The Future Is Not What It Used To Be

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### The Future Is Not What It Used To Be

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DoD budget authority cycles

DoD funding has a 20-year cycle

Constant 2003
$ in Billions

150 200 250 300 350 400 450 500 525


Korea/Cold War
Vietnam era

Post Vietnam
draw down

Ford &
Carter

Reagan
build-up

Gramm-
Rudman
era

Post Cold War/
balancing
the budget

Winning
the War on
Terrorism
(Bush 2)

Geezer
boomers
get theirs

FY 03
budget

$151

$286

$323

$375

$290

$315

$462

$414

$315

$379

$470

$350

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Deficit is high and growing

Sources: Department of Treasury & OMB

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Foreigners are buying our debt and we buy their stuff

Source: Department of Commerce
Interest rates are low and will increase

Source: Council of Economic Advisors
Non-defense* will grow

*(health, Medicaid, income security, social security, interest, other)

Sources: Department of Treasury & OMB
Technologies from
cold war S&T investment
(from OSD DT&E / 03)

Stealth
High performance fighter aircraft, jet engines
Spy satellites
Hypersonics
Terrain matching navigation
High precision navigation
High performance armor
High energy lasers
High power microwave weapons
Advanced signal processing (acoustic & radar)
Advanced simulators
Night vision devices
Synthetic Aperture & MTI Radar
High bandwidth communications
Unbreakable codes
High performance jammers

So what is the plan?

AF -- UAVs -- Robots
Army -- FCS -- Robots
Navy -- guided missiles from subs -- Robots
SOF -- sensor network assisted humans
How will the nation spend its money on R&D?

- Energy: plentiful, clean, affordable
- Environment: clean, affordable
- Education: available, effective, affordable
- Transportation: clean, safe, affordable
- Manufacturing: flexible, clean, affordable
- Health Care: effective, affordable
- Security: effective, affordable, preserve civil liberties
The barriers to affordable solutions are often technical

- Materials
- Computing
- Sensors
- Information technology
- Software
- Manufacturability
- Biotechnology

*But, it is also the people, stupid!*

*or*

*Is it stupid people?*
Demographics point to a major change

Max Life expectancy for females -- 80 years

Developed world population declining by 3 million/year

Half of people over 85 have Alzheimer’s

Source: UN (2001)
Population growth & abrupt climate change could place heavy demands on water supplies

- Biological contaminants are increasing
- Chemicals in water system
- Heavy metals
- Ocean pollution
- Aquifer depletion (in Albuquerque, ~30 feet in 10 years)
- Abrupt climate change?

Water availability is likely to become one of the most pressing and contentious resource issues of this century

- By the year 2025, 48 countries containing 3 billion people will face fresh water shortages

Source: CIA / DoI / 2001
U.S. / world electricity demand

Source: World Energy Council and EIA projections
Tomorrow’s health care needs will drive tech investments

Technical Advances

New Health Experiences

On-line medical care
Sensors/monitors
Intelligent machines
Individualized drugs
Replacement organs
Self diagnosis

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The vital issues

• Energy
• Environment (water)
• Education

Security

• Develop a strategic context
• Apply a system architecture
• Find and kill the terrorists
• Win the global war of ideas
The Global War of Ideas (GWOI)

The global war within Islam will be fought on three battlegrounds:
Engagement, Containment/Rollback, Global Opinion

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Concepts for GWOI

- Quantify the distribution: help us -- ambivalent -- destroy us
- Targeted strategy
- Disrupt mobilization process
- Work through third party moderates
- Infiltrate the cellular network structure
Demographics point to a major change

Max Life expectancy for females -- 90 years

Developed world population declining by 3 million/year

Half of people over 85 have Alzheimer’s

Source: UN (2001)
The barriers to affordable solutions are often technical

- Materials
- Computing
- Sensors
- Information technology
- Software
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But, it is also the people, stupid!

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Kinetic weapon needs against hard targets

- Physical destruction of HDBT with penetrating weapons
  - RNEP
  - Multiple, large conventional bombs.
  - Large Kinetic Energy impactors/rods/jets

- Reliable smart fuses for fast penetrators

- Functional defeat with exquisite intelligence (persistent, ubiquitous, all weather ISR) for location, characterization, and BDA.

- Chem and bio weapons defeat with radiation and long duration high temp
Kinetic weapons against soft fixed & relocatable targets needs

- Smarter weapons that understand location, status, effects, and communicate for real time connectivity and BDA could be developed

- Precision delivered hypersonic masses, rods, and flechetts offer the potential for high lethality and low collateral damage

- Sensor controlled and multimode munitions

- Pre-deployed on-site sensors or short range weapons for precision strike and rapid response eg: UGS, NETFIRE, SOF

- Perch, search, lurch
Will military application of beams ever be real?

- Speed of light weapons including lasers, HPM, & particle beams, non-lethal weapons

Proton Shield

Sensory overload from combined effects

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Summary of needs

- Nuclear and non-nuclear penetrators
- Diggers/sensors for underground warfare
- Brilliant weapons/location, status, effects, comm, BDA
- Agent defeat weapons
- Info ops/functional kill/asymmetric war
- Non lethal weapons
Role of National Labs?

- Affordable benefits?
- Relevance, timely, cost effective?

Spinoff

No

Direct benefits

Maybe

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More C³ needed for relevance

- Consolidate to sustain and enhance competencies
- Cooperate on shared problems
- Compete for applications

- The key to relevance is rapid application of the right tech

Research → Development → Application
The right tech

• Not High Tech
• Not Low Tech
• But just the right tech

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Role of National Labs

• Accelerate solution realization
• Share cost and risk
• Enhance critical capabilities
• Provide focus
• Integrate biological, social, and physical sciences in system solutions

Catalyze interdisciplinary teams for system solutions

Government - Universities - Industry - Lab - Teams

GUILT

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Conclusion

- The rate of political, economic, social, tech change is increasing
- The driving forces for solutions are inescapable
- Advances in technology can be part of the solution
- Rapid/agile/relevant deployment of solutions is essential
- GUILT offer a way to speed and affordability

Prepare for inevitable surprises