

Natural-Born Cyborgs: Minds, Technologies,  
and the Future of Human Intelligence By Andy  
Clark Oxford University Press 2003

# The Human Information Appliance, the “Mesh” and the Future Production of Intelligence: Problems for Resilience in the Combat-Homeland and Diplomacy Spaces

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The Critical Infrastructure Symposium

Arlington, VA - April 23-24, 2012

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# Paper is informed by...

- Science & Technology - Roosevelt/Vannevar Bush (Science: The Endless Frontier) post-world war II model for national power
- Seminars in science, technology, & international affairs using the framework and ideas found in Eugene Skolnikoff's (MIT), The Elusive Transformation: Science, Technology, & the Evolution of International Politics.
- September 2004 workshop conducted by the Dept. of Integrated Science & Technology at JMU for the National Ground Intelligence Center (Engineering and Information Technology R&D for Solutions to Post-9/11 Risks).

## Primary Sources of Knowledge and Analysis

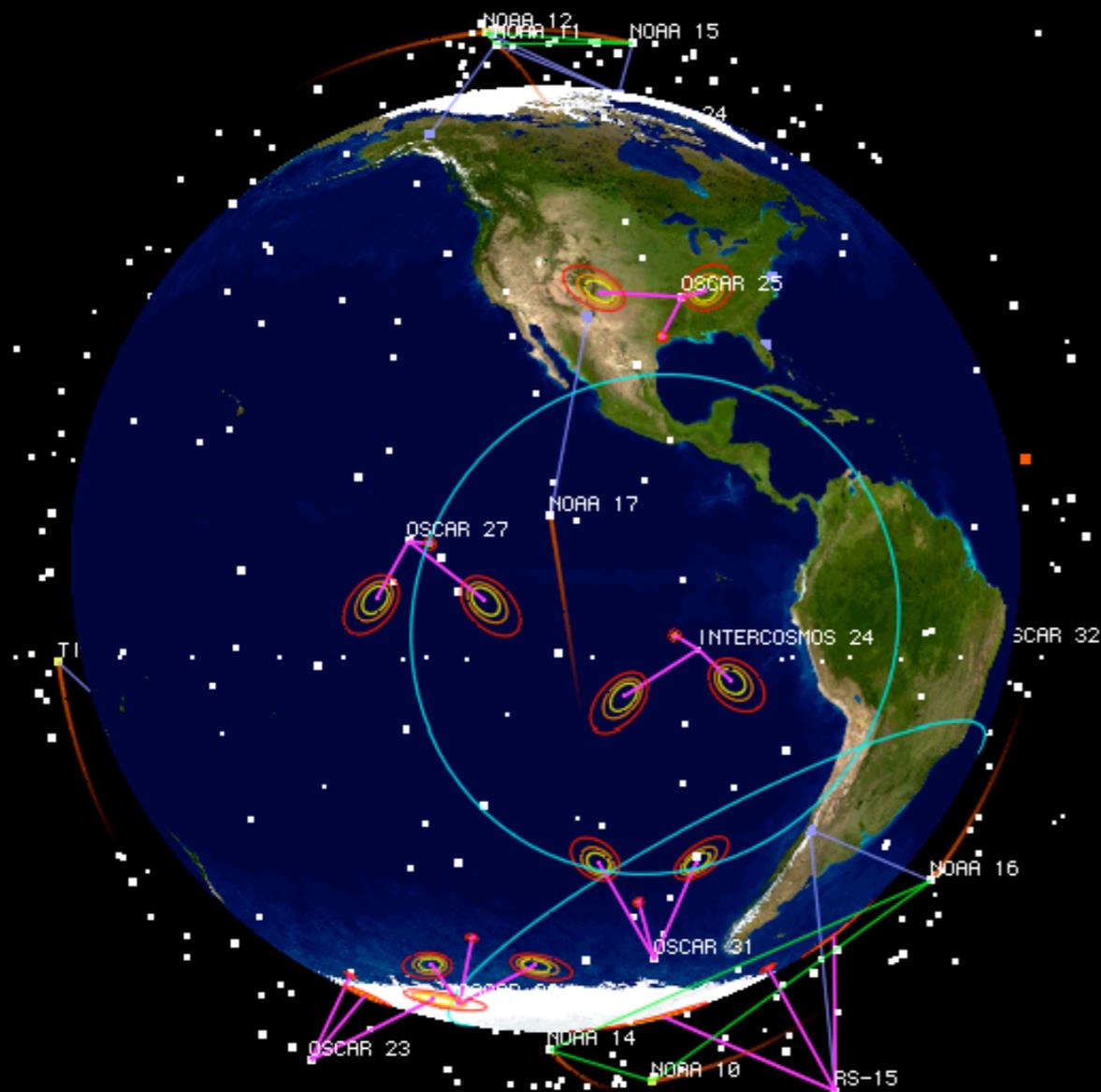
- Martin Libicki's Orbis 1996 on "The Battlespace & The Telemetry of War" - Re-imagining war and deterrence in by the direct application of information technologies to combat and political problems.
- Defense Science Board - Geospatial Information Infrastructure (GII)
- Jeff Raskin (Apple Computer 1978) and Don Norman (MIT) - Information Appliances & Beyond - conceptualization - engineering architectures and human - machine interface (GUI-software).
- P.W. Singer, Wired For War (2009) - a comprehensive investigation into the evolution of robotic warfare to include strategy - tactics - and ethics.
- R.E. Burnett, Ph.D. (2009) APSA - Toronto paper on Genomic-informed WMD: humans-pathogens deconstructed as information processes/entities and the corresponding ethical problems in genetic security technologies.

# Overview...

- Libicki re-imagined war and deterrence with the application of his understanding of information systems and corresponding technologies.
- We provide a similar re-imagining of intelligence collection – analysis – production – and dynamic application for *tactical situation awareness superiority* in three spaces: the battlespace – the homeland space – and the diplomacy space.
- We apply four-dimensional combat in the battlespace to real-time *tactical intelligence production* for an Human Information Appliance platoon.
- We next consider four-dimensional diplomacy (as the counterpart of *national power* to combat) in the *diplomacy space*.

## Libicki's *Battlespace/Combat Mesh* vision was based upon standard information system concepts:

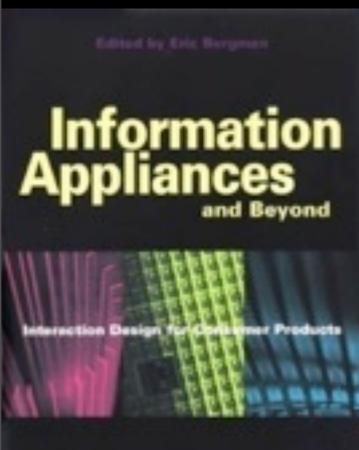
- Information toward the production of operational intelligence is a function of knowledge about...
- where is the opponent's troops, their weaponry, their industry,
- what is the opponent's troop level of capability in terms of firepower and training,
- who is the chief decision-maker that controls the movement and actions of the opponent's troops,
- when will the opponent's troops or weapons go into action, and
- why is the opponent motivated to conduct such hostilities and
- how can we influence their actions toward our desired outcome.



- Imagine the planet in a three-dimensional form floating in space. From the depths of the oceans, where submarines roam, to the surface of the planet in which fiber-optic cables criss-cross, to 22,000 miles above the planet in which geosynchronous orbiting satellites are relaying information at the speed of light). This is the mesh.
- If achieved, the U.S. military would be in possession of a process that will enable it to have certain advantages over potential adversaries in virtually all varieties of conflict.

# A Psychology of Cyborg-Based Information Gathering & Intelligence Production in the Battlespace/Mesh

- **Information Appliances** - Jeff Raskin - Internal Apple Computer memo 1978:
  1. An information appliance is geared to support a specific activity, and to do so via the storage, reception, processing, and transmission of information.
  2. Information appliances form an intercommunicating web. They can “talk” to each other.
  3. Information appliances are transparent technologies, designed to be easy to use, and to fade into the background. They are *poised to be taken for granted*.



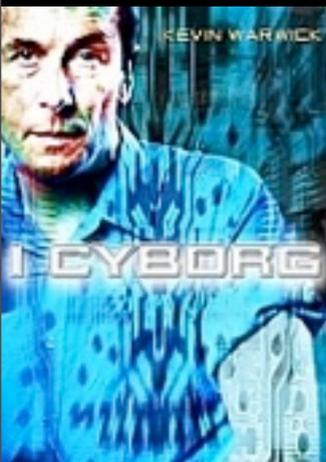
• I am applying the ideas of Donald Norman of MIT, Andy Clark of Indiana University and my own previous work in strategic and tactical information systems to the task of producing intelligence with an evolving human/machine interface

# Implantable Computer Technology: The Human Intelligence Officer as an *Information Appliance*

- The intelligence cyborg must do what she/he has always done - but in a more effective manner with the same level of seamless human/technical integration - via implantation
- The cyborg soldier may be an exoskeleton-enabled human-Hummer...
- The HIA/IO will be an unremarkable diminishable entity of tissue and hardware - not so different in kind from his civilian cyborg counterpart.

[http://www.singularitysymposium.com/  
kevin-warwick.htm](http://www.singularitysymposium.com/kevin-warwick.htm)

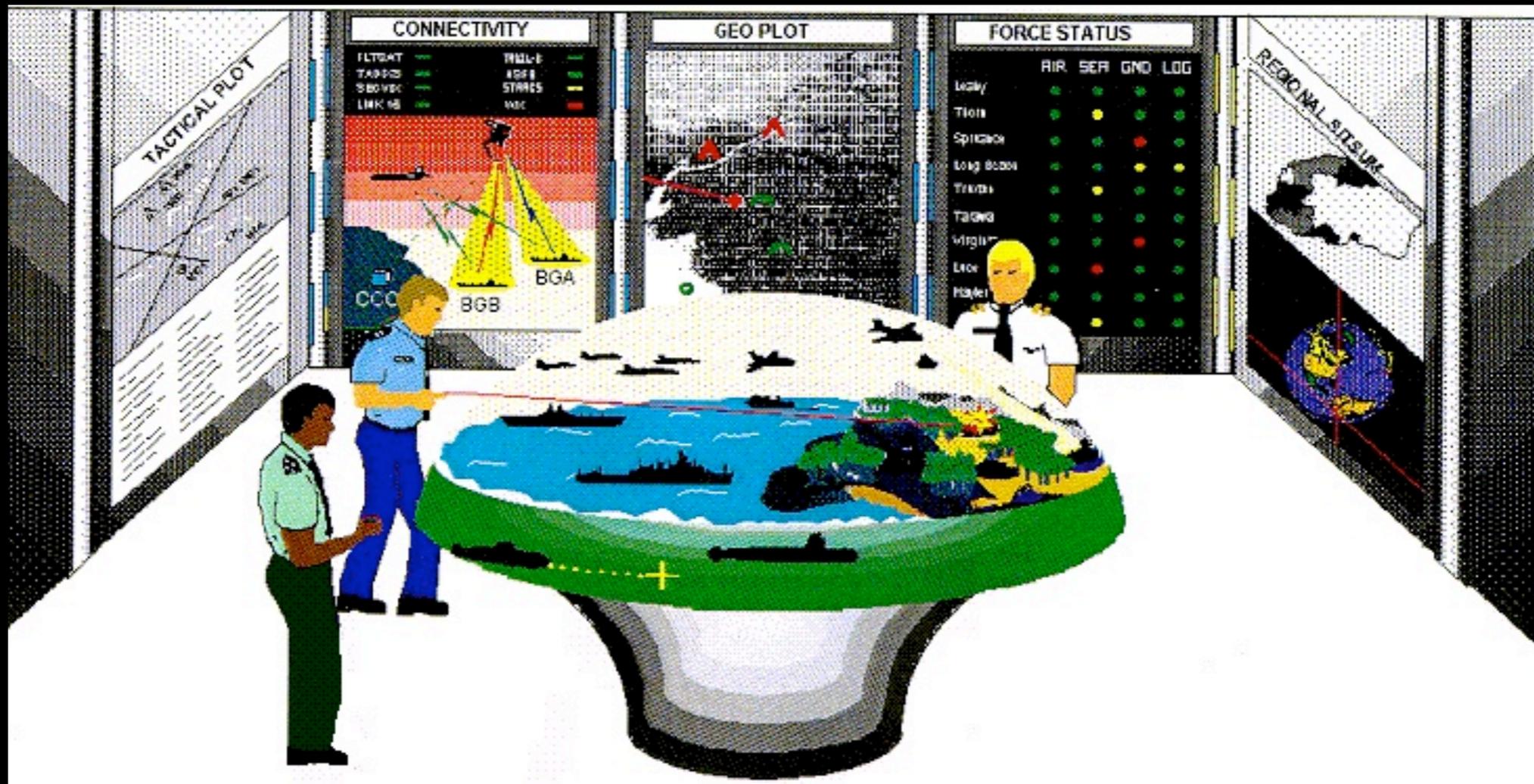
46th U.S. Vice President Dick Cheney- Heart Assist Device-a type of cyborg.



# The Hallmarks of an Effective Information Appliance

- Such an appliance will be “monitoring the world, communicating with other such devices/individuals, and enabling us to manage, recognize, store, and compare information quite effortlessly in the business of the production of intelligence.”
- The appliance need not be overtly “conscious” in order to do the above tasks. Persons/organizations will be able to task various systems *on-board* to acquire desired information.
- An effective appliance will contribute nothing to the complexity of the tasks that they support: “the complexity of the appliance is that of the task, not the tool.”

# The Battlespace as GII: No cyborgs here... yet...



<http://www.fas.org/irp/agency/nima/masterplan/vol1/vol1body.htm>

# Realization of Technology Visualization for the Battlespace

- The platoon is an HIA cloud and the goal is to achieve superior situational awareness with a temporal advantage that can allow it to increase its probability of survival.
- This *cloud* has the capability to collect an exponentially superior amount of environmental data about itself – and very importantly – about its enemy.
- As the data comes in – the cloud in real time – can begin to immediately yield more robust probabilities for impending immediate decision events that correspond to present and/or future actions.

## *Temporal Advantage*

- In this sense – the HIA platoon cloud will have the ability to both see and model a past-present –future event for the purpose of more powerfully informing tactical decision-making needs.
- The unit has created a very small *time machine* that has the potential to see into the future a little bit faster than the enemy: this may be enough for immediate tactical advantage to win the day.

# Realization of Technology Visualization for the Diplomacy Space

- Importantly – we seek to extend the logic of this example back to the *diplomacy space*.
- Consider the advantages of the creation of this kind of advanced situational awareness at an important diplomatic event.
- We can re-imagine the event by substituting the combat platoon with a contingent of diplomats/FSOs as HIAs networking to produce a temporal mechanism to model the opposing side(s) probable positions and moves.

# Libicki's Information Concepts Applied to the Diplomacy Space...

- **where** is the opponent's diplomats, their intelligence, their political center of existence/meaning/purpose and the source of the production of these things,
- **what** is the opponent's diplomatic/intelligence level of capability in terms of Information Operations (IO) and training,
- **who** is the chief decision-maker that controls the movement and actions of the opponent's diplomatic corps and what is the level and trajectory of this authority,
- **when** will the opponent's IO and/or diplomacy/intelligence corps go into/change action, and
- **why** is the opponent motivated to conduct such IO campaigns/activities and

# *Burnett-APSA Paper 2009 – Information Weapons as Genomic-Informed WMD: Systemic and/or Deliberate Ethical Ambiguity?*

- The threat of genetic technology WMD (also explained as an information weapon) posits a policy of *genetic human enhancement* as the only reliable form of individual and statistically significant national defense. *The Security Dilemma applied to genetic war.*
- Here is the element of *human enhancement* and for matters of genetic science this automatically corresponds to – when matched to public policy – *eugenics*.
- Information appliance implantation/augmentation in humans is not tantamount to eugenics – but it remains a form of human enhancement that we must contemplate from the perspective of both citizen and society within a public and transparent ethic.

## *Human regulatory analysis and deployment is a political process – not a digital process.*

- The obvious reason that the deliberate engineering of the human germ line remains controversial is due to human ethics – values that surround the meaning of life – past – present – and future and involve *should questions*.
- The reason that engineering the human germ line is becoming less controversial for the purpose of ending disease – creating weapons – or defending against them is due to the mathematics of information and the efficiency of creating algorithms for lesser complexity and involve *how questions*.

## Knowledge & Wisdom...

- Borrowing from Robert Nozick's thought experiment – The Experience Machine, we put forth the idea of the necessity of building a *Wisdom Machine*.
- Building upon Dr. Charles L. Harper's ideas about the empirical record of the interplay between humans – their technologies – and unexpected outcomes as presented to the 2007 *Singularity Summit: Artificial Intelligence and Humanity...*
- We find a compelling reason in his analysis that creates some intriguing *how* questions that are specific utility to the primary goal of answering *should* questions.

## Can We Rationally Produce *Wisdom*?

- Dr. Harper: we now have the necessary rationalist tools (science/social science) and computational capability (speed/big data) to produce *wisdom as opposed to just knowledge*.
- The development of this kind of *wisdom* knowledge would be most useful and illuminating to the field of genomic-informed WMD and human-machine symbiosis.

End...