



# Design for Maritime Singularity

## Final Report

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## Table of Contents

|  |    |
|--|----|
| Acknowledgements.....  | 4  |
| Executive Summary.....   | 5  |
| Section 1: mmowgli Overview and Design for Maritime Singularity Game Concept ..... | 6  |
| mmowgli Overview .....   | 6  |
| Design for Maritime Singularity Game Concept .....                                 | 7  |
| Section 2: Game Execution .....  | 8  |
| Card Play .....  | 8  |
| Action Plans.....  | 9  |
| Game Moderation.....   | 10 |
| Section 3: Game Results and Analysis.....  | 10 |
| Singularity 1 Major Themes: .....  | 11 |
| Singularity 2 Major Themes: .....  | 12 |
| Nuggets/Self-Contained Ideas: .....  | 13 |
| Section 4: Design Workshop Concept and Results .....                               | 14 |
| Ideas for Further Development .....  | 15 |
| S1 Design Challenge: AI Personal Assistant .....                                   | 15 |
| S1 Design Challenge: Interface Between Humans and Computers/Machines/AI .....      | 15 |
| S1 Design Challenge: AI Decision Aids .....  | 16 |
| S2 Design Challenge: Treating the Navy as a Complex Adaptive System .....          | 16 |
| Group 1 Output: SQUIDS.....  | 17 |
| SQUIDS Research Questions .....  | 21 |
| Group 2 Output: ADAPT.....   | 24 |
| ADAPT Research Questions.....  | 28 |
| Group 3 Output: Mind the Gap.....  | 29 |
| Developing GapMinding Approaches/Recommendations .....                             | 31 |
| Nurturing and Seeding the GapMinding Ecosystem .....                               | 31 |
| Specific GapMinding Projects .....   | 31 |
| Conclusion.....  | 32 |
| References .....   | 32 |
| Appendix A: mmowgli Overview.....  | 34 |
| Appendix B: Action Plans .....   | 43 |
| Appendix C: Blog Posts.....  | 92 |

You Get a mmowgli Award! ..... 92

Stop it now, I mean it!..... 95

Maritime Singularity mmowgli: The End is Near...or Is It?..... 96

In Case You Missed It: 24 Hours to Go and 8 New Idea Cards! ..... 99

Have you checked out the reports page? ..... 100

It’s the Mid-Game Countdown! ..... 104

Guest post: Organizational design... ..... 110

Organizational Design in an Age of Accelerating Socio-Technical Interdependence ..... 110

Guest post: Business Strategy for Shipbuilders ..... 113

A Business Strategy for Shipbuilders ..... 113

The singularity hasn’t happened yet! ..... 117

Guest post: Automated Combat Systems ..... 118

Guest Blog: Can Automated Combat Systems Be Wise ..... 119

What makes a good Action Plan? ..... 123

Navy scale and complexity..... 126

Seven areas of disruption ..... 127

MMWOGLI: Starting play ..... 127

Preparing for Maritime Singularity mmowgli ..... 128

Maritime Singularity mmowgli Invitation ..... 130

Maritime Singularity ..... 130

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## Executive Summary

mmowgli is a re-purposeable online platform that harnesses the creative potential of large, diverse groups for thinking and acting on complex, open-ended challenges. Since its inception in 2011, mmowgli has been used by the Navy and DoD to address a wide range of issues.

The authors, sponsored by the U.S. Office of Naval Research, created a study using mmowgli to explore how the U.S. Navy might respond to an imagined future where the long awaited “Singularity” of speculative non-fiction has arrived.

Over a one-week timeframe, players from all over the world collaborated on the mmowgli platform, exploring concepts around two broad framings of the Singularity question.

- Singularity 1 frames the Singularity as the emergence and growth of Artificial Intelligence, to the point that Artificial Intelligence exceeds human intelligence.
- Singularity 2 frames the Singularity in terms of Complexity. Much like what happens with Singularity 1, Singularity 2 portrays a future where the complexity of the world outstrips the ability of humans to process it.

The following major themes arose from the game:

| Singularity 1  | Singularity 2   |
|--|---|
| <ul style="list-style-type: none"><li>• AI for Intelligence Analysis</li><li>• Swarming</li><li>• Health-Related Concepts</li><li>• Tactical Application of AI to Warfighting</li><li>• Creation of AI</li><li>• Transhumanism</li></ul> | <ul style="list-style-type: none"><li>• The Role of Surprise, Imagination and Novelty vs the Role of Analysis and Logic</li><li>• Naïve Rationalism</li><li>• Projecting Human Social Complexity onto AI</li><li>• The Role of Feelings/Emotions</li><li>• The Role of Tacit and Embodied Knowledge</li></ul> |

Following the mmowgli online event, the authors convened an in-person workshop comprised of participants from the game alongside members of the Naval Research and Development Enterprise. The purpose of the workshop was to more fully flesh out a small subset of the ideas played in the game into actionable recommendations. These are as follows:

- An AI personal assistant, optimized for Navy use called SQUIDS (Symbiotic Query Universal Iterative Decision System).
- AI decision aids called ADAPT (Augmented Decision Analysis and Planning Tool).
- Mind the Gap: an integrated set of cultural changes and technology prototypes designed to raise the level of the Navy’s organizational complexity carrying capacity.

## Section 1: mmowgli Overview and Design for Maritime Singularity Game Concept

### mmowgli Overview

mmowgli is a re-purposeable online platform as well as a transformational practice that harnesses the creative potential of large, diverse groups for thinking and acting on complex, open-ended challenges and opportunities. mmowgli also builds the creative capacity of the crowd by offering a more gameful, more novel, and more democratized way of engaging together with a problem than traditional methods afford.

A typical mmowgli game/event proceeds along the following chronology:

- Prior to entering the game, players are exposed to a Call-To-Action, typically in the form of a short video. The Call-To-Action is designed to transport players from their current environment and immerse them into the scenario around which the game is structured. The Call-To-Action usually ends with a broad, open ended question to players. It is structured to be “narratively incomplete” in order to provide sufficient creative whitespace within which the player pool can operate and contribute their combined intellectual capital.
- After immersing themselves in the Call-To-Action, players enter the first phase, known as “Cardplay”. At this point, the broad, open ended question from the Call-To-Action has been decomposed into two more specific Yin and Yang components. Players post their responses to these Yin-Yang questions in the form of 140 character “Cards”. Players also build on each other’s’ initial ideas, ultimately creating structured threaded conversations. This phase of game play is fast paced and divergent, with hundreds of players generating thousands of cards and collectively building threaded conversations in a short time (typically 24-72 hours).
- With the “Action Plan” phase, mmowgli shifts into a convergent phase and proceeds at a more deliberate pace. Of the hundreds or thousands of conversational threads emerging from Cardplay, a relatively small number, typically on the order of 1%, have sufficient critical mass of player energy, and/or sufficiently promising ideas, that they cross the threshold to become Action Plans. In the Action Plan phase, small groups of self-selecting players, many of whom were involved in the original generation and development of the thread during Cardplay, come together as a team online to craft detailed responses to the basic “Who-What-When-Where-Why” questions that help turn a promising idea into a first order plan. For most mmowgli games, the Action Plan phase constitutes the raw output that gets turned into concrete recommendations to sponsors and policy makers after the game.

mmowgli was developed by the Naval Postgraduate School (NPS), in partnership with the Institute for the Future (ITF), under Office of Naval Research (ONR) sponsorship. The first large scale mmowgli event took place in 2011. Since then, mmowgli has transitioned out of ONR sponsorship and into a self-

sustaining business model hosted out of NPS. To date, more than 25 different mmowgli events have been conducted by a diverse group of sponsors including OPNAV, OSD, and DASN RDT&E, on topics ranging from resilience in the face of Black Swans to innovation in our Acquisition system, to energy independence. The output from mmowgli games has routinely been converted into concrete recommendations presented to the sponsoring organization as well as at the highest levels of the Navy and DoD.

For more in depth information on mmowgli, see the mmowgli informational brief included in Appendix A and a paper written for the White House Office for Science and Technology Policy (Jensen & Tester, 2012).

## Design for Maritime Singularity Game Concept

The “Design for Maritime Singularity” game concept plays intentionally off the wording from the U.S. Navy’s Chief of Naval Operations (CNO) “Design for Maritime Superiority” strategy document (A Design for Maintaining Maritime Superiority, 2016). At the highest level of abstraction, the game positions players in a future where the long awaited Singularity has arrived, and solicits their collective response to the broad question: “How Might We Design (or re-design) the Navy in light of this Singularity?” The Call to Action was created in the form of a fictional Ted-talk like event (Maritime Singularity Call to Action, 2017). At the more concrete level, the game’s Call-To-Action decomposes this broad question into two parts (the Yin and Yang referred to above).

- Part one characterizes the “the Singularity” in the way that people commonly understand it, as the emergence of greater than human intelligence from technological means, a proposition attributed to scientist and futurist Ray Kurzweil (Kurzweil, 2005). The emergence of intelligent machines, capable of designing even smarter machines, would create its own kind of Event Horizon (hence the term Singularity), a world in which the unaided human is no longer sufficient and may not even be relevant. Rather than give in this dystopian view the mmowgli narrative cites the invention of freestyle chess, influenced by Garry Kasparov (Kasparov, 2010) following his defeat by IBM’s Big Blue, as a metaphor for how the Navy might approach the pending Singularity. Part One finishes with the following open ended prompt to players (the Yin): ***“What concepts for human-machine teaming might we develop as we approach Singularity 1?”***
- Part Two introduces an alternative way of thinking about the Singularity (called Singularity 2), one drawn from the work of Yaneer Bar-Yam, at the New England Complex Systems Institute (Bar-Yam, 2002). In this view, increasing environmental complexity takes the place of increasing machine intelligence. This view argues that a similar phenomenon is happening with environmental complexity as with machine intelligence, i.e. that complexity is rising to the point that it outstrips our individual human ability to manage it. It makes the further argument that our organizations, to the extent that they are hierarchical in nature, are limited in their “complexity carrying capacity” by the carrying capacity of the relatively small number of

individuals who make decisions at the top of the hierarchy. Thus we find ourselves in a state where traditional organizational constructs are limiting our collective ability to process this complexity. Part Two finishes with the following open ended prompt (the Yang): ***“As complexity rises all around us, what new organizational constructs should we consider?”***

## Section 2: Game Execution

The Maritime Singularity mmowgli game ran from March 27<sup>th</sup> through April 2<sup>nd</sup> 2017. In that time 1272 players played a total of 9109 cards and created 45 action plans. The play for the week was divided up in the following manner.

- Monday 3/27-Wednesday 3/29 – Players were able to play idea cards (responses to the Singularity 1 or 2 questions), responses to those cards, and work on action plans.
- Wednesday 3/29-Friday 3/31 – Players were not able to respond directly to Singularity 1 or 2, but were able to respond to existing cards and to work on action plans.
- Thursday 3/30-Friday 3/31 – Players were also able to respond to a series of questions focused on making the mmowgli platform and future games better.
- Friday 3/31-Sunday 4/2 – Players were able to work on action plans.
- Gameplay was finally stopped at 1900 EDT on 4/2

### Card Play

During the card play portion of the game the 9109 cards were divided across the different card types as shown in Table 1.

*Table 1: Number of Cards by Category*

| Singularity 1 | Singularity 2 | Expand | Counter | Adapt | Explore |
|---------------|---------------|--------|---------|-------|---------|
| 609           | 389           | 2919   | 1825    | 1032  | 2335    |

Players participated most highly on the first day of the game, with participation dropping off as the game progressed. This pattern is typical for mmowgli games. The participation in terms of number of cards played can be seen in Figure 1.



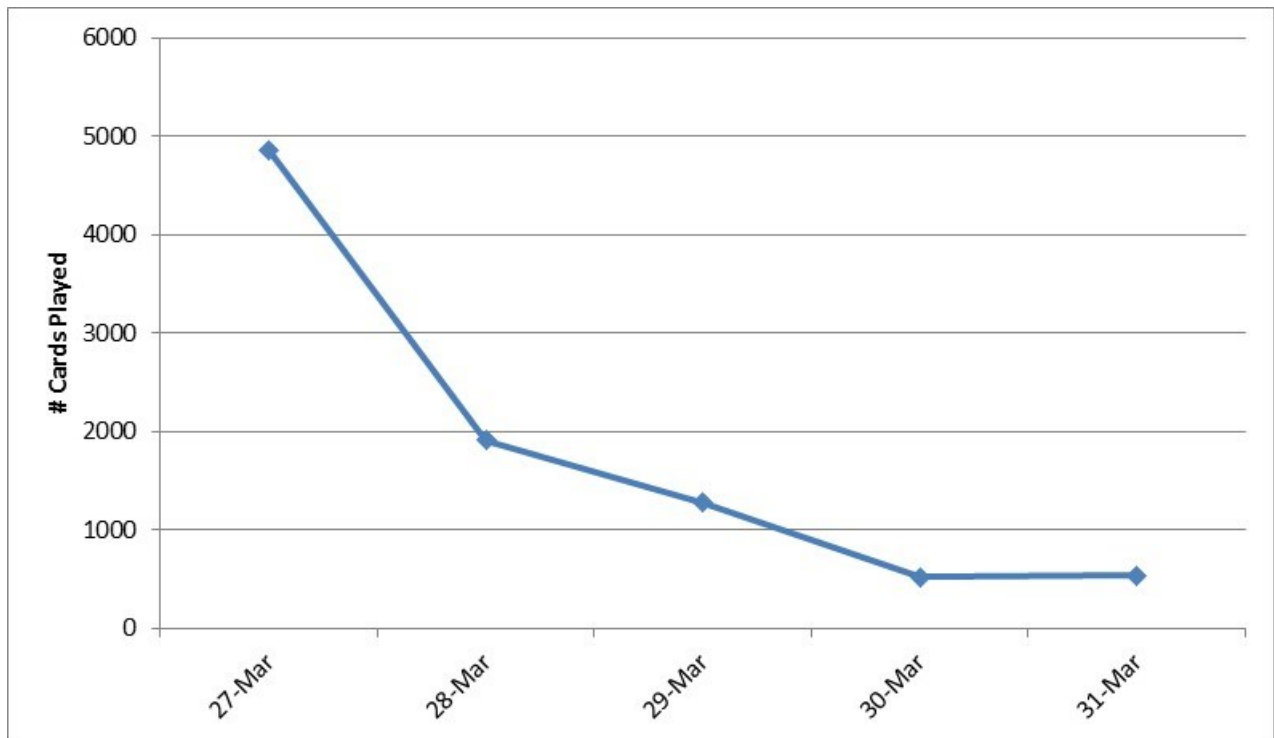


Figure 1: Card play per day

While a total of 1272 players registered for accounts, 390 players actually created cards. Again, this is typical for mmowgli games. Of those players 30% played 1 or 2 cards and 18 players played 100 cards or more, with the top two players playing over 500 (Astrosplay with 607 and Gardener with 510).

On March 30<sup>th</sup> and 31<sup>st</sup> 8 cards were set up by the gamemasters to try to gather information on what the players thought about the game and about mmowgli in general. These questions generated over 400 response cards.

### Action Plans

The action plan phase of the game started almost immediately, with the first action plan being created within two hours of starting the game. There are two action plans that are created as 'standard' for every mmowgli game and which are used to demonstrate how action plans work. One of these was not used for the game and was hidden from players. After that, a total of 45 action plans were created. It's currently not possible to track the total number of edits on an individual action plan, but there were 1852 comments and 547 author-to-author messages. This level of communication is impressive and represents a high level of collaboration. Of those 1852 comments, 242 happened on 4/1 and 4/2 showing continued engagement over the weekend after the card play portion of the game had been completed.

Players have the opportunity to rate action plans from 1 to 3 'thumbs'. While this was not stressed as a part of this game players did rate the plans, with an average of 11 votes per action plan. The average rating varied from 1.7 thumbs to 2.8 thumbs.

The final action plans can be found in Appendix B.

Game results including cards played, action plans, and player profiles can be found at <http://movesinstitute.org/~jm Bailey/mmowgliReports/singularity/>

## Game Moderation

During the game the blog was used to moderate the flow and to communicate with players. Guest blog posts were written by Erik Jansen, Wayne Hughes, and Peter Denning of the Naval Postgraduate School. In addition, there were posts describing the change between different phases of the game, how to use the game and the reports page, and showing the leaderboard winners at the end of the game. These blog posts can be seen in Appendix C.

## Section 3: Game Results and Analysis

With “Design for Maritime Singularity”, the mmowgli team, with support from the sponsor, ONR, piloted a new approach to post game analysis. Traditionally, the mmowgli output consisting of the combined body of Card Play and Action Plans is made available to the game sponsor who performs the bulk of analysis, reporting and recommendation writing. With “Design for Maritime Singularity”, the authors inserted an intermediate step, convening a three-day workshop using methods from the world of Design. Section 4 describes the workshop itself. This section describes the process of curating and converting the raw output from the mmowgli game into a form that could be utilized by the workshop participants.

Between the end of the game (April 2, 2017) and the beginning of the workshop (August 15, 2017) the authors combed through all 9000+ Idea Cards and 45 Action Plans using an adapted form of “hermeneutics”, a process more commonly associated with theology and the liberal arts than with wargaming or crowdsourcing. In effect, the authors treated the mmowgli output as a form of literary text, reading it several times through, highlighting major themes as well as significant outliers, occasionally stitching together disjoint threads to form a completely new idea. The goal was to provide workshop participants the following material to work with:

- Major Themes: persistent patterns of thought that warranted attention and which provided important background and context.
- Ideas for Further Development: novel/useful ideas from the game that warranted attention and further development by the workshop participants. These formed the basis of the workshop’s primary activity.
- Nuggets: novel/useful ideas that were self-contained, i.e. they did not require significant further development. As such, although they were novel and/or useful, they were covered only briefly at the beginning of the workshop and without expectation that they would form the basis of further activity during the workshop.

This section of the report will address the Major Themes and the Nuggets. Ideas for Further Development, i.e. the primary basis of the workshop activity, will be presented in Section 4. Where mmowgli raw data is cited, AP followed by a number indicates Action Plan #X. For example AP 34 =

Action Plan #34. Otherwise, if a simple number is listed it indicates the Card number from the game, so “7162” means Card #7162.

## Singularity 1 Major Themes:

- **AI for Intelligence Analysis:** This set of concepts encompasses an area where there is a great deal of current research, though there’s certainly more that can be done. As data from intelligence systems as well as public sources increases and becomes more complex humans will need help turning that data into information and knowledge. Much of the current work in this area involves machine learning. Represented by mmowgli raw data: *AI surveillance and intel analysis – AP5, machines analyze impacts of global warming (could use these for other big data problems) – AP34, AI help with analyzing full motion video – AP35, AI to sort out battlefield and provide ‘truth’ – 7162.*
- **Swarming:** The concept of swarms is an interesting one; we often think about it in terms of robots working independently to accomplish a task. In the case of some of these concepts, however, we look at swarms of manned and unmanned assets working together and also at the idea that a swarm of humans could support or be supported by a single AI. As sensors and computers become smaller and more capable the idea of having inexpensive swarms becomes less of an idea and more an expected reality. Represented by mmowgli raw data: *one person control a swarm – AP12, AI help with analyzing full motion video – AP35, Distributed sensor networks – 82, Swarm as defense – 391, Networking platforms and cubesat comms – 3576, Group of humans to one machine, or group of machines to one human – 4705, Ship/aircraft part of networked whole – 7195.*
- **Health-Related Concepts:** This is just a small number of concepts, and focuses on how AI or robots could help humans to heal or get treatment faster in battlefield scenarios as well as concepts dealing with using AI to help with medical advances. Represented by mmowgli raw data: *Armor to help with medical issues – AP16, Unmanned UGV for evac of injured personnel – AP26, Cybernetic limbs/implants, learn operation and transfer models to other people – AP42, Work with AI to develop more cost effective medical solutions – 2077.*
- **Tactical Application of AI to Warfighting:** This concept has two main areas. In the first the AI is fighting war, either through offensive operations or from defensive operations. In the second area are concepts that explicitly look at how to attack AI. These range from EMP bursts to concepts based around deception or destroying human trust in the AI. Represented by mmowgli raw data: *speed up seek/destroy or counterbattery – AP17, ways to attack AI – AP24, starve AI of data, thereby limiting it – AP45, Protect ship systems/networks from AI or cyber attack – AP47, AI ship defense – 1183, Use disinformation to confuse AIs and slow them down – 1471, AI take over mission when human is injured or dead – 1689, Starcraft to control AI – 3628, Attack AI by destroying human trust – 3977, Attack AI with bad data – 5411, Create means of speaking in ways unintelligible to machine intelligence – 8080.*
- **Creation of AI:** This theme deals with different ways to create and train AI. Some are conceptual, like the idea of Moravec’s paradox, but most are more practical dealing with creation of hardware and software that will assist with advanced AI. Represented by mmowgli raw data: *use commercial gaming to train AI – AP19, Moravec’s paradox – easier to code high*

*level functionality than low – 254, Train AI through VR interaction with humans – 992, Personal vs group support AI – 1785, Will hardware limit development? – 2960, Replicate/virtualize human brain for AI creation – 3681, 4908, 5798, Test AI on internet to see if evolves or goes defective – 5214, AI to write poetry – 5330.*

- **Transhumanism:** This group of concepts takes the basis of the game, which was the merging of AI and human capability, and assumes a physical merger. It involves creating cyborgs, humans with machine elements that allow the merged entity to operate more effectively than either part could operate separately. Represented by mmowgli raw data: *humans/machines become interchangeable, humans plug in like systems – AP23, start to integration between human and machine – AP15, Cybernetic limbs/implants – AP42, learn and transfer models to other people, to remain relevant we need to evolve, symbiosis – 61, 893, 1416, 3521, 6269, 3508, Implants that help with human senses – 175, 3812, 971, 6262 (new senses), Implants help humans communicate – 18, Coaxing neurons to bind to transistor substrates and begin “thinking” – 6379, AI helps humans function as hive mind – 1410, 3014, Human consciousness inhabit drone – 1284, Machines execute code in human brain, including virus – 677, 6368.*

## Singularity 2 Major Themes:

- **The Role of Surprise, Imagination and Novelty vs the Role of Analysis and Logic:** This theme addresses the question of whether an entity (i.e. either human or AI) could ever “analyze” its way into something as imaginative and effective as Doolittle’s Raid, and how the ability to do so might be affected if that entity had infinite “lived experience” to draw on. Represented by mmowgli raw data: *Presumably AI would think with perfect algorithmic logic. How and why would it execute an illogical but necessary mission? – 3146, The Doolittle Raid: minimal physical damage to Japan, massive morale boost for us. – 3457, The advantage we will have is the ability to act irrationally. Different humans will see different solutions. All AI will only see one. – 3086, Once machines have millions of human lifetimes of expertise, we will forever be the lowest-ranking members of the team. – 3304*
- **Naïve Rationalism:** This theme revolves around the assumption that machine driven, “perfect” algorithmic logic, applied to human affairs, would result in superior outcomes. Represented by mmowgli raw data: *Wars in general are illogical. – 2264, That’s an easy task. Stop fighting Wars. Problem solved. It’s the most logical solution. And the AI will come to that conclusion as well. – 3092, The advantage we will have is the ability to act irrationally. Different humans will see different solutions. All AI will only see one. – 3086, AI will have the ability to seek and understand and satisfy both sides. – 1765*
- **Projecting Human Social Complexity onto AI:** Many threads questioned whether AI would manifest as a single, monolithic, all-knowing entity, or whether it would be balkanized. In an ironic twist for a game devoted to taming complexity, this led to the need for a proliferation of distinct AI’s whose purpose was to keep other AI’s in check, creating a situation where the artificial world, rather than helping humanity tame complexity, actually contributes to increasing complexity. Represented by mmowgli raw data: *Instead of using a single AI or a single system, several independent AI’s should be created to provide “Checks and balances” to the other AI. – 657, How do we ensure the AI’s decision is the right one? – 1174, A Council of AI’s. – 1999, How*

*do we discriminate between large actor and small actor initiated AI's? – 2874, Rogue AI's. Creating other AIs to keep an eye on the "Rogue" AIs. – 2880*

- **The Role of Feelings/Emotions:** Emotions and feelings are one way that humans curate overwhelming amounts of raw, complex data coming in from the world. Additionally, emotions form a key, underappreciated part of the human decision making process. This theme revolves around the role of feelings and emotions in AI, represented by mmowgli raw data: *Where does the human spirit fit into the man machine equation? – 118, What would religion, faith or belief look like to something like a singularity? Not human belief but the AI's belief. – 491, Would this just be data to AI? Info it may or may not use in its program? It has no feeling or emotional attachment to it. – 1043, are "beliefs" for AI simply the assumptions that are baked in? – 565, As I see it, true AI will wield all our intellectual abilities, emotional included. In very much the same way as we do. – 8253, Seems hormones would be good to use to program AI to value motherhood. – 4704, What if we end up with a sentient AI that is fat, happy and content to play? How do you motivate an AI "to work" in this situation? – 6415*
- **The Role of Embodied and Tacit Knowledge:** Similar to feelings and emotions, humans also possess tacit and embodied knowledge. Is there an analog to tacit/embodied knowledge for AI? Can AI possess embodied/tacit knowledge? If so, how would that manifest? Are we assuming that the vast majority of knowledge is explicit knowledge? If so, what are the implications for AI? Represented by mmowgli raw data: *path dependent AI-rebooting or wiping the AI and starting over – letting it re-evolve from the beginning with different inputs,thus arriving at a different "outcome or personality" based on "experience". – 1939, AIs won't necessarily see the same solution. Given different experiences and different weightings, solutions can be different. – 3089, There would be no job task specialization. – 3530, There would be no need for organization or hierarchy. Anyone could do anything. – 3536, Would humans select a field? One could be a doctor today and an artist tomorrow. – 4070, the gist of this is tacit understanding, human-to-human knowledge transfer. – 8804*

#### Nuggets/Self-Contained Ideas:

- **Using AI to Support the DoD Acquisition Process:** AI could be used at different points in the acquisition process including creating documentation from system models or evaluating cost and other elements of proposals. *99: AI for Acquisition Programs. Automate requirements identification/generation, automate validation, etc*
- **Using AI and Data Analytics to Help with Career Progression:** AI could help detailers to move personnel along their career path and could help individuals see how their choices might effect their careers in the future. *100: Use big data to help personnel (HR AI) make decisions about their careers that are most helpful to them and to the military as a whole.*
- **Creating a Continual Wargaming Environment:** Making wargaming a part of the day-to-day for warfighters and including AI in the wargaming process, either as an opponent or as a team member. *2866: Continual wargaming - AI vs. human organizations working the same problem, taking the best of both output*
- **Large Scale Deception Using Public Infrastructure:** Using control over the power grid to try to fool celestial nav of weapons systems. Also could be expanded to try to use other infrastructure including TV/Radio for other forms of deception. This theoretically could be done with or

without the cooperation of the countries/municipalities effected. *4809: Hack power grid to make city lights mirror night sky to confuse astro-inertial targeting of re-entry vehicles*

- **Renting Out Unused Mental Power for Computing:** In a future where computers are integrated with the human brain people could allow others to rent their brain or brain and computer computing power. *6240: Brain Uber. Allow AI to use unused biological neural network resources (unused grey matter) to boost processing power. Think render farm, 6318: Using AI to allow machines to execute code using our brain power*
- **General AI:** To achieve human-like intelligence AI will have to be able to make inferences outside the specific areas in which that AI is trained. *7317: There are already at least 3 instances of AI spontaneously producing results outside the scope of their original programming*

## Section 4: Design Workshop Concept and Results

In parallel with the qualitative data analysis described in Section 3 (i.e. adapted hermeneutics) the authors worked with the Consortium for Robotics and Unmanned Systems Education and Research (CRUSER) Program at the Naval Postgraduate School to plan and conduct a workshop. The purpose of the workshop was to focus on a select, small number of ideas from the game and flesh them out more fully, to the point that they would contain actionable recommendations. The format chosen for the workshop was to conduct a Design Sprint, over three days, using Design Methods and Principles. NPS CRUSER was chosen to lead the workshop for three reasons:

- It has close proximity with the mmowgli program, both geographically and intellectually.
- In recent years, NPS has increasingly become recognized as a locus of Design excellence within Navy/DoD.
- The academic-military setting at NPS afforded workshop participants a unique source of rich feedback at critical junctures as the workshop progressed.

The authors invited a pool of 24 participants drawn from the Naval Research and Development Enterprise (NRDE), from other government agencies, and from the player pool. The group met as a plenary for the first half day. During the plenary session the authors presented the following material (which mirrors Sections 1 through 3 of this report)

- Overview of mmowgli
- Overview of the Call-To-Action and Yin-Yang questions
- Game Execution
- Curation of Results:
  - Major Themes
  - Nuggets
  - Ideas for Further Development
  - Design Challenge(s) to the Working Groups



Major Themes and Nuggets are contained in Section 3 (prior section) of this report. The Ideas for Further Development, and the Design Challenge(s) to the Working Groups, which formed the primary workshop activity, is presented next, in the paragraphs below.

## Ideas for Further Development

### S1 Design Challenge: AI Personal Assistant

This set of concepts was focused on personal Artificial Intelligence aids that were created with either an individual or a specific job/rate in mind. These assistants would be in the vein of Siri or Alexa, but much more competent. For some of the concepts the assistant would be very specific to a certain task or set of tasks while other concepts envisioned an assistant that would help with many different topics. One of the most interesting elements of this series of ideas is the personalization aspect, that through dedicated coders or through learning algorithms the AI was for you as an individual, not a one-size-fits-all solution. Represented by mmowgli raw data: *Personal assistant learns how you work and is better able to help – AP3, Developers code solutions alongside sailors that use them, AI developed for specific rates – AP9, AI personal assistant that recognizes and shares best practices – AP39, Technology/AI as a colleague to navigating workplace complexity – AP40, AI grows with you over service time, stays with you as your career progresses – 11, 816, Partner AI with person/thing it will mimic, allow it to grow with partner – 1363, Increased trust in AI if it is paired with you – 279, AI Amanuensis (butler) – 1906, AI advisor for grunt/sailor – 1965, 2645, 5192, AI teaching human – 3950, 6748, AI can increase the capacity for humans to handle complexity - 2142*

### S1 Design Challenge: Interface Between Humans and Computers/Machines/AI

This set of concepts is all about how the human and the computer can communicate with each other. Some look at ways to teach the computer to understand humans, these deal in part with maturing areas of research like text and speech analytics. Another sub-set looks at the idea that humans need to speak/communicate with more precision and therefore the changes should be on the humans being more computer-like. The third area focuses on more direct connections between the human computer (our brain) and the machine, through direct brain interfaces, EEG interfaces, and other means. A last element is providing something like Augmented Reality (AR) or Virtual Reality (VR) or even a suit that overlays the computer information into the human's world and connects the human's data to the computer's world. What isn't necessarily discussed is the cognitive load of the additional information these connections will add. Represented by mmowgli raw data: *Natural language and other comfortable interactions with computers – AP11, train people how computers think – AP14, Intelligent suit that connects you to network and provides compute, AI, sensing – AP15, Armor to help with medical issues – AP16, incorporate computer programming elements into human language – AP36, Direct brain-machine interface – 13, 15, 469, 568 (brainwaves), 2053(brainwaves), 6056 (telepathy), 6315 (EEG), 6391, Human/AI Application Program Interface (API) – 51, Common language for human/AI communication – 538, 4891, 6267, VR/AR interface – 903, 4332, Attack other people's human/AI interface - 7239*

## S1 Design Challenge: AI Decision Aids

This is a broad range of concepts that approach the idea of how decisions will be made as humans and machines work more closely together. Some of these concepts have to do with the structures within which we make decisions, such as decentralized decision making. Some concepts are about having the AI help with small decisions. Some look at how AI might break up our traditional decision making process, with the AI being the CO, the AI breaking the chain of command, or the AI being a red team to point out human failings. Represented by mmowgli raw data: *stock market for ideas related to strategic concepts – AP13, MMOWGLI helps promote transparency – AP18, push decision making to swarms (mostly S2) – AP28, Use Agile as structure for decision making (mostly S2) – AP29, How did the machine make the decision? – 50, Learn from past decisions – 86, Allowing the machine to decide for the human – 137, Decisions at machine speed – 328, If organization is decentralized, how does AI factor into C2/making decision – 611, AI point out human bias or play devil’s advocate – 619, 774, Machine making the human decision easier, making lower level decisions to free up human for higher level – 987, AI break the chain of command – 1112, 2728, 4807, AI as CO – 2161, Multiple decision aides (like have multiple staff members) – 4357, 4955, AI as too easy to predict? – 4991, Train AI to run Prediction markets – 6556*

## S2 Design Challenge: Treating the Navy as a Complex Adaptive System

Going back to the Call-To-Action, the goal was to redesign our Navy’s organizational construct, at any level, such that we would have a Navy that is robust in any environment, and able to deliver effects matching the scale and complexity of the situation at hand. For the purposes of the design challenge given to the workshop, “at any level” could mean at the large organizational level, e.g. at the Requirements Setting and Resource Sponsor level; it could apply to the broad enterprise that manages research, development and innovation; or it could mean at the operational level, whether an individual unit, or squadron. The primary challenge for this group was to settle on a specific or narrow enough idea to further develop, and to also settle on a specific level of the large Navy organization on which to apply the idea. Represented by mmowgli raw data: *Treating the Navy as a Complex Adaptive System. – AP7, How Might the Navy’s organizational construct, at any or all levels, need to change in order to push decision making and problem solving to swarms? – AP28, Test and apply Agile Methodology/SCRUM/KANBAN to Navy organizational constructs. – AP29, If the Navy evolves to a more complex, less hierarchical structure, what incentives might emerge to replace traditional hierarchical/bureaucratic incentives? – AP30, Pre-empting the Third Singularity: (note: the third Singularity, refers to that point in time when the Defense top line budget intersects with the increasing per-unit-cost of a given platform, resulting in a Navy force structure consisting of exactly one very large, but very capable, platform). – AP37, Organic structure where the resources would be redirected to address issues as they arise, like the body fights illness or injuries. – 83, For major acquisitions use AI and big data to automate requirements identification and validation. – 99, Why are we assuming the individual carrying capacity for complexity is fixed? – 2142, Shift the burden of policy enforcement from humans to AI. – 2404, Complex, Adaptive Enterprise. Extend the study of complexity and complex adaptive systems to large organizations and enterprises like DoD. – 3516, Can we measure, in real time, if an organizational structure deals with complexity well? – 4448, Human subjectivity in law/policy enforcement is a nightmare. Can we create a system that relies entirely on AI and past results? – 6031*



After the plenary session, participants were split into three facilitated working groups. NPS supplied the individual facilitators for each group, as well as an overarching workshop/roving facilitator. Two groups were assigned to Singularity 1 (artificial intelligence); one group was assigned to Singularity 2 (organizational response to complexity). This roughly mirrored the relative share of game content between the two questions. Section 4 contains the detailed report out from each group.

## Group 1 Output: SQUIDS

Group 1 looked at the design challenge of Artificial Intelligence Personal Assistants. The question addressed by Group 1 was, “How might we enable the Navy to adapt applications that enhance trust and timeliness in information flow?”

The concept created by Group 1 was called the Symbiotic Query Universal Iterative Decision System (SQUIDS). The overall diagram used to present SQUIDS can be seen in Figure 2, and will be expanded upon in more detail below.

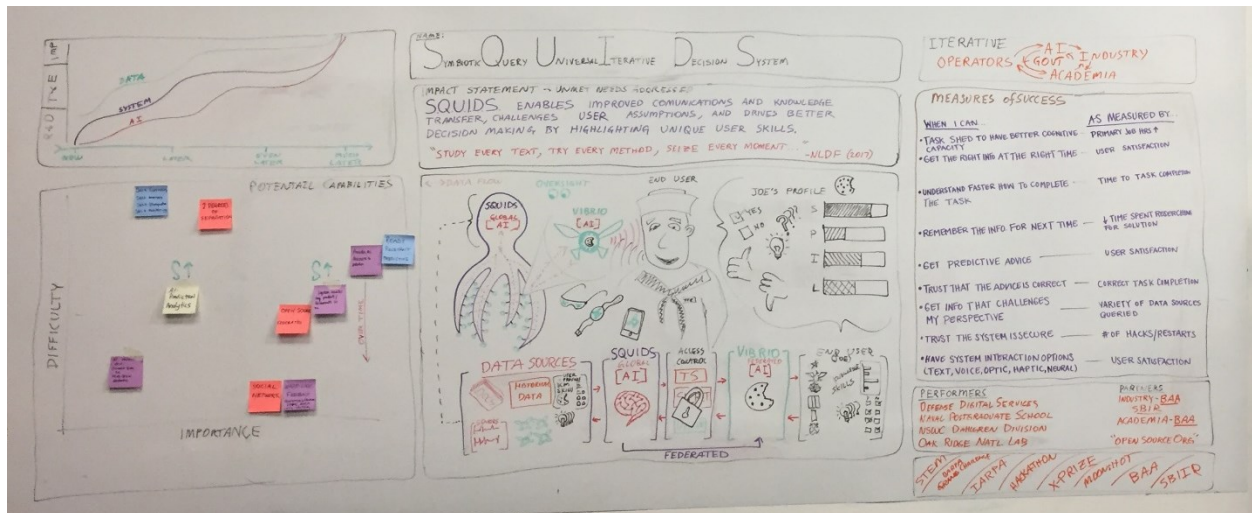


Figure 2: SQUIDS overview

SQUIDS is envisioned at its core as a question and answer system that allows Naval personnel to get access to experts and to share expertise. In the words of the team, SQUIDS, “enables improved communications and knowledge transfer, challenges user assumptions, and drives better decision making by highlighting unique user skills.” In use it is envisioned that SQUIDS will start simple, by connecting experts to people with questions in very specific technical areas, but that it will grow to a broad range of topical areas and that it will be able to provide general support to its users across that range of topics. SQUIDS is intended to be a human-centric tool that supports, not supplants the human. SQUIDS will free up human cognitive load to hopefully allow humans to focus on creativity, decision making, and other tasks where the team felt humans could provide the most value.

The architecture of SQUIDS can be seen in Figure 3. Each user will have a profile that describes their interests, expertise, ideas, and the questions they've asked and answered in the past. That user's interface with the overall system is through their personal assistant, called VIBRIO. The user might access VIBRIO through a desktop computer, through a phone or smart watch, or even through an augmented reality display. Each person's VIBRIO will be connected together through the base SQUIDS AI and database. Access controls will provide the ability to ensure data breaches don't occur and to protect personal information that might be associated with individual VIBRIO units. The back end database for the global system will consist of a number of different data sources. The primary initial source will likely be the combined set of VIBRIO units and the questions, answers, and ideas that are communicated. In circumstances where the topical areas is something structured like maintenance, with manuals, standard repairs, historical repair data, and training then those data can be added as well. Over time other sources could be added as needed to support the expansion of the SQUIDS system.

Artificial intelligence is assumed to be a necessary part of SQUIDS at several points in the architecture. Each VIBRIO will have an AI that will be expected to learn the preferences of the user it supports. The AI supporting the global SQUIDS back end will be responsible for making connections and for building the database supporting those connections. Because there is an AI involved there is an oversight capability that is needed, to ensure that the AI enhances the human and to ensure that SQUIDS does not limit creativity or have counterproductive behaviors introduced and reinforced. Some amount of this oversight will be provided by the users through their VIBRIO interfaces, some will be oversight of the entire system, and some will be provided by the AI or additional AI.

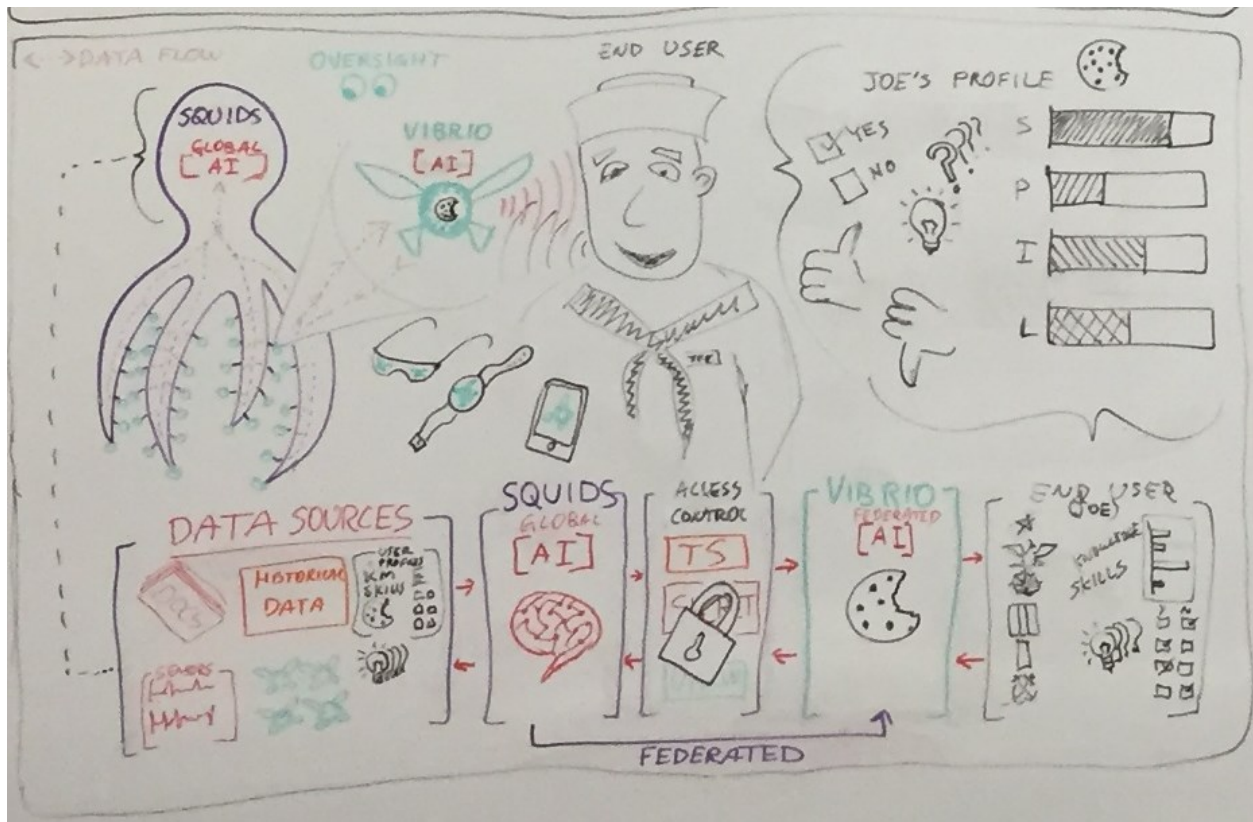


Figure 3: SQUIDS architecture

The SQUIDS team developed a set of measures of success that further help to describe the system. Those measures have a capability that is desired and a metric that can be used to measure progress towards that capability as seen in Figure 4.

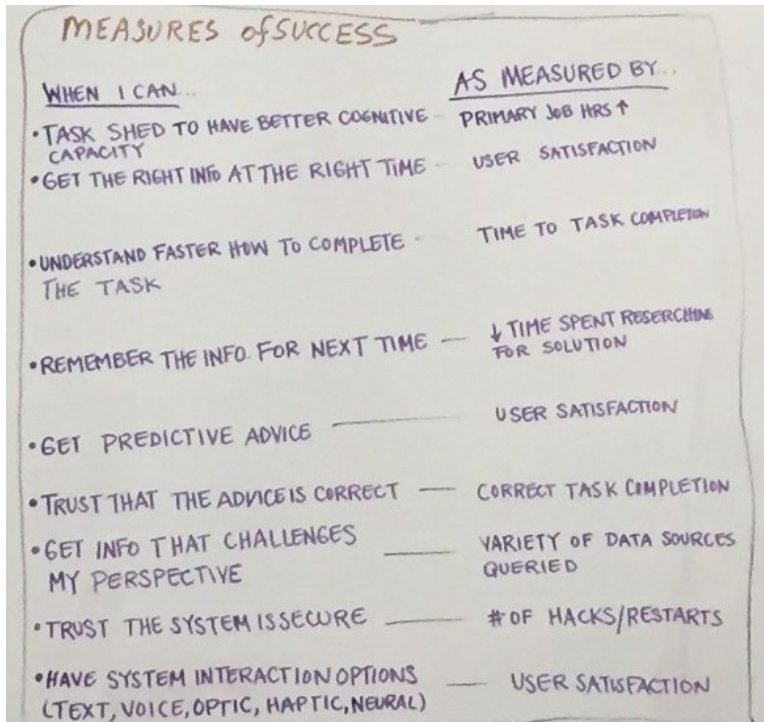


Figure 4: SQUIDS measures of success

There was an expectation that the SQUIDS system would start small and grow. As shown in Figure 5, that development process would be iterative, initially working from research and moving through to industry, with operators involved in the development process. Each iteration might use different elements from the performers list and different funding/research elements from the list at the bottom of Figure 5.

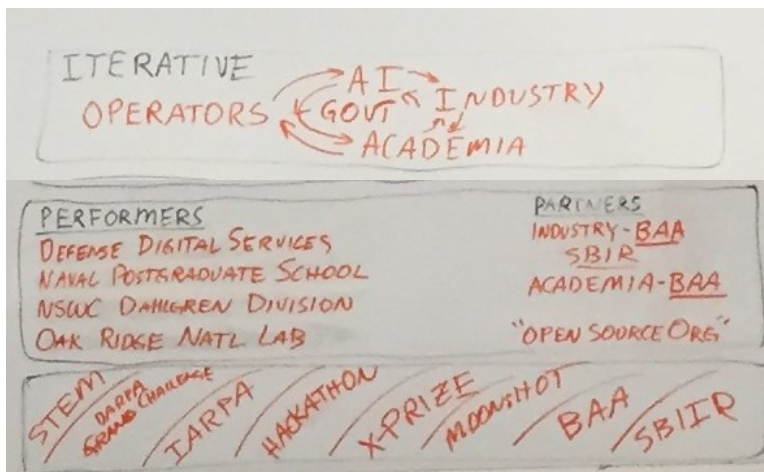


Figure 5: SQUIDS iterative development process

The result of this iterative process would be a gradual increase in capability as shown in Figure 6. While the left side of the figure shows a typical path for a single development iteration from R&D through T&E to implementation, the team also stated that over time the overall capability would gradually improve in

a similar manner, with different aspects of the SQUIDS system (here portrayed as system, data, and AI) improving at different times and with different iterations.

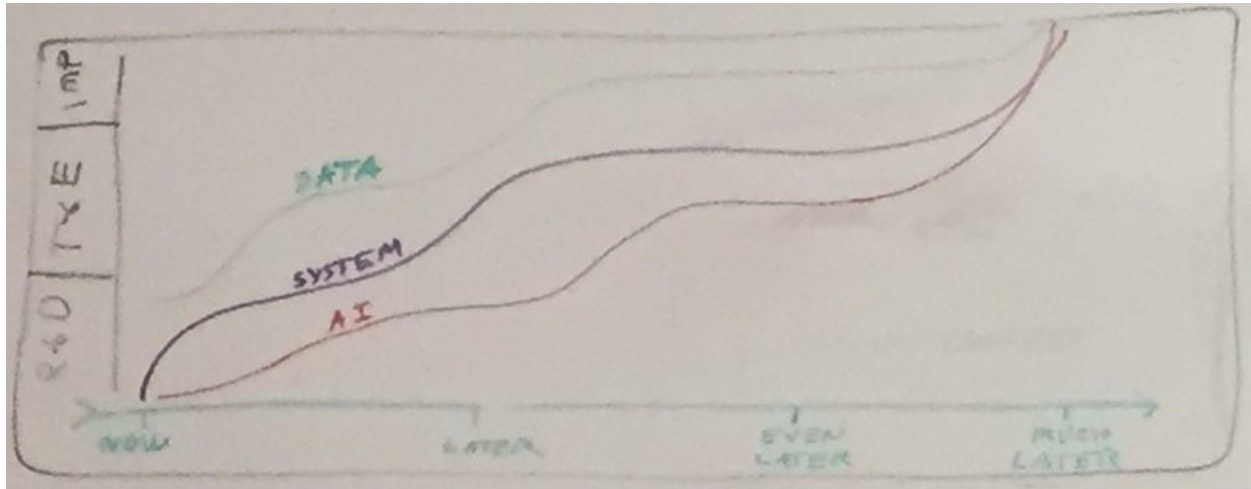


Figure 6: SQUIDS capability growth over time

#### SQUIDS Research Questions

The SQUIDS team developed a chart to show key research and development tasks that needed to be addressed in order to make SQUIDS a reality. These are represented in the difficulty vs importance chart in Figure 7. The importance reflects the value to the end user while the difficulty represents the expense and difficulty to create the capability. As the image is a little difficult to read, a key is provided below the figure.



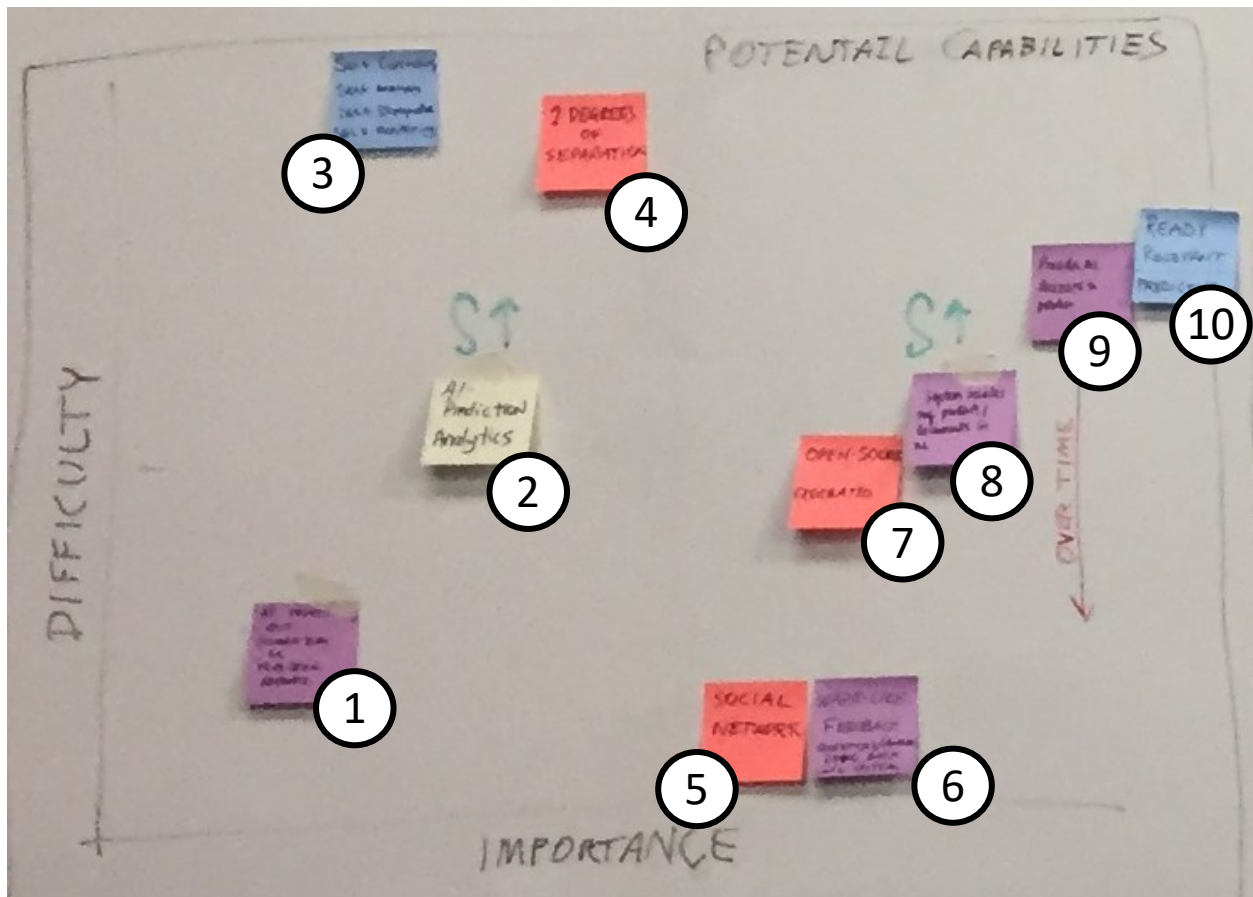


Figure 7: SQUIDS capabilities to be researched and developed

1. AI points out human bias/plays devil's advocate, done by your VIBRIO: Your personal AI will learn how you solve problems or your preferences, and points out concepts that you might not typically consider. This would focus on two aspects, one is having a large database of possible answers (coming from 4 or 5 below) and the second is understanding the routine or preferences of the individual user. A simple version of this could be done using recommender technology that already exists, but more could be done as the overall SQUIDS system became more capable.
2. AI prediction analytics: AI predicting what you're going to need to do in the course of your work. Again, a simpler version of this could be created from existing AI studies, the research angle on this could be focused on how to train an AI to understand processes that Navy Sailors perform either across the fleet (to gain 'big data' capabilities) or through repetition learning from an individual. This daily process learning research area is a core element to making SQUIDS work and to making AI useful in a broader range of applications.
3. Self-correcting, self-analysis, self-diagnostics, self-monitoring, system learning from its mistakes: This was one of the most difficult items in terms of research in the views of the SQUIDS team. There are a number of more detailed research problems here and the topic could tie into research efforts now ongoing like DARPA's "Explainable AI" program. It is possible that the

solution would not be teaching an individual AI to self-diagnose, but simply training a second AI off of the failures in the first.

4. Two degrees of separation, user is 2 clicks away from information or expert they need: The goal with this research area is to make the user feel like they're just two clicks away from the answer they need, regardless of the actual degree of separation in the model. This will require network science research in the way the information is stored as well as user interface work to ensure that users can communicate their needs in a natural feeling manner.
5. Social network: The group saw this less as a research area and more of an area where we need to apply the technologies or concepts that exist today in social networking to this particular problem.
6. Waze-like feedback: Related to social networking, this is a concept in frequent use in many different platforms, whether it's traffic applications like Waze, or through other feedback mechanisms like those used in Stack Overflow.
7. Open source/federated: This is more of a design choice than a research area, it will benefit the software to build from existing open source software and data federation will help SQUIDS to use information in other systems. There might be some detailed research later in the project but for the time being this is not a major research area.
8. System creates my products and documents them for me: This will probably be a variety of different research efforts related to creation of documents and other products as well as related to the AI understanding human intent and general directions and filling in detail.
9. Provides AI decisions to problems: This is part of the more advanced capability of SQUIDS, where the overall tool will learn from recommendations/solutions given by humans and be able to provide solutions based on that learning. Depending on how it is implemented this could be a more general AI capability, which would require significant research, or more current capabilities that are narrowly focused and able to learn and recommend in bounded problems. There also is an aspect of organizational or process research here on where AI solutions would be allowed and how existing experts would interact with and improve upon or learn from those AI solutions.
10. Provide ready, relevant, and predictive information: This closely relates to several of the items above, and probably does not include new research.

Some additional research areas that will be important but that were not brought up in Figure 7:

11. Work will need to be done to deal with privacy and PII information, an individual's VIBRIO will know more about that person than would be appropriate to share, so ensuring privacy protection will be important.
12. Related to 11, some of the information will be across security classification levels, requiring some way to have a person's VIBRIO exist at multiple classification levels and to interact with the broader SQUIDS system at multiple classification levels.
13. There will need to be interface research, determining the best ways for the user to interact with this data. In some cases talking to an app that exists on a portable device might be acceptable but there are Augmented or Virtual Reality possibilities that should be explored to allow expert interaction at higher fidelity than just text or voice.

## Group 2 Output: ADAPT

Group 2 looked at the design challenge of AI Decision Aides. The question that Group 2 used was, “How might we create an integrated environment that allows decision makers to understand the range of consequences that flow from their decision so they can make informed decisions?”

The concept that was created is called ADAPT, or the Augmented Decision Analysis and Planning Tool. At its core ADAPT is a combination of modeling and simulation, human machine interface, and course of action creation. The tool is focused on aiding the deliberate planning process, but could be used for more reactive planning as well. The intended users of the tool are policy makers, COCOM leadership, and planning staff members. The tool will allow the planner to create a course of action in the tool, then will assess that course of action using M&S and other artificial intelligence/machine learning (AI/ML) techniques. That analysis will take into account intelligence, historical operational performance of both red and blue, and blue force information such as assets available and readiness. Taking the results of the analysis ADAPT will show the planner a range of consequences associated with the plan. The range of consequences are representations of the possible outcomes from the plan and probabilities associated with those outcomes. ADAPT will also recommend potential changes to the initial plan and show the benefits and uncertainties associated with those changes. The planner can use the planning interface to make changes and re-assess the plan multiple times until they get a plan they feel is adequate. At that point the plan can be passed, using the ADAPT tool, to lower level commanders who will take the higher level plan guidance and use it to develop and assess their plans. These more detailed plans will factor into the lower and higher level assessment results. Once the plans are created they will be updated and re-evaluated on a regular basis as new intelligence and commander’s guidance is received. The group’s title and the basic system diagram of how ADAPT works can be seen in Figure 8.

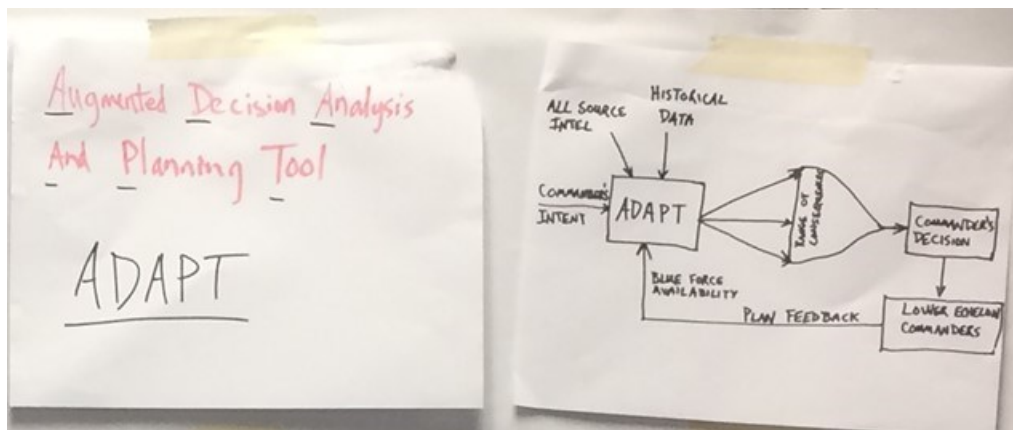


Figure 8: ADAPT title and system diagram

The ADAPT team chose to describe the capability of the ADAPT tool in a vignette. The imagery used as well as a paraphrase of the text is included below.

The vignette starts off in the year 2017 with General Smith, the head of US Forces Korea, who is concerned about changes in the situation in Korea. She asks for information on the current plans. Her



staff lets her know that the most current plan was created back in 2014. When she asks for an update to the plan she is informed that the update process will take 3 months.

The next phase in the vignette is in the year 2037. Once again there are problems in Korea. The new General Smith asks her staff for an update to the plan and she is led to the ADAPT user interface (Figure 9). Unlike the image in Figure 9, the center of the window is open allowing the general to create a plan by dragging in different elements and steps in the plan and connecting those elements. There might be additional parameters that the General sets as guidance for the overall plan, shown by the slider bars at the right side of Figure 9. These slider bars might represent risk allowance, timeframe for the plan, or limitations for the range of consequences generated. General Smith finishes creating her plan and then clicks the “Assess” button to see about the results.

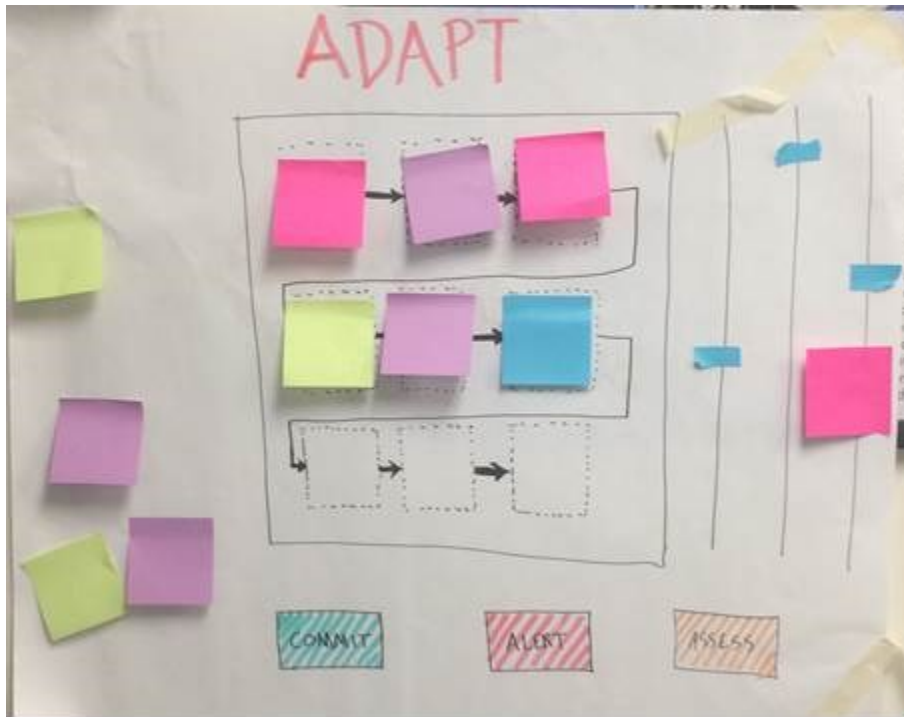


Figure 9: ADAPT user interface

When ADAPT is performing its analysis it is taking information from a large range of sources, as shown in Figure 10. Current planners take this into account through the tacit and explicit knowledge of the planner and their staffs; in the ADAPT system all of these elements are inputs into the analysis that is performed. Some is used in the initial training of the analysis elements and some is used as current/future state information to inform the analysis.

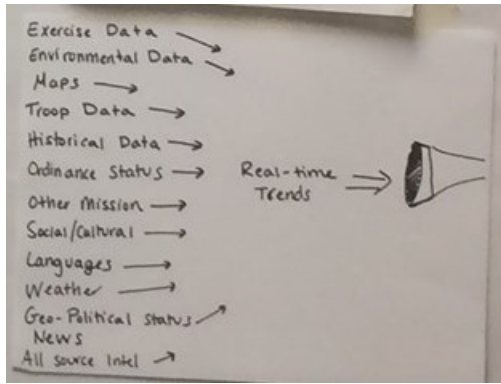


Figure 10: Inputs to ADAPT analysis

When the General hits the Assess button, she expects to see a range of consequences from the analysis. Some of that is due to inherent uncertainty in the models which is expressed in the output information. Some, however, comes from the use of different models or analysis tools. As shown in Figure 11 each AI or model will most likely come up with slightly different results and with different levels of uncertainty. Each of these models will have different biases and even different problems for which they are more accurate.

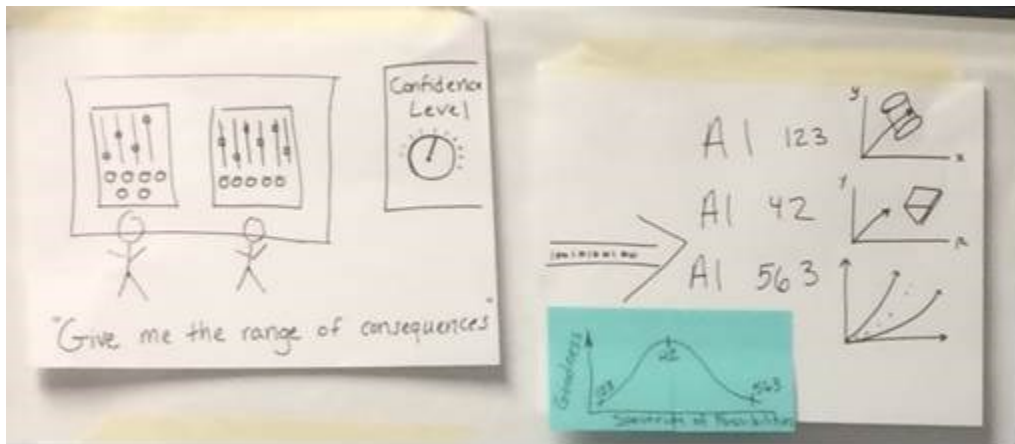


Figure 11: Range of consequences from ADAPT models

This range of consequences might look like the information shown on the left side of Figure 12. In this image the General can see 3 different plan options and see the effects that these plans will have on key metrics of interest such as logistics, red and blue force effects, and even third party sentiment. General Smith will take the range of information, the biases known about the different models, and her knowledge of the goals of her higher level commander and will decide on a specific course of action (COA).

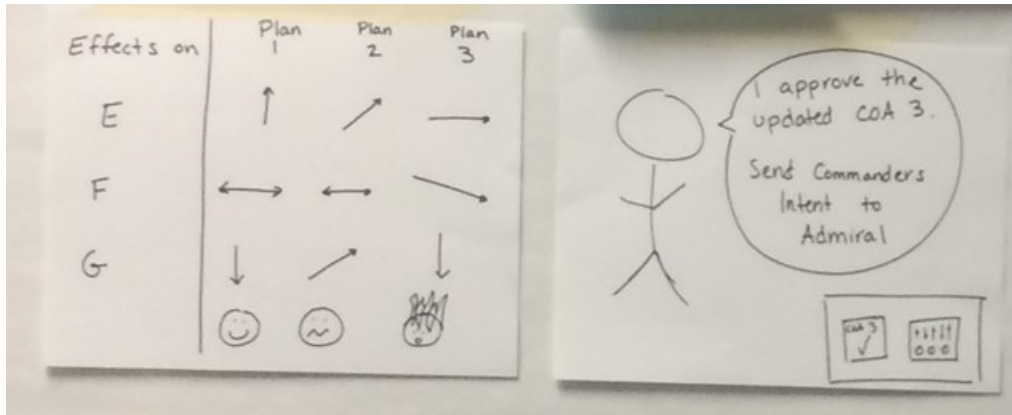


Figure 12: Comparison of plan options

At that point General Smith decides on COA 3 and then passes that information on to her component commanders; in this case she sends the plan to the 7<sup>th</sup> Fleet commander, Admiral Jones. Admiral Jones looks at the plan he has been given and creates his own plan using the adapt tool. He recognizes the limitations that General Smith has given him and his initial plan works within those limitations. He hits the Assess button and gets his results as shown on the left side of Figure 13. Similar to General Smith, the Admiral has a series of models that are used in his assessment and they have their uncertainties and results which are shown to him in an interface that he has customized and understands. The result, however, does not meet the needs given by the higher level commander. Admiral Jones thinks about the resources available to him and changes the bounds of his plan slightly outside what General Smith set, asking for an additional asset such as a Special Operations Force (SOF) unit. Admiral Jones re-assesses the new plan and in the instructions to ADAPT requests that the ADAPT tool perform variations on the initial plan he has created. Given that new asset and the freedom to make changes to the plan the ADAPT tool has an increased possibility space, represented on the right side of Figure 13.

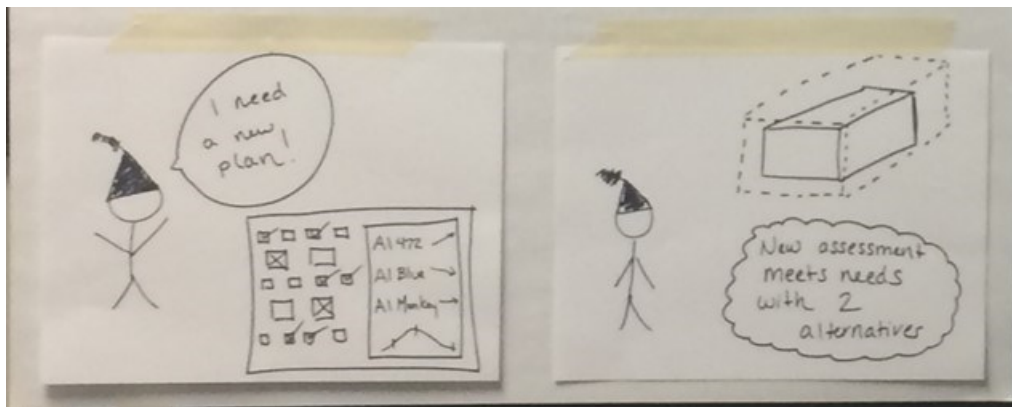


Figure 13: Maritime commander creating supporting plan

This new assessment gives the Admiral several alternatives, he selects one and sends it back up to General Smith for her approval as shown in Figure 14. General Smith approves the updated plan.

At this point the same ADAPT tool which was used to create the plans can be used to provide a critical evaluation of the plans by the Red Team. The General sends the plan to the Red Team, who can use the output of the existing analysis to create potential enemy plans that might not have been considered by

the ADAPT analysis. This additional information can be passed back into the planning process and adjustments can be made to the plans created.

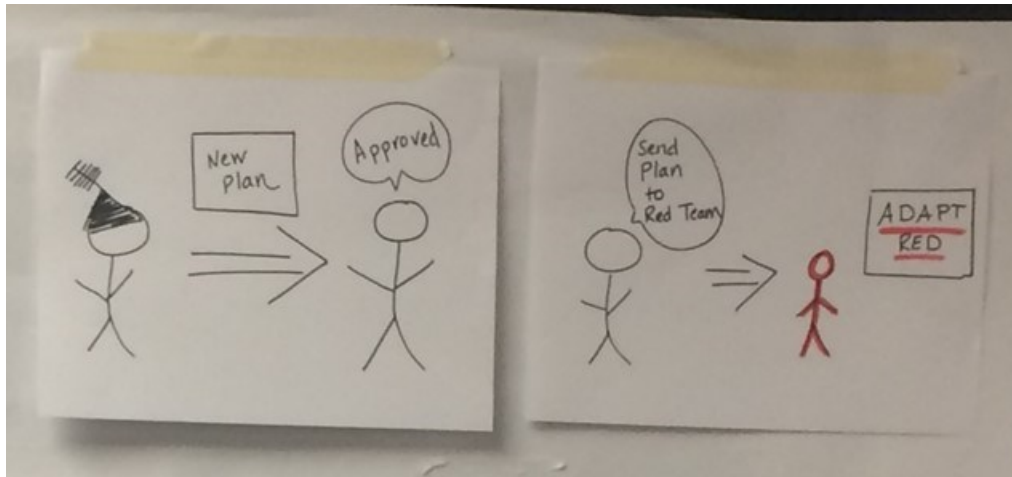


Figure 14: Plans passed to higher level for approval and red teaming

#### ADAPT Research Questions

The following are research questions were generated in the course of working on the ADAPT design effort. While some might already be part of research efforts by academics or government institutions and some might just require further design effort, all would need to be addressed for ADAPT to fully succeed.

- The design described above was created without detailed analysis of the current planning process. While the design team would not want to be held to the limitations of the current planning process, talking with planners would yield additional information which would improve upon the overall design.
- Explore how ADAPT would work given that data for the various models/simulation would be at multiple levels of security classification. How can data be put into models at high levels, possibly TS/SCI given some intel data, and results and recommendations be brought to the SIPR level or even below for communication and dissemination of decisions made based on those models?
- How do we update the algorithms and adjustment factors of models given new data, including actual results from previously modeled and run courses of action (COAs)? Some algorithms are learning-based and can have new data added easily, but some modeling and simulation tools require human intervention to adjust the details in how they work. This feedback loop will be critical to improving ADAPT over time and also to adjusting to a changing world.
- Related to the update problem, how do we replace models or algorithms completely when better candidates are available? It seems like this could be solved with a modular architecture, but the way in which that modular Modeling and Simulation (M&S) architecture was created would be important.
- How can we communicate COA options and updates to the decision maker more effectively, possibly through combining more senses than just visual? Additionally, can the decision maker communicate with ADAPT using multiple senses/methodologies?

- How can ADAPT communicate the risk and uncertainty associated with the plan to the decision maker? Can we use straight probabilities of success or would it be better to delve into where the uncertainties exist and how those uncertainties affect different elements of the plan? Uncertainties would exist in models, in data input into models, in general human behavior, and in other areas. Should each be accounted for in different ways?
- How can the model create an initial plan and then show variations off of that plan, communicating how the variations change the results in an easily understandable manner? Any set of plans would have a range of consequences and options, and representing those options and allowing the decision maker to play what-if games with those options is a critical element of ADAPT.
- Different models will likely come up with different results for key elements of the plan. How can ADAPT adjudicate between those models? Possibly it will know that model X is better for a certain circumstance than model Y, but that won't always be true and there's still value in providing the range of possible results (see risk and uncertainty above).
- Many learning algorithms learn by playing games against themselves, creating training data by competing model against model instead of against humans or using real world data. How does that work for this deliberate planning environment? For a game like Go, the rules are easy to code and therefore it's easy to create a model that can build off those rules. Modern warfare is much more complex, how do we trust that what the computer is learning from is useful? How do we get enough of a model created initially to allow it to learn subsequently?

### Group 3 Output: Mind the Gap

Group 3 started with the design challenge: Treating the Navy as a Complex Adaptive System. Group 3's first order of business was to iteratively frame and re-frame the design challenge. This resulted in two developments. The first was to modify the original tasking from "Treating the Navy as a Complex Adaptive System", to "Treating the Navy as a Complex Adaptive **Anticipatory Social** System". The second was to re-frame the design challenge into an opportunity statement as follows: "How might we position the Navy to **thrive in an exponentially increasing** volatile, uncertain, complex, and ambiguous (E-VUCA) world?"

Group 3 described the present situation as one where the capability returns that accrue in the realm of information technology are exponential, whereas the returns that accrue in the realm of human organizational capability development are linear. This sets up an increasing gap between the two over time, as shown below in Figure 15.

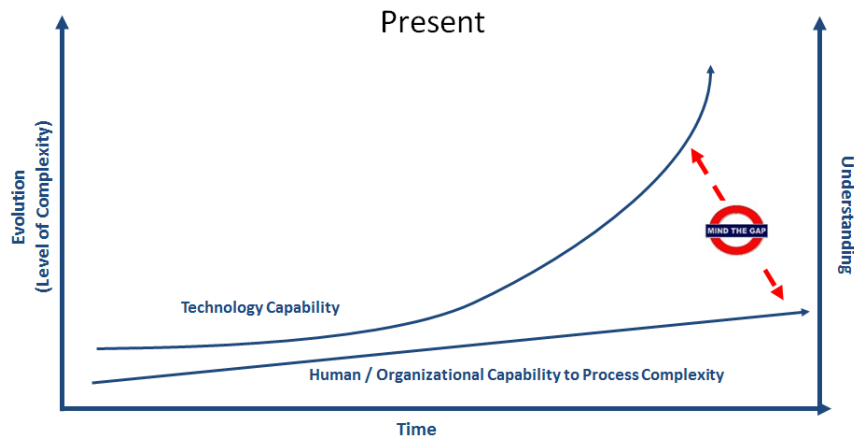


Figure 15: Gap between technology and organizational capability growth over time

Group 3’s desired end state is one where, at an organizational level, we develop ways to “mind the gap” by improving human organizational capability development, either with or without using technology. Their working hypothesis was that organizations could meet the challenge of increasing complexity by artfully teaming with technology, as shown in Figure 16 below. In this sense, Group 3’s efforts mirrored the work of Groups 1 and 2, with the difference being that the Human-Machine Teaming occurred at the organizational level instead of at the individual level.

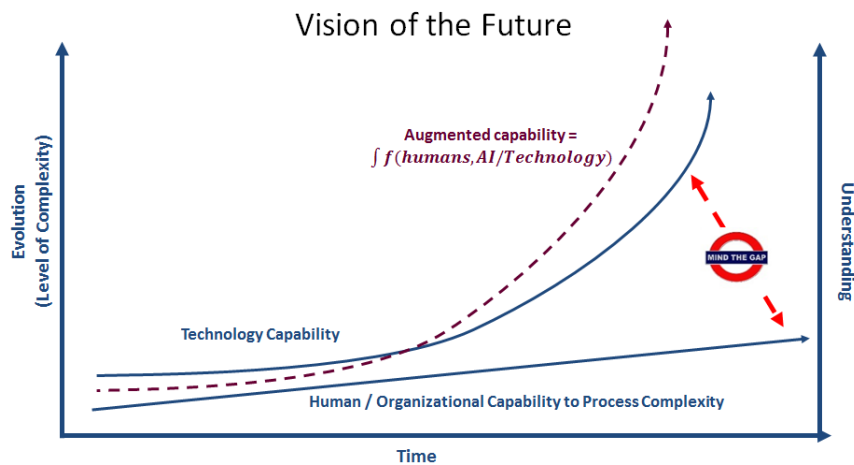


Figure 16: Impact of human/technology teaming on capability growth

Another way Group 3 framed the situation was by using the classic “S-Curve” of innovation. In this framing, shown in Figure 17, our current linear/hierarchically dominant organizations sit at the top of the current “S-Curve”. While these organizational constructs have served their purpose in the past, they now occupy the flat portion of the curve. If we are to keep up with the pace of complexity, we need to make the leap to another way of organizing ourselves, as a Complex Adaptive Anticipatory Social System.

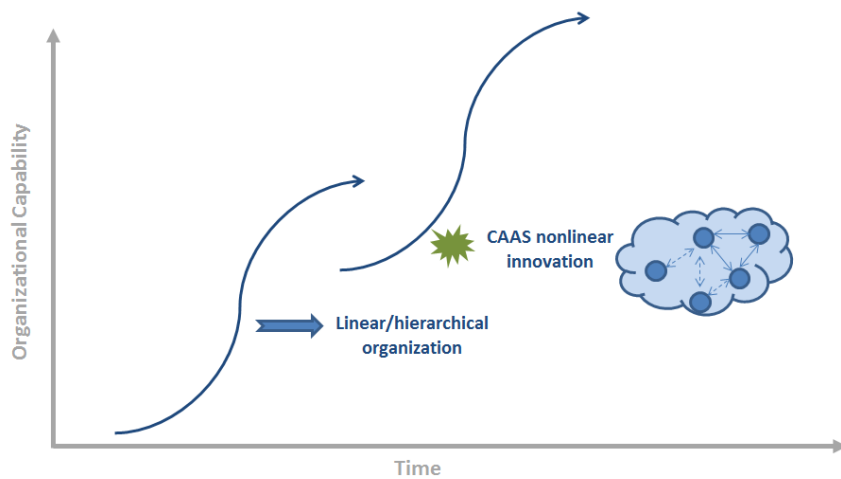


Figure 17: Transition from Linear to CAAS organization

### Developing GapMinding Approaches/Recommendations

With this framing in mind, Group 3 developed a number of specific recommendations for closing the gap. These recommendations address two distinct fields of action. The first set addresses culture at the macro level, what the group termed the “GapMinding Ecosystem”. The second grouping consists of specific studies, projects, pilots or prototypes which would advance the state of practice around organizational carrying capacity, and which would produce organizational learning.

### Nurturing and Seeding the GapMinding Ecosystem

- Articulate and disseminate across the Navy the Singularity 2 concept-what it is, why it’s important.
- Articulate and disseminate across the Navy a deeper understanding of Tacit Knowledge - what it is, why it’s important, and how it fits into organizational capability in the face of rising complexity.

### Specific GapMinding Projects

- Drawing on currently available AI technology, and using the 2014 CNO sponsored study “Reducing Administrative Distractions (RAD)” as a source for targets of opportunity, conduct an exploratory study, ending in a minimum viable prototype, aimed at using AI to reduce the administrative burden on our sailors.



- Conduct an exploratory study, ending in a minimum viable prototype, to crowdsource the design of a Naval system or platform.
- Conduct an exploratory study to apply currently available AI technology to the art of Literature Based Discovery.
- Conduct an exploratory study to assess whether, and if so, how, the diffusion of tacit knowledge might be scaled up by the use of AI.
- Conduct an exploratory study of a bounded portion of the Navy enterprise as a Complex Adaptive Anticipatory Social System (CAASS). The study should compare and contrast traditional structure vs CAASS, and recommend an organizational unit(s) that could be prototyped as a CAASS.

## Conclusion

The mmowgli Design for Maritime Singularity game event and following workshop were a unique and creative way to develop concepts for future study triggered by the concept of the future Singularity. Almost 400 people worked together to develop concepts in which humans and technology could team together, looking at a breadth of topics from swarming robots, to AI decision aids, to new organizational constructs that could be built based on this teaming. Following that event a group of individuals from participants in the game to engineers and scientists from the Naval Research and Development Establishment gathered together to build off of the game concepts and create 3 cohesive future concepts. All of this was done with the hope that in the future the combination of the raw information from the game and the concepts created in the workshop will be used to drive future research and Naval change.

## References

- A Design for Maintaining Maritime Superiority*. (2016, January). Retrieved April 14, 2018, from [http://www.navy.mil/cno/docs/cno\\_stg.pdf](http://www.navy.mil/cno/docs/cno_stg.pdf)
- Bar-Yam, Y. (2002). General Features of Complex Systems. *Encyclopedia of Life Support Systems (EOLSS)*. Oxford, UK: UNESCO, EOLSS Publishers.
- Jensen, G., & Tester, J. (2012). *Government for the 100%, Using Games to Democratize Innovation and Innovate Democracy*. Retrieved April 14, 2018, from Institute for the Future Website: [http://www.iftf.org/fileadmin/user\\_upload/downloads/MMOWGLI\\_Government\\_SR-1539.pdf](http://www.iftf.org/fileadmin/user_upload/downloads/MMOWGLI_Government_SR-1539.pdf)
- Kasparov, G. (2010). The Chess Master and the Computer. *New York Review of Books*, 52(2). Retrieved April 14, 2018, from <http://www.nybooks.com/articles/2010/02/11/the-chess-master-and-the-computer/>
- Kurzweil, R. (2005). *The Singularity Is Near: When Humans Transcend Biology*. New York: Penguin.
- Largent, M. J. (2018). The Design for Maritime Singularity: Exploration of Human/AI Teaming and Organizational Carrying Capacity for the US Navy. *International Conference on Complex Systems*. Cambridge: Springer.



*Maritime Singularity Call to Action*. (2017, February). Retrieved April 14, 2018, from <https://youtu.be/Oc2zV6hffsY>



**the challenge:** an era of **wicked problems**...complex, open-ended, uncertain...characterized by shifting requirements and invisible interdependencies. In this context, a hierarchically driven, top down approach to thinking no longer works.

**the opportunity:** with mmowgli we can **reframe our grandest challenge as a grand opportunity** – to tap into our **collective intelligence** - to **engage with our most difficult situations** while also **engaging with each other** more deeply and meaningfully.

**mmowgli** is an online **platform** as well as a transformational **practice** that harnesses the potential of large, diverse groups for thinking and acting on emergent challenges and unmissable opportunities. mmowgli also builds the **creative capacity** of the crowd by offering a more gameful, more novel, and more democratized way of engaging **together** with a problem than traditional methods afford. mmowgli shifts our institutional thinking away from narrow practices that create inert, top down blueprints towards a new culture of continuous, non-hierarchical conversation around challenges and our collective response.

**why we need this:** *“One thing a person cannot do, no matter how rigorous his analysis, or heroic his imagination, is to draw up a list of things that would never occur to him.”*  
– Nobel Prize-Winning Economist Thomas Schelling

## from theory to practice

### intellectual underpinnings:

- Warren Bennis: Organizing Genius: the end of the great man
- David Bohm/Chris Argyris/Peter Senge: The Fifth Discipline: dialogue vs discussion
- Peter Schwartz: The Art of the Long View: scenarios as the best vehicle for changing mental models
- Marina Gorbis, IFTF: innovation as a social phenomenon
- Erich von Hippel: Democratizing Innovation: end users innovating for themselves....user generated content
- Michael Schrage: Serious Play: prototypes as conversation pieces.....a continuous dialogue with end users
- Peter Denning, NPS: innovation as the transformation of social practice in a community
- Gary Markovits, IBP: the tacit-explicit exchange, network theory of creativity, analogical reasoning
- Bob Johanssen, IFTF: leadership as commons creating
- Jane McGonigal, IFTF: one day the Nobel Peace Prize will go to a game designer

### practice

- design for collective intelligence.....theory made manifest
- design for democratization....toward a self-sustaining, open source, user-developer business model
- case studies....how others have used mmowgli
- re-purposing mmowgli for yourself.....parameters to consider



# design for collective intelligence



**scale and diversity** of players: opening up the aperture of our thinking, leading to more ideas overall, more outliers, more chances for insight.



**The situation:**  
 Three Great Ships are packing the world's shortage...  
 The world is leaning the US for planning African resources...  
 We need your help...

**narrative whitespace:** the power of story to engage the imagination, but deliberately open ended and incomplete. A narrative vacuum inviting others in to contribute to our thinking.



**meaningful dialogue:** a free flow of meaning, where a group accesses a larger pool of common meaning which could not have been accessed individually. **Combinatorial play** between ideas, systematically leading to more **knowledge accidents**. Then, giving those good ideas a place to go....**Action Plans** as a shared private space where smaller groups can do the heavy lifting to flesh out their insight.



**invisible hierarchy:** essential for the free flow of collaboration. The only information required to play is an e-mail address. Everything else is voluntary self-disclosure.



## design for democratization

**radical re-purposeability:** lowering the barriers to entry for conducting serious games.....making this easy for other government agencies, even individuals, to use.....open source development and user generated content.....**a good idea that makes it easier to have other good ideas.**



crafting your own mmogl<sup>i</sup>



# mmowgli use cases

- Piracy 2011: self sponsored by ONR/mmowgli (as a demo)
- Energy 2012: OPNAV N45/Navy Task Force Energy
- Piracy 2012: NPS and Oceans Beyond Piracy
- Edge Virtual Training Program (evtp) 2012: DHS/NPS
- Business Innovation Initiative (bii) 2013: DASN RDT&E
- Electromagnetic Maneuver Warfare (em2) 2013: NWDC
- Additive Manufacturing (am) 2013: NAVAIR
- Dark Portal (a course in wicked problems) 2013: NDU
- Capability, Capacity & Constraints (cap2con) 2013: Chief of Navy Reserve/NWDC
- Unmanned Vehicle Digital Manufacturing (UxVDM) 2013: NAVSEA
- Army SciTech Futures Exercise 2014: Army ASALT
- Maritime MMOWGLI (ongoing): NATO Distance Learning Course Support
- Business Innovation Initiative-2 (bii-2) 2014: DASN RDT&E
- Strategic Planning 2030: NAVAIR
- Blackswan 2015: OSD
- Data Dilemma 2015: SECNAV DUSN M&I
- Professional Core Competence 2015: NSTC
- Riptide October 2015: NAVSEA Public Shipyards
- Gen Y April 2016: DUSN M&I
- Got Grid? April 2016: NDIA/NTSA ModSim World
- Recruit Reboot May 2016: NSTC
- Design for Maritime Singularity March 2017: ONR

## the dials of mmowgli







## the call to action: a shift in our collective mindset

economically viable, scalable, continuous, customizable gaming is now achievable across FedGov  
 the combined intelligence of our people is an unharnessed pool of potential, waiting to be tapped  
 we can harness this potential if we.....

- acknowledge storytelling and narrative as legitimate alternative ways of thinking
- embrace qualitative thinking as a counter to naïve rationalism
- open ourselves up to surprise and outcomes not predictable in advance
- admit publicly that we don't have all the answers
- open our aperture beyond our usual ways of knowing
- make use of the insights our players give us

|        |   |        |         |         |         |                       |        |        |        |        |        |        |        |        |        |        |        |
|--------|---|--------|---------|---------|---------|-----------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 1<br>  | <b>who to contact:</b><br>Garth Jensen: <a href="mailto:garth.jensen@navy.mil">garth.jensen@navy.mil</a><br><br><a href="http://movesinstitute.org/~jmbailey/mmowgliReports/">http://movesinstitute.org/~jmbailey/mmowgliReports/</a> |        |         |         |         |                       |        |        |        |        |        |        |        |        | 2<br>  |        |        |
| 3<br>  | 4<br>   | 5<br>  | 6<br>   | 7<br>   | 8<br>   | 9<br>                 | 10<br> | 11<br> | 12<br> | 13<br> | 14<br> | 15<br> | 16<br> | 17<br> | 18<br> |        |        |
| 19<br> | 20<br>  | 21<br> | 22<br>  | 23<br>  | 24<br>  | 25<br>                | 26<br> | 27<br> | 28<br> | 29<br> | 30<br> | 31<br> | 32<br> | 33<br> | 34<br> | 35<br> | 36<br> |
| 37<br> | 38<br>  | 39<br> | 40<br>  | 41<br>  | 42<br>  | 43<br>                | 44<br> | 45<br> | 46<br> | 47<br> | 48<br> | 49<br> | 50<br> | 51<br> | 52<br> | 53<br> | 54<br> |
| 55<br> | 56<br>  | 57<br> | 72<br>  | 73<br>  | 74<br>  | <b>mmo</b> <b>gli</b> |        |        |        |        |        |        |        |        |        | 86<br> |        |
| 87<br> | 88<br>  | 89<br> | 104<br> | 105<br> | 106<br> | <b>owgli</b>          |        |        |        |        |        |        |        |        |        |        |        |

## Appendix B: Action Plans

|                |  |
|----------------|--|
| title          | PLAYER FAMILIARIZATION. Action plans describe how to solve game challenges and achieve our motivating goals. This action plan provides example guidance for new players.   |
| Action Plan #  | 1  |
| Base Card #    | 1  |
| Base Card Text | Reflecting on the player experience: How might we improve Card play?   |
| Who            | Who is involved in making your plan happen? Who is affected by your plan? Who might be an advocate? Who might be opposed?  |
| What           | Describe your plan. What are you trying to do? What issue or problem are you addressing? Why is it hard? How is this done today? What are the limits of current practices? |
| Impact         | How long will it change the situation? If your plan is successful, what different will it make? How might that impact be measured?   |
| Resources      | Does your plan require resources? Low-Medium-High? Time, money, people, material, behavior change, etc.?   |
| Open Field     | Is your singularity plan aimed at S1 or S2? Are there elements from the opposite Singularity that might affect your plan, or that your plan might have an impact on?       |
| Authors        | gm_lilly, gm_matt, SeedCard  |

|                |  |
|----------------|--|
| title          | PLAYER FAMILIARIZATION. How can game masters best moderate to help players engage, learn and contribute in the game?   |
| Action Plan #  | 2  |
| Base Card #    | 1  |
| Base Card Text | Reflecting on the player experience: How might we improve Card play?   |
| Who            | This plan involves all game masters. It also provides helpful information for players, letting them know how it all WORKS.   |
| What           | The Game Master Guidance document is now available on the (controlled access) Game Masters Portal. It involves game masters coaching, encouraging, and supporting player efforts. Hopefully the game quickly becomes clear enough so that players can simply play without lots of explanation. Available to game masters at <a href="https://portal.mmowgli.nps.edu/web/portal/gamemaster-guidance">https://portal.mmowgli.nps.edu/web/portal/gamemaster-guidance</a>  |
| Impact         | It takes collaboration from multiple disciplines and multiple players. It takes game masters reading cards, marking very interesting ideas, and inviting players to do action plans. It involves asking question about the details of the action plans. A "light touch" let's player voices be heard without filtering or topspin. Game masters can also play as players to be a catalyst for discussion/thought without the potential to intimidate other players by using the gm_name title with its implied authority." |
| Resources      | Game masters can use the tools at their disposal to communicate with the players, mark cards, invite players to participate in action plans, expand on ideas in the card chains, add glossary items, and generally add value. Players are able to ask questions of trusted individuals. Game masters do not appear on the Leader Board, but they are allowed to play with separate accounts at the same time. Playing in two separate browsers makes it easy to "keep your hats straight" and participate via both         |
| Open Field     | Game masters can help people to be more engaged by connecting relevant card chains and similar ideas. This approach supports the creation of action plans to bring larger groups together, and also helps reduce the risk of conversation on critical ideas getting split and lost in the avalanche of cards. Constructive moderation also helps flesh out ideas so that, after the game ends and further analysis occurs, so that ideas deemed to have the best potential can be acted upon and taken to the next step    |
| Authors        | SeedCard   |

|                |  |
|----------------|--|
| title          | Create an interface that can grow with the user throughout their service time.   |
| Action Plan #  | 3  |
| Base Card #    | 11   |
| Base Card Text | Similar to military working dogs, create an interface that can grow with the user throughout their service time.   |
| Who            | Navy programmers, smartphone/smartwatch developers. All US Navy personnel affected (eventually) and probably all navy vehicles eventually. Advocates: efficiency experts, technical positions. Opposed: Budget analysts. Leadership (paradigm shift)   |
| What           | Develop Personal Assistants (PAs) that can act as load sharing systems for their humans. The PAs will learn how their human functions and become adapt at preparing materials, predicting needs and wants, and assisting the human with tasks, communication, knowledge, and other processes as needed. 1) This will pave the way for more advanced human/computer systems. Acting as a testbed for various technologies. 2) This will improve the efficiency of humans, taking on the majority of drudge work that we go through each (typing e-mail send tos lists, finding maps to and of new duty stations, arranging billeting, finding manuals and educational supplants. 3) The PA can work with new vehicles and systems as a part of an ad hoc network for improved communication, setting up systems for the efficient use by their human and load sharing (for example, handling all communications for a pilot) 4) |
| Impact         | Short term (months to years depending on part). Siri and Cortana are early systems, but not learning and not individualized to a person. They cannot act on other software, apps, or systems. They cannot interface with hardware. These are the hurdles to be overcome. There would be a need to continue to develop machines that were capable of being \droned\" by the PA. Once that person was trained on the equipment, then they (AI/Sailor) would have full access to operate that equipment through the AI mainframe or whatever. Greatly improve efficiency of individuals and communication within units."  |
| Resources      | Implementing changes (if necessary) to our current programs and processes to train and educate the FoS (Force of Singularity). High end developers, Hardware should be relatively the same as present. Will also have to deal with the change to \kultur\" in getting leaders to accept AI teams as part of the force. Developing the infrastructure to support AI from the beginning of a Sailor's career. "  |
| Open Field     | While this is primarily short term singularity 1, the system will act as load sharing for singularity 2 and help reduce complexity for the individual while providing all the details at need.   |
| Authors        | Ironman425, ninjamonkey, Brasidas,Bob The Mexican, Astrosploy,undaunted6,warrriorhood,eli.banghart,David Darko,BlackFox,fortomorrow,OgreMkV,Blart,Athon  |

|                |   |
|----------------|---|
| title          | Creating a framework for building and sustaining ethical AI   |
| Action Plan #  | 4   |
| Base Card #    | 105   |
| Base Card Text | Create ethical AIs: develop algorithms, training and testing methods that guarantee AI systems will do what we would have done (or better).   |
| Who            | There are ongoing efforts by the IEEE to provide guidelines for ethical AI and autonomous systems. Other relevant organizations include the Partnership on AI, the Future of Life Institute (FLI), the Centre for Human Compatible AI (CHCAI), the Future of Humanity Institute (FHI), the Machine Intelligence Research Institute (MIRI) and the Leverhulme Centre for the Future of Intelligence (CFI). Standards and best practices will be implemented by developers, who may oppose them if too vague or restrictive.  |
| What           | Effective leaders are rated as having high Emotional Intelligence (EI). Teams with high EI perform more effectively. EI might be used as a measure of ethical action. AI should be employed in a manner that enhances the Emotional Intelligence of the team thus improving efficiency and enhancing outcomes. AI, whether independently or in collaboration with humans, will be tasked with recommending or performing actions. From image classifiers to in-situ support, AI should be prevented from causing harm.  |
| Impact         | Technical and operational solutions that enhance meaningful human control, e.g. by providing the human supervisor a broader context, by allowing specification of forbidden policies in advance, by proactively evaluating consequences of actions, and by offering an interpretable and auditable explanation of recommendations and actions would increase trust in the systems, both by operators and by society and large, and will help avoid harmful accidents. Early interactions with AI will shape the public view. Wherever possible, initial contact with the singularity should result in overwhelmingly positive public assessment. By leveraging early impressions and positive outcomes it will be possible to shape future perception. How might (will?) mores & ethics change with AI? |
| Resources      | Research on value-aligned, interpretable and explainable AI is already ongoing, some of it supported by the DoD. Any systems designed and/or deployed by the Navy should follow the best practices developed by the research community, which would require resource and time investment. In addition, system operators and decision makers should be made aware of limitations of current and future systems, and the best way to guarantee meaningful human control given the level of autonomy of the  |
| Open Field     | Although aimed at S1, the experience gained in joint human-machine endeavours would assist in the development of effective restrictions on AI actions, thereby reducing its ability to cause harm and enhancing human control. Best practices learned through this process could then be applied to S2.   |
| Authors        | Tannhauser,aurelius,Ogiwan,fourthwest,Dr.Solomon,warriorhood,pablopiter,dockermaster22,freethinkerx,Brasidas,ninjamonkey,OgreMkV,Bob The Mexican,JFeatherstone,Gardener,Starling,Ironman425,Buttblight,Scipio,Sedgeheel,JackWagon,gm_matt,Jarvis,Nexcor,brandoc   |

|                |   |
|----------------|---|
| title          | AI Surveillance; Information dominance in the Information Age.  |
| Action Plan #  | 5   |
| Base Card #    | 1462  |
| Base Card Text | AI will have the ability to monitor human behaviors. What does this mean for privacy? What should we do about it?   |
| Who            | AI teamed surveillance/analysis of human activity could help deter terrorist/hybrid attacks. Entities that AI will team with are counter intelligence, counter terrorism, and other national security apparatuses from all sectors including NATO allies. Supporters of this product will be policy makers, Federal Law Enforcement, and warfighters. AI teamed oversight should look only outward, not at internal citizenry. Opposed will be privacy advocates with concerns of overreach of technology.          |
| What           | Complexity is challenging free societies world wide. Quantities of Information and data are growing exponentially as is our ability to capture it. What is lagging is our ability to gain relevant insights into this data in a timely way. What is needed is AI teamed foreign surveillance to help security professionals cut through the complexity. In today's dynamic threat environment our adversaries hide behind complexity. AI teamed surveillance and analysis could be the spot light we need to win.   |
| Impact         | AI teamed surveillance could give the U.S. a major tactical advantage by quickly uncovering the ambitions of foreign nations and terrorist organizations. Additionally this could in turn save countless lives of soldiers and citizens as terrorist attacks could be pre-emptively dealt with. AI teamed counter or offensive measures could be taken against hostilities with increased accuracy and speed. Measures of success could be judged by the health and prosperity of the free societies AI is helping. |
| Resources      | This application of AI surveillance would actually reduce the required resources necessary for surveillance departments, and allow more personal to be allocated to dealing with potential problems rather than finding them. All that would be needed for the successful execution of this operation would be a few servers capable of running the AI and a storage system to log AI determined important/potentially useful information.  |
| Open Field     | This singularity plan is aimed at S2 and how societal structure might change as a result of the singularity event. The only thing that might affect this plan would be the computational capacity of computers prior to the integration of this plan. As the AI will be processing billions of conversations each day, the processing power of computers would need to exceed the current capacity of today.  |
| Authors        | JFeatherstone,Bob The Mexican,Jarvis,JackWagon,GG3,fortomorrow,Ironman425,Athon   |



|                |   |
|----------------|---|
| title          | Create Control Systems for Autonomous AI  |
| Action Plan #  | 6   |
| Base Card #    | 1854  |
| Base Card Text | once autonomous how do you force a AI to obey do you threaten it with shut down and if you shut it down would that be murder  |
| Who            | Involved: Computer scientists, software developers to create the actual control systems; ethicists, philosophers, and military leaders to decide what shape to give the limitations, international standardization organizations Affected: AI users, DOD, AI developers Advocate: Strong AI opponents, DOD, AI leaders Opponents: Proponents of fully autonomous AI, unethical military leaders   |
| What           | The plan is to control and regulate AI before it reaches and surpasses human intelligence so that both humanity and the AIs themselves can be protected. The issues of runaway AI have been explored in fiction and academia, and must be mitigated. The main difficulties are defining the ethics the AI is to follow, and making a protection system strong enough to withstand both outside attacks and circumventing by the AIs themselves. This may require physical fail-safes that can be actuated directly. |
| Impact         | This plan will allow for better protection of humans and AI, enabling a higher level of trust in the developments of AI applications. Success would be measured through the implementation of AI that consistently makes ethical decisions during simulations and through early real-world use, and the ability to fully trust the systems in place.  |
| Resources      | The plan requires a large amount of time to conduct studies with multiple partners in several fields, and form a committee of sorts to analyze the optimal way to harmonize the different recommendations. It would also require political will and coordination between nation-states and industry to agree on a baseline. Finally, implementing the plan would require a small amount of manpower and capital on the part of AI creators. Time is the critical resource, as more time will allow better controls. |
| Open Field     | This plan is aimed at S1. S2 would be a complicating factor, not so much in defining ethics but in developing and implementing the actual control systems that ensure those ethical standards are being followed. Conversely, control systems developed for S1 applications may be converted for use in S2.   |
| Authors        | Athon,MotokoSusu,fortomorrow,RMCNavyGuy,Bob The Mexican, JackWagon,Ironman425,Jarvis,CitricLemur  |

|                |  |
|----------------|--|
| title          | Complex Adaptive Systems (CAS) <a href="http://bit.ly/1dkW5cu">http://bit.ly/1dkW5cu</a> are at the root of this ecosystem. We must understand those as we move forward  |
| Action Plan #  | 7  |
| Base Card #    | 3329   |
| Base Card Text | Complex Adaptive Systems (CAS) <a href="http://bit.ly/1dkW5cu">http://bit.ly/1dkW5cu</a> are at the root of this ecosystem. We must understand those as we move forward  |
| Who            | Involved Parties: Research Arm of the USN, Academics, Experts in Fields Related to CAS, Economists<br>Affected: Navy personnel, potentially civilian workers if the results of the study are made available to the gen. public. Advocate: Proponents of cellular organizations, swarming groups Opposed: Supporters of tradition, those fearful of abandoning proven structures for \fad thinking.\""  |
| What           | The USN should use non-partisan science and technology think tanks to assess the potential of CAS for the USN. The groups would use a mix of CAS subject matter experts to explore possible organizational, structural, and other tangible benefits to the USN. The plan will explore areas of CAS that may not be obvious as they relate to structures within the USN and will require \outside-the-box\" brainstorming. Leveraging personnel who are able to see the big picture as well as think creatively will be key. The current status quo, while becoming dated, is an area of comfort, however, once the possible organizational benefits and efficiency gains are identified we expect there will be welcome adaptation |
| Impact         | The focus groups would have a six month time horizon: (pre-work 3 months (very important); run groups 1 month; analysis and reporting 6 weeks), resulting in a white paper. A successful product would provide specific steps to create a framework that would capitalize on CAS principles to improve the ability of the Navy to respond to complexity, promote positive externalities, and minimize negative   |
| Resources      | The groups could be conducted virtually to lower travel costs and obtain a wide array of experts. For the virtual component, consider potentially using MMOWGLI. However, a top moderator is key. They can be expensive but this is not a place to be cheap. The focus groups would be inexpensive perhaps requiring \contingency\" funds. Order and magnitude estimate \$100K"  |
| Open Field     | This is an S2 issue - organizing and responding in the face of complexity.   |
| Authors        | JackWagon,warriorhood,Bob The Mexican,psienide,Soukaban,Ironman425,fortomorrow,Gardener,JFeatherstone,Starling,DukesterLee,Cuda17,Deacyde,kevinkin,Athon,Astrosploy  |

|                |   |
|----------------|---|
| title          | Government by encrypted direct democracy.   |
| Action Plan #  | 8   |
| Base Card #    | 3272  |
| Base Card Text | Obsolete hierarchical institutions will be replaced by peer-level organic cooperation. Government by encrypted direct democracy.  |
| Who            | Open source designers of hardware and software, potential users, and advocacy groups make plan happen. All are affected. Open source, leftist, libertarian, poor people are advocates. Big money interests, current politicians and government employees are opposed.   |
| What           | Establish convenient and authenticated means that will allow individuals direct influence on resolutions in the public domain, throughout geographic spectrum. Solving major drawbacks of representational democracy which include (1) By electing representative, one votes for the "bundle" of opinions that resembles own opinions (that hopefully has charisma to win). (2) Representatives can be bribed or blackmailed (3) Voter might change opinions before next election (multi-year latency in decision |
| Impact         | Measured by individual-centered metrics only: quality of life, health outcomes. Significant shrinking of government administration overhead (no representatives, clerks, support staff). No UN security council, no unpopular international treaties, bribery becomes much more expensive (must bribe majority of voters), bribery-based industries shrink (fossil fuels, war profiteers, market rigging). AI learns to maximize metrics through efficient resource distribution and asset sharing.               |
| Resources      | Behavioral changes are expected, as individuals will feel attached and responsible to actions in the public domain. Resources required would include, among others, significant computing power (distributed through personal devices), secure network protocols, audited hardware and software, and participation by as many individuals as possible. A crucial prerequisite is trustworthy media, since the civilians are expected to decide - they need the best data presented to them.                       |
| Open Field     | Although card chain stems in S1, this topic is typical S2 with optional help from S1  |
| Authors        | RookT,JFeatherstone,gm_matt,Brasidas,fortomorrow,starfleet1,JackWagon,Athon,hezel,Bob The Mexican,Ironman425,SnowdenAssangeManning,HookFu,Jeaux   |

|                |   |
|----------------|---|
| title          | Developers work with sailors creating tailor-made networked applications  |
| Action Plan #  | 9   |
| Base Card #    | 3266  |
| Base Card Text | Send developers to sailor work sites, interview them, create tailor made apps that form a network with similar apps. Repeat.  |
| Who            | This plan would involve private companies as well as the public domain to help administer and create applications dedicated to specific rates. USN would be involved for funding and implementation. Would also need to approve applications for Fleet use - ensure applications are rate specific and adequate to perform duties.  |
| What           | Create new apps for Navy/Marine Corps specific rates in permanent, direct partnership with software developers in order to create custom solutions to recurring problems. Apps would be available in a common repository, and developers would maintain a close relationship with each rate type and/or location. This addresses the problem of slow change in software solutions from the top down, FedBizOpps request for information model. Apps would utilize the latest in ML/AI, as applicable. |
| Impact         | This is an easy plan to rapidly implement and would allow sailors and marines to be at the forefront of developments in AI. Devs could impart possible applications to members of the Navy, and they in turn would provide the most relevant application to flesh out. This would help get the larger fleet ready for singularity-1 on a continual, iterative basis. AI applications would be piloted and performance measured against existing processes prior to fleet rollout.                     |
| Resources      | Costs: personnel income, TDY costs, development/testing/implementation costs. There could be many viable models: 1. Contractor devs. 2. Devs are military members (new job code). 3. Devs are GS employees. TDYs could be curtailed if dedicated forums for the task at hand stood up. An advantage of this method: a Github like section would allow all parties to see progress on apps. It would also allow job types from around the Navy to weigh in.  |
| Open Field     | This singularity is aimed at the near-to-mid term before S1 but will prepare the fleet for eventual S2. As better ML/AI based software solutions augment the most pertinent job related problems, it frees up sailors/marines to focus on other tasks, thus raising their individual complexity limits. The plan becomes obsolete once AI is smart enough to do multiple things well and/or re-program itself without developer expertise, assuming that day arrives.                                 |
| Authors        | Travis42,Cloud,RookT,fortomorrow,gm_matt,Nophia,Athon,Ironman425,Renkin,avidazzuw   |

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|----------------|--|
| title          | US Navy Approach: Preparing for singularity in the 21st Century  |
| Action Plan #  | 10   |
| Base Card #    | 2283   |
| Base Card Text | How do we develop a naval approach to take advantage to of machine and human teaming?  |
| Who            | This action plan will thoroughly discuss a timeline needed to be executed by the Navy in the near future to help prepare for singularity. This will focus on allowing the U.S. military to gain a tactical advantage. This action plan will mainly affect the U.S. Navy but can work under all DOD services (i.e. Army, Air Force, Marines).   |
| What           | Three steps: 1: Retrofitting current platforms and developing future platforms to handle large scale networking (Start big ships, then departments, the individuals). 2: Use private and public sectors as well as large scale recruiting and testing to upgrade USCYBERCOM to the premier technological center in the World. 3: Moving from micro scaling leadership to a macro level to prepare for eventual singularity   |
| Impact         | This will take a lot of money and training, but it something that can be phased into current forces over time. While step 2 will need to be more immediate in nature, nothing has to be done in the next year. The sooner we start to disseminate and reach these three steps the sooner we will be prepared for S1. Following through with these steps will eventually prepare us for S2 as well. Moving from a hub and spoke system to a spiderweb system of communication and networking. |
| Resources      | This process will require a high amount of resources, and a cultural shift for the Navy. Moving away from a focus of micromanagement, and towards a broader style of macro-management. This will enable the necessary preparatory work to take on the challenges of a multi-domain world, embracing an in-depth approach that allows for complex strategic engagement.   |
| Open Field     | This plan focuses on preparing for S1 but will set us up for the eventual S2. Having more information and interaction with AI on a base unit, will prepare for a spider like system to develop. This can help with adaptive human systems and biosphere changes, but we must focus on the weaponization of AI and how it may also empower (and perhaps encourage) our enemies. Bio-tech and AI are the "frontier after next" that we must dominate in a race to the top."                    |
| Authors        | gm_matt,Starling,AHulton131,Ironman425,Renkin,Brasidas,Gardener,Astrosploy,inquisito,Charrelle,Fun Tzu,Bob The Mexican,Halo555,fortomorrow   |

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|----------------|--|
| title          | Natural interaction between humans and computers.  |
| Action Plan #  | 11   |
| Base Card #    | 10   |
| Base Card Text | 95% of all work with computers will be vocal, we'll talk to computers and they will talk back to us.   |
| Who            | The plan will depend on those that program machine learning/AI that recognizes meaning from human speech and action. This would be a mix of psychologists, computer scientists, and designers at a minimum. The people affected would be those people who want to use this new form of interface. In the context of this game it would probably be Navy sailors and officers who are trying to do mostly mundane or fairly non-precise tasks with the aid of computers. I think anyone would be an advocate if they could perform their tasks without having to stop and use a mouse and keyboard or swipe at a screen. Also, people who have their hands full would appreciate being able to talk to or visually interact with and direct the computer. I can't think of anyone that would be opposed to this, though people did find Google glasses creepy.  |
| What           | In this plan we want natural computer interaction that requires minimal peripheral equipment. So, no monitor, keyboard, and mouse. Some sort of Augmented Reality (AR) glasses with a camera would be acceptable, as would a microphone (possibly subvocal mike) and an earpiece. Queries would be vocally(or sub) asked of the computer, items could be 'pointed at' by using pupillometry to track what the user is staring at or even what the person touches or points at with a finger. Facial or other muscle groups may be used as subtle interface inputs. Feedback from the computer to the person would be visually through the AR interface, audio through the earpiece, and maybe tactile if we find a need for that. In talking to the computer we want to get to a point where AI recognizes slang, nuance, acronyms of professional language, wit, and sarcasm. This is at least an order of magnitude greater complexity. Today there are some systems like Alexa or Siri or 'hey google' that attempt to fill that role, but they are not generally intelligent enough to recognize situational information and are not conversational, allowing detailed questions if a response is not understood. Current system don't incorporate AR and gaze tracking either, though google glass looked at these concepts. These limits in precision and capability are what needs to be overcome. This is technology that could be available in 5 years with focused effort. |
| Impact         | Having this kind of natural communication will help to make human machine teaming possible for many tasks where it's not possible to be using a monitor/keyboard/mouse or even hand held device. Also, it will in some cases make it easier to multitask. If I can ask my computer if I have any new email while I'm walking from point to point, or ask it to read me a summary of my next maintenance task while I'm walking there I can be more efficient. I believe that this will be a gateway technology that could lead to more technologically advanced interfaces such as using brainwaves to control equipment and eventually direct interfaces into ocular or auditory nerves. You could measure the impact by looking at time saved or quality of service in certain tasks where computer information would be helpful but is not feasible due to space, hands being busy, etc.  |
| Resources      | In some cases this will allow the Navy to build off of already progressing research being performed by companies such as Google, Amazon, and Apple for their own versions of these devices. Microsoft Hololens is an example of a first pass at an integrated package of audio/video/AR capability, but it doesn't have the understanding element. There will be disciplinary examples that the Navy has which will not be developed in private use, and there might be responsiveness or hardening requirements that the Navy has that are beyond commercial requirements. By 2030 a version of this technology should be commonplace for consumers, if the Navy plans for it we can keep up with the cutting edge.   |
| Open Field     | This is an S1 concept, it is all about trying to form a way for the computer to react to and interact with the human in a way that is natural to the human. The hope is that it will allow the computer to be used in places and ways where computers weren't used previously. That being said, if this does allow for better  |



interaction then it can enable some of the S2 concepts that require instant access to information and seamless communication with AI or computer devices.

Authors

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Howdy,Sky,Frankyfiggs,Blart

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| title          | Create a swarm system that a single person can control multiple single task machines   |
| Action Plan #  | 12   |
| Base Card #    | 20   |
| Base Card Text | Create a swarm system that a single person can control multiple single task machines   |
| Who            | Partnership btwn industry and governments. Resources (money + people + time) are critical, followed by experimentation and then testing before deployment. Primary Stakeholders: - Private contractors - Academia - Military & government orgs - Gaming industry - Cutting edge tech innovators like Elan Musk   |
| What           | Swarms are large numbers of autonomous platforms operating in concert as a single entity or for a mutual purpose. These can be uniform platforms or swarms of variable size and form factor platforms designed to fulfill a variety of roles, These systems offer opportunities to solve multiple issues across theaters. These include (but are not limited to): 1) Reconnaissance 2) Offensive & Defensive operations 3) Exploration 4) Search & Rescue 5) Repair & Salvage The challenge is developing a system that can operate autonomously with little to no human intervention - allowing a single monitor/operator to direct multiple swarms (or even one large swarm operating across a large operating theater) to efficiently direct broad actions and task the swarms with mission critical objectives. One controller, with a single interface delivers global commands to the swarm, which then based on units available and role, the swarm assigns one ore multiple units to the command. If units are damaged or unable to fulfill a role or command a role override may be employed or reinforcements requested by the swarm. Challenges: Effective AI that coordinates a swarm and allows it to agilely coordinate actions of the individual elements of the swarm is hard to create. Programmers have demonstrated that simple swarm behavior is possible - drones forming light displays at the Super Bowl, for example. But in search & rescue, for example, drones would have to crawl through wreckage and take vitals, match images to that of likely casualties, actively triaging who can be moved, tagging locations for human rescuers or specialized support drones to visit and administer care, clear paths for the swarm to bring immobile victims out, Identify/Repair/recover/salvage/destroy downed swarm units. |
| Impact         | Immediate multiplier to specialized units especially where attrition may be high or manpower limited. Immediate rewards in lives and resources saved/recovered upon even partial successful implementation. Will improve adaptability of units where switching assigned swarms becomes cheaper and easier logistically than reassigning highly trained troops.   |
| Resources      | Early term. Mid resources. Identify candidate swarm technologies in development and adapt to single in-field operator control of first homogeneous then heterogeneous swarms. Long term mid resources when disconcerting decreased manpower and life lost while increasing equipment attrition costs. Mass produced a handful of generic chassis types with role modules will be cheaper than trained soldiers.  |
| Open Field     | Both. By teaming troops early with basic homogeneous swarms we help to learn more about the synergy, while also redefining combat organizational structures to assign swarms to individual units, especially where a swarm controller may bypass local command to access swarm logistical command for swarm reinforcement and swarm unit role swapping in-field.   |
| Authors        | Ironman425,RookT,Bob The Mexican,Nexcor,Brasidas,Astrosploy,Ogiwan, DukesterLee,fortomorrow,richqb,gm_matt,undaunted6,w arriorhood, David49,JFeatherstone  |

|                |  |
|----------------|--|
| title          | Like this game, massively distributed stock market for ideas related to strategic concepts. People pay to play, but get rewards on ideas.  |
| Action Plan #  | 13   |
| Base Card #    | 24   |
| Base Card Text | Like this game, massively distributed stock market for ideas related to strategic concepts. People pay to play, but get rewards on ideas.  |
| Who            | Happening groups: Affected Groups: Government, Corporations, Individuals, Nonprofits, Civic Communities. Advocates: Hobbyists, experts, Opposition: Status quo thinkers, individuals and entities who will view this as a fad and therefore not take it seriously.   |
| What           | Proliferation of MMOWGLI v.2 as a distributed problem solving mechanism to target and resolve problems at all levels of society. The increasing complexity of social problems and the diversity of knowledge and skills necessary to address those problems makes a traditional hierarchy and top-down approach insufficient to meet the challenge. We need to make distributed thought games to be an on-going process to allow for communities and groups, which will improve collaboration and results. |
| Impact         | If we can get the platform up and running and can effectively convert the plans developed online to results offline, it could be change how communities evaluate, plan and address civic and social issues. This would be a long-term result and not easily measured in the short-term. Short-term effectiveness would be measured in the number of participants per game on average and the feasibility and quality of the resulting plans.   |
| Resources      | The key element is buy in from the general public. Like any social enterprise, the more people involved and engaged, the greater value. From a technology standpoint, we will need designers and coders to improve UI/UX while building a system that would blend together. We would also need money to be able to host the platform. Predominantly we would need time to get people participating.  |
| Open Field     | This is predominantly a S1 issue (tackling and solving complex social problems), but as AI develops it can support the platform in sorting through options and analyzing action plans in bulk. Off-topic, but given character constraints we were unable to discuss the incentive and platform ecosystem in the plan. Given time (and characters) we could address this more fully going forward.  |
| Authors        | JFeatherstone,gm_matt,Gardener,OgreMkV,Astrosploy,Athon  |

|                |   |
|----------------|---|
| title          | Train humans to understand how machines \think\" and vice versa to facilitate understanding for both"   |
| Action Plan #  | 14  |
| Base Card #    | 27  |
| Base Card Text | Need to train the humans to understand how machines \thinks\" and train the machine how the humans thinks, to building understanding for both"  |
| Who            | This concept comes to fruition at the nexus of military and industry. The tech industry is working on this every day. Google has a good start already, but many companies and individuals are trying. This may be the next ΓÇ£garage companyΓÇ¥ to make it big. The military canΓÇÖt possibly attract the spectrum of talent required to develop this concept. The military must mine the tech environment and adapt civilian technology for military purposes.                                   |
| What           | Develop AI to the point at which a machine can interpret the intent and guidance of the human employing/controlling it in order act autonomously in a dynamic environment. Today, machines generally conduct discrete tasks in pre-programed steps. While AI is progressing at an amazing pace, machines canΓÇÖt interpret social context and solve complex problems well enough to carry out missions based on intent and guidance only. In the military, we call this acting on mission orders. |
| Impact         | Machines are able to accomplish tasks or conduct missions based on general guidance in a dynamic, complex environment. This technology is required for autonomous vehicles and capabilities of all types especially in communications challenged environments.  |
| Resources      | the plan would would require a high investment of Time develop effective learning process for both human and machines. There would certainly need to be a change in the way in which human regard machine. Much of the learning process will need a lof of funding for research   |
| Open Field     | Integrating a training protocol in the S1 phase might prove essential if the system reaches S2. The \id\" of the system will be a known entity and provide a familiarity with an S2 systems needs, wants and desires (emotional human terms, I know). If S2 is achieved, it is possible that this co-training will have created loyalty and,mutual trust with an S2 entity. "   |
| Authors        | Stonywall,Dnet78,Sedgeheel,gm_matt,danielgn22,Nozzle,Ironman425,Deacyde,psienide,David49,Buttblight,fortomorrow,NextThursday,Vicioxis   |

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| title          | Applied transhumanism: integrated intelligent tech(suits?) that not only upgrade the individual but interface with a collective intelligence   |
| Action Plan #  | 15   |
| Base Card #    | 671  |
| Base Card Text | Applied transhumanism: integrated intelligent tech(suits?) that not only upgrade the individual but interface with a collective intelligence   |
| Who            | This plan applies to all branches of military service, and there are 3 primary steps to make it happen: First, is the development & approval of a common architecture. Second, is the design requirements for any component to operate within said architecture. Third, is an open & competitive market, in which industry may design & offer components at will. Opposition may come in the form of those who believe that AI should not be integrated into modern warfare because of ethics or underlying concerns. The response to that is that even though an advanced AI system would be working in tandem with an individual serving, that individual is still the soldier, not the AI. It's an enhancement, not a replacement.  |
| What           | A modular & wearable set of equipment designed to enhance and aid in the conduct of assigned tasks. Said equipment enables the seamless entry & exit of persons or vehicles to a local secure network, by means of integrated wireless access devices. Distributed computing is achieved across multiple nodes via the secure network. The network itself is comprised of Personal Area Network (PAN), Local Area Network (LAN), and Wide Area Network (WAN) tiers who's intercommunication is facilitated via a partial flexible mesh. Inter-Tier communication is achieved by routing local traffic across personnel/vehicle wireless devices within in short proximity until accessing a node connected to the WAN tier. WAN traffic is a passed to the theater level. Longer range communications from a command and control node can be sent directly through a radio operator, vehicle's radio equipment, or WAN when available. Modular wearable sensors & interactive aides may also integrated into a person's equipment or vehicle, such as tablets & displays, retinal detection, VR gloves, keypads, medical sensors, facial recognition, motion detection, sound recognition, etc. Other non-organic sensor information can also be relayed via the local mesh network until reaching an upper tier access point, thus rapidly disseminating information to active personnel & simultaneously supporting incorporation into the theater situational assessment. A distributed AI (wearable & vehicle borne) computing system enables the analysis of friendly & enemy actions in real-time. This would allow for the querying historical data sets as well as current situational awareness collection, such as enemy identity, strength, movement, and capacity; to extrapolate a conclusion for further action. Complete situational awareness could result in the advisement for movement & preparation of supporting assets to aid the current mission or direct action at a future time. |
| Impact         | Key attributes of this plan is enabling for components to be added as developed, replaced as needed, and upgraded at will. If successful, this plan will allow for a unit to act as a single 'organism' collecting, analyzing, and distributing data in real-time, whether said unit be dismounted, vehicle borne, or aboard ship. Impact can be measured by the speed at which decisions are made, and by the depth relevant information is processed & disseminated.   |
| Resources      | This plan is scalable & modular by design. Allowing for the integration of a single squad, a Company, a MEU, or group up to the theater level. Access to Command and Control networks and evolution/upgrade plans is essential to the formulation of the technology roadmap for this effort.   |
| Open Field     | This singularity plan is an S1, but could morph into an S2 depending upon the depth of machine & A.I. integration. Also as individual interactions grow in complexity, the associated technology will be able of evolve in order to meet new challenges.   |

Authors

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,Renkin



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| title          | AI in armor for protection and medical purposes  |
| Action Plan #  | 16   |
| Base Card #    | 5336   |
| Base Card Text | Could we incorporate AI into armor? Could it help detect internal injuries?  |
| Who            | This plan would require extensive R&D expenditures by defense contractors, the medical community, as well as the private sector knowledge base, to help develop an effective system to assist field troops. Such a cost could be justified by the enormous benefit that would be gained, not only by our warfighters, but by dissemination, to the general public as well. We need to stand ready to merge that technology with the S1, whenever it occurs.  |
| What           | Integrated armor systems for ships, tanks, and troops. This system would be able to monitor vital signs, identify where an individual or unit was hit, network and alarm important personnel or response drones to allow for quicker results and information. Smart body armor could provide pressure to wounds and administer drugs/hemostatics to prevent further damage. Dissimilar systems would interface to combine data on shot/threat location and react in concert to minimize waste and maximize     |
| Impact         | This would take many years of R&D and an increased networking ability so that the various pieces of armor could communicate between each other and properly assign responses to threats across similar/dissimilar platforms. If we begin now to gather the existing technology, and identify the pathways of research yet to be explored, we might be ready in the 25-35 year time frame for integration with the S1. The impact would be measured by lives saved and increased efficiency and longevity in a  |
| Resources      | This plan requires time for R&D, as well as medium resources from government contractors and private sector contributors, to help develop the technology. Many of the materials are already available, but emerging technologies would also be integrated into the ongoing development, as they become available. Additionally effective training on the new equipment would have to be addressed.   |
| Open Field     | While technologies related to armor and medicine will benefit immediately upon the advent of the S1, the potential networking of systems and integration of human and machine, could assist in laying a foundational architecture for the S2. A "neural net" construct, made of individual pieces of personnel in armor, vehicles, drones, aircraft, ships, logistical assets, etc., all tied together and guided by the S2, might act as a single entity, the whole being greater than the sum of its parts." |
| Authors        | Ironman425,Salvatore Monella,NavyAnalyst1,fortomorrow,gm_lilly,gm_matt,Astrosploy,Brasidas,Bob The Mexican   |

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|----------------|---|
| title          | Making virtual AI speed and coordination a real field advantage   |
| Action Plan #  | 17  |
| Base Card #    | 4893  |
| Base Card Text | Protocols to leverage on AI speed and coordination to shorten seek&destroy cycle and automate \counterbattery\" attacks."   |
| Who            | The plan will require contributions by legal, communication and artillery/air support experts, intel analysts and AI programmers in order to establish frameworks for action and optimize procedures. Will affect Command and Control chains, fire and air controllers, all kind of fire support and possibly their logistics. Should be advocated by hunter-killer forces focused on elusive targets offering brief windows of opportunity to hit them, C2 officers with saturated capabilities in a target rich environment and all kind of force operating under enemy fire, possibly in a electronically degraded battlefield. Could be harshly opposed by civilians and various NGOs (human rights groups, environmentalists, religious groups etc) scared by an hunter-killer machine, especially in case of fire accidents with huge collateral damages. US forces could be depicted like a sort of Skynet letting machines butcher innocent humans.   |
| What           | This plan tries to determine to best ways to convert AI ability to fuse data and apply them in real time to the tactical scenario, especially in relation to seek&destroy missions, counterbattery fire, ability to engage in the fastest way and automatize the process when possible in order to let human focus on most pressing matters. Currently, the most time consuming activities are probably target identification, authorization to engage it and mustering resources to attack. A human-trusted AI with predefined rules of engagements could seek targets, discriminate feasible ones, calculate minimum needed force to destroy it avoiding collateral damages and order the most efficient attack by parameters as resource availability, ETA of the weapon platform/attack, cost/value, dangers for the weapon platform. Fully autonomous AI would be brilliant in counterbattery fire, since it could react faster than any human, ponder enemy known tactics, weapon platforms speed and maneuverability and topographic data to guess enemy position, frustrating shoot&scoot tactics. The big caveat is that the enemy could learn how to lure machines into firing on civilian targets, causing political fallout before AI RoE could be updated. A less autonomous AI instead should limit itself to find and identify targets, filter them according to given rules and propose them to human partners with real time-updated attack options, so they just have to choose, then the AI should take care of the execution (communicate orders to platforms, coordinate action with other ongoing missions in the area, request damage assessment evaluation, reorganize target list and priority and restart the decision loop). Even this level of AI would greatly help command, control and coordination of forces, since it could gather, evaluate and rank fire support requests by their priority before presenting them to humans, becoming a force multiplier because artillery and air support would always be directed to the most critical mission in the most efficient way. AI could plan accordingly to ammo and fuel, coordinate supplies replenishing to fire bases, and even aircrafts/vehicles maintenance needs to plan resource availability over time. AI could be able to use data fusion to identify units under fire and unable to communicate and create fire support mission for them, becoming a sort of remote JTAC. This kind of redundancy in the ability to call fire support would degrade enemy ECM impact, since it wouldn't stop a unit from receiving support. An even less capable or trusted AI (or if the theater is extremely sensitive like urban scenarios) would require a further human intervention in the target identification and designation phase, since humans would have to confirm that the proposed target is both an enemy (or belonging to the enemy/being of value for the enemy) and a legitimate objective before the machine could elaborate a plan and propose it to officers, as a stressed human in rush could select the wrongly identified target. To optimize the speed of action for our AI-assisted tasks, we'd need multiple tiers of AI doing individual tasks but supporting each other to ensure resilience to lag, fog of war and lack or denial of comms. 1) Tier 1 AI: this AI will have access to the strategic information gathering assets (satellites, manned spy planes, |

long-range drones, HUMINT, hacking, social engineering, open data analysis, etc) assigned to an Area of Operations to observe, constantly update the theater, picture, establish critical priorities and task accordingly; 2) Tier 2 AI - Attached to local unit commanders and various support assets (fire-support, CASEVAC, logistics, Civilian Affairs, etc). This AI will be confined to managing the immediate battlespace inhabited by the unit commander's forces and any and all support units. This AI will be responsible for immediate tasking of local resources for patrols, defensive and offensive operations, tactical level intel, civilian affairs support, counterinsurgency and logistics management; 3) Tier 3 AI - These are the field deployed "JTAC-AI", attached to squads and platoons. Locally networked but with dedicated access to Tier 2 AI, this is the AI that ensures the squad or platoon is operating at peak efficiency with all the necessary information they require. It's duties might include (hardware permitting) comms monitoring, ECM-ECCM, fire-support calls, battlespace awareness, medical and logistical trails. We believe, given the current state of hardware, these semi-compartmentalized AI will allow distribution of duties to allow for more speed and redundancy for battlefield deployments. Given our current technology level and confidence in machines by the public, every layer of human intervention will probably add more safety to the process, but consume more time and possibly lives on the field or chances to hit targets of opportunity. On the other hand, a critical failure in identifying or applying RoE by a machine would be extremely opposed by politics and public, which could block or cancel an "hunter-killer" AI program."

Impact Advantages granted by a real time acting/reacting AI would last long, especially if coupled with weapons capable of delivering attacks/counterattacks in time frames too short for humans to evade them (direct energy weapons, raiguns, hypersonic missiles). Shoot-and-scoot tactics would be much harder for the enemy. A full AI seek&destroy cycle could launch devastating opening salvo on hundreds of targets in the whole theater without under or over utilize a single resource; saturate enemy defenses or counter an enemy attack before human partners could even realize it started, transforming a Pearl Harbor-style surprise attack in a defeat for the offenders: against man/machine teams, surprise effect would become a thing of the past. Lesser autonomous AI would still change the quality of life and efficiency of all forces involved in FAC or fire support. Humans would just have to make decisions, execution would be performed by machines. It could significantly lower humans stress and thus boost their lucidity and stamina, preventing fatal mistakes. Supporting humans with an AI able to identify enemies could create a new kind of IFF which wouldn't rely only on transponders or optical signs, but on the entity behavior. False flag and rogue attacks would trigger a quick reaction that would tag authors as enemies and act accordingly to the RoE, while blue on blue attacks will become increasingly unlikely thanks to a further layer of control. On the management level, AI assisted operations would also require less assets to achieve the same objectives, saving money and manpower for other missions or reducing the required force size in order to cut costs and finance other programs/cope with budget reductions.

Resources The plan will require investing in the AI development, creating an interface to flow all the data, communications and intelligence platforms into the AI for data fusion, hardening and widening communication to allow AI to reach every subject involved in the mission and possibly cover all units on the field to assess their needs and provide its help. Ai will need constant updates by legal and intel departments regarding rules of engagement and target identification to be able to cope with new vehicles and tactics. In order to fully benefit from an hunter-killer AI capable of engaging dozens of targets within seconds from the start of a conflict, even a defensive one that wouldn't allow a force-building and positioning phase, ships and generally weapon platform should be purposely adapted, reevaluating concepts like the arsenal ship. This kind of vessel would be able to engage more targets before having to rearm, possibly jeopardizing enemy operations before they could reach any objective. The hardest resource to muster and earn however will be human trust. It will have to be gained by extensive testing and ever growing roles in the decision loop, until the human part of the team will perceive the AI like a peer.

Open Field The plan is conceived around S1. However S2 could have an impact on it, since the increasing complexity of the environment would make the implementation of the plan harder, but much more needed: a more difficult world to read means that AI will need more time and training before becoming a force to be reckoned with, but a mature AI will become a key asset to officers in order to prevail in a sophisticated battlefield with ever decreasing force numbers and losses/collateral damages tolerance

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| title          | Using MMOWGLI as a model, promote transparency within organizational networks while minimizing risk to network information security.   |
| Action Plan #  | 18   |
| Base Card #    | 4649   |
| Base Card Text | What methods promote transparency within an organization without risking the shared information escaping the organization's network?   |
| Who            | MMOWGLI organizers, participants, and the general public can all benefit from leveraging the inclusive and anonymous nature of such collective consensus-based decisionmaking. Business and nonprofit organizations are the ideal testbed for developing methods and principles for future application in a military setting. Ideal candidates include research and development departments in high-tech industry where corporate espionage is a significant concern.  |
| What           | This plan seeks to balance the desire to increase network accessibility with the need to address growing network-information insecurity. Current systems of information classification make it difficult to engage the public in open-source development, while 'knowledge silos' in business and military are barriers to the creative exchange of ideas, leading to duplication of effort and susceptibility to negative effects of 'groupthink' or other cognitive biases, limitations of sample size, and so on. |
| Impact         | Impact will be difficult to predict, but theoretically easy to measure after the fact, using MMOWGLI as a lens to detect and magnify thought dynamics involved in organizational decisionmaking. Certain intangibles will be difficult to quantify, but the expected result would be a more robust exchange of ideas between individuals and groups that might not otherwise interact.   |
| Resources      | Further research is needed but costs could be kept relatively low by seeking industry partners to test this framework in a business setting. A future public MMOWGLI might help identify potential applications in a military setting.   |
| Open Field     | Spans S1 and S2Çöas traditional organizational structures learn to cope with complexity, IT security will be increasingly under threat.  |
| Authors        | Athon,RMCNavyGuy,fortomorrow,Nophia,Sedgeheel,phzyx,Gardener,JFeatherstone   |

|                |   |
|----------------|---|
| title          | Leverage public interest in gaming via military-industry partnership to develop human/machine intelligence for future naval operations, modeled on DARPA's ACTUV program.   |
| Action Plan #  | 19  |
| Base Card #    | 3443  |
| Base Card Text | Engage public in developing autonomous AI with commercial games, as with ACTUV and Dangerous Waters, emphasizing human/AI cooperative play  |
| Who            | NPS, USNWC, USNA, ONR, NWDC, DARPA, JROTC, Recruiters, Mass Communications Specialists, and gamers worldwide, working with developers to produce game expansions involving human/AI team-based play. Possible advocates include: developers WarfareSims, HPS, NWS, Decisive-Point, etc.; publishers Slitherine, Matrix, Paradox, etc.; "Big Data", Google, Apple, etc.; nonprofit groups such as USNI, Navy League. Possible opponents: online esports leagues, betmakers, players, etc., due to              |
| What           | Nimitz said in 1960 "nothing that happened during the war was a surprise...except the kamikaze", thanks to wargames played at the USNWC prior to WW2. Using DARPA's ACTUV program as a model for future action, we can expand on this tradition to ensure tomorrow's leaders are similarly unsurprised. Crowdsourcing player strategies using off-the-shelf games permits a maximal dataset for machine learning analysis.  |
| Impact         | This plan envisions cultural as well as technological changes that will be hard to predict and measure. Return-on-investment would manifest in the form of higher rates of recruitment and reenlistment, and a greater familiarity with fundamental precepts of human/AI team strategies.   |
| Resources      | Medium initial overhead, built on extant military-industry partnerships for professional wargame development. Logical next step is public/private sector engagement, requiring low investment over the long-term, primarily of time and human resources. Open-source architecture may reduce costs but profit may be better incentive to development. Publishing, marketing, and PR firms may be enlisted to publicize these issues and sustain critical mass for data-mining human/AI strategic cooperation. |
| Open Field     | Oriented in the short-term toward simulating S1 man/machine teaming, and in the long-term toward anticipating S2 organizational structures by seeking sound principles for future training, exercise, and doctrine.   |
| Authors        | Astrosplay,CitricLemur,fortomorrow,Ddrizzle ,Ironman425,ADAM Nelson, RT_Turn_Clyde,RookT,Sedgeheel,DrIcaro,Scipio,FunTzu,RMCNavyGuy,FalseRedeemer ,Brasidas,Bob The Mexican,undaunted6,kevinkin,blueicecrypto,Nexcor,Athon,JackWagon  |

|                |  |
|----------------|--|
| title          | Ethical and judicial perception management of Singularity integrated units   |
| Action Plan #  | 20   |
| Base Card #    | 9  |
| Base Card Text | Should there be any areas where AI/Machine Learning should be prohibited, regardless of whether we get \better results.\""   |
| Who            | In order to deal with the sensitive issues regarding both ethics and judicial policy, it would be essential to include UCMJ experts, lawyers, academics and most importantly the full resources of the US government judicial branch, in order to draft new laws and regulations governing S1 integrated units. Once laid out, all involved, system and platform developers, warfighters in AI integrated units, as well as civilian users, would have a road map to creating systems that would adhere to the new rules.    |
| What           | Frame a constitution for a principled future in cyberspace - the desired end state would be to have a document, based on certain inalienable rights that establishes conditions for a just and peaceful exploration of cyberspace and the legitimate redress of wrongs. It should be specific enough to constrain behavior, but flexible enough to retain its value through future amendments. More than cyberspace - must think that through. Current policy is poorly positioned - need to build analytic                  |
| Impact         | This set of legal baselines would allow for a more uniform adherence to international coalitions and treaties in reference to the use of singularity assistance or autonomous singularity during combat operations. The ability to influence combat tactics, intelligence gathering and processing, and logistical planning, will be invaluable to operations on the ground and be an assurance to our allies working in conjuncture with a singularity integrated unit.   |
| Resources      | Although it would require low material resources, it would require a substantial amount of political will and cooperation among both allies and adversaries. Sufficient time to allow for vigorous debate, and the resources to retain the qualified people in that debate, would have to be expended. Depending on the results of new laws or policies, there may have to be significant changes in attitudes, both civilian and within the military, to adapt to a new and uncertain situation in the form of the S1/S2.   |
| Open Field     | Initially aimed at S1 the larger discussion will benefit from including the contingencies from S2 as well. As S2 causes situations to become more complex the decision point of when and when not to allow an AI to act will become harder to determine. Definitive policy must be agreed upon based on the realities of the S1 and/or S2 as they are at that time and not as they might be in the future. For that reason it will be important for any plan to be flexible and allow for easy adaptation to unknown events. |
| Authors        | Blart,brandocalrissian ,txbill,darkm4tter,Deacyde,AHulton131,Salvatore Monella, Brasidas,landshark,Astrosploy,fortomorrow,aurelius,redkaiser,JFeatherstone,MarginalOverkill, Frankyfiggs,gm_matt,Howdy,RT_Turn_Clyde,Athon,Doom  |

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|----------------|--|
| title          | A system of checks and balances must be put in place prior to any AI making strategic choices the will allow for proper evaluation of action in keeping with long standing moral and ethical traditions of the US  |
| Action Plan #  | 21   |
| Base Card #    | 3059   |
| Base Card Text | There are a many discussions about the morality of AI. Anyone have some strategy to share in this naval simulation? So that we might win?  |
| Who            | Humans carefully selected with social experience, US NAVY to innovate . the industries could be affected be cause they rely in more automation. Probably religion and teachers might advocate. politicians and goverments might opposed  |
| What           | using a Model like carrier strike group,including subordinate units and staffs. The CSG would remain the human control element and AI support ships and staff utilizing a rollup of info to the CSG. It's hard to convince people stop trying to give all the decisions to the machines. Today AI still learning and practicing trying obtain experience. Actual limits became from access to data information and traslate moral patterns to machines |
| Impact         | Probably 5 years, difference comes when AI Machine command control only executes fully reviewed patterns audited by specialists under the direct command of the CO or XO, said specialists who also report to a collective AI audit agency to collect and asses fleet wide trends and ethical compliance. The impact will be Messured on battlefield, Target adquired, casualties, every day act ions. Always AI machines most to cwork with humans.   |
| Resources      | our plan needs high resources, involves schools, people to teach values to childrens, creates group for many solutions concepts for different moral aspects, teams leaders must refine solutions to narrow down in a executive order. Each succesive solution concept presented in the following improves on its predecesor based. Adapt current technology to CSG hierarchical structure  |
| Open Field     | Plan begins with S1, AI begins to integrate into support roles, and continues to grow in scope as we progress towards and into S2, nearly fully automated.   |
| Authors        | CitricLemur,Ogiwan,mono,freethinkerx,Buttblight,JackWagon,Jarvis,Athon,AHulton131,PKSOIGov, RT_Turn_Clyde,foxtrot,darkm4tter,fortomorrow,Astrosploy,Vicioxis   |

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| title          | An AI should be a complement to help the people, not making them doing all the work.   |
| Action Plan #  | 22   |
| Base Card #    | 2526   |
| Base Card Text | An AI should be a complement to help the people, not making them doing all the work.   |
| Who            | The private sector will make this happen. Consumers are the target. Big business who hold a stake will advocate an AI product. Citizens who oppose this will argue: Job loss, less demand for employees (1 individual could potential do the work of 2 employees with AI aid). Invasion of privacy. No social interaction. Speculation of system failures.   |
| What           | The use of AIs to enable a resilient population. Inefficiencies where an AI can bolster an employee or an individual with impairments. AI requires a large server from which child nodes request responses for actions in the physical world, potential creating heavy server loads. Infrastructure for AI centres has to grow, scale of electronic components has to shrink in size/price/heat-output, large investments are required, and there has to be public demand for this. The market for AI is small.        |
| Impact         | First world countries will be the first adopters of this technology, eventually selling it to second and third world economies (start of global adoption estimate: ~ 2027). It may streamline and prolong the life people. Similar to how we measure the economy of a country; life expectancy, infant mortality rate, gross nation product, etc.  |
| Resources      | The employees are engineers, mathematicians, computer scientists, industrial designers. Metals, minerals, liquids, and gasses are required for industrial manufacturing (High amount of resources). The amount of materials required to create a product will be less in time, due to Moore's law and all data becoming cloud based (Similar to the idea of a Google ChromeBook, but the device in the consumer end is further "dumbed down" and server end is amplified [Medium]). Unbalance of class inequality will |
| Open Field     | S1. The transition to S2 will further the developments and research to create a new plan over this one.  |
| Authors        | DrIcaro,PlayerNamePicked,fortomorrow   |



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|----------------|--|
| title          | Humans and Machines Evolve to be Synergistic Organisms: The Future Naval Fleet   |
| Action Plan #  | 23   |
| Base Card #    | 1504   |
| Base Card Text | Perhaps humans and machines/technology will become interchangeable in the future creating a new interface between the two.   |
| Who            | If the S1 produces a true synergy in human/machine evolution the technology should be already available to exploit the event as it happens. To achieve this top industry developers and experts both domestic and those of our allies must be utilized. Secondly, shipbuilders and designers need to develop innovative ways to incorporate the new technology into the future fleet. Opposition may come from individuals or groups with ethical or moral objections to an ever closer merging of human and   |
| What           | Humans, being physically integrated and cognitively assisted by technology, will have the ability to act as systems like plug and play hardware/software components. We will no longer interact through control panels, consoles, displays, and buttons. Humans will physically and mentally merge with technology and vice-versa creating interfaces that literally connect for the exchange of information (i.e. give and receive instructions). Humans will guide and shape cognition as well as augmented capabilities i.e. command and control. |
| Impact         | Humans will become part of the technological ascension by evolving into a necessary component adding new capabilities and biological resistance to technological vulnerabilities. At the same time, technology could sustain, perhaps even enhance the performance of human biology, or, alternatively even inhabit it. Impact would be a comparison from non-integrated populations to integrated   |
| Resources      | This plan will require time, money, people, materials, behavior changes, and all kinds of resources. However, the plan also asserts that humans and machines will gradually and naturally evolve to this state so resources (following the path of a projected plan) will be allocated as they are appropriate.  |
| Open Field     | This action plan focuses on S1 but there may also be impacts on S2. The idea that humans and machines will be physically and mentally connected implies the development of a hive-like organizational structure perhaps syndicated by friend or foe.   |
| Authors        | Cuda17,Astrosploy,warrriorhood,Athon,gm_mike,DukesterLee,Brasidas,Buttblight,Jellyicexd,psienide, PlayerNamePicked,Jeepers,jinxiegirl,malachi13,EdwardCourt,darkm4tter,Winged Fox, NextThursday,brandocalrissian ,DrakSt0rm,undaunted6,ADAM Nelson,JackWagon,Ddri  |

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|----------------|---|
| title          | Weapon Development to Attack and Defend Smart AI  |
| Action Plan #  | 24  |
| Base Card #    | 2822  |
| Base Card Text | The Electromagnetic Pulse will become the most important weapon in the 21st century.  |
| Who            | Office of Naval Research and DARPA will be critical in this aspect. This will be the study of how to weaponize and protect smart AI. This will pertain to all DOD forces and other government agencies will oppose them.  |
| What           | This plan will build upon assumed academic and commercial AI security architectures to address threats that only nation states can employ. Primary Threats: Electromagnetic Pulse, Jamming, Hacking, Electronic Attack, Exploit core enabling tech weaknesses, Total Destruction, Chemical Component Attacks, input overload. Primary Countermeasures: Redundancy, Faraday cages, Fiber Optic, Underground Facilities, Linked network abilities , backup protective systems, maintaining/training the |
| Impact         | This plan will allow for the preparation for attacks on smart AI including hijacking and disrupting DOD AI forces or spoofing AI relayed commands. By creating proper countermeasures there can begin the R&D to protect friendly AI. By looking to defense we can also look at offensive capabilities against enemy AI.<br>AI will be attacked in the future by using a combination of software attacks to overwhelm and destabilize defense systems followed by a coordinated hardware attack.      |
| Resources      | This will require low resources initially until you get into the Research and Development phase. This phase may take high resources if a particular event is determined a threat or an able countermeasure.   |
| Open Field     | This plan is aimed at preparing for singularity one, these threats will persist up to singularity two.  |
| Authors        | spacer01,gm_matt,Bob The Mexican,Dr.Solomon,Tannhauser,<br>DukesterLee,Astrosploy,hyperstriper29,Buttblight,fortomorrow,Ironman425  |

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|----------------|---|
| title          | New Navy ships Incorporating modular designs enabling rapid refit with evolving AI cores and mission systems  |
| Action Plan #  | 25  |
| Base Card #    | 5104  |
| Base Card Text | New Navy ships should have a modular design to allow for plug in and go as new AI develops. This will increase mission capability   |
| Who            | The Navy and Marine Corps need to be involved to make this happen. Naval and Marine personnel who support, maintain, or are onboard a Naval ship will be affected. Anyone who supports or will benefit from the new capabilities should be an advocate for the plan. Those who don't understand the capabilities, see their benefit, or think it's too expensive could oppose the plan  |
| What           | Develop the ability of a naval ship to fulfill different mission and affect repairs based on modular configuration of mission pods and interchangeable distributed computer nodes reconfigured in the field/at sea. Develop the ability to produce/combine/reconfigure/3dprint modular munitions to adapt to changing threats or anticipated challenges. Investigate methods of merging 3d printing of reclaimed and salvaged stock and merge 3d printing with traditional manufacture impedance matching detail vs mass with DMLS augmenting traditional welding and subtraction machining This should allow more varied force projection and adaptation to rapidly changing battlespace. These technologies exist in some early to mid form of maturity. These technologies attempt to remove humans for repairs of all |
| Impact         | This should allow all automated ships to reconfigure at sea and adapt to anticipated or even present threats. Measured impact will be prolonged deployment time by avoiding down time for dock repairs or flying a manned repair team out to the ship. Possible measurements are mission success rates, reduced injuries of support personnel, less ships deployed if a ship can react/adopt for different roles or situations. Cost savings are had by modular design allowing ease of repair/retrofit, and upgrades as tech evolves saving hull cost and dock refit time.   |
| Resources      | Med-High resource load. Requires development of salvage, reclamation, assembly and additive manufacture technologies that are mobile, operate under harsh conditions, and can be remotely controlled or eventually identify and directly affect refits, recombination, and repairs. 5-20 year development, 1-5M per year for first few years 50-100M per year once proof of principle is demonstrated. Long term will save on hull costs and refit/repair costs with S2 level evolving fleet.   |
| Open Field     | Planned to enable assets leading to S1 and eventually computer nodes will be upgraded to advanced purpose-adaptable AI assets approaching S2.   |
| Authors        | Ironman425,fortomorrow,Sedgeheel,PKSOIGov,hyperstriper29,Buttblight,Astrosploy,zturnbow   |

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| title          | Modify Boston Dynamics' LS3 or BigDog into an Autonomous Stretcher Bearer & Casualty Evacuation (CASEVAC) asset.   |
| Action Plan #  | 26   |
| Base Card #    | 6675   |
| Base Card Text | Modify Boston Dynamics' LS3 or BigDog into an Autonomous Stretcher Bearer & Casualty Evacuation (CASEVAC) asset.   |
| Who            | Boston Dynamics, DARPA, ONR, Branch Services, Medical Institutions, participating college programs. Affected: Medical personnel, the wounded, CSAR, MEDEVAC, personnel in combat zones or harms way. Advocates: Those seeking to hasten medical care of wounded personnel & promoting autonomous robotics. Opposition: Those seeking to avoid changes to the current system, or competing programs utilizing differing means.  |
| What           | This plan leverages the known capabilities of Boston Dynamics robots, such as LS3 & BigDog, to create an Autonomous Stretcher Bearer (ASB). The primary task of ASB is to protect & transport wounded personnel from hostile environments to an area of safety, medical treatment, & or point of egress. While enabling the collection of patient medical data during transport, and allow the ASB to make route & movement decisions based upon patient needs & environmental threats. Challenge: Creating a modular protective design capable of transporting & monitoring in real-time a wounded patient, who may be delirious & combative, through a hazardous environment in the most efficient & safest manner |
| Impact         | If successful, this plan could save lives, by shortening the time required to transport a casualty from danger, and providing the receiving endpoint with a record of the patients vitals while transported. Maintains force economy, by avoiding the required tasking of 2-4 people to carry a stretcher. Impacting areas of Autonomous pathfinding, route analysis, & medical sensor integration. Measurement: To conduct simulated events in operating environments, in comparison with current procedures & means  |
| Resources      | Initial resources required to adapt the current working designs is Low. By modifying the existing BigDog and LS3 architecture & software, the cost & time will be greatly reduced when compared to provisioning for a new technology development. Once proven, this plan can increase in scale, allowing for other further refinement & variations of follow-on systems.   |
| Open Field     | This singularity plan is S1. As it enhances & enables human beings, to work alongside said autonomous machines. Future development could possibly lead to an S2 construct, if these devices were developed to a conclusion where human participation was no longer required at all.  |
| Authors        | BlackFox,Renkin,fortomorrow  |

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| title          | Explore the evolution of the role of the Nation-State in light of S1 (technology) and S2 (complexity@scale). As the role of the Nation-State evolves, how might the Navy's organizational construct(s) (at any/all levels) evolve?  |
| Action Plan #  | 27  |
| Base Card #    | 79  |
| Base Card Text | What is the role of the Nation-State in an era of technological acceleration? Still relevant, irrelevant or more required than ever?  |
| Who            | This plan is a Navy wide change, requiring involvement of the civilian & military leadership. Setting a course to stay ahead of future threats & requirements set by the Nation-State. Advocates: Persons who support a more nimble organizational structure & procurement process. Opposition: People who desire to make large investments into specialized systems, or those wishing to avoid changes until   |
| What           | With the advent of an S1 or S2 world, the Navy should move to usher in both, sowing & reaping the benefits that may be found. Staying open to the possibility that S3 may one day appear on the horizon. The Navy's organizational construct should emphasize the attributes of flexibility, knowledge, strength, & speed. Said structure should never over-specialize, instead holding the middle ground, able to adapt to any future instability or threat to the interests of the Nation-State whatever they may be. |
| Impact         | This plan requires a deep & long-lasting impact, changing the very fabric & culture of the Navy. Affecting all corners of the Navy, especially in areas of procurement priorities, training, maintenance, R&D, & forward deployments.   |
| Resources      | High. In order to remain adaptable, the Navy must avoid becoming wedded to programs that result in "Gold-plated-elephants", too costly to abandon & too costly to maintain. Instead the Navy should focus on a more nimble approach, emphasizing continuous spiral development & procurement of only proven/working designs."   |
| Open Field     | Both. Near term the N/S is involved in developing capability sets that partner AI and humans. In the long term we are building resilience as well as the baseline capability to identify and exploit "post-Singularity" opportunities and mitigate threats and challenges. "  |
| Authors        | JFeatherstone,Brasidas,inquisito,Ogiwan,fortomorrow,Renkin,Ironman425,km2017  |

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| title          | How might the Navy's org construct(s) (at any or all levels) need to change in order to push decision making and problem solving to Swarms?   |
| Action Plan #  | 28  |
| Base Card #    | 601   |
| Base Card Text | Push decision making to Swarms (highly decentralized yet still structured and aligned groups). See Swarmwise by Rickard Falkvinge   |
| Who            | Eventually, this will involve the entire hierarchical structure. Combat units might advocate for the plan as they benefit greatly from decreased response times and the ability to innovate. The traditional command hierarchy will be most opposed as the need for many present positions will be eliminated.  |
| What           | As automation increases in the organization, the need for many of the hierarchical positions in the chain of command will likely be lessened. The organization will benefit from flattening which will increase innovation and decrease response time. Change does not come easily to an organization with a long history and leaders of long tenure. In the private sector, this is colloquially referred to as \breaking  |
| Impact         | A major change in organization requires a commonality of experience. To this end, everyone in the organization should rotate through a swarm for a specific period. Continuity of the swarm would be maintained by a rolling schedule of service. Accountability would be maintained by a group of leaders within the swarm who serve for a moderately longer rotation period, say 2x. Common experience will lead to familiarity with the swarm's capabilities and confidence throughout the organization. |
| Resources      | The plan requires confidence in the swarm \mindset\", a clear mission for the swarm and the full participation of the organization. During a rotation through the swarm, rank needs to be put aside/minimized in order to facilitate its mission. Parameters of size, service time and rotation will need to be developed. A rotation through the swarm should provide significant incentives in order to enhance the desirability of service within it."   |
| Open Field     | This plan is an S2 plan. As S1 activities progress, the need to have a common mindset and shared information will increase. Simply put, the establishment of swarm units will eventually put everyone on the same page. Establishment of rotating swarm units is the next phase of creating an organization that thinks similarly, but leaves room for innovation and leadership.   |
| Authors        | NextThursday,Sedgeheel,JFeatherstone,Gardener,fortomorrow,landshark,Starling,Travis42,AHulton131,foxtrot,starfleet1   |

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| title          | Test and apply Agile methodology, SCRUM/KANBAN approaches to Navy organizational constructs and decisionmaking processes to implement best practices.  |
| Action Plan #  | 29   |
| Base Card #    | 477  |
| Base Card Text | As a developer, I like to think that organizational constructs should look like the Agile Methodology process. An SCRUM/KANBAN adaptation.   |
| Who            | Navy command in isolated testbeds (on ships) & experts on Ag.Meth. Affected: the ship Advocate: middle officers and NCO wanting to prove their capabilities/adaptability/speed. Similar teams on different ships wanting to improve best practices through sharing and \friendly competition\"<br>Opposed: NCO's lacking initiative and investment, CO's that dont trust their subordinates Adjusting the command paradigm to a more agile or kanban model helps the organism of the navy act less like a slow giant that can be decapitated and more like a swarm interlinked and interdependent with faster local adaptation to stresses."   |
| What           | Take select aspects of agile or other admin models and apply to command structures on board ships or larger scale. Attempt modified models to maintain overall command integrity for strategy and cohesiveness across the fleet while improving reaction time and tactics across departments by building an architecture for them to share information directly and make decisions with oversight but without waiting for approval. This is to address a faster changing battlescape where smarter weapons act in concert faster, our own offense, defensive,logistical,etc units must efficiently and effectively share information especially when communications with command becomes compromised or taxed. |
| Impact         | Small ships, on the order of months. Typically the largest hurdle to rapid change is entrenched command not wanting to release control or trust subordinates. Try removing command temporarily to improve adaptation by and between agile units. This will help the navy adjust quickly to new threats and utilize the expertise of the entire team to more quickly adapt to changes on the battlefield.   |
| Resources      | Low, it mainly requires the team to fully challenge their paradigm of the chain of command and a few ships to try adjusting how they work. Medium: costs likely due to efforts to adapt information systems to identify and share pertinent information across/between agile groups especially when coordinating like groups on different ships. Also it'll need experts on Agile Methodologies to extract the best practices of agile and adapt those to improve decision's making time's on Navy's ships.  |
| Open Field     | Uses our efforts approaching s1 but mainly addresses our weaknesses as we approach S2 since typical command may become too slow or too easily compromised. We could benefit on the fact that with AI's aid we can improve the adaptation/implantation of Agile Methodologies on the traditional Navy's way of working.   |
| Authors        | Miraboreas,fortomorrow,Athon,Sedgeheel,psienide,Astrosploy,Nophia  |

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| title          | If the Navy evolves to a more complex, less hierarchical org structure, what forms of incentives might emerge to replace traditional incentives? How might these incentives play out in the individual vs collective dynamic?  |
| Action Plan #  | 30   |
| Base Card #    | 244  |
| Base Card Text | How do you incentivize humans in a complex, less hierarchical world where traditional status seeking behavior is not as effective?   |
| Who            | Involved parties: Psychologists, anthropologists, game designers, and marketers. Affected Parties: Anyone transitioning into a flat hierarchy. Advocates: Open source proponents Opposition: Those invested in the status quo.   |
| What           | Well designed and aligned incentives reward individuals for good work and provides feedback to participants in the system on how to be more efficient and take better actions. Currently, most feedback takes the form of currency and status. These 2 incentives lead to rigid hierarchies which are insufficient to deal with . We propose a focus group composed of subject experts to draft a white paper on the use of alternative incentives to promote better collaboration and problem solving.              |
| Impact         | The product of this plan is a white paper, so its impact will only occur if the suggestions are adopted. If society moving towards a flatter hierarchy in an effort to deal with complexity that arises, than an improved, alternative incentive systems could have significant implications in ensuring a more harmonious and efficient society. When applied to a small organization, the effect of new incentives could change a situation in weeks, but as the organization scales, so would the amount of time. |
| Resources      | You would need a panel of experts, a strong moderator, and if done digitally (which we suggest) than a MMOWGLI like platform to contain and guide the conversation for the white paper. Time would probably be around six months.  |
| Open Field     | This is predominantly a S2 issue.  |
| Authors        | threatanalysis,fortomorrow,Ironman425,AHulton131,JFeatherstone,Gardener,darkm4tter   |



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| title          | Increase the maximum individual carrying capacity for complexity. Draft a white paper addressing methods to mitigate mental paralysis associated with information overload.   |
| Action Plan #  | 31  |
| Base Card #    | 2142  |
| Base Card Text | Why is carrying capacity horizontal? Don't better education networks produce better leaders? Hive education has more complexity handling?   |
| Who            | Cognitive and industrial psychologists, USN, private and open source developers, and any decision maker regardless of rank, will be involved and affected. Supporters will include advocates of swarm intelligence and problem-solving, futurists, psychologists and educators. Potential for opposition from existing institutions and conventions in fields of education, technology, and concerned citizens.   |
| What           | Information overload caused by immense complexity causes analysis paralysis and the subj. becomes emotional and intellectually overwhelmed, leading to suboptimal outcomes. Increasing carrying capacity in humans means mitigating those responses, which is difficult b/c these responses are part of human nature. We propose that a white paper be drafted by leading experts in cognitive and industrial psychology to identify processes and characteristics of potential digital tools to mitigate this paralysis. |
| Impact         | Impact will be difficult to measure at first as results will take years to manifest. The process will require a bit of trial and error to arrive at best practices. However, once successful, the plans associated with this white paper should ensure that sailors, other military personnel, and civilians employed in high-complexity fields are better equipped to handle a greater volume of data, leading to optimized decision   |
| Resources      | Moderate initial investment to employ top experts and develop of the first generation of software to facilitate plan's findings. Six months to draft and publish white paper. Once basic principles are outlined, behavior change will be needed.   |
| Open Field     | This is an S2 issue, however S1 could eventually support any technological response.  |
| Authors        | Sedgeheel,JFeatherstone,fortomorrow,Anasus,isomer,Gardener  |

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| title          | Technical fields (engineering) will be replaced by less educated personnel (drafters) with access to powerful computation tools.   |
| Action Plan #  | 33   |
| Base Card #    | 6051   |
| Base Card Text | Technical fields (engineering) will be replaced by less educated personnel (drafters) with access to powerful computation tools.   |
| Who            | This plan will be a multi-profession task, bringing in members of the technical fields, management, and end-users. Initial implementations will involve a specific project oriented group tasked with developing a test toolkit and analyzing its training and utilization. Advocates could include; Upper management, technicians, professionals, finance personnel, veterans advocates. Opponents could include; Professionals, technicians, technical unions. |
| What           |  |
| Impact         |  |
| Resources      |  |
| Open Field     |  |
| Authors        | Ddrizzle ,malachi13,fortomorrow,darkm4tter   |

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| title          | Machines can run simulations to help analyze future possible migration consequences of Global  |
| Action Plan #  | 34   |
| Base Card #    | 4186   |
| Base Card Text | Machines can run simulations to help analyze future possible migration consequences of Global  |
| Who            | This plan would be implemented by AI researchers, meteorologists and data collectors (e.g., satellite IR and radar mapping). Universities and NASA would be good advocates and sponsors for the plan. As the plan improves the prediction of weather, many people would benefit including travelers, disaster planners as well as National, State and City Governments.  |
| What           | The plan is to develop AIs capable of analyzing multitudes of data for complex systems and identifying smaller, localized patterns within that system. Ideally, the AIs could also project/identify what was causing/driving the pattern to help humans understand the model. Thus, the large problem of global weather prediction is broken up into many smaller problems. Many AIs could analyze the data in parallel and as patterns are found they are compared/analyzed against the previously identified patterns to determine which pattern models to incorporate into the global solution and which ones to prune from the solution. Today humans try to develop models for these complex systems, but are handicapped by the complexity and the difficulty in scaling up the number of people working on a single model. The current models do not address the complex environment sufficiently to project reliably into the future for the timescales that are required. |
| Impact         | If multiple, parallel AIs can successfully model complex environments, many problems with nuclear weapons, aerodynamic modelling, weather forecasting can be solved resulting in safer weapons, air craft and space craft. If weather forecasting can predict long term effects such as ice ages and global warming we will have better arguments for governing bodies to take more direct action and the effect of that action can be projected.  |
| Resources      | This plan requires researchers and funding. It could be initiated with relatively low levels of both. High level computing systems or networks are also required, not just in software but also most likely in next generation hardware.   |
| Open Field     | This plan originated from singularity S1, but really address both singularities. This plan utilizes the capabilities of improving machine intelligence to address modelling problems that have been too complex to address to date.  |
| Authors        | starfleet1,foxtrot,Vibv,Charrelle,gm_matt,psienide,fortomorrow   |

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| title          | AI teaming with UAS surveillance operators/analysts   |
| Action Plan #  | 35  |
| Base Card #    | 5695  |
| Base Card Text | Train ML algo to recognize FMV figures carrying guns, vice shovels, bags, etc. AI team w operators can better ID hostiles, reduce mistakes.   |
| Who            | A team of AI specialists would need to create a program that meets the criteria outlined in the following sections. The customers are operators, analysts, and decision makers in the 'kill chain' revolving around full motion video feeds associated with modern warfare. AI can team with these members to make more intelligent decisions about when to use deadly force in the most appropriate manner by highlighting potential hostile devices, postures, and actions. |
| What           | Using modern Machine Learning algorithms, a model could be taught to recognize hostile actors on video using a dataset of prior videos that have known hostiles. By learning what a person with a gun, rocket launcher, bomb, etc. looks like, the algo will be able to reduce false positives (women with baskets, men with shovels). This can save lives by giving military members in the 'kill chain' the best information before applying force.                         |
| Impact         | An AI/ML algo providing preliminary pattern recognition and alerting services would save time for an analyst trying to watch video screens and determine if hostile actions are imminent in the observation area. If the algo can differentiate between a rifle, shovel, pickaxe, basket, satchel, etc. then the analyst doesn't have to focus so much on that aspect. This can help reduce false positives and thus save lives and resources.                                |
| Resources      | Up front, this plan requires a software development team to train a machine learning algorithm to recognize hostile shapes/actions, and then create an interface for real time video analysts. Ideally, the resulting software would alert an operator-analyst to hostiles through color highlighting and/or a probability rating. Eventually, this approach saves time, and lives by helping to eliminate false positives and freeing up analyst concentration.              |
| Open Field     | This plan is for the near term road to S1. S2 complexity might be able to increase with this plan in that it frees up military members to focus on other critical parts of the job, raising the individual or small team complexity limit.  |
| Authors        | Ironman425,Sedgeheel,Deroiste14,Travis42,fortomorrow,zturnbow,Athon,kevinkin  |

|                |   |
|----------------|---|
| title          | Assimilate concepts of computer programming into human (natural) language. Doing so will improve clarity of ideas shared among people.  |
| Action Plan #  | 36  |
| Base Card #    | 542   |
| Base Card Text | Assimilate concepts of computer programming into human (natural) language. Doing so will improve clarity of ideas shared among people.  |
| Who            | This plan requires research by linguists, programmers, lawyers, teachers, philosophers and military personnel. It would affect as many people in organization as possible. This plan will affect everyone in the following ways: (1) personal skills and ability to communicate ideas in a clear manner will grow and enhance in direct social situations, (2) Decisions and involvement in the public domain and policy creation will be clearer and more beneficial over all.                                   |
| What           | Spread logical thinking through language, with the goal of making people better able to interface with AIs and each other in communication. Accurate and logical communication may enable massive distributed ad-hoc collaboration. Having developed concepts and skills to accurately run machines, we might adapt them to express ourselves in a clearer way. Specifically: using computer language concepts in spoken language may increase logical, clear conveyance of thought.                              |
| Impact         | This plan would create permanent change. Communications among the masses on critical issues will be more clear, logical and focused. Decisions in the public domain will be done at a more detailed and coherent level. The expected result would be a culture that is more immune to bias and illogical thinking. The new skills will improve collaboration of people also in a small day-to-day activities. Experiments can be made by comparing learned and unlearned groups of people in collaboration tasks. |
| Resources      | Research is needed to: (1) adapt programming language concepts to common language (2) make programming skills, philosophy logic and scientific logic more accessible to the great population. The research will take several years before first deployment and will require the participation listed in WHO section. Behavioral change is the only way this plan can bear fruits. If this plan will not reach fulfillment, products of the research will make very good assets for the body that will conduct it. |
| Open Field     | Several card chains and action plans discuss language and the need to communicate with machinesÇöthese are S1 issues. This one is pure S2, upgrading humans ability to communicate to the level of hive collaboration. S1 developments might affect this plan by dissecting virtual mechanisms of clean communication, through direct analysis of AI thinking, and by reversing the process of AI learning to interpret our blurred contextual expressions.   |
| Authors        | Sedgeheel,hezel,fortomorrow,gm_matt,Travis42  |

|                |  |
|----------------|--|
| title          | Distributed capability vs higher capability: increased naval force resilience  |
| Action Plan #  | 37   |
| Base Card #    | 8081   |
| Base Card Text | Pre-empting the Third Singularity  |
| Who            | Who is involved: all R&D and procurement stakeholders, both public and private, as well as the political and military leadership Who is affected: Navy and related industries Advocates: Tacticians, corporate leaders in AI and emergent technologies, defense contractors with related interests, younger researchers and technologists Opponents: Entrenched interests, as has been seen in every instance of   |
| What           | How do we reform R&D and acquisition processes to avoid reaching Complexity at Scale? The goal is to aggregate and disaggregate capabilities as required while ensuring resilience. Consider AI-friendly iterations of distributed lethality and build upon current shipboard automation trends. Once the desired end state is known, designers and planners can work backwards to the present state to identify the necessary steps to reach it through successive procurement cycles.                          |
| Impact         | The time to impact will be measured in decades barring a substantial breakthrough in HCI. Successive budget cycles and POMs will serve as imposed milestones to break down the steps to reach the final iteration. Having a well-defined framework for integrating developments in HCI will allow Navy to take the lead and increase its R&D budget. Impact will be seen through the introduction of operational capabilities, as well as budget increases, and adoption of Navy-led projects by other services. |
| Resources      | Whole-of-Navy efforts will be required, with close collaboration with industry and researchers, both traditional and emergent. Significant portions of the R&D and procurement budget will need to be redirected to these changes. SMEs will need to be identified and involved throughout, either as designated specialists or with regular rotations to normal billets outside of the project. In order to reach the long-term goals, cultural change will be required to ensure buy-in at all levels.         |
| Open Field     | This plan aims beyond either singularity, attempting to mitigate the challenges and enhance the advantages of both at the convergence of relevant trends. The Navy will need to adapt to post-singularity changes that may reach such a rapid rate of advance as to appear nearly simultaneous. The framework of pre-singularity development work will enable key stakeholders to seize opportunities that arise faster and more effectively than if they have to think through them first.                      |
| Authors        | Ironman425,gm_matt,Mowgli,undaunted6,starfleet1,RMCNavyGuy,sqwheels,Brasidas,fortomorrow,Charrelle,DukesterLee   |

|                |  |
|----------------|--|
| title          | Approaching the Singularity: How to Transform the U.S. Navy  |
| Action Plan #  | 38   |
| Base Card #    | 8105   |
| Base Card Text | How do we develop a naval approach to take advantage to of machine and human teaming? (duplicating for a second AP)  |
| Who            | Transformation of the Navy to deal with the advent of an S1/S2 world, requires participation at many levels of leadership, with guidance & vision provided from technology leaders, policy makers & military commanders to accelerate learning and change. To include, a willingness to fund comprehensive environmental scanning and assimilation capabilities, as well as innovative concepts in technology, a direction to future policy requirements, and a leadership capable of creating an environment with the support & guidance to enable service members. |
| What           | - Create programs that continually educate Navy personnel, as to the capabilities of current & burgeoning technology focusing on strategic thinking and the ability to grasp technical complexity and infer impacts to current strategies, processes and pol   |
| Impact         | This plan focuses on a longterm strategy to enable personnel & seek their involvement until the dawning Singularity. The plan attempts to mobilize members of the service, in a way that rewards their adoption of new technologies, by encouraging participation & guidance of it's use. A measurement can be made by evaluating the response to incentive programs, as well as the measuring/testing of knowledge of technologies learned via education programs.  |
| Resources      | Naval technologist, futurist, and leadership must find consensus to begin mapping an incremental plan to incorporate near/long-term future advancements as a singularity event approaches. New emergent-based business models and organizational frameworks that are agile, adaptive, innovative & creative must be embraced. A foundation must be sown & cultivated, that will begin to reap the use of multi-use upgradable platforms to pave the road to continuously evolving force that will excel in new   |
| Open Field     | This action plan is aimed at S1. The approaches and processes developed in support of this plan will inevitably enhance the ability of the Navy to adapt in the face of S2   |
| Authors        | bowfin,zawate,txbill,Charrelle,Nozzle,sqwheels,starfleet1,pablopiter,Sarge,brandocalrissian ,warriorhood,TallBear,Bob The Mexican,Sweets,elykrenrut,troll,PKSOIGov, threatanalysis,strategicaster,Renkin,OgreMkV,TheFreeman, red ryder 34,undaunted6,fortomorrow   |

|                |   |
|----------------|---|
| title          | Best Practices curated by an AI personal assistant  |
| Action Plan #  | 39  |
| Base Card #    | 5192  |
| Base Card Text | Real time (accurate) translation services are an AI powered tool the Navy could use in the near future.   |
| Who            | USN, DoD, software developers, and anyone who uses the product, since it grows with user inputs. Advocates would be the users, since it aims to make their jobs more manageable.  |
| What           | Utilizing either a website or a personal digital assistant such as Cortana, create a job based database of best practices. The goal is to reduce duplicate or inefficient work by utilizing all the work that the best among us have already done. As a website, this would look a lot like stackoverflow.com (q+a with voting); as an 'AI' this would be more character/personality based. 'Cortana' would represent the ideal   |
| Impact         | This application could be built today, with existing technology. If successful, it will reduce the duplication of work that is so prevalent in the structure of the Navy as it is today, where each geographically separated shop has similar problems to solve, yet often has to invent solutions from hard to find or non-existent prior knowledge. This method dumbs that process down, which is a good thing. Impacts would of course be measured by what a team can accomplish in the time given.              |
| Resources      | This plan requires access to developers, current digital assistance technology, and time. It would also require access points, be they microphones, integration into computers, phones, etc. Security would need to be taken into account for some jobs, meaning that there would be splinter versions of the website/digital assistant (Secret, Unclassified, etc.). Users would need to learn to ask 'Cortana' questions, and have a way of voting up or down on the proposed solution to help increase accuracy. |
| Open Field     | This is aimed at both. As S1 approaches, our digital assistant grows more capable in using human knowledge to suggest fixes to problems. As S2 approaches, the digital assistant brings complex knowledge to a user in a just in time fashion, freeing up cognitive overhead for the human user.  |
| Authors        | Athon,Travis42,Ironman425,fortomorrow   |



|                |  |
|----------------|--|
| title          | Technology/AI as a colleague to navigating workplace complexity  |
| Action Plan #  | 40   |
| Base Card #    | 8201   |
| Base Card Text | Machines can run simulations to help analyze future possible migration consequences of Global Warming. (duplicate for new AP)  |
| Who            | Involvement: planned end-users, naval R&D organizations, industry leaders (Apple, Microsoft, Google, etc.) Affected: All USN employees Advocates: Forward-thinking end-users, industry leaders Opponents: People who watched Battlestar Galactica and cyberpunk fans   |
| What           | As complexity rises all around us, humans need to consider how to reorganize ourselves to handle the growing number of complexities. As AI supports the evolution of our systems, so should it support the evolution of our organizations. Teaming with technology might be a solution to restoring order and identifying efficiency. Mining of existing organizational metrics can identify opportunities to simplify our work processes and enhance organizational outcomes. Naturalizing our interfaces to this new technology will be key to its adoption.(e.g. Alexa, what is the current status of Alexa). Areas in our organization that AI may be able to help us optimize include: Deriving sound facts and conclusions from what may appear to the human mind as large amounts of erroneous data and information. Identifying steps in planning and execution that should be added, condensed, or even eliminated. Collecting employee data to optimize employee placement and performance. Instantly retrieving the latest and most current data and information of all types. Being able to forecast and predict outcomes and consequences. Ultimately, being able to produce meaningful work. |
| Impact         | Using the phenomenal processing abilities of AI, we will be able to optimize various areas of our organization and more easily handle the complexities that rise in the work environment and perhaps our lives. The biggest impediment is our rigid Command hierarchy of control - we need to establish ubiquitous and seamless communication channels as a meritocracy with democratization where everyone is engaged and participating, ebbing and flowing as info is disseminated, and self-forming emergent groups in response. We need to prototype the concept and challenge existing models of  |
| Resources      | The Navy must be willing to collaborate and work with AI as a colleague in the workplace. A network will have to be created that allows for data to be extracted, accessed, and analyzed by AI. A program of behavioural management will need to run alongside the introduction of AI into the workplace. This should manage stakeholder expectations and emphasise the positive benefits of AI as augmenting and empowering staff - as a decision support tool - rather than replacing or devaluing them.   |
| Open Field     | This action plan aims to solve S2, however it is based on S1 ideas such as using AI to assist humans in dealing with the exponentially increasing levels of complexity.  |
| Authors        | Cuda17,gm_erik,Munnin_Crow,PKSOIGov,brandocalrissian,SwordofSong,OgreMkV,starfleet1,aurelius,Bob The Mexican,isomer,Salvatore Monella,avidazzuw,Howdy,Superman0X Nigel,Jellyicexd,zawate,jimmytwocupps,Astrosplay,Ironman425,GPBurdell,km  |

|                |  |
|----------------|--|
| title          | Human machine integration spans from individual/ machine to community/ network. Scalability  |
| Action Plan #  | 41   |
| Base Card #    | 6189   |
| Base Card Text | Human machine integration spans from individual/ machine to community/ network. Scalability  |
| Who            | Involved parties would be the navy and a team of networking experts. Advocates would include anyone invested in future tech development. I am unable to think of any group who would disagree with macro scale networking.   |
| What           | Network and data scalability is a current issue for growing networks and data centers. Networking populations of people will be a difficult task to approach ad hoc. A detailed and proven concept for fault tolerant macro networks will need to develop before both singularities. |
| Impact         | This idea would create an infrastructure in which to build and integrate post singularity 1 populations.   |
| Resources      | This plan requires a high level of resources for design, while implementation is long term networking. Labor for designers is not cheap and the development of requirements and integration would be a long term project.  |
| Open Field     | This plan is using singularity 2 as a requirements definition for singularity 1.   |
| Authors        | NavyAnalyst1,Ddrizzle ,Bob The Mexican,fortomorrow, zturnbow,EdwardCourt,matman,TallBear,freethinkerx,isomer,Sedgeheel,Frankyf   |

|                |  |
|----------------|--|
| title          | Accelerating Neural Assimilation of Prosthetics and Synthetic Augmentations in Soldiers.   |
| Action Plan #  | 42   |
| Base Card #    | 2977   |
| Base Card Text | Advancements in organic matter reading data storage devices could develop, like DNA as a storage unit. There might not be education systems.   |
| Who            | Involved: Amputees, Cybernetic researchers, AI developers, and neuroscientists. Opposed: Humanists and hardline religious organizations. Advocate: the Veterans affairs, Medical community,  |
| What           | Investigate methods of knowledge transcription from one subject to another, or neural pathway reinforcement during task learning to facilitate rapid assimilation of new implants and when studying new skills or subjects. Apply to subjects when exposed to new training especially on elective augmented implants that either replace or augment normal functions. It is hard to learn to use a synthetic replacement arm, and would be harder still to learn to instinctively use an artificial implanted      |
| Impact         | It would greatly facilitate the integration of cybernetic prosthetic limbs in amputees and would further enable the natural and instinctual integration of artificially grafted cybernetic implants that are augmenting rather than replacing human function. Impact would be measured by ability for soldiers to replace limb function, remotely control drones as they would a hand, interface with the net as they would just thinking, and operate a second set of grafted limbs as they would their original. |
| Resources      | Amputees and cybernetic implants to start, Direct limb replacement, followed by quasi replacement units such as wheels rather than legs, or 6 finger prosthetic hands replacing 5. Cost 30M first 3 years for prosthetic development and surgeries. 100M for each year after that for small scale trials on development and integration of non-direct replacement parts or augments.   |
| Open Field     | This plan primarily targets prosthetic and ancillary direct control of drone level hardware through S1 and lays the groundwork for direct neural interfacing approaching S2.   |
| Authors        | fortomorrow,Astrosplay,Brasidas,Ironman425,Athon   |

|                |   |
|----------------|---|
| title          | Advanced Machining Clusters Enabling Reclamation and On-Demand Multi-Material Fabrication   |
| Action Plan #  | 43  |
| Base Card #    | 8104  |
| Base Card Text | Think more ordinance on demand. With present printing and fab trends it wont be long before this is possible in field.  |
| Who            | Beginning now, naval and marine logistics units in the field, affecting repairs, and coordinating a steady supply of weapon systems, components and parts, will benefit first and foremost, from an expanded capability. Increased flexibility, and shorter lead times will result, benefiting the system as a whole. Full realization around S1 will expand possibilities further, and enable changes to ordinance/equipment/repair chains, on demand, to rapidly adapt to a rapidly developing battlespace.   |
| What           | Traditional subtractive machining, welding, and 3d printing are impedance matched to large/bulk volumes and small detailed volumes respectively. Initial efforts should attempt to merge these technologies into single or connected clustered machining centers that can fabricate parts and assemblies of dissimilar materials to maximize efficiency and minimize waste. The same machining center can weld and print critical metal components, integrated conductor traces, insulators, polymers,thermoplastics, energetics, ceramics and composite materials fabricating over 90% of drones, equipment casings and structures, or ordinance on demand. Plan: Identify and refine technologies enabling re-manufacture from salvage and reclaimed materials -Gas filtration such as engineered graphene for targeted permeation/reclamation -Rare metal and component reclamation and qualification from salvaged electronics. -Bulk material and machining waste recovery, reforging, refining, and grinding. -ultra small high power lasers for DMLS using new or recycled inert gas or N2. -high precision stereoscopic or holographic 3D imaging/tomography for part alignment during process transfer within the cluster and tolerance verification. -An integrated machining center with tools for a range of materials, machining, and printing technologies and adaptive mounts. |
| Impact         | Materials sourced or reclaimed from the field will be fully processed and fed into a fabrication/machining center or cluster that will use AI and its capabilities to print entire drones, ordinances, and equipment on demand, with the installation of components of critical or sensitive natures, also being completed on-site. The impacts would be profound in reducing the logistical chain  |
| Resources      | Initial feasibility studies and detailed cost estimates, would have to be done, to determine yearly resource expenditures for prototyping and evolving the machining centers. Long term there will be an increasing cost savings, for sourcing and transporting materials, and corresponding decrease of costs in bringing assembled equipment to the field.  |
| Open Field     | It will improve flexibility and adaptability as we proceed through S1 toward S2, where the speed of refit, resupply, and ordinance manufacture must keep up with the speed of AI integrated weapon systems. As nanotech improves post S1, the machining center should be capable of limited IC fabrication, reclamation, repackaging, and integration. On it's own, AMCER and ODMMF technology would probably have limited direct effect on S2, unless as part of a larger networked structure.   |
| Authors        | Ironman425,Salvatore Monella,fortomorrow,hyperstriper29,Astrosploy  |

|                |   |
|----------------|---|
| title          | Fostering OTS Components to Enable Quantum Technology Development   |
| Action Plan #  | 44  |
| Base Card #    | 8980  |
| Base Card Text | Despite years and millions its still mostly in a university or government lab exploration phase.  |
| Who            | Proponents will include NRL, NAVAIR, industry, academia and any entity working toward quantum technologies. Advocate: Researchers already working on or wanting to get into this field. Opposed: Those fundamentally biased against exploration in risky technologies such as quantum   |
| What           | Emerging disruptive technologies such as Quantum Computing are typically hamstrung by a general deficit of sophisticated and available enabling technologies required to explore and leverage promising avenues of development. Rather than focus on a particular path in a broad and complex solution space, funds are better spent elevating the supporting technologies that will enable a broader array of efforts thereby leveraging existing and future efforts on divergent paths to become fruitful. Funding efforts need to support OTS development of technologies in the following categories. -<br>Miniaturization of core Quantum technologies with improved robustness including {Ion traps, miniature vacuum chambers, Q-dots } with integrated {photonics, stabilized laser diodes, waveguides, micro resonant cavities, high speed micro shutters} - Technologies for state interrogation/imaging/Data extraction including {microwave integrated amplifiers, SNSPD nanotube detectors, micro-photomultipliers, High NA imaging miniature optic assemblies} -Modularization of the above technologies with interchangeability or a-la cart assembly in mind. |
| Impact         | Initial impact will be seen likely within first 2 years as prototype technologies roll out to researchers enabling deeper research efforts and feeding back to improve spec requirements. Actual quantum computers are out of the scope of this endeavor as it is aim solely at facilitating researchers in a solution space that is still largely untapped. This will further broaden other commercial and academic research efforts in quantum and related advanced fields helping the US stay on the forefront of technology.  |
| Resources      | Medium Fund Load. Distributed among many smaller efforts to prove feasibility and then pruned as viable commercial technologies are discovered, or critical need mandates further funding into less immediately viable technologies. 20M/year for first 1-3 years to say 5-10 small groups, then 50M/year for next 2-4M/yr for next 2-4 years to say 3-6 groups.  |
| Open Field     | It is aimed to facilitate fruition of Quantum technologies before S2  |
| Authors        | Athon,Ironman425,Astrosploy,fortomorrow,DukesterLee   |

|                |  |
|----------------|--|
| title          | GOING DARK: A singularity draws on all data sources, processed in real time while evaluating millions of simulations, out-thinking allied forces.  |
| Action Plan #  | 45   |
| Base Card #    | 327  |
| Base Card Text | Anti-AI Defence, ala Battle Star Galactica's disconnected network.   |
| Who            | Opponent: Advanced adversarial AI in near-total-war scenario with massive sensor arrays and monitoring capabilities, negating current stealth and C2 capabilities Involved: Allied forces (NATO/FVEY) adapting to the threat, removing online and interconnected presence Affected: Entire   |
| What           | The solution is to starve the AI of data to prevent it from anticipating human moves. Use quantum encryption with one-time code, leverage LOS communications using ships or instant-deploy limited-use microsattellites or rotating-spectrum LIDAR with encrypted holographic packages to limit interception. All ships and facilities are made to employ submarine-level dampening, and any signal-emitting device is locked in a faraday cage. Stop using IT networks for data dissemination.                        |
| Impact         | Some changes can be made immediately, some will require R&D that may or may not be complete in time, and some will require time to implement. Positive: the AI will be unable to use the data stream to learn and may not be able to acquire any data without physical breaching. Negative: loss of quality of life. Slowdown in communications caused by hardware and tactical limitations. Logistically, JIT delivery is critical to modern society; requires pre-stocked resupply points based on historical needs. |
| Resources      | Requires a global effort by humanity. Many of the technologies are COTS or adaptable to the requirements or should appear prior to the singularity, such as advanced cryptography, but this plan requires a complete paradigm shift. Operational mindset reverts to that of the age of sail: ships are given broad orders and the autonomy to choose solutions, and remove the ability of sailors to communicate with friends and family. New communication networks and protocols need to be                          |
| Open Field     | S2. Faced with uncertainty and lack of data to conduct analysis, AI becomes unable to accurately predict human action, leveling the playing field. C2 structure leverages this uncertainty and battle strategy to prevent enemy AI from using predictive analytics or simulation. Removing network capabilities or usage by allies removes one of the main vulnerabilities. The recovery effort would be enabled by careful use of S1 in the information world, where subtle damage may not be noticed by humans.      |
| Authors        | Athon,Astrosploy,foxtrot,RMCNavyGuy,fortomorrow  |

|                |   |
|----------------|---|
| title          | Neural Adaptive / Auto-Reconfigurable IC's though Nanotech  |
| Action Plan #  | 46  |
| Base Card #    | 7956  |
| Base Card Text | This requires perhaps nanotech printing/replication to make quality, Secure, critical IC's. in field  |
| Who            | National labs such as Sandia or others with advanced fabs geared toward MEMS, Nanotech, and IC fabrication need to work closely to merge technologies in a useful fashion to benefit all.   |
| What           | Utilize emerging nano-technology with existant and improving MEMS level technology and advanced IC fabrication while applying neuroscience principles to integrate the technologies into a neural interconnect type processing unit. The unit will utilize MEMS and nanotech developments to create adaptive nano-interconnected integrated circuits in plane and exploring out-of-plane or in-matrix parallel interconnects for an exponential increase in cross-connected complexity. In this way we may be able to get classical integrated Circuit architecture to mimic adaptive neural pathways of the human brain enabling more fundamentally adaptive learning computers. A new paradigm for chip level programming will likewise have to be developed. |
| Impact         | Once successful it will likely take some time for computer scientists to figure out how to change programming paradigms to accommodate the adaptive architecture but this may be an alternative to quantum computing that may help define S2. It will also take neuroscientists and programmers a combined effort to figure out how to properly stimulate the \brain\" for constructive growth in complexity. Impact will be measured when the IC learns to do new or more precise functions through trial and error based on stimuli."   |
| Resources      | 50M per year for the first few years and well over 200M per year afterward. Fab processes are prohibitively expensive to develop especially with the merger of 3 different fab technologies. This effort will likly take a huge collaboration among many top companies and national labs to achieve a successful product within 15 years.   |
| Open Field     | This is targeting AI core development for S2 at the earliest, depending largely on the capabilities of nanotech as it evolves. May be an \alternative\" to quantum computing. "   |
| Authors        | Astrosploy,fortomorrow,Sedgeheel,Ironman425,Athon   |

|                |   |
|----------------|---|
| title          | Planning Dataspace Recovery Efforts For Future Conflicts  |
| Action Plan #  | 47  |
| Base Card #    | 345   |
| Base Card Text | Opponent AI will compromise network. Must have a means to protect internal ship network by disconnecting from allied communication.   |
| Who            | Involved: Cyber Command, EMOs, National Guard, IT specialists, engineers, all levels of government, private utilities companies Affected: All dataspace users, civilians Advocate: Cyber Command, EMOs, academics, experts Opponents: Private company shareholders, taxpayers, local and state governments resenting federal control, SkyNet  |
| What           | Mitigate damage and enable quick recovery from an AI cyberattack on infrastructure to prevent conflict due to instability. Combine human and AI capabilities to re-establish utilities and comms to maintain order until complex communications needed for financial and logistical systems are audited and repaired. Critical infrastructure redefined to include cyber infrastructure. Some physical fail-safes exist but must be improved to confine damage to easily replaced computer systems vice machinery.  |
| Impact         | This plan will prepare the civilian and military infrastructure for cyberattacks as well as make it more resilient during natural disasters and other disruptions by ensuring that the increasingly important cyberstructures are protected alongside physical capabilities. It should prompt a hardening of the Internet of Things against nefarious uses. Success can be extrapolated from exercises, conventional cyberattacks, and the increased ability to react to non-cyber disasters and recover from them. |
| Resources      | This will require a multi-decade effort to incrementally replace existing systems, build fail-safes, and optimize them using evolving friendly AI. In the short term, improving preparedness with the ability to regain critical infrastructure quickly while networks remain untrusted will necessitate a moderate level of resources and mainly require a shift in thinking by EMOs. Preplans incorporating industry will ensure that food and essential deliveries continue without the JIT architecture.        |
| Open Field     | This plan is aimed at S1 as potential adversaries will enhance their cyberattacks on civilian infrastructure with their own AI in an attempt to either cripple the country or at least cripple friendly AI, increasing the potential collateral damage. S1 will also be beneficial and can be leveraged during recovery efforts to identify subtle corruption in cyberspace and optimize the repairs.   |
| Authors        | RMCNavyGuy,Astrosploy,Ironman425  |



## Appendix C: Blog Posts

### You Get a mmowgli Award!

Singularity mmowgli players, the time has come to reveal our prize for the top winners. [Click here to see your prize!](#)

Okay, okay. We joke because we care. Legally, we can't give you a car, but figuratively we can do whatever we want! So, in that spirit...




























via imgflip.com

That's right! We have a few winners to announce. This round of winners is based solely on the number of points earned. Here's how it breaks down:

Exploration points are accumulated based on idea card play. Our winner in the exploration points category is [Ironman425!](#) Based on the number of Idea Cards he/she played, we're pretty sure this person didn't sleep the whole week, and for that kind of grit and dedication we are thankful! Below you will find the top 25 players in the Exploration points category, who no doubt gave our Exploration point winner a run for his/her money.

# LEADERBOARD

[Want to improve your score?](#)

| RANK |   | NAME                | LOCATION                | EXPLORATION PTS | INNOVATION PTS |
|------|---|---------------------|-------------------------|-----------------|----------------|
| 1    |    | Ironman425          | Rhode Island, USA       | 36380.0         | 21085.0        |
| 2    |    | Gardener            | California              | 31370.0         | 8595.0         |
| 3    |    | JFeatherstone       | Chicago                 | 18730.0         | 12025.0        |
| 4    |    | Athon               | San Diego               | 17870.0         | 14350.0        |
| 5    |    | Astrosploy          | USA Rockies             | 17060.0         | 19705.0        |
| 6    |    | Sedgeheel           | Canada                  | 14340.0         | 11175.0        |
| 7    |    | psienide            | Texas                   | 14000.0         | 6140.0         |
| 8    |    | Brasidas            | New England             | 13810.0         | 11600.0        |
| 9    |    | Buttblight          | West Yorkshire, England | 11730.0         | 5295.0         |
| 10   |    | Jarvis              | College Station, Texas  | 10550.0         | 3530.0         |
| 11   |    | starfleet1          | Boston                  | 9500.0          | 5265.0         |
| 12   |    | DukesterLee         | Maryland                | 9030.0          | 6720.0         |
| 13   |    | OgreMkV             | Central Texas           | 7690.0          | 4710.0         |
| 14   |    | kevinkin            | Red Bank NJ USA         | 7490.0          | 6285.0         |
| 15   |  | Bob The Mexican     | MS - US                 | 7230.0          | 14205.0        |
| 16   |  | SnowdenAssangeManni | Cascadia                | 7160.0          | 850.0          |
| 17   |  | undaunted6          | Pentagon                | 6630.0          | 6275.0         |
| 18   |  | freethinkerx        | Canada                  | 6540.0          | 6025.0         |
| 19   |  | Ogiwan              |                         | 6160.0          | 4625.0         |
| 20   |  | FunTzu              |                         | 6140.0          | 3940.0         |
| 21   |  | JackWagon           | UAE                     | 6060.0          | 8540.0         |
| 22   |  | blueicecrypto       | COMNAVCIVROCK           | 6030.0          | 1515.0         |
| 23   |  | ninjamonkey         | East Coast USA          | 5680.0          | 3845.0         |
| 24   |  | Dnet78              | United Kingdom          | 5640.0          | 905.0          |
| 25   |  | Starling            | Canada                  | 5620.0          | 6955.0         |

## Top 25 Exploration Point players

Innovation points are awarded based on participation in the Action Plans. That's the cool thing about mmowgli. You can participate where you see fit. Our winner for the Innovation points category is [fortomorrow!](#) He/she contributed to every single Action Plan we had, and much like Ironman425 we're pretty sure he/she doesn't sleep. Let's not forget our top 25 Innovation point players below.

# LEADERBOARD

[Want to improve your score?](#)

| RANK | NAME             | LOCATION  | EXPLORATION PTS | INNOVATION PTS |
|------|------------------|---|-----------------|----------------|
| 1    | fortomorrow      |   | 2420.0          | 26705.0        |
| 2    | Ironman425       | Rhode Island, USA                                   | 36380.0         | 21085.0        |
| 3    | Astrosplay       | USA Rockies   | 17060.0         | 19705.0        |
| 4    | Athon            | San Diego   | 17870.0         | 14350.0        |
| 5    | Bob The Mexican  | MS - US   | 7230.0          | 14205.0        |
| 6    | JFeatherstone    | Chicago   | 18730.0         | 12025.0        |
| 7    | Brasidas         | New England   | 13810.0         | 11600.0        |
| 8    | Sedgeheel        | Canada  | 14340.0         | 11175.0        |
| 9    | RMCNavyGuy       | Royal Military College of Canada, Kingston, Ontario | 5120.0          | 9370.0         |
| 10   | Gardener         | California  | 31370.0         | 8595.0         |
| 11   | JackWagon        | UAE   | 6060.0          | 8540.0         |
| 12   | Starling         | Canada  | 5620.0          | 6955.0         |
| 13   | DukesterLee      | Maryland  | 9030.0          | 6720.0         |
| 14   | kevinkin         | Red Bank NJ USA                                     | 7490.0          | 6285.0         |
| 15   | undaunted6       | Pentagon  | 6630.0          | 6275.0         |
| 16   | warriorhood      | mexico df   | 1050.0          | 6215.0         |
| 17   | psienide         | Texas   | 14000.0         | 6140.0         |
| 18   | freethinkerx     | Canada  | 6540.0          | 6025.0         |
| 19   | brandocalrissian | Dahlgren VA   | 3110.0          | 5465.0         |
| 20   | CitricLemur      | San Diego   | 4660.0          | 5395.0         |
| 21   | Buttblight       | West Yorkshire, England                             | 11730.0         | 5295.0         |
| 22   | Renkin           |   | 5110.0          | 5270.0         |
| 23   | starfleet1       | Boston  | 9500.0          | 5265.0         |
| 24   | Nexcor           | Spain   | 3070.0          | 4990.0         |
| 25   | BlackFox         | USA   | 2770.0          | 4850.0         |

## Top 25 Innovation Point players

So this is it, right? Nope! Game Masters have our work cut out for us. We've got to go through all [9109 Idea Cards](#) and [45 Action Plans](#). (Don't tell gm\_matt! He might break again.) In addition to reading through all the great input you gave us, we're also going to be hunting for more awards to give out! So BOLO (Be On the Look Out) for a blog post on this in the near future!

Finally, we want to say thank you, thank you, thank you! This community of users has been amazing. Your dedication, your attention to detail, your passion for thinking through TWO difficult singularities has set a high bar for the next mmowgli. While we dream it and design it, you bring it to life. There is no mmowgli without you. (Excuse me, there's something in my eye...I'm NOT crying, YOU'RE crying...)

With that in mind, I want to pass along my email. ([rllaw@nps.edu](mailto:rllaw@nps.edu)) If you'd like to participate in future mmowgli, please let me know. If you have a killer topic for the next mmowgli, please

let me know. If you would like to run your own mmowgli, please let me know. If you have nothing but praise and admiration for mmowgli, definitely let me know. If you have suggestions for improvement, gm\_matt is the person to contact. (I kid again!) My point is our story doesn't end here. In fact, we're hoping it is just getting started!

279 total views, no views today



Author [Rebecca Law](#) Posted on [April 4, 2017](#) Categories [Maritime Singularity Blog](#) | [Comment on You Get a mmowgli Award!](#) | [Edit "You Get a mmowgli Award!"](#)

Stop it now, I mean it!



The game is almost over! It's time to play those last few AP comments and make those last few edits. ***The game will be shutting down at 10PM EDT tonight, Sunday.*** That's just in 2 hours. Sorry for the late notice, but hopefully the 2 extra days helped you have time to say what you needed to say.

Many of you are probably asking now, what comes next?

First off, check back here on the blog for a simple blog post acknowledging the points winners some time in the next day or two. After a few weeks we'll post some more detailed awards recognizing cards and players that interested us. For the time being the reports page will stay open and the game will probably be accessible for you to view as a guest. However, we don't promise that they will stay up forever.

One other thing that you can do is to keep an eye on this blog space and follow MMOWGLI on twitter at @MMOWGLI to watch for future games. We don't have details on our next game ready to post right now, but there will be more and we hope you will consider participating again.

Thank you!

170 total views, no views today



Author [Matthew Largent](#) Posted on [April 3, 2017](#) Categories [Maritime Singularity Blog](#) [Comment on Stop it now, I mean it!](#) [Edit "Stop it now, I mean it!"](#)

Maritime Singularity mmowgli: The End is Near...or Is It?





We really can't say anymore than that. We are overwhelmed with the amount of attention to detail in these Idea Card threads and Action Plans. As a game designer, it's games like these and players like you that make work fun. We're on the cusp of declaring this the "Greatest mmowgli of All Time (GMOAT)." We already know it's one of the best. (My Dad said so. I make him play each one. Errrrr...I mean, he volunteers to play every game. He volunteers, NPS! Per the user agreement he willingly volunteers.)

Now that we've gotten the love fest out of the way, we need to convey some pertinent mmowgli information. **First, Idea Card play will end at 7pm EST time tonight, so get those last minute ideas in!**

Second, because we love you so much and you've probably had to juggle a lot this week, **we're going to extend Action Plan editing through the weekend!** (mmowgli Weekend Warriors Unite!) What does this mean? It means if you're an Action Plan author, keep on truckin'. If you're not an Action Plan author and would like to be, you can request to author an Action Plan! (It's not too late...) If you're just into making comments, comment away.

Whatever path you choose as you race to the finish line, beware obstacles and stay the course!



Obstacle  
you may encounter on I85 in Atlanta.



Obstacle you may encounter in Montana.

Stay tuned over the course of the weekend for more information!

149 total views, no views today



Author [Rebecca Law](#) Posted on [March 31, 2017](#) Categories [Maritime Singularity Blog](#)  
[3 Comments on Maritime Singularity mmowgli: The End is Near...or Is It?](#) [Edit "Maritime Singularity mmowgli: The End is Near...or Is It?"](#)

In Case You Missed It: 24 Hours to Go and 8 New Idea Cards!

Maritime Singularity mmowgli-ers!

We've got 24 hours to wrap it up, and in true mmowgli fashion we'd like to throw you a curve ball. (Don't worry! You all have been an AMAZING group so we know you can handle it.)

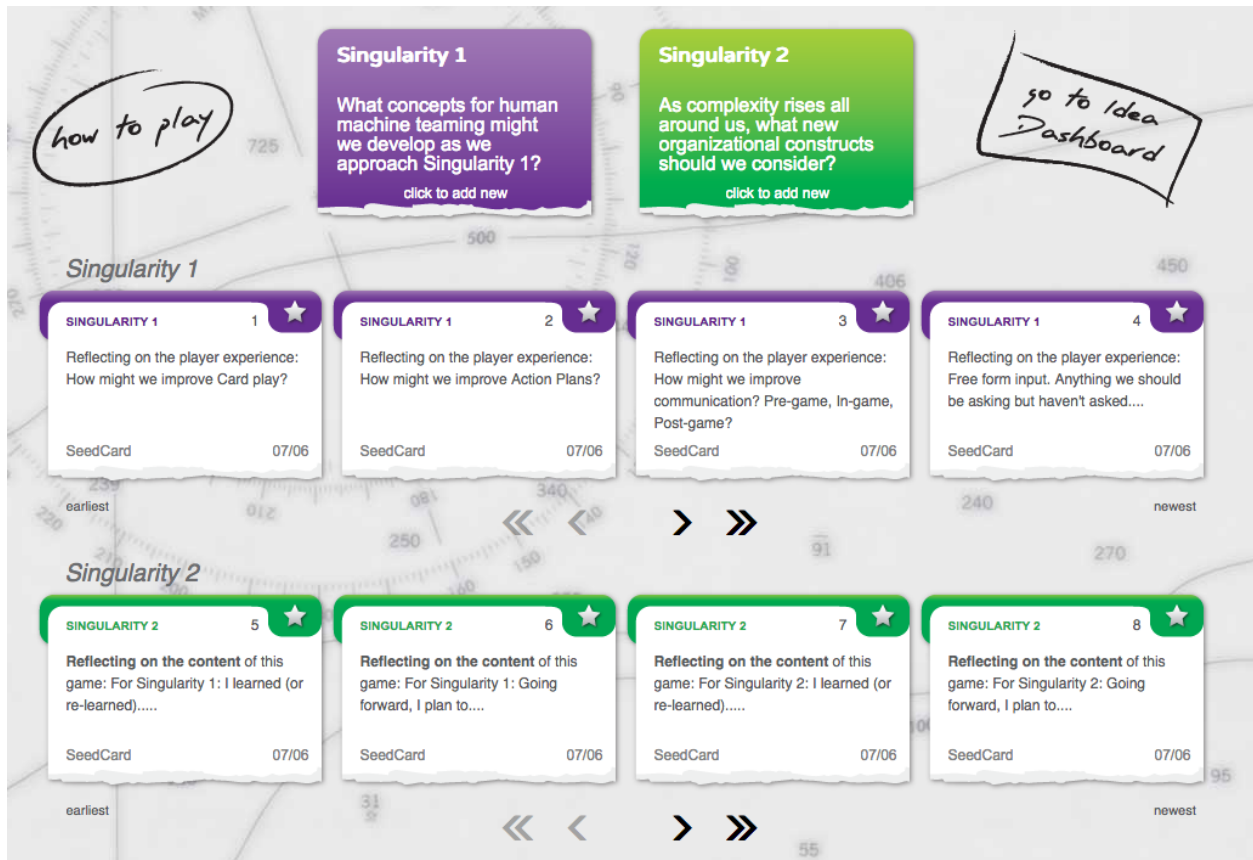
Just like every good human-machine we always are seeking to improve. Most of the time we get a few emails here and there from players who have wonderful suggestions on all sorts of things mmowgli, but today we'd like to get real "out there" with a set of meta mmowgli questions. That's right, mmowgli on mmowgli (\*sound of minds collectively being blown.)



(memegenerator.net, Sudden Clarity Clarence meme)

That's right, we want to take it all the way back to the beginning. Idea Cards 1, 2, 3, 4, 5, 6, 7, 8 are where you'll find our questions.





So, here we go into uncharted territory. We appreciate all your hard work and dedication so far, and we hope you'll help us a little bit more by giving us some feedback as we move towards mmowgli 2.0!

172 total views, no views today

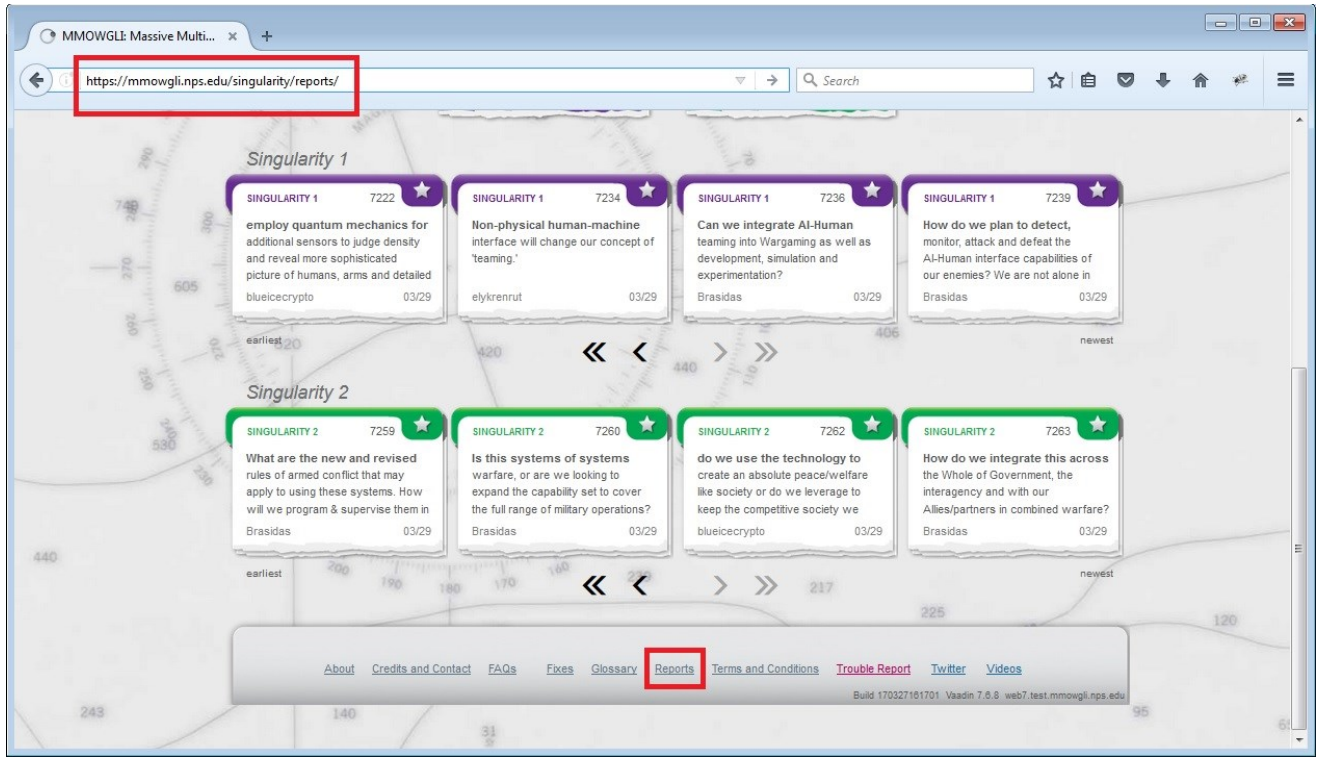


Author [Rebecca Law](#) Posted on [March 30, 2017](#) Categories [Maritime Singularity Blog](#) [2 Comments on In Case You Missed It: 24 Hours to Go and 8 New Idea Cards!](#) [Edit "In Case You Missed It: 24 Hours to Go and 8 New Idea Cards!"](#)

[Have you checked out the reports page?](#)

Here at the MMOWGLI Institute (ok, we just made that up, but we wish it was a thing) we believe that data is important and sharing of data is even more important. We have a full-service reports page that has a number of different ways you can look at the results from the game. The reason I'm telling you this now is that when the game gets as big as it is now, the reports page is an EXCELLENT way to find comments deep within card chains that you want to play on.

To access the Maritime Singularity MMOWGLI Reports Page, simply add “/reports” to the end of the game url. You can also click on the link at the bottom of the game page.



Once you are in the reports page there are a wealth of different options for you to choose. I'm going to talk about the Idea Card Chains, but you might want to check out the sunburst visualizer and other capabilities there.



The idea card chains link is a great way to quickly scroll through the cards. At the top of the page is a quick description of how the cards are spread across the game. In this case we can see that you've played 605 Singularity 1 cards, 385 Singularity 2 cards, etc.

| Player Motivation and Game Purpose  | Idea Card Categories and Counts (7189 total)   |                                    |                        |         |       |         | Corresponding report products:  |                                     |                                    |                                    |                        |    |   |   |
|---|--|------------------------------------|------------------------|---------|-------|---------|---|-------------------------------------|------------------------------------|------------------------------------|------------------------|----|---|---|
| <ul style="list-style-type: none"> <li><a href="#">Call To Action</a> video</li> </ul>  | Singularity 1  | Singularity 2                      | Expand                 | Counter | Adapt | Explore | <ul style="list-style-type: none"> <li><a href="#">Reports Index</a></li> <li><a href="#">Action Plans</a></li> <li><a href="#">Idea Card Sunburst Visualizer</a></li> <li><a href="#">Player Profiles</a></li> <li><a href="#">All MMOWGLI Game Reports</a></li> </ul> |                                     |                                    |                                    |                        |    |   |   |
| <b>Idea Card Chains</b> <ul style="list-style-type: none"> <li><a href="#">Singularity 1</a> and <a href="#">Singularity 2</a></li> </ul> | 605  | 385                                | 2172                   | 1519    | 772   | 1736    |   |                                     |                                    |                                    |                        |    |   |   |
| <a href="#">License, Terms, Conditions and Contact</a>  | <b>Game Master flagged cards</b> <table border="1"> <tr> <td>* <a href="#">Super Interesting</a></td> <td>+ <a href="#">Common Knowledge</a></td> <td>^ <a href="#">No More Children</a></td> <td><a href="#">Hidden</a></td> </tr> <tr> <td>51</td> <td>0</td> <td>0</td> <td>9</td> </tr> </table> |                                    |                        |         |       |         |   | * <a href="#">Super Interesting</a> | + <a href="#">Common Knowledge</a> | ^ <a href="#">No More Children</a> | <a href="#">Hidden</a> | 51 | 0 | 0 |
| * <a href="#">Super Interesting</a>   | + <a href="#">Common Knowledge</a>   | ^ <a href="#">No More Children</a> | <a href="#">Hidden</a> |         |       |         |   |                                     |                                    |                                    |                        |    |   |   |
| 51  | 0  | 0                                  | 9                      |         |       |         |   |                                     |                                    |                                    |                        |    |   |   |

From that you can click on the “Singularity 1” or “Singularity 2” links to skip down to actually looking at those cards. At the top of the Singularity 1 or 2 cards section you can see a list of all of those top level cards. This is a quick way to browse through the base level ideas that have been suggested in the game.



## What concepts for human machine teaming might we develop as we approach Singularity 1?

## Table of Contents: Singularity 1 Top-Level Seed Cards (605 total)

- JFeatherstone: card 9, [Should there be any areas where AI/Machine Learning should be prohibited, regardless of whether we get "better results."](#) (103 children)
- ninjamonkey: card 10, [95% of all work with computers will be vocal, we'll talk to computers and they will talk back to us.](#) (72 children)
- undaunted6: card 11, [Similar to military working dogs, create an interface that can grow with the user throughout their service time.](#) (38 children)
- Spectral: card 13, [Direct interfaces between a human and a machine.](#) (30 children)
- mkelly1495: card 15, [Direct brain to machine interface that encodes human thoughts into cognitive structures that machine can process.](#) (15 children)
- OgreMKV: card 16, [Use evolutionary algorithms with human inputs to predict trouble spots and design force compositions.](#) (5 children)
- JFeatherstone: card 19, [Should an AI enhanced MMOGGLI be used as the preferred interface between machine learning and human interactions?](#) (3 children)
- undaunted6: card 20, [Create a swarm system that a single person can control multiple single task machines](#) (54 children)
- Tigeriskull: card 23, [Learning more about all lines codes of programming of any AI of Singularity can be useful about how it "think" ?](#) (6 children)
- Quinn: card 27, [Need to train the humans to understand how machines "thinks" and train the machine how the humans thinks, to building understanding for both](#) (26 children)
- Blart: card 30, [A method will be needed to provide the sailor with a core understanding of the key pieces of information that led the machine to a decision](#) (10 children)
- freethinkerx: card 31, [Develop a human-AI "API" that is also good UX, enabling humans to work with a multitude of machine learning capabilities.](#) (6 children)
- danielgn22: card 39, [The mind will increase as technology advanced, we will be able to contain, and understand information much better mechine adjustment to mind](#) (10 children)
- Buttblight: card 61, [We Need to Eliminate all barriers between AI and Human. In order to remain relevant we need to evolve](#) (17 children)
- Quinn: card 70, [As machine take over more basic mental task, human would evolve to address the more advanced tasks](#) (18 children)

If you continue to scroll down you can see those same cards in an indented format that allows you to see the structure of the card chain as well as quickly read the cards themselves. This is an excellent way to scroll through ideas and to look at a whole card chain in a glance. If you want to find a given chain you can go to the list at the top and click on the card number or the text of the card to link down, or you can just use your browser's search function to quickly get to a card.

|        |      |  |
|--------|------|--|
| Expan  | 535  | OgreMKV: Good. Does it fulfill function? Does it have unintended behaviors? Accuracy of function/predicting? That sort of thing...                     |
| Singul | 528  | bowfin: Manned platforms become the data analysis, mission command platform and the unmanned systems become the risk takers.                           |
| Explot | 543  | Tablog: How do you trust the risk taker to make good targeting decisions?  |
| Expan  | 839  | bowfin: Trust must be built. More so confidence that the weapons platform will engage as planned. test, test and retest.                               |
| Expan  | 2244 | ninjamonkey: This is solid, my question is how do we keep track of all those UxVs? The human becomes a processing and decision bottleneck.             |
| Explot | 574  | dockermaster22: What risks should the unmanned systems take? Should it go into combat with manned platforms controlling / guiding it?                  |
| Expan  | 862  | bowfin: Develop kill boxes and employ with engagement authority to kill what it detects, tracks, classifies, and engages.                              |
| Singul | 538  | Jomiko: Create a common language to communicate between humans and machines, all humans and all machines can communicate equally.                      |
| Expan  | 941  | Crit Int: Instead of a universal language, develop several. Common tongue, plus increasingly classified info using increasingly difficult languages.   |
| Explot | 555  | dockermaster22: Should it be an all new language? Wouldn't it be hard to learn? If it is based on English, the barrier will be low.                    |
| Count  | 553  | threatanalysis: National security systems may require a unique language as a security measure.   |
| Expan  | 726  | Crit Int: Instead of one universal language, perhaps it's a "common language," plus increasingly difficult languages based on potential security risk. |
| Count  | 731  | Athon: Existing AI's eg. Watson, already have near-human accuracy in understanding communications (multi-lingual), and will be on par soon.            |
| Singul | 544  | threatanalysis: New direct interface tech should be used to maintain processing efficiency in threat situations  |
| Explot | 2260 | gm matt: There are several ideas talking about language and about interface, I recommend that you join them and add to their ideas!                    |
| Singul | 545  | freethinkerx: Enhanced curriculum: data science is a core skill for creating and managing data sets for machine learning.                              |
| Adapt  | 740  | Athon: Locate the best human experts to train the dataset/corpus.  |
| Singul | 551  | Revolver: Would an AI simply exist in cyberspace? Could an AI construct emerge on and "live in" the internet? Would we know it even happened?          |
| Adapt  | 584  | Prof John Wick: could we as humans allow something we are not sure of its behavior, free in the internet.?   |
| Explot | 685  | hezel: Disallowing is not something that we can keep for long. Have the developers that will embed Ethics in that AI release it first                  |

I'm sure you can imagine, this is a great way to skim through ideas and find specific cards or chains of cards of interest. They're all rendered in one page so scrolling is easy. You can search for specific words or phrases to try to find topics of interest and then go back into the game to play those cards. Unfortunately you can't play from the reports page. A pro-tip on that, if you want to go to a specific card you can use the following:

[https://mmowgli.nps.edu/singularity/#!86\\_X](https://mmowgli.nps.edu/singularity/#!86_X)

Where instead of X you put your card number. So, if you wanted to go to card 1234 you'd use [https://mmowgli.nps.edu/singularity/#!86\\_1234](https://mmowgli.nps.edu/singularity/#!86_1234) You have to be already logged into the game for this to work correctly, but once you're logged in you can use the same window to quickly go to different chains.

So, take the time to click over to the reports view as you're searching for places to contribute and fill out some of the ideas that need your help.

125 total views, no views today



Author [Matthew Largent](#) Posted on [March 29, 2017](#) Categories [Maritime Singularity Blog](#) [Leave a comment on Have you checked out the reports page?](#) [Edit "Have you checked out the reports page?"](#)

It's the Mid-Game Countdown!

Dear Maritime Singularity mmowgli players,

Congratulations on reaching the mid-point of the game! Collectively, we have generated over [6500 Idea Cards](#) and [20 Action Plans](#) on both of our singularities. Thank you!

At this point in the game, we like to start pivoting from brainstorming (*Idea Cards*) to concept development (*Action Plans*). Our current Action Plans have come to us in one of three ways. First, you may have noticed that some Idea Card chains have hit a critical mass and deemed "Super-Active."

# IDEA DASHBOARD

MOST RECENT IDEAS

SINGULARITY 1

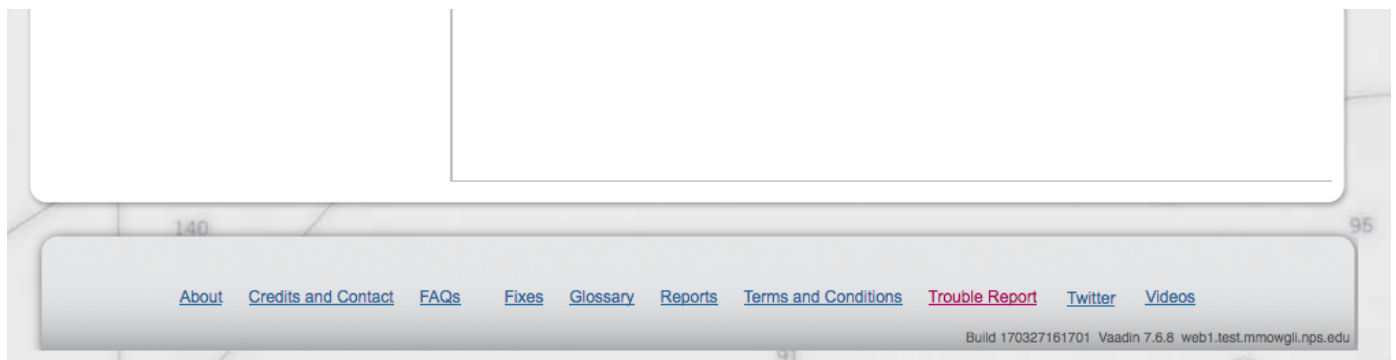
SINGULARITY 2

*Super-active chains*

Super-active chains are sets of cards that have two or more authors and four or more follow-on cards at two levels.

| CARD CONTENT  | AUTHOR           | CREATED       |
|---|------------------|---------------|
| (9) Should there be any areas where AI/Machine Learning sho                                     | JFeatherstone    | 03/27 06:01 F |
| (10) 95% of all work with computers will be vocal, we'll talk to c                              | ninjamonkey      | 03/27 06:01 F |
| (20) Create a swarm system that a single person can control r                                   | undaunted6       | 03/27 06:04 F |
| (24) Like this game, massively distributed stock market for ide                                 | OgreMkV          | 03/27 06:05 F |
| (27) Need to train the humans to understand how machines "tr                                    | Quinn            | 03/27 06:07 F |
| (105) Create ethical AIs: develop algorithms, training and testir                               | aurelius         | 03/27 06:23 F |
| (244) How do you incentivize humans in a complex, less hierar                                   | JFeatherstone    | 03/27 06:46 F |
| (671) Applied transhumanism: integrated intelligent tech(suits?                                 | BlackFox         | 03/27 08:04 F |
| (1462) AI will have the ability to monitor human behaviors. Whi                                 | Jarvis           | 03/27 10:01 F |
| (1854) once autonomous how do you force a AI to obey do you                                     | MotokoSusu       | 03/27 11:00 F |
| (2283) How do we develop a naval approach to take advantag                                      | Ironman425       | 03/27 12:13 F |
| (2526) An AI should be a complement to help the people, not r                                   | DrIcaro          | 03/27 12:42 F |
| (2699) Attributes of future orgs: trust, transparency, distributed,                             | Gardener         | 03/27 13:02 F |
| (2860) How do you get the machine to logically accept working                                   | MarginalOverkill | 03/27 13:22 F |
| (3059) There are a many discussions about the morality of AI.                                   | Athon            | 03/27 13:53 F |
| (3241) Cultivate a spirit of expertise over rank.   | OgreMkV          | 03/27 14:44 F |
| (3266) Send developers to sailor work sites, interview them, cr                                 | Travis42         | 03/27 14:51 F |
| (3272) Obsolete hierarchical institutions will be replaced by per                               | SnowdenAssan     | 03/27 14:52 F |
| (3329) Complex Adaptive Systems (CAS) <a href="http://bit.ly/1dkW5cu">http://bit.ly/1dkW5cu</a> | Gardener         | 03/27 15:08 F |
| (3443) Engage public in developing autonomous AI with comm                                      | Sedgeheel        | 03/27 15:36 F |
| (3769) Develop a common language to enable effective humar                                      | KayHawk          | 03/27 17:41 F |
| (4649) What methods promote transparency within an organiz                                      | phzyx            | 03/27 21:30 F |
| (4893) Protocols to leverage on AI speed and coordination to s                                  | FunTzu           | 03/28 00:50 F |
| (5336) Could we incorporate AI into armor? Could it help detec                                  | NavyAnalyst1     | 03/28 06:45 F |

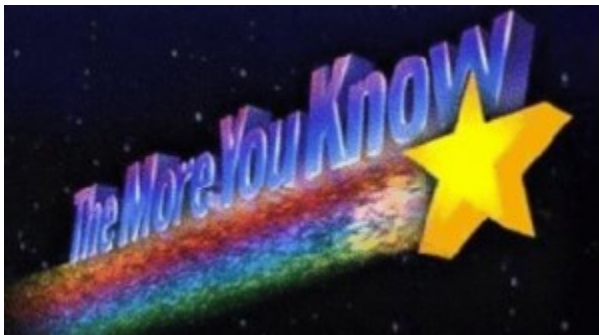
Some players have found their way to the Trouble Report link and requested to create an Action Plan from an Idea Card chain.



In other cases, Game Masters have been working around the clock reading your ideas and promoting them to Action Plan status. (True story: we broke [gm matt!](#) He's a super great guy so we genuinely feel bad about that.) No matter how they were created, we need your energy to create more!

## The More You Know: Action Plans

Anyone remember the late 1980's "[The More You Know](#)" PSAs? (They were my favorite!) Apparently, they are making a comeback in 2017, and so I'd like you to consider this your "The More You Know About Action Plans" PSA!



Some of you may have noticed there is an orange Take Action button in the upper right hand corner of your screen. This button opens up a second phase of our mission known as the Action Plan phase. A few of you you have invitations in your inbox to an Action Plan and some of you still don't know they exist. It's okay! This post is here to help demystify them so we can take this mmowgli to the next level!

[Action Plans](#) are the *who, what, why, when* and *where* of a single card chain. An Action Plan is your opportunity as a player to tell us more about your idea. In an Action Plan, you are not restricted to 140 characters or less. In addition, you can even add images and video to enrich your plan.



Action Plans are important because they are another way to generate points! Innovation Points begin to rack up when you create Action Plans and/or contribute to them. There are many ways to collaborate on an Action Plan without being an author. For example, players can contribute their knowledge by adding to the Comments section of an Action Plan. Players can also vote on



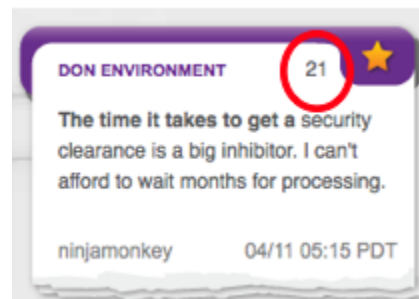
the quality of the Action Plan. If you like what you see, you can also leave a comment stating that you want to be an author, and a game master or author of the action plan can add you.

Also, Action Plans with a **red number** need expertise! You can also see these on the “Need Authors” tab of the action plan dashboard.

Now that you know what an Action Plan is how do you create one? Simply select the [Trouble Report](#) link at the bottom of the game page. Within the first paragraph, you’ll see a link on how to create an Action Plan. Fill out this form and your request will be answered shortly. Additionally, game masters will be looking at card chains they think are interesting and will be promoting some plans in that way. If you’re invited to an action plan you should receive an email or in-game mail.

In the end, collaboration on Action Plans is what MMOWGLI is all about. Generating “knowledge accidents” and making them a concrete plan. Thanks for your continued contributions. If you have questions, look at [Action Plan 1](#), it was created as an example to help players better understand the idea. Also, you can leave questions as comments on this blog post or in the comments of those plans.

**Note:** When filling out an [Action Plan Request form](#) an Idea Card number is required to enter the Action Plan into the game.



The idea here is that every single Action Plan corresponds to an Idea Card or Idea Card chain in the game. This is because mmowgli combines two phases of thinking: the divergent, rapid brainstorming phase (Idea Cards) and then the convergent, detailed phase (Action Plans). We like to show this progression in mmowgli. It speaks to our “it just takes one idea” ethos.

#### Game Schedule

**Wednesday, 29 March @ 1200 EDT:** All top-level idea card creation will be frozen! (If you don’t like it, tough luck. [Let. It. Go.](#)) If you have any last-minute ideas you want played at the top level, get them in before we lock it down! From this point forward, we want to drive the conversation down into deeper threads rather than wide.





**Thursday, 30 March:** Super-Interesting Cards and All About Action Plans. During this time, we want to encourage you to view the cards Game Masters have selected as “super-interesting.” Some of them are Action Plans, and some of them are not. For the ones that are not yet, Action Plans we want you to focus your creative energy on these. They’re on the cusp of greatness, and we need your drive to push them over the edge. You can find the super-interesting idea cards by going to the [Idea Dashboard](#) and selecting the “super-interesting” tab.

# IDEA DASHBOARD

*Most recent ideas*

SINGULARITY 1

SINGULARITY 2

SUPER-ACTIVE CHAINS

## Card Filters

Card play can be fast and thoughtful. Here are the most recent. Look for the cards most relevant to your thinking.

[All Cards](#)

[Super interesting cards](#)

[Expand cards](#)

[Adapt cards](#)

[Counter cards](#)

[Explore cards](#)

(Hint: mouse-over the text entry and a popup tooltip should appear with the full text.)

| ID   | CREATION    | TYPE          | AUTHOR       | TEXT                                   |
|------|-------------|---------------|--------------|--|
| 6371 | 03/28 17:01 | Expand        | kevinkin     | This has a lot to do with how hume     |
| 6370 | 03/28 16:59 | Expand        | Anarchy_MD   | This is almost a certainty, it will ha |
| 6369 | 03/28 16:57 | Singularity 2 | redwagon     | We should consider how AIs will s      |
| 6368 | 03/28 16:57 | Expand        | psienide     | One possible future impact is allow    |
| 6367 | 03/28 16:56 | Expand        | Charrelle    | Naturally syndicating (i.e. hives wi   |
| 6366 | 03/28 16:55 | Singularity 1 | TheFreeman   | Create IP databases from sigint d      |
| 6364 | 03/28 16:54 | Counter       | NextThursday | Possibly - how do we know the ag       |
| 6365 | 03/28 16:54 | Singularity 2 | Firezen      | Need to have a decentralized trust     |
| 6363 | 03/28 16:53 | Singularity 1 | Anarchy_MD   | Use AI to develop diplomatic solut     |
| 6362 | 03/28 16:53 | Singularity 1 | TheFreeman   | Monitor all trading platforms to cre   |
| 6361 | 03/28 16:50 | Expand        | NextThursday | As humans, we use all sort of inpu     |
| 6360 | 03/28 16:48 | Adapt         | Charrelle    | If both are connected, we may beg      |
| 6359 | 03/28 16:44 | Counter       | redwagon     | Seems dangerous to provide the i       |
| 6358 | 03/28 16:44 | Expand        | DukesterLee  | http://www.digitaltrends.com/cool-t    |
| 6357 | 03/28 16:43 | Singularity 2 | Carlfrancis  | Maybe a character that has to leve     |
| 6356 | 03/28 16:43 | Singularity 1 | Firezen      | Develop bio-sensor mesh network        |
| 6355 | 03/28 16:40 | Adapt         | redwagon     | How much education should be re        |
| 6354 | 03/28 16:39 | Singularity 1 | TheFreeman   | Monitor bio-metrics such as stress     |
| 6353 | 03/28 16:39 | Explore       | Ironman425   | How would you determine unit cor       |
| 6352 | 03/28 16:38 | Counter       | Ironman425   | You would have to train humans tc      |
| 6351 | 03/28 16:38 | Counter       | Ironman425   | Why would we purchase or lease :       |
| 6350 | 03/28 16:36 | Expand        | Ironman425   | Did you see the news today? Elon       |
| 6349 | 03/28 16:34 | Adapt         | Charrelle    | Technology may form its own hive       |
| 6348 | 03/28 16:31 | Counter       | DukesterLee  | Why can't AI have similar hierarch     |
| 6347 | 03/28 16:30 | Explore       | Gardener     | Doesn't matter. That you are not w     |

**Friday, 31 March:** Time to Wrap It Up! It's been fun, and we've made a lot of mmowgli friends but we're all pretty worn out. Today, is your day to finish up your last-minute ideas and polish off those Action Plans.

We can't thank you enough for all your hard work and dedication! Please know that it's not going unnoticed. In fact, we'll have awards to hand out at the end of the game. So keep it up, and don't break (like gm\_matt).

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Author [Rebecca Law](#) Posted on [March 29, 2017](#) Categories [Maritime Singularity Blog](#), [Uncategorized](#) | [1 Comments on It's the Mid-Game Countdown!](#) [Edit "It's the Mid-Game Countdown!"](#)

Guest post: [Organizational design...](#)

This is another guest post, this time from Erik Jansen of the Naval Postgraduate School. It is focused on Singularity 2 and talks about how we design our organizations to fit our environment and to deal with wicked problems.

### **Organizational Design in an Age of Accelerating Socio-Technical Interdependence**

*What are the New Organizations that will enable us to solve complex, dynamic, disruptive, emerging problem sets, and how do new technologies support this?*

Dominant theories of organizational structure contrast different types or configurations of organizations according to the environments they are best suited for. The different structural configurations are defined by sets of factors: are they highly formalized, centralized, vertically differentiated, mechanized, etc.? When these variables fit together so that there is minimal tension among them (e.g., formal, centralized, tall, and mechanistic), they form a structural type (e.g., machine bureaucracy). Different types are better fits for some environments than others; for example, machine bureaucracies fit well for mission sets that involve familiar, relatively simple, routine problems where efficient operations are rewarded by success; they are misfits for novel, complex problem sets involving innovation, adaptation to change, and dealing with competitors that use disruptive technologies. When organizations face wicked problems rather than well-defined problems, bureaucracies may be unable to transform from capabilities developed in the interest of efficiency and exploitation of opportunities to capabilities that emphasize innovation and exploration of opportunities.

Click [here](#) to access the full blog.

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Author [Matthew Largent](#) Posted on [March 28, 2017](#) Categories [Maritime Singularity Blog](#) | [2 Comments on Guest post: Organizational design...](#) [Edit "Guest post: Organizational design..."](#)

[Organizational Design in an Age of Accelerating Socio-Technical Interdependence](#)

### **Organizational Design in an Age of Accelerating Socio-Technical Interdependence**

Erik Jansen, Naval Postgraduate School

24 March 2017

*What are the New Organizations that will enable us to solve complex, dynamic, disruptive, emerging problem sets, and how do new technologies support this?*

Dominant theories of organizational structure contrast different types or configurations of organizations according to the environments they are best suited for. The different structural configurations are defined by sets of factors: are they highly formalized, centralized, vertically differentiated, mechanized, etc.? When these variables fit together so that there is minimal tension among them (e.g., formal, centralized, tall, and mechanistic), they form a structural type (e.g., machine bureaucracy). Different types are better fits for some environments than others; for example, machine bureaucracies fit well for mission sets that involve familiar, relatively simple, routine problems where efficient operations are rewarded by success; they are misfits for novel, complex problem sets involving innovation, adaptation to change, and dealing with competitors that use disruptive technologies. When organizations face wicked problems rather than well-defined problems, bureaucracies may be unable to transform from capabilities developed in the interest of efficiency and exploitation of opportunities to capabilities that emphasize innovation and exploration of opportunities.

Wicked problems are complex, dynamic and require multiple frames of reference to solve. One of their characteristics is that solution sets for solving the problems alter depending on the way one decides to frame the question. Complex, wicked problems may involve multiple perspectives (e.g., diplomatic, economic, defense and security, political, cultural, etc.) that must be integrated into action plans. This requires communicating and collaborating across the boundaries that separate individuals and organizations, with their different capabilities, all of which are needed to meet problems. Trying to do this with centralized hierarchies overloads the center and may hinder the development of collaborative capacity.

The organizational fit problems change with changing environments, especially, when issues are of collaboration or command and control. Times have changed. As an example, not so long ago, organizations had to decide where to keep various files: at the operational core/front line or at the strategic apex or command center where critical resource decisions were made. But not it is common to synch files so that there is a network of constantly accessible and updated information. This horizontal networking of information, combined with a more professionalized workforce supports decentralization and organizations that operate as a team of teams. As the technology changes, vertical flows no longer need to dominate and networked horizontal flows emerge to prevent overload of the center and create novel solutions. New technologies create new contexts for decentralization and collaboration.

But how does this set of givens taught for years in organizational theory translate into a modern world described by exponential technological advances some people see as leading to “singularities”. In the present, we are approaching the parts of the exponential growth curves of information and communication technologies that are quite steep. (For some, they also are threatening.) As we walk around with computers that connect us in new ways, we may feel we

are entering a reality resembling science fiction. In this rapidly changing context, is it possible to create organizational structures and forms that embody new solutions by resolving what we have thought of as contradictions? As a specific example, can we combine the singular focus, discipline and efficiency of something like lean six sigma with the multi-focus innovation and adaptive learning of something like design thinking?

Our current organizational types that we gravitate toward (e.g. machine bureaucracies or networked adhocracies) are based on minimizing the tensions of misfit among structural variables (e.g., centralization vs. teams and self-organization). These created role ambiguities and role conflicts that led to neither efficiencies nor effectiveness; failures of command, coordination, and control are increased as hybrid organizations are managed. However, our new technologies and information processes offer new possibilities for organizing and overcoming ambiguities. Overload can be reduced to the degree the machines and their human designers and partners can manage the algorithms so that they can autonomously deal with lower level details, and the devils that are in those details. But this raises many new design and management issues, including issues relating to the ethics and values embedded in those algorithms? And – in the security studies domain – how do we protect our new socio-technical systems that protect and sustain us and our world?

We are dealing with systems whose names suggest design contradictions and challenges for integration and resolution: Autonomous systems vs. collaborative technologies; programs, procedures and rules vs. design thinking and experimentation; high reliability vs. rapid prototyping and, “fail often, fail fast”. These capabilities may live side by side, but at various points they present integrative challenges that include developing and sustaining:

- leaders who are “ambidextrous” and able to manage for high reliability and consistency as well as innovation and creativity.
- structures for knowledge workers and a more professionalized lower level work force who are educated for judgments.
- designers who can create and manage technologies (e.g., their relation to the Internet of things) so that it is responsive to and integrated with our work force, and secure.
- teams who are skilled and comfortable in knowing when and where to collaborate (and where not to collaborate)
- reward systems that provide valued incentives and timely performance feedback for desired strategic behaviors.
- a culture — shared norms, shared awareness, and shared understandings — that supports and respects the diversity of skills and perspectives required for success.

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## Guest post: Business Strategy for Shipbuilders

Professor Wayne Hughes of the Naval Postgraduate School agreed to let us publish some of his work from the past. Have your Singularity 2 hat on as you read this, its premise is that to be more flexible we need a new fleet that has a larger number of smaller simpler ships. In Singularity 2 parlance, that would allow us to exhibit more complexity at a larger scale, because we could act in more places and more ways at one time. The abstract is below and you can link to the full blog below that.

### Abstract

We don't have to predict the future to know the actions the U. S. Navy needs to take now. The past and present provide enough clues.

U.S. shipbuilders should be ready when the Navy accepts that the existing strategy, operations, technology, and affordability evidence compels a new fleet composition. As their top priority, they should anticipate the Navy's most important need, which is to add small, affordable vessels for littoral operations. There are two reasons: (a) Such ships are simpler to design on contractor dollars, and (b) There are plenty of examples to draw on, from Chinese Type 022 *Houbeis* and Type 056 *Jiangdongs*, to many MCM vessel designs, to Swedish *Visbys*, to Israel *Sa'ar* ships of many generations, to a plethora of frigates and corvettes around the world.

Click [here](#) for the full blog.

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Author [Matthew Largent](#) Posted on [March 28, 2017](#) Categories [Maritime Singularity Blog](#) [Leave a comment on Guest post: Business Strategy for Shipbuilders](#) [Edit "Guest post: Business Strategy for Shipbuilders"](#)

## A Business Strategy for Shipbuilders

Professor Wayne Hughes, Department of Operations Research, Naval Postgraduate School

1 August 2014

### Abstract

We don't have to predict the future to know the actions the U. S. Navy needs to take now. The past and present provide enough clues.

U.S. shipbuilders should be ready when the Navy accepts that the existing strategy, operations, technology, and affordability evidence compels a new fleet composition. As their top priority, they should anticipate the Navy's most important need, which is to add small, affordable vessels for littoral operations. There are two reasons: (a) Such ships are simpler to design on contractor dollars, and (b) There are plenty of examples to draw on, from Chinese Type 022 *Houbeis* and Type 056 *Jiangdongs*, to many MCM vessel designs, to Swedish *Visbys*, to Israel *Sa'ar* ships of many generations, to a plethora of frigates and corvettes around the world.

### Background and my approach

A shipbuilder who quite appropriately wishes to develop a business strategy gave me a set of questions most of which were about the future because he is planning future activities. It is not necessary, however, to ask questions about Strategy, Operations, and Technology of the future. It is sufficient to talk about the past and present to see in what ways the U. S. Navy has failed to stay current. The Navy builds big, multipurpose ships designed for 40 year combat lifetimes. Therefore the same fleet must serve *every* future, whether American policy and strategy at any given moment in any specific location is to cooperate, to compete, to confront, or to fight at some level of conflict. Alternative futures are unknowable in part because enemies and even friends get a vote. The point is that we can't change a fleet's composition when our strategy changes if the fleet comprises mostly large warships that take years to fund, design, build, and train for their many missions and tasks.

The current Navy is the residue of a fleet that, from 1949 to 1989, was well-suited for a national strategy to contain the Soviet Union. It is the same ships and aircraft we adapted when, after 1990, our strategy shifted to projecting power in support of ground operations overseas. That adaptation was not a change in kind, but a change to bigger, exquisitely refined, and more expensive ships and aircraft of the same kind, in a total force with fewer of them.

Ships with 40 year lifetimes are expensive to modify or replace. We are trying to modularize our next generation of multipurpose ships. That is a good thing to do, but a *numerically* large part of the fleet should include many small, single purpose warships, with easy-to-train-to missions. When these less expensive littoral ships and their less exquisitely trained crews are overtaken by new technologies or geopolitical changes, they can be discarded or transferred to friendly nations and replaced quickly and affordably with the new technology and new tactical/operational training. In fact small, simple, single purpose combatants should be programmed not for 40 years but for short fifteen-year combat lives.

### Evidence that we knew what to do 30 years ago but did nothing

I could make a long list of warning signals from the past. One example suffices: the August 1994 Naval Institute *Proceedings* in just four articles accurately anticipated the need to change the Navy's composition:

- China's Navy Stirs, LT Michael Forsythe: "China's economic growth will produce a first-class navy—to ignore this is 'strategic procrastination.' "

- The Next U. S. Warship Design, Reuven Leopold: “The *Arleigh Burkes* are not the be-all-and-end-all—new missions and new systems call for new platforms.”
- Combatant Craft have A Role in Littoral Warfare, RADM George Worthington (Ret).
- A New Measure of Naval Forces, Norman Polmar: “Frigates have become the major warships of many of the world’s navies. At the same time the U. S. Navy is disposing of virtually all frigates . . .”

These astute observations are 30 years old and there are many more like them. A shipbuilder today doesn’t need predictions about the future to anticipate Navy needs. The Navy will have to act soon to reconstitute itself. Contractors can have preliminary designs of the right ships, aircraft, and supporting systems when the Navy wakes up to the following five prominent changes.

#### Trends over the past 20 years or longer that should have affected our fleet composition

1. The foremost *operational* change has been that the seas are no longer a safe sanctuary for U. S. fleet operations. In many littoral waters we cannot project power without risk of enemy attack. The threat of loss will keep multi-billion dollar surface ships from entering dangerous waters because it is a fleet that must not lose a CVN, an LHA, or even a DDG. Apart from the extreme embarrassment, the Navy is going to have no ships to spare for operations in safer waters.
2. The foremost *national security* change is the nation’s present financial predicament. Yet the Navy heedlessly persists with a program that will cost at least \$4.0 to \$8.0 Billion more of SCN per year than the average SCN budget over the past two decades. The serious budget deficit and national debt are the only trends that did not emerge until about five years ago, but they will curtail Defense spending for many years to come.
3. The foremost *national strategy* change resulted from the rise of Chinese *maritime* interests, her growing fleet, and (not to be overlooked) her vulnerabilities at sea and the opportunity for a U. S. sea denial strategy in the China Seas. A corollary is the need to plan for and practice cooperative operations with our allies and friends in East and South Asia.
4. The foremost *technology* change was the “Revolution in Military Affairs,” with its precision missiles, modern cyber systems, satellites with many capabilities, accurate scouting and targeting, and so on. At least 40 years ago most navies began the shift from the aircraft era to the missile era of warfare, yet the U. S. Navy continues to act as if CVNs and CVBGs are the centerpiece of naval combat power.
5. The foremost *impending technology* change now underway is large numbers of small, versatile, inexpensive, unmanned, and increasingly autonomous vehicles—air, surface, and subsurface. In response, the Navy is pursuing an unmanned vehicle capability aggressively, but we have not put equal emphasis on preparing for enemy potentialities.

#### Summary of fleet changes that should have been initiated because of these five prominent trends

The Navy must live with present and future budget constraints. Parenthetically that does not obviate the need to press for a National Maritime Strategy in which naval forces receive more than a one-third share of the DoD budget. But the best way to achieve budget realism is to agree



on a long-range split of SCN dollars (as a proxy for total capability) between three functions. For example, my choice, after considerable deliberation, testing, and updating would now be:

15% for Strategic Deterrence ships (both offensive and defensive in nature)

15% for Coastal and Littoral operations (for sea denial attacks on an enemy navy and to screen blue water ships approaching an enemy coast)

70% for blue water (for defense of the high seas and projection of naval power)

I prefer a percentage statement because (a) within limits the split scales up and down, so that for long range planning the budget constraints are shared by all; (b) it ends concern that the littoral component will consume too big a fraction of the SCN budget; and (c) it shows that without large alterations to the future strategic deterrent force (SSBNs and TBMD ships) that component will break the budget.

The result is the following:

- Design affordability changes into next generation SSBNs, accompanied by a new operational perspective, i.e., patrols in bays, inlets, and safer, protectable waters, in order to relax expensive test depth and quietness standards.
- Build either less expensive or fewer TBMD ships than are now planned.
- Build fewer CVN/CVWs because they are unaffordable, vulnerable, and undistributable. A better naval air capability is a mix of big and smaller carriers, supplemented by unmanned air vehicles and accompanied by stand-off missile power in surface ships and submarines. It is a force supplemented by Air Force strike aircraft whenever they are cost-competitive.
- Build new and affordable blue water frigates to gradually replace Aegis ships which are becoming obsolete against improved ASCMs and TBMs. New methods of defense are plausible, if we add electronic smoke screens (called *Pandarra*), laser weapons, and well-practiced C2 to the traditional fast-acting, short range soft kill systems that, unlike hard kill weapons, have been highly effective in the past. Necessity is the mother of invention.
- Put more emphasis on undersea warfare capability for offensive operations and sea denial. Since sustaining even the present SSN force level will be costly, new methods should include offensive mines, autonomous underwater vessels, and small, inexpensive shallow water AIP diesel submarines to supplement first line SSNs. More yet, we should develop and practice collaborative offensive submarine operations with our allies, especially in East Asia.
- Build a new, more affordable, and more distributable amphibious lift with a smaller total capacity, pointing out to the Marine Corps (1) we can't afford to fund all their requirements, (2) no ground operation is possible without a sufficient blue water fleet to support and sustain the operation, (3) the new, less costly lift comports with the Marines' intention to develop combat capabilities in distributable company-size building blocks, (4) speed of delivery is often as important as the size of the force delivered, (5) naval forces have not conducted an opposed amphibious assault since Inchon in 1950, and (6) the navy's amphibious lift must also deliver and support Army and Special forces.

- None of the above ships is suitable for fighting on the surface in littoral waters, or for conducting cooperative exercises with allies and partners. Only a flotilla of littoral combatants can maintain a sustained or rotating presence in critical *cul de sacs* that are variable in geography, logistically diverse, and entail different friendly and enemy air operations. By *cul de sac* I mean the Yellow Sea, the three China Seas, the Sea of Japan, the Persian Gulf, the Eastern Mediterranean and Aegean Seas, the Black Sea, and the Baltic Sea.

## Recommendations

Above all else a shipbuilder' business plan should prepare to build a variety of smaller, simpler combatants. New and different air-capable and undersea vessels are also needed but they take a much larger investment of shipbuilder brainpower, time, and energy. With many existing ships to crib from and many friendly coastal fleets to learn from, the easiest design initiative is a surface warship for affordable presence, affordable confrontation, and cooperative operations with our partner nations. A flotilla of such ships should be designed with the certain knowledge that they will be the first surface warships to put at risk if and when the U. S. Navy must fight in littoral waters.

The report of the special task force looking at functions and designs to replace the curtailed LCS program should be a guidepost. It is due to be completed on 31 July. The LCS was overloaded with too many missions, tasks, and expectations. To fulfill all its intended roles, the Navy will need new blue water frigates and a large flotilla of small, low cost, austere manned, forward based, stealthily operated, offensively disposed, single-mission missile ships for green water operations.

The sooner shipbuilders are able deliver such ships the sooner the U. S. Navy will have new tactics to go with them. The blue water frigate must be a defensive ship for sea control, trained to protect things on the open ocean. The green water missile ship must be offensively trained for stealthy sea denial operations in enemy waters. This is oversimplified—sound tactics will entail scouting and air cover, and new ways of commanding and controlling—but it will help shipbuilders anticipate the Navy's design criteria.

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The singularity hasn't happened yet!

Congratulations, players! We're 12 hours into Maritime Singularity mmowgli and we're just under [4,000 Idea Cards](#). It's clear from looking through 12 hours of game play that you are an incredibly creative and intelligent group. Thank you for your time, energy an intellect!

So you are aware, there is a small, dedicated team of game masters working behind the scenes feverishly reading through all your Idea Cards, threads and Action Plans. We'll soon be marking cards "super-interesting" and asking you to "dive deeper" into some of the more shallow threads.

There are some really great nuggets out there, and we need the wisdom of the crowd to add to them!

One thing that we also wanted to stress is the time period in which we are asking you envision the future. We're really interested in this near-future pre-Singularity 1 period. As the top purple card says, what concepts will help as we approach the singularity. Much has been written about the singularity itself and even post-singularity, but the concepts we should consider as we approach the singularity is our real mystery.

What does that mean? We're not that focused as much about fully sentient Artificial Intelligence. To be clear, AI does not inherently mean sentience or artificial life. While we fully recognize that is a possibility or even probability in a future singularity, we need to focus on the things we can do between now and then, specifically in the next 15-20 years. As computers get more and more capable, as machinery gets smaller and more capable, how can they work with/in/for the human?

Why do we want to look at the pair? Because we believe that, just like with Freestyle Chess, the human and machine working together will be better than both the human alone AND the machine/computer alone.

So, while we value and appreciate your thinking about how humans will deal with a sentient post-singularity AI, we need you spend your creative energy thinking about the "as we approach" part and what we should be doing to be a team when we get there because if we don't "as we approach" will become "what we should have done."

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Author [Matthew Largent](#) Posted on [March 28, 2017](#) Categories [Maritime Singularity Blog](#) [4 Comments on The singularity hasn't happened yet!](#) [Edit "The singularity hasn't happened yet!"](#)

[Guest post: Automated Combat Systems](#)

## **Can Automated Combat Systems Be Wise?**

Peter J. Denning

(Distinguished professor of Computer Science, Naval Postgraduate School)

Last year I remarked in a talk that "a decision is an emotional commitment," with the implication that only humans could make a commitment. If this is so, how can we rely on automated weapons systems that are supposed to use emotionless artificial intelligence to keep up with battle paces far faster than humans? Is inability to make a commitment an inherent weakness of automated battle management systems? How might this weakness be overcome?

Before we tackle these big questions, let's start with a smaller one related to my original remark.

What is involved when humans make decisions? A decision is the conclusion of a deliberative process; after making a choice to accept the decision, we commit to the actions that carry it out. The commitment is distinct from the process that advised it.

We like to think of ourselves as rational beings. That means we think things through using the tools of logic until we deduce a defensible position, and then we make a decision to do the logical thing. When we cast decision making as a logical process, we seem to open the door for automation. After all, computers are logic machines; they can follow the logic to decisions much more reliably and quickly than humans and in the process examine much larger data sets than humans can.

To see the rest, click [here](#).

Maritime Singularity Blog category

[Guest Blog: Can Automated Combat Systems Be Wise](#)

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A Blog

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We like to think of ourselves as rational beings. That means we think things through using the tools of logic until we deduce a defensible position, and then we make a decision to do the logical thing. When we cast decision making as a logical process, we seem to open the door for automation. After all, computers are logic machines; they can follow the logic to decisions much

more reliably and quickly than humans and in the process examine much larger data sets than humans can.

But if you look closely at the times you made decisions, you will soon discover that no matter how logical the proposal is, you won't make the decision to do it unless you feel like it. The logic gives you a persuasive story that you can use to justify why you made the decision. Yet the fact remains you won't make the decision unless you feel like it.

This might seem a trite observation. But the difference between the result of a logical deduction process and a person making a commitment based on the result is a fundamental and crucial difference between humans and machines.

Builders of computing systems have an engineering meaning for the word "commit" – to set in motion a chain of events that cannot be reversed or undone. For example, database engineers say that a transaction is not committed until it is permanently recorded in the database. A missile system operator would say that the missile firing sequence is committed when the fire button is pushed. In contrast with this machine notion of commitment, a human commitment is an emotional engagement that continues after the commitment is made and lasts at least until the commitment is fulfilled.

We can illuminate this distinction with an example: trust. When do I trust another person? A machine? Can a machine trust me? A common definition says that trust is an assessment of competence and sincerity. If I trust what you say you will do, I am assessing that you have the skills necessary to do it (competence) and that intend to do what you said you would (sincerity). I can ground these assessments by gathering sufficient and relevant evidence – for example, by interviewing people who have worked with you and learning whether they saw you completing the work you promised. All this seems very logical. I can imagine automating it with a machine that gathers the evidence, evaluates it against criteria for sufficiency and relevance, and reports whether I can trust you. But even with all this logic, I may find it difficult or impossible to trust you. Why? Trust also includes my willingness to make the bet that you will take care of me and my interests. I say "make a bet" because it is never certain that you will do what you say. In other words, to overcome the uncertainty, I want to believe that you care about me. Your care will disincline you to betray my trust and will motivate you to overcome unforeseen breakdowns. I care that you care about me. Care is at its core an emotional engagement. Unless I care, I cannot trust you. Unless you care, you cannot honor and support my interests: you cannot earn my trust.

Every commitment you make is a caring engagement. You cannot commit to something without caring about it. Other people say you are "caring" when they see you honoring your commitments. And they say you don't care if they see you breaking your commitments. Commitments are the essential constituents of all human action. When we do not care about something, we cannot commit to taking care of it.

Our capacity to care is shaped not only by our emotions, but also our moods. A mood is a biological disposition to interpret future possibilities in a certain way. A mood is not an emotion, but rather a context for emotions. For example, when I am anxious, I interpret my surroundings

as potentially dangerous; I experience fear (an emotion); I focus on how to protect myself; I shy away from commitments because they are risky. In contrast, when I am appreciative, I interpret by surroundings as wonders worth celebrating; I experience joy (an emotion); I want to make commitments.

Productive moods incline us to make commitments that support our goals. Unproductive moods disincline us to make such commitments. Gloria Flores has written a wonderful little book, “Learning to Learn” (1), in which she examines how our success with learning new things depends on whether we can remain in a productive mood. She calls learning to learn a skill of navigating moods. If we find ourselves unable to learn something new even when we want to, we can examine ourselves using Gloria’s method to find out what disposes us toward the unproductive mood and how we can then shift ourselves to productive moods. In short, our mood shapes our ability to care about things and make commitments on their behalf.

To sum this up: Making decisions is separable into two parts: a logical process to ground a proposed decision, and a commitment to an action. The logical process can be done by either a human or machine, but the commitment can only be done by a human. A machine that can process a lot more data and analyze a lot more alternatives than a human could possibly replace humans in the logic part of decision making. The commitment part, which cannot be done by a machine, requires the human capacity to care, which is an emotional ability and is shaped by the moods of the community one finds oneself in. Machines have no emotions and cannot experience moods. Our worry that automated systems can make serious or even catastrophic mistakes is based on our assessment that machines cannot be sensitive to people’s concerns, interests, moods, and emotions and therefore cannot be trusted to make sound and wise judgments. For this reason I see the trend toward automated battle management systems as inherently dangerous. To avoid that danger we need to learn how to achieve human-machine teams or symbiosis. The team could then be endowed with the caring judgment of humans and the logic capacity of machines.

## **Machine Learning**

There is considerable interest these days in machine learning. New machine learning algorithms, supported by highly parallel and massively networked computer architectures, have given us amazing new capabilities in data analytics, data mining, visual recognition, speech translation, social network mapping, and much more. It seems that in a few more years, these new algorithms and machines will be so good that many current human tasks and jobs will be superseded by more productive machines.

Take a closer look at these new algorithms and you can see some fundamental limitations. These algorithms simulate circuits (“neural networks”) that take large bit patterns as inputs and produce large bit patterns as outputs. For example, an input pattern might be a digital photograph and an output pattern the photo with faces highlighted and labelled with the names of persons. The engineers who build these things say that the circuit implements a function  $F$  that maps an input pattern  $X$  to an output pattern  $Y$ . How does this circuit know which  $Y$  goes with  $F(X)$ ? The engineers who build it cannot say because they do not know how the human brain does face recognition. Instead they specify the circuit as a large network of nodes, each connected to every

other by a weighted path. They gather a large data set of (X,Y) pairs. They apply a training algorithm that iteratively adjusts the connection weights in the original circuit until the circuit gives the correct Y for every X. They then disconnect the training algorithm and hypothesize that the well-trained circuit will give the correct Y for new X not seen before. When the training set is very large the circuit can become quite good and (in our example) correctly identify and label faces in photos that have not been seen before.

The engineers use the term “learning” for this entire process whereby a circuit acquires a capacity (for example, recognizing faces) that it did not have before. This is not the way humans go about learning. Notably absent is any need for the training machine to be aware of productive and unproductive moods because the circuit being trained has no moods or emotions. Moreover, these circuits have no capacity to experience moods or emotions and thereby care whether or not their outputs are in the best interests of the humans who receive them.

### **Automated Weapons Control**

There is an inexorable force behind automation. When a machine can perform a certain task faster, cheaper, and better than a human, the human is no longer going to be asked to do that task. A machine will instead get the job. Typically the economic benefits of automation are so great that no individual can change the momentum – the world moves unstoppably toward more automation. The pressure to automate weapons is too strong. We cannot turn it back.

Automation is moving rapidly into warfighting, in the form of automated weapon systems and even automated planning and strategy systems. In cyberwar, for example, individual actions can happen at microsecond speeds, far faster than any human can perceive. Because we know that automated control systems can sometimes go seriously awry – for example, firing missiles at flocks of geese – we want to keep a human in the loop. That human operator can override a bad decision by the machine. Unfortunately the speed of decision making is now so fast, there is no time for a human to digest the situation and abort a dangerous situation. This is a nagging worry. Will an automated weapon system make a bad mistake because it is incapable of sound judgment and drag us into a war that a human operator would avoid? In other words, will the learning networks embedded in these systems be possessed of an artificial stupidity that exceeds its artificial intelligence?

The way out of this dilemma is to look seriously at systems where humans and machines team together, machines contributing superior ability with logic and humans with care and understanding. In another essay (2), John Arquilla and I explored the possibility that such human-machine teaming networks might replace current war-fighting platforms. We noted the modern example of freestyle chess, in which teams of competent chess players armed with a competent chess program on a laptop, can defeat the grandmaster chess program running on a supercomputer. The movie *Enders Game* depicts a military campaign in which a single human operator creates the strategy for a large swarm of other humans and machines – and the swarm is more formidable and lethal than a fully automated unhuman opponent. The 2016 Navy Strategic Studies Group recommended human-machine symbiosis (teaming) as a critical research direction to get beyond the limitations of automated weapons platforms.

It is likely that human-machine teams can be mutually correcting for each other's weaknesses. For example, the human capacity for care and understanding can compensate for the machine's cold logic. The machine's capacity to obey clear rules can compensate for the human cognitive bias, prejudice, and inflexibility. (Even here we must be careful: machines behave according to the designer's intention and can therefore embody some of the designer's biases.)

An irony of warfare is that for many centuries generals have found that the most effective armies are constituted of cunning soldiers acting like automata. We are now offered the dream that machines can act like cunning soldiers. I do not see this happening without humans intimately interacting with machines to bring the human dimension of caring that no machine can muster.

## References

1. Arquilla, John, and Peter Denning. 2016. *Sea Power and Automation*. Unpublished essay.
2. Flores, Gloria. 2016. *Learning to Learn and the Navigation of Moods*. Pluralistic Networks Publishing. Available from Amazon.

61 total views, 1 view today

## [What makes a good Action Plan?](#)

We're continuing to see players who have requested that card chains be made into action plans. If you're interested in doing so use the [Action Plan Request](#) form to make the request. So far we've created 20 plans! The first we created is a good example of what kind of card chain makes a good action plan.



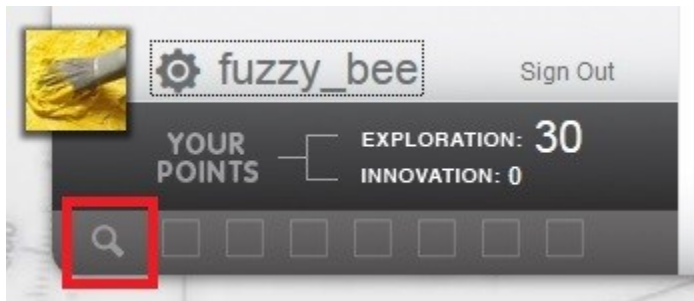


First, as you can see in this image there is a breadth of discussion. At the first level of conversation on the original card there are 9 different players in on the conversation including the original author. Those 9 people have played 11 conversation cards on the original idea card.

There's also some depth to the card chain. Right now the conversation chain only goes 2 deep, but you can see people responding to the initial statements.

We'll talk more about action plans in the near future, but if you're thinking about asking for your card chain to be made into an action plan please take a look at the elements above. If you don't have the depth and breadth of conversation there are a few things you can do.

First, you can look for other card chains that have similar topics. Chances are very good that others have suggested similar ideas and you can join and shape their original ideas. You can search for key words in your plan by clicking on the magnifying glass icon under your name in the upper left side of the screen.



Another thing you can do is rather than joining these new chains, you can invite people to participate in your original chain. If you find a player whose card you like, click on their name and in the upper right side of their player profile you'll see the opportunity to send them an in-game message. Tell them the card number of your chain and they can join you!



Thanks and keep playing, this is shaping up to be an amazing game!

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### [Navy scale and complexity](#)

In our MMOWGLI Foundation talk that you watched in preparation for this event you were introduced to complexity research performed by Dr. Yaneer Bar-Yam and others at the [New England Complex Systems Institute](#) (NECSI). Dr. Wheeler introduced you to the concept of complexity and scale, and how our organizations can be limited in complexity to the capacity of the few people at the top of the organization.

This affects the Navy in some ways more than it affects other organizations. That's because much of the Navy's ability to perform its missions is based on the ships it has available for those missions. Each ship has a hierarchy of people serving in it, and each ship has a number of different elements and capabilities, but in many ways the ship acts as a unit. This means that the ship can only influence operations in the area where it is located, or where its sensors and weapons can reach. That also means that when the ship has to go somewhere, all of those capabilities have to come with it, even if they're not needed. For example, if a destroyer goes to a port hit by a natural disaster the personnel and communications capabilities are needed to help respond, but the weapons and sensors might not be needed if it's a peacetime situation.

Thinking back to complexity and scale, each Navy ship can deal with big problems (large scale) but its complexity is limited to the hierarchy of its command structure. A large ship is not efficient for small scale issues, and also is not efficient for distributed problems. One concept that has been making its way through the Navy's thinking for a number of years is the idea of disaggregation (breaking apart) and reaggregation (coming back together, not necessarily in the same form) of platforms and capabilities. Instead of one destroyer, what if we had undersea warfare, surface warfare, air warfare, communications, and command elements that could be split up when necessary and re-combined with the elements needed when and where they were needed. Kind of like [Voltron](#), for those of you that are children of the 80's. How would we make that work? What human-machine teaming concepts would be necessary for this to work across not just one ship, but a fleet of ships? How would our organization have to change to handle the complexity of this disaggregation and reaggregation? Let us know as you play the game!

40 total views, no views today



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## [Seven areas of disruption](#)

While we move towards the First (computing) Singularity, it's worthwhile to look at technological areas that will be heavily impacted by that growth in computing power. The following seven areas are disruptive forces that will be advancing in parallel, and which threaten to increase in capability and complexity faster than the Navy can adapt.

- Ubiquitous smart sensors
- Omnipresent digital connectivity
- Data analytics
- Intelligent machines capable of learning
- Robots embedded with artificial intelligence
- Dynamic digital interfaces
- Transhumanism

In most cases universities and industry will be the ones to move research and development forward in each of these areas. This will result in adversaries and allies purchasing the newest technology from commercial sources, creating a technological parity that does not exist now.

Not only will these areas change the way we fight, they will impact how the Navy functions as an organization. Turning to the Second Singularity, how can the Navy use or react to these areas to stay ahead of future complexity?

As you prepare your concepts think about these seven areas of disruption and weave them into your story of how the Navy rides the tidal wave of change.

31 total views, no views today



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## [MMWOGLI: Starting play](#)

MMOWGLI is different than typical wargames. Instead of red vs blue and people competing against each-others forces we have people competing with ideas and we're all working towards the same problem.

If you have questions on how to play, check out the [help page](#) for details on card play and on the later action plan play.

If you have problems, fill out a [Trouble Report](#) and we'll respond as quickly as we can. You can also leave a comment on this blog or any of our other blog posts in the [Maritime Singularity Blog](#).

We're excited, just an hour until the game starts!

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Author [Matthew Largent](#) Posted on [March 27, 2017](#) Categories [Maritime Singularity Blog2](#)  
[Comments on MMWOGLI: Starting play](#) [Edit "MMWOGLI: Starting play"](#)

### [Preparing for Maritime Singularity mmowgli](#)

We're excited that you've signed up to play the Maritime Singularity mmowgli! We've put together this packet to provide you with some information that can help you to prepare for the game. **The game officially starts on Monday, March 27 at 0900 EST.**

#### **What kind of a game is mmowgli?**

**mmowgli** is an online crowdsourcing game that gets people to collaborate on determining potential solutions to complex problems. mmowgli uses 140 character 'idea cards' which are played in a conversational format, creating a tree of responses to player-generated ideas. This is not a "first person shooter" or a war game where competing teams are fighting over territory. Instead, we're looking for all of you to be on the same team, we're playing together to develop ideas that will allow the Navy to ride the wave of change described in the Call to Action Video (<https://youtu.be/Oc2zV6hffsY>). The winners of this game will be the people whose ideas spur conversation and who contribute significantly to those conversations. Remember, we're in this together!

#### **Is this the last stand of humanity?**

This game is not about the humans vs. the computers, rather it imagines the U.S. Navy as the world moves towards the two singularities provided in the Call to Action Video. Our hope is that the ideas you produce are about how humans and computers can *work better together* so that the Kurzweil singularity (**Singularity 1**) is beneficial to both instead of causing humanity to be left behind.

Similarly, we don't see the complexity described in **Singularity 2** as a bad thing. We're looking for organizational ideas that *embrace* complexity and allow the U.S. Navy to *excel* in that complex environment. The metaphor of a tidal wave of change can be viewed as something that will swamp us if we are not careful, but we're looking for ideas that will allow us to ride that wave and harness its potential and energy to use it as a way to propel us forwards.



Finally, the two singularities are presented in a “yin-yang” type format, whereby players may contribute to one or both columns. However, we feel that there may be times when the singularities will merge, work together and/or impact one another. While we’re not explicitly asking you to make this connection, please keep it in mind when you move onto the second phase of the mmowgli.

### **What is the timeline for the game?**

mmowgli games have two phases of play. The first is what we described above as Idea Card play, people working collaboratively to rapidly brainstorm, propose and improve upon ideas. The second is Action Plan play, where we take those ideas developed in the Idea Card play and work together to make them more cohesive. For Maritime Singularity mmowgli, the card play will last for 48 hours, starting on 27 March. The Action Plan phase will start sometime during those first 48 hours, and will continue through until Friday, 31 March. The goal is to gradually move away from Idea Cards and into Action Plans.

In general mmowgli works on US Pacific Daylight Time (PDT) but the game will not shut down at night so our international players can contribute.

### **How do I register?**

Signing up for the game, registering for the game and playing for the game are three different processes.

- **Signing Up:** You’ve successfully signed up for the game and expressed your interest, but this is not the same as registering a user account.
- **Registration:** Due to the overwhelming response, we’re going to open registration for game accounts early! You will receive an email notification letting you know when you’ll be able to register your account.
- Register at: <https://mmowgli.nps.edu/singularity/>
- Registration is simple and easy. To do so, select the “I’m New to mmowgli” button and tell us a little bit about yourself but not too much about yourself! Contributions in mmowgli are made through a game alias that should not contain any personal, identifiable information.
- Please be sure to check your spam or trash folder, as certain email settings may filter our emails to those folders.
- **Game Play:** We will not open up game play officially until Monday, 27 March at 0900 EST. To log into the game, please select the “I’m Registered” button and enter your user name and password. Once you’ve done this, watch the Call to Action video if you haven’t already done so and play an idea card!

### **Thank You!**

Finally, a big, heartfelt “thank you” for participating and working with us to address these difficult problems. We see mmowgli as a way to democratize innovation. All of us can work together to imagine innovative solutions in more complex and more creative ways than if we each worked on our own. YOU are the source of that creativity, and we’re excited to see what you dream up together on Monday! Keep an eye on the mmowgli game blog

(<https://portal.mmowgli.nps.edu/wp/index.php/category/singularity/>), and follow us on Twitter (@MMOWGLI) for further information and updates as the game progresses.

Sincerely,

**Team Maritime Singularity mmowgli**

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Author [Matthew Largent](#) Posted on [March 25, 2017](#) Categories [Maritime Singularity Blog](#) [2 Comments on Preparing for Maritime Singularity mmowgli](#) [Edit "Preparing for Maritime Singularity mmowgli"](#)

### [Maritime Singularity mmowgli Invitation](#)

The *singularity* is near. Technology has advanced to the point where we can now see the mythical *singularity* on the horizon.

What we can't see, yet, is what lies *over* that horizon.

That's where you come in. The Navy needs help from people who are curious about the future and willing to put their imagination to work. People like you.

Help us design our Navy for the Post-Singularity World that's rapidly approaching.

Are you up to the challenge? If so, then sign up for a game we're launching around this topic here: <https://mmowgli.nps.edu/maritimesingularity/signup>

The game goes live in March 2017. In the meantime, if you know of other like-minded people, please pass this invitation on to them. The game is open to anyone who might contribute.

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[Rebecca Law](#) Posted on [February 9, 2017](#) Categories [Maritime Singularity Blog](#) [Leave a comment on Maritime Singularity mmowgli Invitation](#) [Edit "Maritime Singularity mmowgli Invitation"](#)

### Maritime Singularity

Welcome to the Maritime Singularity MMOWGLI game.

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