



PEOPLE

DEPARTMENT OF THE NAVY THE FUTURE OF NAVAL INNOVATION

IDEAS

INFORMATION

OUR FUTURE...

“... THE IDEA OF THE FUTURE BEING DIFFERENT FROM THE PRESENT IS SO REPUGNANT TO OUR CONVENTIONAL MODES OF THOUGHT AND BEHAVIOR THAT WE, MOST OF US, OFFER A GREAT RESISTANCE TO ACTING ON IT IN PRACTICE.”

JOHN MAYNARD KEYNES, 1937

QUESTION THE FUTURE

It is impossible to predict the future and the only certainty is that its challenges will differ from those we are planning for today. The DON must continually monitor and assess global trends and adapt accordingly. Creating an innovative, learning organization, willing to accept the best ideas of the workforce, is critical to sustaining the world's preeminent Navy and Marine Corps.



GLOBAL TRENDS



DEMOGRAPHICS



TECHNOLOGY



DATA/INFORMATION



ENERGY



CLIMATE/ENVIRONMENT



SHIFTING POWER

“WE MUST BE FASTER, MUCH MORE INNOVATIVE AND QUICKER OR WE CAN – WE WILL – LOSE.”

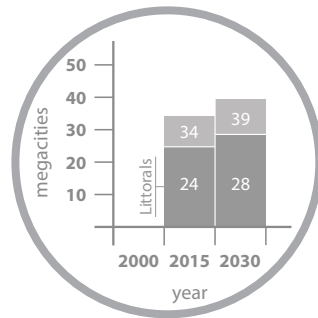
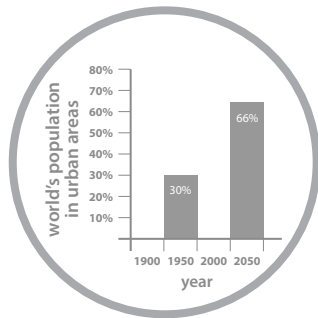
SECRETARY OF THE NAVY, RAY MABUS



DEMOGRAPHICS

OBSERVATIONS *

- Countries amassing a large proportion of seniors face the possibility of slower or stagnant aggregate GDP growth.
- Large youth bulge in **28 countries** of Africa, East Timor, and Afghanistan.
- Globally, more people live in urban areas than in rural areas. In **1950, 30 per cent** of the world's population resided in urban areas and by **2050, 66 per cent** of it is projected to. **Growth of megacities; currently 34 megacities with 24 along the littorals.** By **2030, expected to be 39 and 28** respectfully.
- Migration will become more globalized as both rich and developing countries suffer from workforce shortages.



*Observations from the Global Trends 2030 report



FUTURE NAVAL IMPLICATIONS

EXTERNAL

- Will migrations cause more frequent conflict and regional instability?
- How do operational concepts evolve to face large urban areas and mega cities in the littorals?

INTERNAL

- Will defense spending decrease because of the aging US population?
- How will the DON incorporate diversity of thought into its decision making process?
- How will the DON attract, develop and retain world class talent?



TECHNOLOGY

OBSERVATIONS *

- Robotics will eliminate human labor in more applications. Blurring between industrial and service robots will occur.
- Automation and advanced manufacturing technologies are changing mass production and how future products and services will be delivered to the middle classes in both developed and developing countries.
- The nexus of nano-, bio-, information- and materials technology will likely yield future disruptions to U.S. national security.
- UAVs will routinely monitor intrastate and interstate conflicts, enforce no-fly zones and survey national borders.
- Non-state actors increase use of technology from COTS.

**Observations from the Global Trends 2030 report*



FUTURE NAVAL IMPLICATIONS

EXTERNAL

- How to defend against unique "one-shot" weapon systems?
- Will adversaries exploit human enhancements prohibited by American ethical standards?
- How will DOD compete with adversaries with access to disruptive technology and more agile acquisition systems?

INTERNAL

- Will internal DON certification processes keep pace with advanced manufacturing capabilities?
- How will expeditionary/shipboard robotics change manning requirements?



CLIMATE/ENVIRONMENT

OBSERVATIONS *

- The severity and frequency of existing weather patterns will intensify, with wet areas getting wetter and arid ones becoming more so.
- Demand for food and water will grow substantially owing to an increase in the global population.
- Rapid changes in precipitation patterns—such as monsoons in India and the rest of Asia—could sharply disrupt that region’s ability to feed its population.
- Arctic summer sea ice is diminishing in area and volume faster than any models anticipated and could vanish earlier than the original predictions of 2030-2050.
- A more crowded and interconnected world increases opportunities for human and animal diseases to emerge and spread globally.

**Observations from the Global Trends 2030 report*



FUTURE NAVAL IMPLICATIONS

EXTERNAL

- How will the creation or alteration of geographic terrain features affect geo-politics?
- How will climate changes impact our current operational concepts?
- Will the inability to provide food, water and energy serve as cause for wars?

INTERNAL

- To what extent can afloat basing be used to minimize shore infrastructure?
- How will changes in environmental conditions impact DON installations around the globe?



DATA/INFORMATION

OBSERVATIONS *

- Cloud computing, cheap data storage and smart devices will put increased computing capability and meaningful analysis in the hands of 80 percent of the world's population.
- Since modern data solutions have emerged, big data sets have grown exponentially in size. At the same time, the various building blocks of knowledge, as well as the software tools and best practices available to organizations which handle big data sets, have not kept pace with such growth.
- As societies become more dependent on software and systems become more interconnected, the potential levels of damage inflicted by cyberweapons will increase.
- Private companies in the future will possess mountains of data and have more real-time information at their fingertips than most governments. Non-state actors will be able to influence behavior on as large a scale as state actors.
- "Internet of Things" is an enabler for super empowerment (primary source to facilitate recruiting, training, financing, command and control for non-state actors/terrorists).

**Observations from the Global Trends 2030 report*



FUTURE NAVAL IMPLICATIONS

EXTERNAL

- Will the line between homeland security, intelligence, and military action become less definitive?
- What tools does the military need to escalate and de-escalate conflict against asymmetric opponents in the cyber domain?

INTERNAL

- How can the DON share its data with the public while protecting networks and essential data?
- How can the DON use its data and IT tools to become a true learning organization?

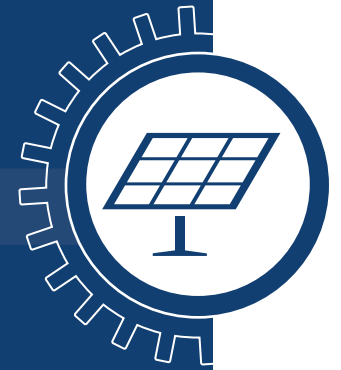


ENERGY

OBSERVATIONS *

- The demand for energy will rise dramatically over the next 15-20 years largely in response to rapid economic growth in the developing world.
- A transition to bio-based energy produced from nonfood biomass would radically alter world energy markets and be essential to improving food security.
- Solar energy could disrupt the global energy environment if it achieves a competitive cost with electricity produced from other sources of energy.

**Observations from the Global Trends 2030 report*



FUTURE NAVAL IMPLICATIONS

EXTERNAL

- As North America emerges as a leading natural resources/fuel exporter, will defense requirements change?
- Will global energy demands/flow change naval presence requirements?

INTERNAL

- How does the DON reduce vulnerabilities associated with long fuel supply transport lines?
- How does the DON insulate its critical infrastructure from the fragile and aging commercial power grid?





SHIFTING POWER

OBSERVATIONS *

- Power is shifting from states to networks and coalitions in a multipolar world.
- The shift in national power may be overshadowed by an even more fundamental shift in the nature of power.
- Social networking will continue to be a potentially potent political weapon.
- Individuals and small groups will have the ability to perpetrate large-scale violence and disruption—a capability formerly the monopoly of states.



**Observations from the Global Trends 2030 report*



FUTURE NAVAL IMPLICATIONS

EXTERNAL

- Will new concepts and instruments of power change approaches to force projection?
- Can conventional military power serve as an effective deterrent to state aggression in the future?

INTERNAL

- How do military personnel structures adapt to more empowered civilian recruits?
- How does the DON provide military personnel more control over their career paths and personal goals?
- Can the DON leverage the power of internal social networks?

VISIONS OF AN UNCERTAIN FUTURE

Throughout our history, the DON has been fortunate to have renowned visionaries Sailors and Marines, such as CAPT A.T. Mahan, LtCol Pete Ellis, and Admiral Hyman Rickover, in our ranks. These visionaries looked 10 to 20 years ahead and anticipated future security challenges. As we look to the future, we must challenge current assumptions, ask tough questions about plans, programs and concepts and consider new ways to address the complex challenges looming on our horizon. The following are a few examples of the great minds associated with the DON today and their personal thoughts on the future operating environment.

SWARMING TACTICS

"With just a little imagination,we see even farther ahead,the possibility of developing very small undersea swarming systems. These would clear minefields, engage enemy submarines, and so on. Small aerial swarm weapon systems could prove exceptionally useful in dealing with air defense of carrier strike groups."

- Dr. John Arquilla, NPS

VIRTUAL INSTABILITY

"An increasingly chaotic global information environment will require ... complex manipulations of systems and the data passing through them. In a world where any representation of military action is potentially negated by an equally plausible counter-representation, militaries must deny their enemies such representative capacity." - LTJG Kat Dransfield, CHINFO

"Over the next 20 years the world will see a proliferation of the means to supplement human performance. A parallel rise in their use will impact both the battlefield and supporting military functions from shipyards to watch floors." - Mr. Scott Cheney-Peters, OPNAV

GENOME MANIPULATION

"A SYSTEM BUILT IN THE COLD WAR COULD KEEP PACE WITH A LARGELY PREDICTABLE SOVIET OPPONENT VIA A DECISION CYCLE MEASURED IN YEARS. THAT ENVIRONMENT IS GONE."

THE HONORABLE RICHARD DANZIG, SECRETARY OF THE NAVY 1998-2001

AUTONOMOUS WARFARE

"The Navy faces the historically unprecedented simultaneous confluence of two Macro-Revolutions: the emergence of a new realm of combat, dominated by autonomous Machines; and imminent Cyber battle for any and every smart machine in the Navy." - Dr. Mark Hagerott, USNA

HYBRID WARFARE

"The rise of non-state actors, information technology, and proliferation of advanced weapons gives rise to modern hybrid war...The United States requires, but does not have, a credible strategic-level ability to address incremental, persistent belligerence and interdict and roll back external sponsors of insurgent and separatist movements."
- CAPT Robert Newsom, SEAL

DRONE WARFARE

"The biggest danger to the US is smart, small, but long range underwater drones. They could be used to mine US or allied ports or as self-deploying torpedoes to seek out and attack US forces. The advent of cheap, autonomous drones means our base camps, fuel supplies, ammo dumps, and flight lines are easy to attack and very expensive to defend." - Dr. T.X. Hammes, NDU

VIRTUAL BATTLEFIELD

"Future conflicts will not be won simply by using the EM spectrum and cyberspace, they will be won within the EM spectrum and cyberspace & require changes to our operating concepts, military systems and – most importantly – a new way of thinking in our Navy." - Admiral Greenert, CNO

RESOURCE SCARCITY

"Sources of conflict will include water, energy and food scarcity... ungoverned spaces, territorial and tribal disputes, and regional competition."
- General Dunford, CMC

AN UNCERTAIN FUTURE NECESSITATES INNOVATION



Given today's process-driven environment, it is difficult to consider the full breadth of challenges and opportunities our naval forces will encounter in the future. Being wedded to a single view of the geopolitical environment was acceptable when preparing for a predictable adversary but such an approach does not prepare us for the dynamic, uncertain environment we face today. Successfully innovating for the future begins by embracing uncertainty.

Defense-wide and joint processes channel us into a "least common denominator" view of the future. Instead, it is more prudent to foster an environment that creates a competition of ideas and which accepts the reality that the threat we are preparing for today is not the threat we will encounter in the future. While cumbersome processes affect the way we build weapons programs and procure resources, we must never allow them to constrain our ability to think and innovate.