldiers in 2005, with the controversial digital Universal Camouflage Pattern (UCP). The Army's Natick Soldier Research, Development and Engineering Center (NSRDEC) conducted the research and development of new camouflage patterns from 2002 – 2004.[24] NSRDEC attempted to develop a camouflage pattern that would replace both the BDU and DCU and be able to function in an urban environment. Similar to the Marine Corps, the Army also had an interest in urban camouflage based on military interventions evacuations and urban conflicts in the 1980s and 1990s. Unified Task Force, the US military humanitarian intervention in Somalia in 1992 and Operation Firm Endeavor, the US peacekeeping mission in Bosnia in 1996 were recent examples.

The new camouflage development was initially part of the Future Force Warrior (FFW) Advanced Technology Demonstration.[25] There were initially six patterns that were tested, along with various color schemes. Amongst the patterns tested were a geometric track-like design (Track), a design resembling brush strokes (Shadow Line), a pattern with random brush strokes (All Over Brush), and a pattern called Scorpion which was developed by the company Crye Precision (App. B, Figure 5). There was also analysis conducted on color palettes that were primarily seen in woodland, desert, urban, and urban/desert terrain. Tan was identified as the common color in all environments, and it was initially planned that all OCIE be issued in tan as it would allow for interoperability amongst different camouflage patterns (which is what the Marine Corps utilized with their MCCUU).[26] No form of digital camouflage was part of this testing.

In parallel to the development of UCP, an early prototype of the ACU (the uniform cut and not the camouflage pattern) was being rigorously developed and tested. In 2002, Program Executive Office (PEO) Soldier in conjunction with NSRDEC would begin developing what would be called the Close Combat Uniform (CCU). The CCU was an attempt to modernize the fit and functionality of the BDU while increasing the ease of care for the uniform. Several of the changes developed for the CCU were incorporated into the final ACU design to increase usability. Examples are the use of Velcro closures, a zippered blouse, horizontal pocket openings, a mandarin style collar, and the replacement of black boots to no-shine tan boots. As far the wearability and maintainability of the uniform, the CCU was the start of Velcro unit patches and rank (to reduce sewing costs), a wrinkle-free fabric, and a no ironing/starch policy to maintain the IR camouflage capability of the fabric.[27] The process even included adopting uniform modifications from special operations units. The CCU was field tested by the 3rd Brigade 2nd Infantry Division (later identified as the 1st Stryker Brigade or 1SBCT), 1st Brigade 25th Infantry Division (later identified as the 2nd Stryker Brigade or 2SBCT) and select other units. The field testing was extensive and included multiple varieties of the CCU in some of the camouflage patterns from the initial UCP testing. These included the Tracks and Scorpion patterns, along with the legacy woodland and desert tricolors (App. B, Figure 6). Both the 1SBCT and 2SBCT would deploy to Iraq with the legacy desert tricolor version of the CCU in 2003 (App. B, Figure 7).[28] While short lived, the CCU was popular with the deployed forces and was well received as an evolution on the BDU/DCU family.

Despite the combat testing and extensive feedback from Army personnel on the CCU, PEO Soldier fielded the ACU in April 2005 with a previously untested camouflage pattern called

UCP. For reasons that are still unknown, PEO Soldier leadership selected a camouflage pattern that was not previously tested. The GAO reported that:

> PEO Soldier officials told us that prior to the completion of this study the leadership chose a camouflage pattern and colors for the new uniform without data from the camouflage study. PEO Soldier leadership could not provide a performance report to support the selection of the Universal Camouflage Pattern nor explain how the camouflage pattern was developed. The Universal Camouflage Pattern was not part of the Natick study and was not tested prior to the decision by PEO Soldier to use this pattern or prior to the June 2004 approval of the pattern by the Chief of Staff.[29]

Instead of using the tested patterns for production, the digital camouflage pattern screens from MARPAT and CADPAT were used, along with a different color palette (tan, gray, and sage green) and it was officially named UCP. The original camouflage testing conducted by NSRDEC concluded that Desert Brush was the most effective pattern, but these results were released in February 2005, after the official announcement of the ACU with digital UCP in June 2004.[30] While it may be unclear as to why the Army chose an untested digital camouflage pattern, it should be noted that a potential reason was the overwhelming popularity of MARPAT amongst service members.

The ACU was officially fielded in February 2005 and utilized the same digital patterns as MARPAT with a new and untested color palette. For reference, MARPAT had already been in service with the Marine Corps for three years at this point. While there is no shame in plagiarism amongst the services, especially if it results in increased performance and cost savings, the Army made the deliberate decision to use an untested color palette on the MARPAT screens for UCP. Camouflage contains an aspect of functionality in addition to corporate image and the Army seemingly failed to differentiate the two. It is possible that PEO Soldier incorrectly assumed that since the pattern was already tested, the color palette was inconsequential and would not greatly affect the functionality of the camouflage.

Aside from the camouflage pattern, the ACU also suffered initially from wear issues, with several crotch seams failing during regular use and the poor longevity of the Velcro closures. The crotch seam was an issue that was part of the BDU, but no changes were initially incorporated into the ACU. This would eventually be resolved in 2007, two years after it was fielded to deploying units.[31] PEO Soldier also made the decision to field OCIE in UCP since there was only a single camouflage pattern for the uniform. During the early phases of OIF and OEF the Army struggled to field matching OCIE to its deployed forces due to the extensive costs of maintaining two sets of OCIE (App. C, Figure 9). The reduction of overall cost was one of the primary drivers for the Marine Corps' decision to field OCIE in the common color (coyote brown) between its desert and woodland MARPAT.

Aside from the new fit and camouflage pattern was the removal of branch devices for officers. These devices were worn on the collar on the BDU and indicated the officer's occupational specialty (eg. crossed rifles for infantry, crossed sabers for cavalry). Another significant change was moving the rank from the collar of the BDU to the middle of the chest in the ACU. This shift would be incorporated in future Navy uniforms as well and would become a subject that is still debated today, with sailors voicing their discomfort at starting at female service member's chests to identify their rank.[32] These uniform changes ran in conjunction with then Army Chief of Staff General Peter Schoomaker's desire to infuse a warrior ethos back into the Army. Senior Army leaders were concerned with the decline of basic soldiering skills and a drift towards more technical competence at the expensive of warfighting skills. This was intended to shift Army culture to where "everyone is a soldier first and their military specialty second."[33] LTC Dave Anderson, the Product Manager for Soldier Clothing and Individual Equipment claimed that, "The goal was not to change the look of the Army. The goal was to find

a more functional uniform."[34] However, based on Johannes Baumbach's three purposes of camouflage, functionality is just as important, if not more, than corporate image.[35] One could make the argument that if the functionality is poor, so is the corporate image.

The corporate image of the Army was already under serious strain as it attempted to adapt to a post-Cold War identity. The Global War on Terror (GWOT) initiated an identity shift from a conventional warfighting force expected to see combat in eastern Europe, to one that was combating an insurgency in the Middle East. Doctrine, equipment, training, and service culture all needed to change and adapt to the new role the Army found itself in. Several expensive programs that were developed for a conventional enemy were quickly cancelled after September 11th. An example of this is the Comanche attack helicopter, which was cancelled in 2004 after a nearly $7 billion investment. The concept for the Comanche was developed in 1983 and was designed to be a stealth helicopter that could perform a variety of mission from attacking armored targets to armed reconnaissance. However, the GWOT rendered the Comanche obsolete, as its ballooning cost and original operational requirements saw it drift from relevance. It's capabilities were also already performed by the Apache helicopter, which was already in service and would be able to rapidly modernize using the funds set aside for Comanche development. The Comanche is a metaphor for the early 2000s Army, which was having difficulty to adapting to a new type of warfare and upgrading or adapting its hardware for counterterrorism missions, which is doctrinally a Special Forces mission.

While functionality may have been the initial intent, the fielding of the ACU resulted in a culture shift for the Army who was actively engaged in two highly kinetic and complex wars in Iraq and Afghanistan. The ACU performed poorly across both theaters at a time when soldiers most needed an effective uniform. The performance and perception of ACU would have a

negative effect on morale and identity for the Army, who was already struggling to meet its recruiting goals in 2005. By February 2005, the Army missed its goal of 7,050 new recruits by 27.5 percent. This was significant since the Army had already activated members of the Individual Ready Reserve into active duty and moved thousands of recruits from its delayed entry program into basic training ahead of schedule. [36] The Army's corporate image, which is typically beneficial in recruiting, was a hinderance and failed to produce the professional appearance the Army needed in 2005. The fielding of the ACU became a visible example of how poorly the Army was performing as a whole, and something as fundamental as correctly clothing soldiers became hotly debated. The psychological aspect cannot be understated, as a well-functioning combat uniform is critical in providing confidence to the wearer that their uniforms will not only be wearable but keep them safe and concealed from threats.[37] This was in sharp contrast to the fielding of the MCCUU and MARPAT for the Marines, which functioned well and was popular amongst Marines.

The Navy Joins the Digital Uniform Revolution

Not to be left out of the digital uniform era, the Navy developed their own digital camouflage pattern. Unlike the Army and Marine Corps, their camouflage pattern would be primarily based on service identity, and the uniform was inadequate for the intended operating environments. On 26 February 2003, a little over a year after the debut of the MCCUU, the Navy stood up Task Force Uniform (TFU) and would start the process of developing and field-testing replacement uniforms for the Navy, in hopes of reducing the total numbers of uniforms for sailors.[38] While there were several initiatives outlined in the charter, one of the primary goals was the development of a better working uniform than the utilities and wash khakis that were worn in The Fleet. Based on feedback from over 40,000 survey results, a majority of sailors

wanted a BDU style uniform to replace their working uniforms.[39] The Navy Working Uniform (NWU) was designed to take the place of utilities, wash khaki, coveralls, woodland green, aviation green, winter working blue, and tropical working uniforms.[40] From the outset, the Navy acknowledged in the TFU Charter:

> Sharp-looking and serviceable uniforms underpin good morale and build esprit de corps. Uniform matters are an emotional issue that consistently surfaces concerns in the area of fit, expense, comfort, durability, wearability, usefulness, interchangeability, maintenance, limited usefulness, Service recognition, storage, and complexity and inconsistency of application of uniform standards.[41]

The Navy decided on a digital pattern that consisted of navy blue, deck grey, haze grey, and black (App. D, Figure 12). These were all colors that were commonly found in working environments on a ship according to TFU. The Master Chief Petty Officer of the Navy Terry Scott touted the uniform as being able to camouflage stains from grey paint or grease without requiring to be replaced. [42] Like the Army and Marine Corps, the NWU would utilize a no iron or starch policy, but this was not due to tactical requirements, but rather ease of use. The digital pattern was also helpful in camouflaging wrinkles. According to the GAO, "the Navy's goals were to adopt a set of uniforms that reflected the requirements of a 21st century Navy and its naval heritage."[43] Like the Marine Corps, the Navy would incorporate their logo, the Anchor, Constitution, and Eagle (ACE) symbol into the camouflage pattern as a source of service pride. Despite an extended testing period from 2004 to 2008 before fielding, the reception to the NWU was mixed. Immediately dubbed the "aquaflage" and "blueberries," the functionality of the uniform was questioned in a man-overboard scenario.[44] There were also some wear issues, with fading of the uniform occurring quickly, and performance in hot weather environments, such as Guam and Bahrain. The NWU was made of a 50/50 nylon and cotton blend, the same material of

the “winter weight” BDU. There was also the policy of wearing 100% leather steel toe boots at all times, even in an office environment.

The NWU became a major safety hazard to those serving onboard ships. In October of 2012 the Navy’s Clothing and Textile Research Facility (NCTRF) in Natick, Massachusetts conducted tests on the NWU for flame resistance. This “impromptu test” reinforced the fact that the NWU lacked flame resistance properties. It also discovered that “when subjected to flame it will burn robustly until it is consumed.”[45] The material would also melt and drip during these tests. While this was not the first time the Navy had to address flame resistance and the NWU (a Navy Safety Center message was sent out 6 October 2011 addressing firefighting concerns), it was the first large scale reporting of its ineffectiveness as a functional uniform. While it was not designed for firefighting and none of the previously issued Navy uniforms were flame resistant, there was a backlash from sailors in the Fleet. In October 2013 the Navy announced the Flame Resistant Variant (FRV) coveralls for shipboard use by December of that year as a result of sailor feedback.[46] This was the beginning of the end for the NWU, which no longer saw use on underway ships. After years of negative feedback from sailors, the NWU Type I was replaced by the NWU Type III starting in 1 October 2017, with a final transition date of 1 October 2019.

There was also a delay in uniform development for expeditionary sailors serving in forward deployed environments. The new NWU would subsequently be called the NWU Type I, and the Type II (a digital desert pattern), and the Type III (a digital woodland pattern) were fielded in 2011.[47] The Type II and III were originally developed by Naval Special Warfare Command (NSWC) for the SEAL teams and with combat camouflage requirements in mind. The Chief of Naval Operations requested the use of these patterns for expeditionary sailors in 2009 from US Special Operations Command (USSOCOM).[48] Interestingly enough, the Navy chose to

ask permission from USSOCOM, rather than the Marine Corps to adopt their camouflage, even though sailors were being issued MARPAT at Marine Corps commands. Like the Marine Corps, a woodland and desert pattern were developed, tested, and fielded. The camouflage patterns were originally called Area of Responsibility 1 and 2 (AOR1 for desert and AOR2 for woodland) before they were adopted by the Navy. As with MARPAT, the NWU Type II and III used the same digital pattern screens from CADPAT but were oriented vertically, instead of the horizontal orientation used in MARPAT, and incorporated the ACE logo (which was not present in AOR1 & 2). The uniform weight was 100% cotton for hot weather performance unlike the Type I and had different fit and design characteristics. Like the ACU, rank was affixed in the middle of the chest, along with Velcro on the sleeve pockets for attaching patches, and a mandarin collar.

The issuing and wear policies for these uniforms were confusing immediately from their debut. The NWU Type III was issued as organizational gear to commands that typically wore the BDU. The organizational gear distinction meant that it could only be issued, and not purchased by service members and restricted their use. These uniforms were mostly issued to Navy Expeditionary Combat Command (NECC) sailors, which included Seabees, Riverine Squadrons, and Explosive Ordnance Disposal technicians. The Type II was restricted to forward-deployed SEALs and sailors supporting SEAL commands. This was a compromise between the Navy and Marine Corps who objected to the Type II being fielded, since it was strikingly similar in appearance to desert MARPAT, and he Marine Corps was adamant about maintaining a service unique uniform according to the GAO.[49] Despite the development of the Type II, expeditionary sailors not assigned or attached to SEAL teams could not wear it. The uniform situation was so confusing that US Central Command (CENTCOM) implemented their own uniform issuing and wear guidance.[50] However, CENTCOM's uniform guidance was equally complex as it was

confusing and at any given time from 2011 and onwards, sailors in CENTCOM could be found wearing upwards of six different types of camouflage uniforms. The GAO acknowledged that the different uniforms required for Navy personnel serving in combat zones placed them at greater risk from the enemy if they stood out from other forces.[51] Sailors assigned to Army commands in Iraq and Afghanistan were being issued the ACU. Sailors that were part of Marine Corps units (such as chaplains and corpsmen) wore MARPAT and those who were attached (who joined the Marines in theater) wore DCU, while others who were assigned to SOF units were issued MultiCam. Sailors that were deployed to other locations within CENTCOM, such as Bahrain, Djibouti, and Kuwait, were wearing the Type III (App. D, Figures 13-15).[52] This issue is still unresolved today and have been no changes to the Navy's uniform policy regarding the Type II.

The Air Force's Digital Tiger Stripe Mess

The Air Force fielded the Airman Battle Uniform (ABU) in 2007 after almost five years in development. The program was initiated in October 2002, nine months after the MCCUU was fielded to the Marine Corps and by this point the camouflage revolution was well underway. No service wanted to be seen as lagging behind the other. It was initially fielded to airman completing basic training and the complete fielding to the force took four years, with the entire service in ABU by 2011. Like the NWU Type I, the ABU was not based on any technical requirements but emphasized service identification. "Our intent is to create a uniform that will be distinctive, practical, easy to maintain, comfortable and, most important, a uniform you will be proud to wear," said Air Force Chief of Staff General John P. Jumper, according to an official Air Force Press release in August 2003.[53] Seemingly in response to the new Marine Corps uniform, General Jumper tasked the Air Force Uniform Board in early 2003 to develop and field a distinctive uniform that would distinguish airmen from the other services. The Air Force also

circumvented any sort of acquisition process rigor or any requirements-based process for the ABU's development. The GAO reported that the Chief of Staff instead used senior leadership briefings to steer the development and fielding.[54] The blue and greys used in the digital tiger stripe pattern were meant to provide a distinctly Air Force look, instead of camouflage in the field.[55] The initial design was a darker blue tiger stripe pattern that was used in Vietnam (by the US and ROK as mentioned earlier), but it received poor feedback during wear tests with airmen in 2004 (App. E, Figures 16 & 17).[56] The final pattern was lightly digitized (again seemingly to follow the Marine Corps' and Army's lead) and utilized a color scheme that was very similar to the newly debuted Army digital UCP. Like the NWU Type I, the ABU utilized a heavier weight fabric that the BDU, which proved to be impractical in warmer climates such as those found in the Middle East and Asia. This would eventually be replaced with a lighter weighted fabric due to negative feedback and seemed less than practical for the operating environment of the GWOT.[57] There were few changes made to the cut of the ABU when compared to the BDU. The primary difference was the camouflage pattern, the removal of two pockets on the blouse, and addition of an internal map pocket. It also followed the trend of being a wash and wear uniform that required no starch or ironing for daily use. Unlike the other three services however, the Air Force required sage green boots, instead of tan, and forced vendors and supply chains to conform to the Air Force's unique requirement.

Like the Army, the Air Force's goal was to develop a single uniform to replace the BDU and DCU. The Air Force had previously determined that wearing camouflaged uniforms only affected 3% of their force, which primarily belonged to Air Force Special Operations Command (AFSOC). "97 percent of the Air Force does not require a camouflage uniform," Air Force spokeswoman Jennifer Stephens said in April 2004. [58] The results of the Air Force's efforts were

a non-combat uniform for wear at the home base according to the GAO.[59] Airmen deploying overseas that required actual camouflage for tactical reasons would utilize the legacy BDU or DCU. Unlike the Navy, the Air Force did not pursue developing a separate set of combat uniforms for their expeditionary airmen for use overseas and deferred to using Army uniforms for airmen deployed to Iraq and Afghanistan (App. E, Figure 18).

Congress Starts to Investigate and Weigh in on Combat Uniforms

By 2009, the lack of effectiveness of UCP in Afghanistan was starting to gain traction in official channels outside of the DOD. Congress had started to take notice of the overwhelming negative feedback from Soldiers deployed to Afghanistan. Representative John Murtha, Chairman of the House Appropriations Subcommittee, was the primary driver in the camouflage reform, after he had received complaints directly from soldiers during a 2009 trip to Afghanistan.[60] Afghanistan is a much more challenging environment to camouflage troops due to the wide variation in terrain. US Forces found themselves operating anywhere from arid desert to the Hindu Kush mountains to irrigated farmland and lush forests. A congressional conference committee directed the DOD to take immediate action to provide personnel deployed to Afghanistan with a camouflage pattern that was suited to those environments.[61] This official guidance was published in H.R. Rep. No. 111-151 from 12 June 2009. It stated that "the Department of Defense take immediate action to provide combat uniforms to personnel deployed to Afghanistan with a camouflage pattern that is suited to the environment of Afghanistan."[62] This was an unprecedented move from Congress, considering that the poor performance of UCP in Afghanistan had not been singled out as the cause of death for any US soldiers serving there. Effective camouflage in combat is not just limited to the pattern worn in the field (although it is a significant portion), but the types of equipment carried, doctrine, and the enemy's detection

capabilities (App. Figure 27). Iraq was not part of this discussion, as it had already been decided that all US forces were to withdraw in December of 2011.[63] UCP had also functioned marginally well in that environment, since most of the combat occurred in urban centers where camouflage performance were negligible. This time frame was also during President Obama's first year in office, and he had campaigned heavily on shift the attention of the Global War on Terrorism from Iraq to Afghanistan. Interestingly enough, by the time Congress intervened, NSRDEC was concluding a two-year study on the effectiveness of UCP. Unsurprisingly to those involved, UCP performed poorly in both woodland and desert environments. [64] It should be noted that this testing also confirmed that environmental specific camouflage performed the best in the environment they were designed for and that MultiCam, while not the worst, was also never the best in any one category during testing. While this may have been acceptable for Afghanistan's broad and diverse landscape, it would dispel the unrealistic expectation of a "universal" camouflage. The Marine Corps was already aware of this problem when they developed MARPAT and while they entertained the idea of a universal camouflage pattern, they ultimately decided to develop separate woodland and desert colors schemes. "There is no doubt that the different places that we are expected to operate are very different. It's very hard to have one camouflage do it all," according to Major Gabe Patricio who was assigned to MARCORSYSCOM in 2000.[65]

Starting in September of 2009 the Army began two different wear tests in Afghanistan to find a replacement camouflage for soldiers wearing UCP. This was not intended to find a camouflage pattern to replace UCP wholesale, but only for use in the Afghan theater of operations. Both tests were conducted by PEO Soldier and the first test involved two battalions from the 4th Infantry Division. 2nd Battalion 12th Infantry regiment wore MultiCam, which was

used by SOCOM personnel. MultiCam was an evolution of the Scorpion pattern that was used in the initial round of NRSDEC camouflage pattern testing from 2002. It incorporated seven different colors, and was designed as a transitional pattern, instead of the three colors in UCP. It should be noted that the results from the 2002-2004 NRSDEC camouflage testing were not used, despite NRSDEC concluding that "Desert Brush" was the most effective pattern in 2005. It outperformed MultiCam in desert and urban environments in NRSDEC's 2009 photosimulation testing and was owned by the US Government, thus avoiding any licensing issues for production. The Army however did not include it for its wear testing for Afghanistan due to a six-month lead time for production.[66]

3rd Squadron 61st Cavalry Regiment wore a newly developed pattern called UCP-D. UCP-D added coyote brown to the color palette and reduced the percentages of the sand and greys (App. F, Figures 19-21).[67] UCP-D was an Army attempt to salvage UCP and demonstrated their commitment to the pattern, either due to the sunk cost in UCP, or to avoid professional embarrassment. UCP-D had limited testing, and only involved a survey of 200 soldiers at Forts Hood and Campbell with recent combat experience.[68] The other wear test involved PEO Soldier personnel photographing seven different types of camouflage in the field in Khost, Afghanistan. The patterns photographed were AOR2, UCP, MultiCam, Desert Brush, UCP-D, and a commercially available camouflage called Mirage (App. F, Figure 22). The team consisted of members from the Asymmetric Warfare Group; Army Special Operations Command; Army G4; the Maneuver Center of Excellence; NRSDEC; and the Naval Research Laboratory.[69] Noticeably absent from this round of testing was MARPAT, and pattern that was already fielded and combat tested and proven. This was most likely due to the expedient nature of the testing. In March 2010, the Army announced that MultiCam was to be issued to all soldiers deploying to

Afghanistan beginning in July of that year.[70] It was renamed Operational Enduring Freedom Camouflage Pattern (OEF-CP) was for use only in the Afghanistan theater of operations. This official camouflage change was the beginning of the end for UCP, as the Army started another camouflage study in 2010, a mere five years after the fielding of the ACU.[71] NRSDEC also followed with expedient testing of MultiCam and released the results in December 2010. The results overwhelmingly favored MultiCam for use in Afghanistan and based on surveys and perception tests by soldiers.[72]

By 2010 Congressional attention was focused across the entire DODs camouflage patterns and not just the Army's. The Services were allowed to maintain service-unique camouflage patterns, as called out in the 2010 NDAA, as long as there was interoperability and equal levels of performance.[73] This was a compromise, as it allowed the Marine Corps to keep its MARPAT and did not force the other services to adopt another pattern. There was a demand signal to adopt MARPAT in the Army, especially since it had performed so well in the decade since it has been introduced. Both the woodland and desert variants of MARPAT were to be part of the new camouflage study in 2010.[74] The Army admitted as such in July of 2010, "Since [UCP] is universal to all environments all over the world, it's a bit of a compromise. We had to go - and that's what the secretary directed - and re-examine the logic for the Universal Camouflage Pattern. Maybe it's a bridge too far. Maybe what you need is about two, or more," said Lt. Gen. Mitchell Stevenson, the Army's deputy chief of staff for logistics, G-4, and head of the Army's Uniform Board.[75]

The Army's new camouflage study was supposed to conclude in 2012, but the Army delayed making a decision on the way forward with UCP. It was clear that the pattern was to be replaced, but there was already a heavy groundswell within the Army to just continue wearing

MultiCam since it had proven to be effective in Afghanistan. It was a critical moment for the Army as the Air Force was also considering replacing their tiger stripe ABU as well and was issuing MultiCam to its forward deployed airmen. This was around the same time that they Navy realized that they had to something about the lack of usability of their NWU Type I. All of the services except for the Marines were experiencing the negative feedback from their service-unique camouflage uniform decisions. Most of these discussions were playing out in the court of public opinion, with several editorials penned about joint service camouflage and fixing the public debacle that was created by the Services. The Army, Navy, and Air Force had all failed to grasp and understand the dual roles of camouflage uniforms in service identity and functionality. By poorly addressing the functionality of the uniform, there was collateral damage to the service identity function as well. By improving the functionality, services would could create a unique service identity, but this process does not work in reverse as demonstrated by the aforementioned.

In an act of inter-service rivalry, Marine Corps' leaders placed service identity over the survivability of other servicemembers by not allowing the Army to adopt MARPAT. This pattern was one of the better functioning forms of camouflage currently in production and helped prove the futility and inadequacy of a universal camouflage pattern (App. C, Figure 11).[76] It was authorized for testing as part of the army's new camouflage improvement study, but the Marine Corps refused to allow for the possibility of the Army adopting MARPAT, citing their service unique requirements along with its patent. According to Sergeant Major of the Marine Corps Sgt. Maj. Carlton Kent, "The main concern for the Marine Corps when it comes to other services testing our patterns is that they don't exactly mimic them. The MARPAT design is proprietary, and it's important those designs are reserved for Marines. We just need to make sure each of our

designs is unique to each service."[77] This statement essentially blocked other services from wholesale adopting MARPAT, and the Army had to back off previous statements that suggested removing the EGA from the pattern for Army use.[78] While visiting Marines in Hawaii, Commandant of the Marine Corps General James Amos was famously quoted as saying, "We are on it like a hobo on a ham sandwich. I love the hell out of this uniform, and I don't have any intention of changing it."[79] This was in July 2013, just prior to the release of the next NDAA, which was expected to address more camouflage uniform problems. Even the Senior Enlisted Advisor to the Chairman of the Joint Chiefs, Marine Sgt. Maj. Bryan Battaglia admitted that US forces on the battlefield looked like "An American Baskin Robbins," a reference to the variety ice cream chain known for its 31 flavors. The plethora of American camouflage uniforms subsequently confused allies overseas. He did soften the messages of Marine Corps leaders by saying that a joint camouflage was being "discussed," but this was an attempt to deescalate the situation and was nothing more than a talking point.[80] This was the second time that the Marines had resisted sister service use of their uniform. The first was when the Navy chose to adopt a uniform developed by SOCOM instead of one that already existed in the Department of the Navy.

The End of UCP and Service Unique Combat Uniforms

The camouflage situation was further clarified by the 2014 NDAA, which used more forceful language and called for a common combat camouflage uniform. H.R. 3304 stated that the DOD, "shall eliminate the development and fielding of Armed Force-specific combat and camouflage utility."[81] While certainly not the first time there has been congressional involvement in DOD affairs, this was particularly embarrassing, since it involved such a basic tenet of the Armed Forces – placing its servicemembers in the correct uniform for their operating

environment. There was also overwhelming negative view towards UCP from within the armed forces as a whole. This affected the Army's camouflage development and essentially forced the service to adopt MultiCam or one of the other services' patterns. Even when faced with this direct language, the Army faltered on the wholesale adoption of MultiCam and bickered with Crye Precision over MultiCam licensing fees which would have resulted in a 1% increase in the cost of MultiCam uniforms to UCP. This would prompt Crye Precision to release a scathing public letter about PEO Soldier's business practices and their frustration with the Army since they decided to pursue UCP.[82] After months of speculation over the future of Army camouflage since it finished its camouflage improvement program, the final decision was quietly announced on 31 July 2014.[83] The Army ended up selecting a self-improved version of Scorpion (which was part of the original camouflage test from 2002). It was named Scorpion W2 and was officially designated as the new Operational Camouflage Pattern (OCP). Ironically, the Scorpion pattern was previously withdrawn from the most recent camouflage improvement testing due to its similarity to Crye Precision MultiCam.[84]

The Air Force followed the Army and officially adopted announced OCP as their new camouflage uniform on 14 May 2018.[85] Similarly to how the Air Force wore the original BDU, they acknowledged that "the OCP will bring back Air Force heraldry with unit patches," instead of solely designing an entire camouflage uniform around service identity and not functionality in the field.[86] The Air Force was also not without its own vendor issues, as the creator of the tiger stripe pattern released a statement detailing the poor relationship they had with Air Force officials during the creation of their unique pattern.[87] There was pushback from camouflage developers on the Services' insistence on fashion over function, with several camouflage experts writing about the poor performance of camouflage uniforms for forward deployed troops.

The Navy is currently wearing the NWU Type III in place of the Type I and wears the FRV coverall while underway but is field testing a new two-piece flame retardant uniform. The uniform follows the cut of the Type III but reverts back to the traditional navy color scheme of navy blue for E-6 and below (instead of a light blue shirt that was worn in utilities, the uniform is solid navy blue) and khaki for E-7 and above (App. G, Figure 23). This was the color scheme that was in place prior to the testing of the Type I in 2004 (App. G, Figure 24). The current Fleet Forces Command Master Chief Rick O'Rawe was given overwhelming feedback that sailors working onboard ships wanted a uniform that was designed for shipboard use, and did "not look like you are in the woods."[88] This prompted the new two-piece flame retardant uniform tests in the neotraditional colors of blue for junior enlisted and khaki for senior enlisted and officers. It would also allow for sailors to wear the uniform on and off the ship like the recently retired Type I, as the current FRV coverall is only for use aboard ships and cannot be worn beyond the pier. If this wear test proves to be successful, the Navy would field a uniform based on operational requirements first, with service identity as an obvious byproduct second. This end state is not too far from what Task Force Uniform intended to field in 2004 when sailors wanted a BDU like uniform, but without the unnecessary digital pattern.

This digital camouflage fiasco lasted approximately 15 years and was a departure from 20 years of uniformity across the DOD. The Marines were not only the first to break from this uniformity, but also refused to allow other services to adopt their camouflage after it was proven to be superior. This may have been a manifestation of Marine Corps insecurities about their identity. The Marine Corps has a long history of fighting for its existence. Ever since their creation in 1776, there has been an institutional fear of being disbanded or absorbed by the Army. Inter-service rivalry would follow the Marine Corps until present day, and its strong

desire to not be viewed as a second land army have come back to haunt it. Marines have always enjoyed the status of their distinctive uniforms, but the adoption of the M81 woodland camouflage saw their elevated status fall into conformity with the other services. The Marines did incorporate some unique aspects such as the EGA on the breast pocket and distinctive eight-point cover, but overall looked the same as the Army in the field. It is not surprising that they chose to differentiate themselves at the end of the 1990s, a period of relative calm in US military history. This undoubtedly was part of General James Jones' initiative to develop the MCCUU as distinctive and help to reduce the fear of the Marine Corps being viewed as a second land army. There was a long professional discourse over the role of the Marine Corps, from a purely amphibious force, to one capable of engaging in short, brief conflicts as were typically seen in the 1990's. Ironically it was not their uniforms, but the roles that the Marines played in Iraq and Afghanistan, that would reinforce that viewpoint.

The unintended consequence was the overreaction of all the other services to this "digital revolution" and poorly attempted to copy the Marine Corps' lead or rushed to failure as was the case for the Army. There was a large psychological price that was paid, with military members relying on their service to provide a uniform that was practical and functional. This was not the case for the Army, Air Force, and Navy. While uniforms as a whole provide recognizability and allow for the proverbial "fruit salad" that adorns most dress uniforms, combat uniforms are on the other end of the spectrum and are supposed to ensure the survivability of the wearer above all else. Fashion cannot dictate function, but function can certainly influence fashion, and the camouflage uniform debate showcases this effect while demonstrating the effects that a poorly functioning camouflage uniform can have on service identity.

Baumbach defined the three roles of camouflage as increased survivability, identification of friend or foe, and corporate image (Figure 28). He weighs all three aspects equally in modern camouflage design. However, the camouflage missteps by the Navy, Air Force, and Army in the 2000s proves that this is not the case. This is true especially when corporate image is the primary requirement. Survivability and function should drive camouflage design, and a beneficial byproduct is corporate image. When corporate image is the main requirement of camouflage, it tends to lack any sort of functional attributes. While the Marine Corps sought a distinctive look to influence battlefield intimidation, they Corps ultimately picked a pattern that was the better performing (MARPAT), instead of the Tiger Stripe pattern that was favored by then Commandant General Jones. The superior performance of the MCCUU in the field was a large contributor to the Marine Corps' corporate image, as its functionality was ultimately what was desired in a combat uniform. This is also reinforced by the Army's adoption of Scorpion W-2, which was functionally superior to UCP. The patterns that were developed for corporate image and service uniqueness (NWU Type I, Air Force's Tiger Stripe, and UCP) were all functionally weak and adversely effected opinions about service priorities and identity. These issues were manufactured by an inability to realize that the functionality of a camouflage/combat uniform is in and of itself a main contributor and benefactor to a service's corporate image and identity.

This does not mean that corporate image is not as valuable as survivability. Since 9/11 all four services have opted to wear camouflage utilities over service uniforms in circumstances and situations when they were traditionally worn. These include places like the Pentagon, Service Staff Colleges, and senior staffs. With the emergence of camouflage uniforms taking primacy as the daily uniform of the armed services, it has also become a main symbol of their corporate image. The difficulty moving forward for the armed services is managing the functional

requirements of the uniform with a strong desire to project a strong corporate image. While it may be tempting to equate functionality with increasing corporate image, this issue is not that simple. The Army has recently adopted a new service uniform, which is a reproduction of the uniform worn by the Army in WWII. In 2008 the Navy adopted and quickly retired service dress khaki in 2012. It was another nostalgia driven decision that was based on a WWII uniform. These two instances showcase the difficulty in accurately shaping a service's corporate image (they defaulted to earlier designs), and fortunately neither uniform is required to function outside of administrative purposes. Combining this challenge with the added dimension of survivability and functionality produces a demanding situation, but not one that is untenable as demonstrated by the Marine Corps. This discussion would be radically different if the Army had opted to adopt the Desert All Over Brush (App. B, Figure 8) pattern in 2004 and the uniform functioned well in combat. It also would have demonstrated the benefits of interservice rivalry, with competition being the main driver in improving camouflage effectiveness. Instead, the narrative was the Marine Corps lack of willingness to support a sister service in the name of service identity. History presented the Marine Corps with an opportunity to rescue the Army from itself, but the cultural repercussions within the Marine Corps was apparently too high of a cost to bear.

Deciding on Desert All Over Brush may have even altered the Army's post-Cold War narrative towards a positive lens and showcased the quick adaptability of the Army to shift to modern threats in the post-9/11 counterterrorism role and change the Army's corporate image from the 2000s. These potential narrative changes should serve as a cautionary tale for the newly formed Space Force, who adopted the Army and Air Force's OCP uniforms as a cost-saving measure. The decision, while based in cost-saving, was quickly mocked by both the public and internally within the military, with regards to the questionable function of MultiCam for their

unique mission. The Space Force has to find the right balance between corporate image and functionality of their uniforms if they want to establish the right service identity and culture. Luckily, their camouflage or working uniforms do not have to function in combat environments, but they can certainly experience the same pitfalls that the other services did in the 2000s.

Appendix A: Marine Corps

Figure 1: Then Commandant General James Jones inspecting a prototype version of desert MARPAT in 2001. The color grey was dropped in the final version. (Photograph by SSgt. Keith A. Milks)

Source: Barbara Starr, "From Cammies to Pixies? Marines Dump Old Wrinkled Duds for Permanent Press and Pixel Patterns," *ABC News*, June 20, 2001, https://web.archive.org/web/20020204012448/http://www.abcnews.go.com/sections/us/DailyNews/camouflage010620.html

Figure 2: Two early prototypes of the MCCUU. The version on the left features zippered removeable sleeves, while the version on the right features an experimental tiger stripe pattern that was outperformed by the pixelated pattern during testing. (Photograph by Sgt. John Sayas)

Source: Barbara Starr, "From Cammies to Pixies? Marines Dump Old Wrinkled Duds for Permanent Press and Pixel Patterns," *ABC News,* June 20, 2001, https://web.archive.org/web/20020204012448/http://www.abcnews.go.com/sections/us/DailyNews/camouflage010620.html

Figure 3: The experimental version of urban MARPAT. This was not formally adopted by the Marine Corps.

Source: Guy Cramer, "Why Not Just Use MARPAT," HyperStealth Biotechnology Corp. (blog), June 4, 2013, http://www.hyperstealth.com/coyote/.

Figure 4: An experimental version of urban camouflage utilized by the Marine Corps in the 1999 Urban Warrior Exercise. Urban camouflage was experimented with by both the Army and Marine Corps in the late 1990s.

Source: Blake Stilwell, "The Marine Corps tested a skateboard unit in the 1990s," *We Are The Mighty*, February 11, 2019, https://www.wearethemighty.com/gear-tech/marine-corps-skateboard-unit-1990s

Appendix B: Army Close Combat Uniform

Figure 5: An early prototype of the CCU with Crye Precision's Scorpion camouflage pattern. This uniform would come back to haunt the Army, as it would adopt a version very similar to this eight years later for use in Afghanistan after the poor performance of the ACU.

Source: Erik H Larson, "History and Development of the US Army Close Combat Uniform (CCU/CU)", http://camopedia.org/image/pdf/CCU_Mk2.pdf

Figure 6: The Army's Close Combat Uniform in service in Iraq with 1SBCT in 2003. This version of the uniform featured the DCU camouflage tricolor pattern that was still in service with the Army. The CCU incorporated key features that are seen in the ACU today, such as the Velcro unit patches, zippered blouse, and removal of lower pockets on the blouse.

Source: Michael Gilbert, *The News Tribune*, https://www.thenewstribune.com/news/local/military/article35388975.html

Appendix C: Army Camouflage Trials

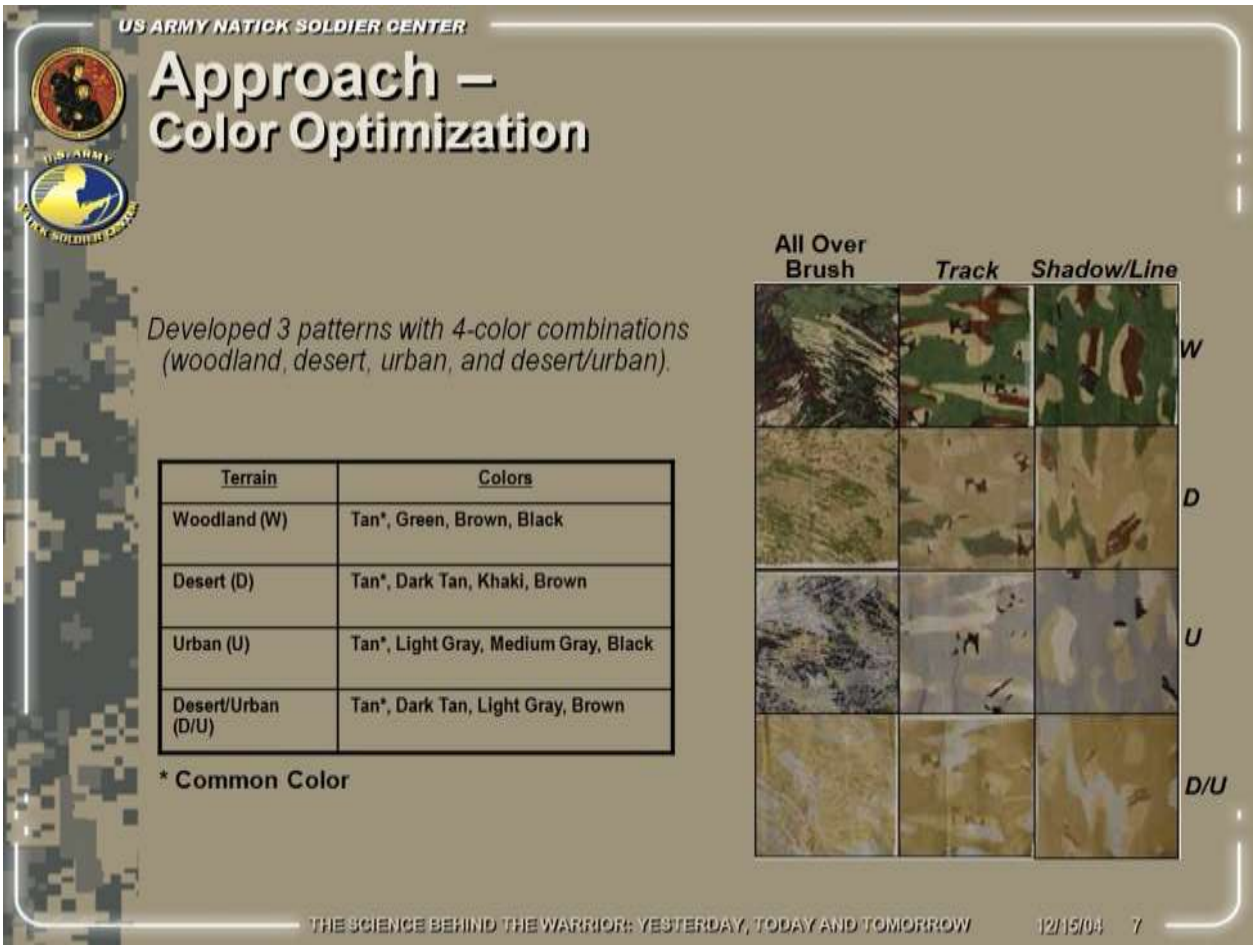

Figure 7: The NRSDEC patterns tested in 2004. Desert All Over Brush was the best performing pattern.

Source: Guy Cramer, "US Army Camouflage Improvement Explained," HyperStealth Biotechnology Corp. (blog), May 21, 2013, http://www.hyperstealth.com/camo-improvement/index.html

Figure 8: A soldier re-enlists wearing a desert all over brush uniform during the 2009 camouflage trials in Afghanistan. The difference between UCP and the pattern is very distinct and apparent.

Source: Guy Cramer, "US Army Scorpion," HyperStealth Biotechnology Corp. (blog), May 30, 2013, http://www.hyperstealth.com/scorpion/

Appendix D: Army Combat Uniform with UCP

Figure 9: A photo of Army Chief of Staff General Schoomaker during an awards ceremony in Iraq in 2004. He is wearing the ACU, six months after the its official announcement as the Army's replacement for the BDU and DCU. At the time, the Army was still struggling to field matching OCIE to units deploying to Iraq and Afghanistan as depicted in the above photograph. Soldiers wore body armor (amongst other items) in the woodland pattern while deployed to Iraq, yet the Army deemed it a good time to pursue a new camouflage uniform.

Source: Benjamin Cossel, "Gen. Schoomaker Awards Cpl. Eldred the Bronz (sic) Star," *Defense Visual Information Distribution Service*, December 25, 2004, https://www.dvidshub.net/image/2783/gen-schoomaker-awards-cpl-eldred-bronz-star

Figure 10: An early and widely circulated parody on the effectiveness of UCP.

Source: "Tomorrow Is Your Last Day to Wear Army UCP and Navy Blueberry Uniforms," *Soldier Systems Daily*, September 29, 2019, http://soldiersystems.net/2019/09/29/tomorrow-is-your-last-day-to-wear-army-ucp-and-navy-blueberry-uniforms/

Figure 11: An example of the lack of "universality" in UCP.

Source: Cynthia De Leon, "Hammerhead FTX," *Defense Visual Information Distribution Service*, March 30, 2017, https://www.dvidshub.net/image/3294281/hammerhead-ftx.

Appendix E: Navy

Figure 12: The NWU Type I (left) is pictured here with the E-6 and below utility uniform (right) which it was designed to replace.

Source: Jennifer Villalovos, "USS Wyoming operations," *Defense Visual Information Distribution Service*, February 19, 2009, https://www.dvidshub.net/image/1267048/uss-wyoming-operations.

Figure 13: The Navy's nuanced policy for expeditionary sailors led to several instances like the one seen above from 2009 in Iraq. It was not uncommon for sailors serving in CENTCOM to be in four different camouflage uniforms. The NWU Type I was not designed for use in expeditionary environments, and expeditionary sailors were often dependent on the commands they supported for uniform guidance.

Source: Joint Combat Camera Center Iraq, "Chief pinning," *Defense Visual Information Distribution Service*, September 9, 2009, https://www.dvidshub.net/image/205595/chief-pinning.

Figure 14: Another example of the results of the Navy's uniform policy. Pictured here in Afghanistan in 2011 are three Master Chiefs, wearing three different types of camouflage, all of which were authorized for wear. From left to right: DCU, ACU, and AOR1, prior to it's adoption as NWU Type II.

Source: Tiffini Vanderwyst (Jones), "Navy leaders travel to boost morale in Afghanistan," *Defense Visual Information Distribution Service*, January 21, 2011, https://www.dvidshub.net/image/736069/navy-leaders-travel-boost-morale-afghanistan

Figure 15: A visual representation of the results of the Navy's NWU Type II policy. Sailors who wore DCU in desert environments were forced to wear the Type III, which was for woodland environments. To this day the Type II is limited to NSW sailors. This photo is from 2011, the year the Type II/III were introduced.

Source: Veronica Suarez, "MCPON Rick West visits NAVELSG FWD sailors," *Defense Visual Information Distribution Service*, December 5, 2011, https://www.dvidshub.net/image/496708/mcpon-rick-west-visits-navelsg-fwd-sailors

Appendix F: Air Force

Figure 16: The new Air Force test uniform on the right is compared to the legacy woodland BDU during testing in 2004.

Source: Marni Mcentee, "Testing new Air Force BDUs a hands-on task," *Stars and Stripes*, April 17, 2004, https://www.stripes.com/news/testing-new-air-force-bdus-a-hands-on-task-1.18899

Figure 17: The new Air Force test uniform, with a subdued digital tiger-stripe pattern, is on the left. The original test colors, on the right, proved to be "too distinctive" for airmen who offered their opinions, Air Force officials said.

Source: Lisa Burgess, "Air Force develops new test version of field uniform," *Stars and Stripes*, November 3, 2004, https://www.stripes.com/news/air-force-develops-new-test-version-of-field-uniform-1.25686.

Figure 18: The Air Force's lack of planning for expeditionary uniforms left airmen in situations as seen above. The ABU was ill suited for operations in CENTCOM (or any operational theater) and was not designed for any actual combat use. Airmen were often forced to use Army ACU backpacks, helmet covers, and body armor (as seen above), because these items did not exist in the digitized Tiger Stripe pattern.

Source: Richard Longoria, "EOD Airmen in Iraq prepare for an explosive battle in Afghanistan," *Defense Visual Information Distribution Service*, March 3, 2011, https://www.dvidshub.net/image/388256/eod-airmen-iraq-prepare-explosive-battle-afghanistan

Appendix G: UCP-Delta Testing in Afghanistan:

Figure 19: The soldiers on the left and center are field testing UCP-D in Afghanistan. Of note is the use of coyote brown OCIE, since coyote brown was now a part of the camouflage pattern.

Source: Combat Camera Afghanistan, "5th SBCT, 2nd ID troops conduct patrol in Arghandab River Valley," *Defense Visual Information Distribution Service*, December 13, 2009, https://www.dvidshub.net/image/232733/5th-sbct-2nd-id-troops-conduct-patrol-arghandab-river-valley

Figure 20: Another picture of UCP-D testing in Afghanistan in October 2009.

Source: Program Executive Office Soldier, "UCP-Delta 2," Program Executive Office Soldier Flickr Account, October 21, 2009, https://www.flickr.com/photos/peosoldier/4206229541

Figure 21: A close up view of UCP-D and the inclusion of coyote brown into the pattern.

Source: C. Todd Lopez, "New cammo pattern may blend in better in Afghanistan," news release, September 17, 2009, https://www.army.mil/article/27514/new_cammo_pattern_may_blend_in_better_in_afghanistan

Figure 22: Field testing in Khost, Afghanistan in late 2009 by PEO Soldier. Patterns from left to right are: AOR2, UCP, Multicam, Desert All Over Brush (the NRSDEC winner), UCP-D, and Mirage.

Source: Program Executive Office Soldier, "Camo Assessment Team," Program Executive Office Soldier Flickr Account, October 15, 2009, https://www.flickr.com/photos/peosoldier/4203122993/in/photostream/

Appendix H: Navy Testing of New Flame Retardant Uniforms

Figure 23: The latest uniform being tested by the Navy. It is the same cut as the NWU Type III, is flame retardant, and uses the traditional color scheme from the previous generations of uniforms.

Source: Veronica Suarez, "U.S. Fleet Forces Conducts Wear Test of Two-Piece Organizational Clothing Prototype," *Defense Visual Information Distribution Service*, February 5, 2019, https://www.dvidshub.net/image/5125497/us-fleet-forces-conducts-wear-test-two-piece-organizational-clothing-prototype

Figure 24: Uniforms worn by sailors pre-NWU Type I. E-7 and above wore khaki while E-6 and below wore blue.

Source: Mark Gleason, US Navy Official Photo, January 14, 2005, https://www.navy.mil/view_image.asp?id=20752.

Appendix I: The Plethora of Digital Camouflage Patterns

Figure 25: A visual representation of the height of the digital uniform craze. The four services are represented wearing their service-unique camouflage uniforms.

Source: Lewis Hilburn, "Joint Task Force-Guantanamo change of command," *Defense Visual Information Distribution Service*, June 25, 2012, https://www.dvidshub.net/image/612636/joint-task-force-guantanamo-change-command

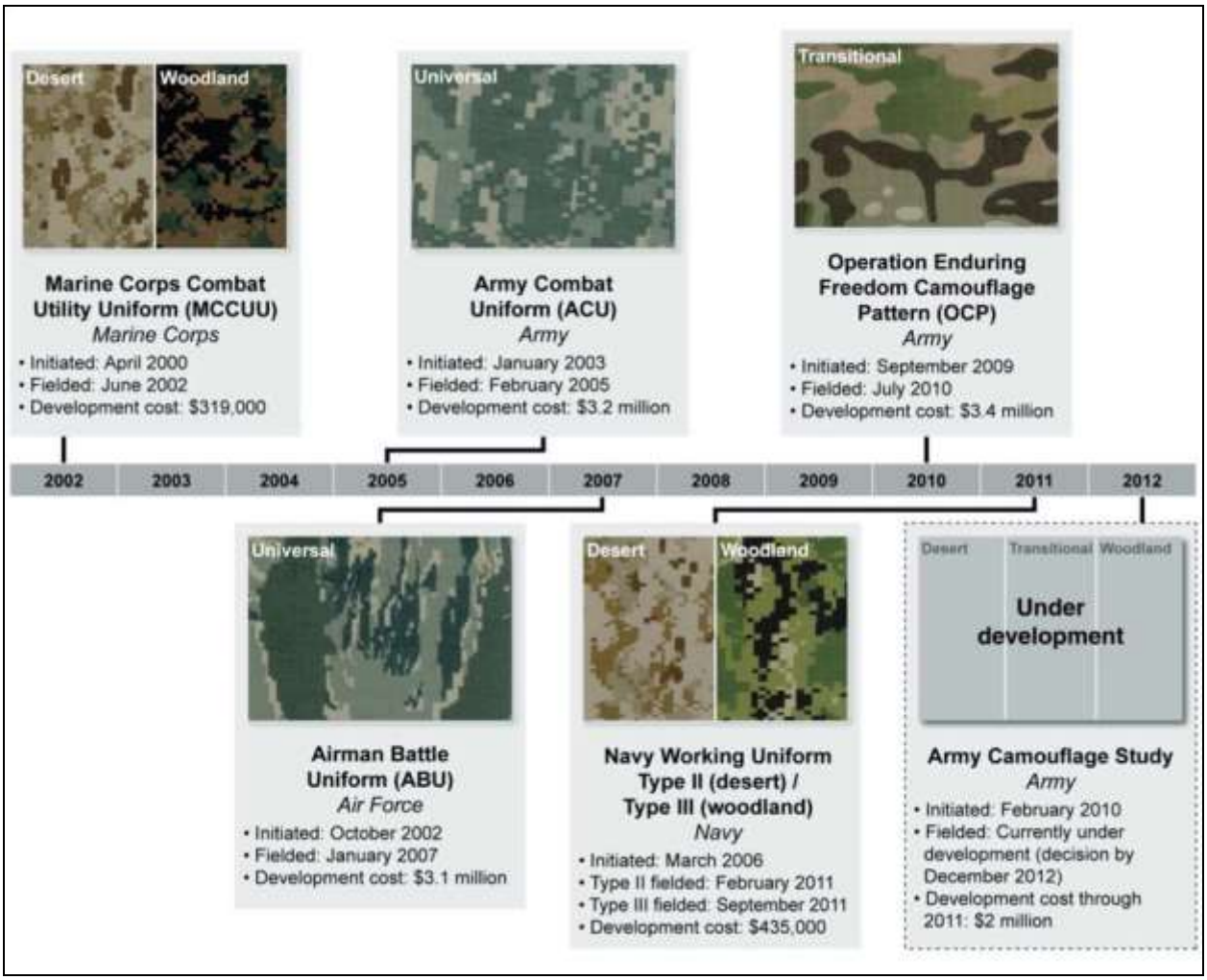

Figure 26: The timeline of camouflage development throughout the 2000s.

Source: US Government Accountability Office. *DOD Should Improve Development of Camouflage Uniforms and Enhance Collaboration Among the Services.* Washington, DC: Government Accountability Office, 2012. https://www.gao.gov/products/GAO-12-707, 5.

Appendix J: Camouflage Pattern Theory

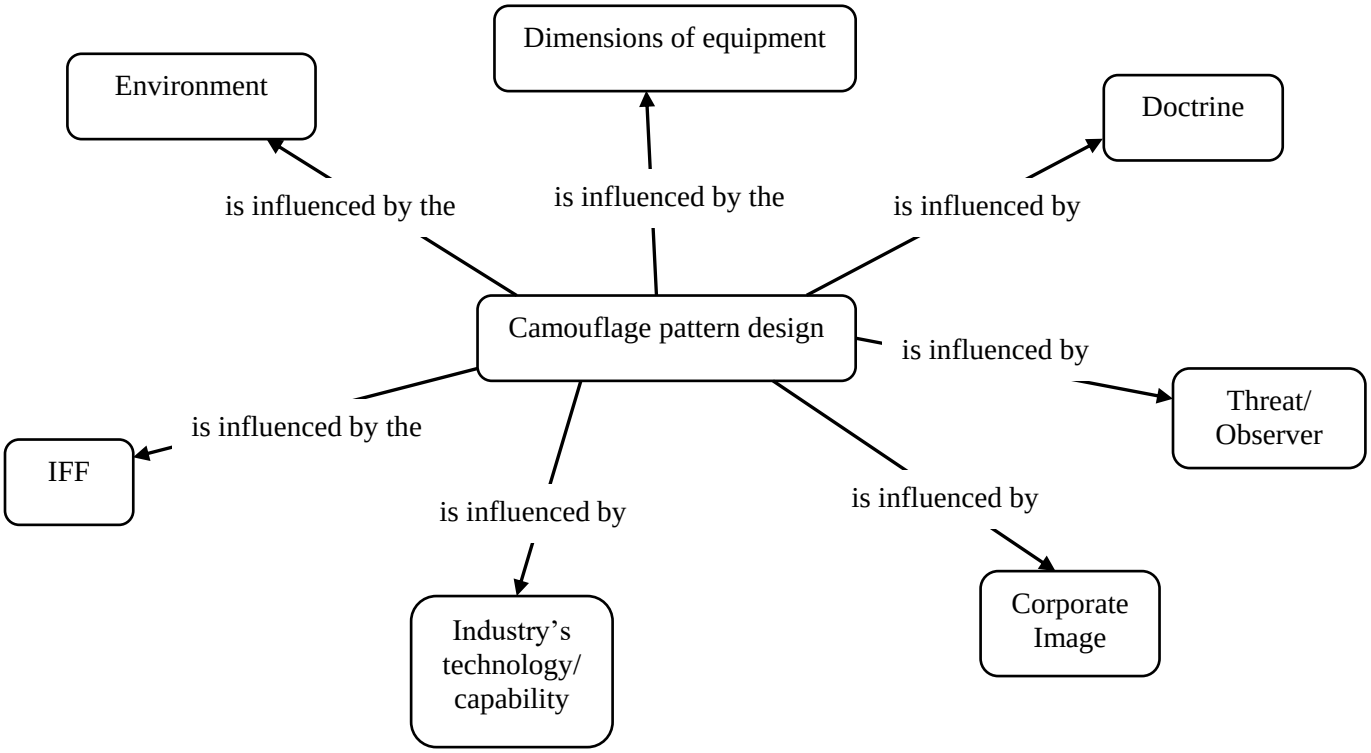

Figure 27: Factors influencing camouflage pattern design.

Source: Johannes Baumbach, "Colour and camouflage: design issues in military clothing," in *Advances in military textiles and personal equipment,* ed. Emma Sparks, 79-102 (Philadelphia, PA: Woodhead Publishing, 2012), 92.

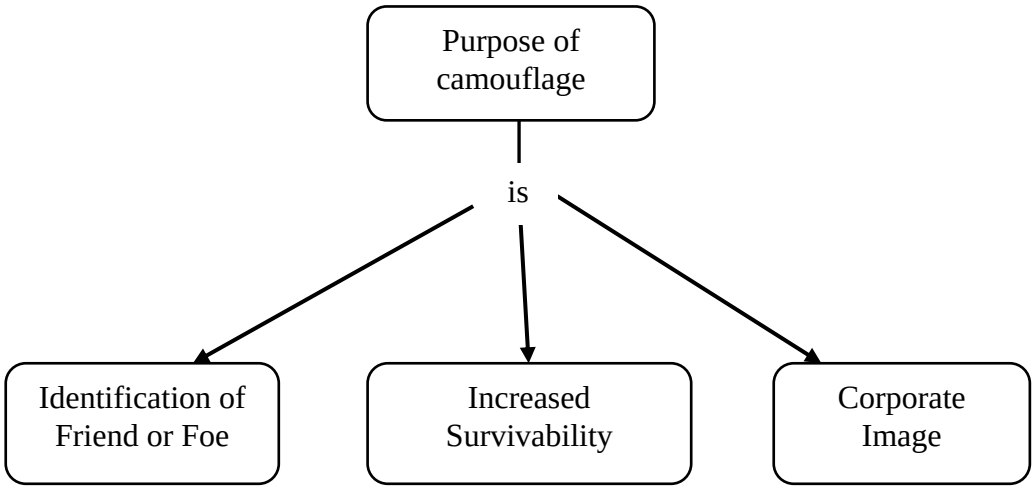

Figure 28: Purpose of camouflage.

Source: Johannes Baumbach, "Colour and camouflage: design issues in military clothing," in *Advances in military textiles and personal equipment,* ed. Emma Sparks, 79-102 (Philadelphia, PA: Woodhead Publishing, 2012), 80.

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