Notes:

To begin Mr. Purser noted that the Joint Operating Environment, Trends & Challenges for Future Joint Forces through 2030, the JOE, is as much as process as a product since it is constantly being developed through a series of studies, conferences and exercises.

Mr. Purser also explained that his Deep Futures Group was established about a year ago and is still developing. It is continually widening its network of contacts with other organizations. There are currently only four full-time members plus a consultant, T.X. Hammes. The Group’s objectives include

- Identifying emerging threats and opportunities related to the future security environment
- Facilitating an understanding of these emerging threats and opportunities across the Joint Concept Development and Experimentation (JCD&E) enterprise

The Deep Futures Group products include

- The Joint Operating Environment (JOE) document
- Trend papers
- Conference and special study reports

Trend papers may come out as often as every two weeks

- Topics are those determined to be what is most important for the JOE audience at that time
- Most tend to be edgy think pieces

Conferences are held with partners such as TRADOC and a growing list of others (see slide #3) including international partners

All of these partners are part of the JOE process

- There is an outer and inner ring of partners
- Partners are from inside and outside the government
- There is a desire to extend the network for passing these trend papers to an even larger group
- Foreign partners include the German Transformation Center
  - 25 foreign liaison officers to JFCOM are available for consultations
  - They are asked what they think of identified trends, etc. and what their governments think about given topics

What is the JOE?

- Recognizes that there is no perfect view of the future environment
- If a lot of alternative futures are looked at, more likely that somewhere in the mix there will be something like what will actually happen
- Not looking specifically at areas of operation
- Basic organization of the JOE
  - Chapter 1: Introduction
  - Chapter 2: Trends in the Joint Operating Environment
• Human Geography
• Governance and Legitimacy
• Resources and Economics
• Science, Technology, and Engineering

• Chapter 3: Challenges Facing the Future Joint Force
  • Enduring Challenges
  • Emerging Challenges
  • National Security Shocks

• Chapter 4: Implications for the Joint Force
  • Terrain
  • Base
  • Knowledge
  • Force Application
  • Command

• Chapter 5: Conclusion

Terminology needed to be established so that everyone would be using the same meanings
• Operating Environment: general description of important features of world’s international system
• Critical variables: characteristics of an operating environment; a set of the most important constituent elements of a strategic environment
  • Differences in variables reflect accumulated trends and shocks over time
• Trends: movement of a variable over time
  • They document ongoing changes to variables
  • Permit projections of the characteristics of an operating environment for a future point in time.
• Shocks: Can precipitate or result from trends

The JOE takes a stand on how to develop plausible views of the future
• Call them trends – mega trends and minor trends
• The JOE also looks as what will have the most impact on the Joint Forces

Basically trends and shocks will define alternative futures
• Then critical variables will further adjust these alternative futures
• Variables can be major things such as life expectancy
  • JOE tries to take into account a range of such variables
The slide above summarizes the primary trends that the JOE uses to develop alternative futures. As an example, look more closely at Human Geography out to 2030

- Going beyond 2030 is difficult because what can be predicted is so murky
- Do need to go beyond the horizon of the POM
- Major trends
  - Differences in wealth among people will continue to grow
  - Public health will generally improve but with challenges such as AIDS, pandemic flus, etc.
    - A recent paper on this subject caused enormous feedback for the Futures Group
    - There were many complaints from all sides of the issue, so it must have been about right
    - Project Horizon involved an alternative future that had an impact from a pandemic

Migration Trends

- Many varieties
  - Muslims to Europe
  - Europeans/others to the US
    - Those coming to US do so for the economic opportunities including sending money home
    - In the Washington area can see this migration process happening more than in other areas of the country
  - Could also involve growth of crime, especially drug and people smuggling
  - Creating problems involving ultra-ethnicity and growing religious ideology issues
    - May become the defining aspects of an region that was once more diverse
  - See trends such as more technical degrees are going to the foreign-born in the US than to native born

Demographic Trends

- Expect 2 billion more people by 2030
  - Most will be in developing countries
  - Most will live in mega cities near coast lines
    - This will cause problems with governance
  - Populations are aging in some areas to such an extent that the employment cycle will be effected
    - Some countries will no longer have people willing to do the low-paying but necessary jobs
    - Serious complications expected if there are not enough younger people to help support older ones
      - See Slides 10 through 13 for other informative Population Pyramids
  - US is actually doing relatively well with a stable population pyramid compared to other developed and developing states
    - US has a very healthy population spread now and in 2030
    - The working age cohort is large enough to support the older cohort and to invest in the training of the younger cohort who will be there to support them in their old age
  - Europe and Japan have totally different pyramids with dwindling numbers available to support an aging cohort especially by 2030
    - Their aging wage earners only want higher paid, white-collar jobs
    - There are no youth to handle the low-pay jobs – where the bulk of wages should be
    - Need to find alternative workers probably from migration in Europe
      - Will likely change the political atmosphere of these democracies
• Japan’s culture is not as accommodating to foreign workers so they may be turning to robotics
  ○ Japan may have the first robotic economy by 2030

Russian and Chinese indigenous populations are not reproducing themselves so will cause them enormous worker problems in the future
• Russia may not be able to provide for its own security
• China’s problem will be exacerbated by the one-child policy that it used for decades
  ▪ Cultural values limited the number of females compared to males
  ▪ Having so many extra males available in the future might make an enormous cohort available for mass employment overseas – for construction or military actions

In the developing world including places like India and Nigeria, the population is very young
• The young are known for not making the best decisions if they do not have adequate mentoring, schooling, supervision
  ▪ Could have an impact both on economic and governance issues
• Nigeria has particular problems with a lack of supervision and schooling for their youth
  ▪ May make a large cohort available to be used a child soldiers

Urbanization Trends
• Governance may not be as strong in the mega cities that are growing everywhere
  ▪ There will be a need to deal with issues such as crime lords controlling parts of the cities
• By 2030 66% of the world will live in cities near coastlines
• See slide #14

Climate Change Trends
• Great deal of debate about whether global warming is being caused by human actions
• Much less debate about whether or not the globe is warming (See slide #15)
Tracking of the rise of sea levels has gone on since the beginning of the industrial age. Some scientific records can go back 100,000 years to show various ups and down in the earth temperature that might relate to the wobbles of the earth around its base:
- Episodic changes have taken place every few thousand years
- Can also say that there is more CO2 in the atmosphere than ever before
Current warming may be from human activity or part of the overall cycle with some additional impact from human activity:
- In any case, sea levels are rising – to be a problem for cities on coasts
- Adding to problems of governance of these areas

- Much of this will happen in areas of stress
  - Some areas will have problems getting enough fresh water
  - Crisis areas generally spread out from the region around the equator
  - At the same time the population is growing in areas already under stress
    - Areas without enough water of their own will demand it from elsewhere
      - Example 1: southern California demanding more water from the north or from other states
      - Example 2: Countries in Central Asia demand more water from productive areas upstream
        - Most such areas already have political problems with each other
        - Want to trade water for goods
  - Such areas are likely to become flashpoints as water becomes more scarce

Economic Globalization Trends
- Globalization cannot be turned back
- India and Asia are growing into partners in the world market but are doing so in their own ways
  - So must expect that the future world economy will be different
- The European Union will be shrinking economically as India and Asia grow
  - Some impact on the US but less so than in Europe
  - By 2015 China’s economy could surpass Europe’s
  - By 2025 China could have the largest economy

Global Energy Stress Trends
- By 2030 the world will triple its need for energy
  - The need for energy is growing in Europe and the US but at a slower rate than in India and Asia
- There is a big debate about when the world will have found 50% of all available oil
  - That includes coming up with new technologies to get at oil locked up in tar sand or oil shale
  - Such new technologies, when they were more developed, could have significant impact on ecology
- We can definitely say that we are at the end of cheap oil
  - World will need to do something about saving energy and finding alternative sources
  - Can expect a major impact on the world by 2100
  - Oil constraints will have a large impact on military requirements

Science and Technology / Engineering Trends
- Changes move faster here than in any of the other categories
- Involves Info-tech / Bio-tech / Nano-tech / Neural-tech
  - Also involves bringing all these fields together
  - May someday have a human that only has a brain remaining as a carbon-based element – all else will be engineered using a combination of technologies
- Already need to have ways to improve soldiers’ capabilities to hear/see/do things
- Advances will bring both threats and opportunities
  - Bio-engineered virus could attack certain characteristic (blood type A+) which show up predominantly in one ethnic group or another
  - When all of these technologies come together it will be possible to build Schwarzenegger-movie-style soldiers
  - Cellulosic ethanol is not that far away
    - Growing switch grass for ethanol may actually have additional advantages
    - Instead of letting land lay fallow between corn crops, could grow switch grass for making ethanol which also helps the soil
  - Smart dust could be sprinkled on people or things clandestinely to track or follow them
• Life logging could allow soldiers to constantly report on what they are doing
  • Then when a similar situation arises the system will already know the best way to handle the situation
  • Every soldier becomes a sensor and has access to all other sensors

Constrained US Military Budget Trends
• Entitlement payments are growing so DoD’s budgets are likely to remain flat
• Military will need to look at better ways of acquiring what it needs

![Four Big Entitlements](image)

Trends and Variables
Slides 23-25 summarize the major trends and expand on each by describing the range of variables that might influence the given trend
• Need to look at the country’s ability to adapt to the problems that the trends are predicting
• This research must come to some conclusion about what is most plausible in the future
• Then there must be some consideration in acquisitions about the capabilities that will be applicable across several of the most plausible futures
• Corporations that are transnational may not be constrained by any government regulation
  • Their focus is on making money for their stockholders who may be all over the world
  • So what they make may not be under the control of any one government
• Impact of religiosity as radical Islam grows it could come in conflict with traditional governments
• Economies will become more Asian influenced
  • The variable will be how well a growing economy can float all boats
  • Improving economies can be helpful to people in rural areas or may not
  • Elements of power that are growing in Asia could check US growth
• Closer identification with own cultures may limit capabilities of governments to govern certain populations
• How will the US handle moving from its single Superpower status to a situation with two or three?
• Legitimacy issues for governments that need to handle many of the stresses described above
  • Many of these stresses come together in the Arc of Instability that cuts across much of the world
  • Superpowers may need to go in to handle problems that local governments fail to handle
• Nuclear proliferation complicates relations
  • Example: North Korea, which has no real economy, but because it may have nuclear weapons has the ability to push back at the countries that do have economies
  • Expect even more problems will arise with Iran if it acquires nuclear weapons
  • Non-state actors also want nuclear weapons as bargaining chips

Critical Uncertainties
Slides 26 lists a number of concrete examples of how different futures might play out based on the trends that have been described including:
• US long-term competitiveness which depends on elements such as low national savings rates / trade imbalances
• How China will manage to move from a communist to non-communist state
• Success of nuclear containment
• What new items will come out of the combination of the rapidly developing info/bio/nano/neural technologies
• Impact of a potential energy shock if entirely new ways of acquiring energy are developed
  ▪ Will relate to who has the new supplies / who can buy it / who can control it
• New forms of government in Russia, China, Saudi Arabia, etc. since change is likely but how well it is handled will be critical
  ▪ Near term example may be Pakistan and what side ultimately controls it
• Centuries-old schisms in Islam may be coming to a head or at least more visible to the US
  ▪ There are forces from both Iran and Saudi Arabia
  ▪ More proxy wars (like what is going on in Iraq) could occur and US could be dragged in
• Climate change complications

JOE Chapters 1 and 2 deal with trends; Chapter 3 discusses what the various trends mean to the future joint force and what needs to be done about them

Enduring Challenges
• These have been seen before but always a little different
• Conflicts with other Great Powers – not that likely
  ▪ But big impact, especially if China or India become more hostile
• Collapse of currently functioning states
  ▪ Could happen anywhere in the arc of instability
  ▪ Pressures are increasing and could be complicated by issues such as the capability to grow crops
• Potential opportunities also arise from changes but need to be thought about ahead of time
  ▪ Must be flexible to handle off-shore balancing of the Asian economy
  ▪ US can push countries and help them get fully involved in economic world order
  ▪ North Korea has nothing to do with world economy now
  ▪ Corporate Security Engagement – when whole government gets involved
  ▪ Not everything is combat, much can be done with economics
  ▪ US needs to emphasize concept that peace is cheaper than war

Emerging Challenges
• Potential for an increased number of failing governments
• Anti-access strategies and capabilities are increasing
  ▪ China may have a stake in the world economy but still may want to guard something (Taiwan) by controlling US ability to interfere
  ▪ Both Russia and China are developing high tech ways to keep the US out of given areas
  ▪ US needs to keep open all major waterways, trade routes, etc.
• Although the global finance system is relatively robust, the impact of a major attack on it is difficult to estimate
  ▪ Those countries that now have a stake in the system may be less likely to cause problems
  ▪ Still must always be ready to handle such attacks
• Persistent cyber conflict
  ▪ Requires increased cyber security for all
  ▪ US government already under attack by those probing the systems
  ▪ On the other hand, the US also has ways of getting back at those who attack it
  ▪ Increasingly complex information systems have both great power and great vulnerability
• Anti-Americanism is growing
  ▪ Need to ensure that rising tides of wealth help to float all boats in the world economy
  ▪ Rising wealth does cut down on the number of reasons for conflict
• US strengths are its leads in airpower/technologies/etc. – and US must keep those leads
• US economy is relatively flexible and resilient and it must be kept that way
• Such things as US ownership of internet domain-name and root servers can help by providing the ability to disrupt adversary cyber-systems

Shocks
• By definition they are hard to see coming but have big impacts
• Also hard to plan for but must do some anyway
• Example: energy disruption
  ▪ Allies are even more dependent on fragile sources
  ▪ Most of the sources of energy are now in unstable areas
  ▪ Planning for a shock could involve finding ways to mitigate dependencies and ensure a stable flow of energy

• Example 2: Nuclear attack
  ▪ US once had studies about how to work in a nuclear environment – need to go back to such studies to be ready just in case

Opportunities
• Find better ways to produce energy
  ▪ Hydrogen highways already appearing – only hydrogen-powered cars allowed to travel on them
  ▪ Once good fuel cells are developed hydrogen power use will explode
• US needs to stress that in a globally-connected economy those who start wars are the ones most likely to suffer
• US must be able to track nuclear weapons use and must make it clear that it is being done to dissuade potential use

Chapter 4: Joint Force Implications
Must first understand the elements of conflict
1. Terrain – physical / human / economic / etc.
   ▪ Basic context of where conflict happens
   ▪ Example: the Pacific Theater in World War II terrain was vast seas with a few scattered islands and large land masses on one side
     ▪ US and Allies oriented their combat on the seas
     ▪ Asian countries oriented their combat all along the land masses to the west
2. Base – can be physical or moral
   ▪ Read Tony Echeverria, a Clauswitzian writer, on center of gravity – where strength comes from
   ▪ In Pacific Theater example: combatants moved from one island to another – fire and maneuver
     ▪ Got strength from one island to attack the next island
3. Force Application – ability to impose one’s will on an opponent
   ▪ May be maneuver and fires for the military or position and influence in non-military areas
4. Knowledge – ability to gather / integrate information to use in planning actions
   ▪ Helps combatant to decide where to put bases, what weapons to use
5. Command – central to all combatant actions / application of force
   ▪ An understanding of why you are doing what you are doing

Terrain in the Global War on Terrorism involved many places in the world
• May not be just physical
• Advances may create cultural friction in the human terrain
  ▪ Others will see the world differently and believe that their way is the right way
  ▪ US must understand this different view in order to pursue its advantages and take advantage of the other side’s weaknesses
• US must be perceived as a legitimate actor
• Not just a DoD approach
• Not just the whole US government – need cultural willingness to win
  ▪ Must understand where we are coming from

Base – power is moving away from nation states
• Moving toward religious and ethnic bases
• Must understand these bases to know how to handle the problems they present
• One big help has been the accessibility presented by today’s global commons
• Must also be ready to protect your own base

Force application – involves fire and maneuver but also other things like information applications
• Current US dominance in traditional combat capabilities will force adversaries to look for alternative means including such things as cyber warfare
• Adversaries will avoid open / less complex environments
  ▪ Example: Baghdad is preferred terrain for adversaries since the city has many diverse areas that all need to be handled differently
  ▪ Will run into this more as world becomes a series of mega-cities
• US may not always be able to maintain its traditional dominance so will need alternative responses, too
• Cognitive domain – need to understand abilities in information operations
  ▪ US may have had more success than we think
  ▪ Al Qaeda does not see itself as being as successful as we generally think
  ▪ Always will be a problem with understanding where non-state actors stand
• Lawfare – the ability of adversaries to operate within the US legal system
  ▪ Means US can’t respond because of following its own laws
  ▪ Adversaries don’t follow those laws but make use of them

Knowledge – information operations and perceptions
• US reliance on its information systems could be a vulnerability
• With very little cost any one could acquire sub-meter imagery to be used in planning of or feedback after physical attacks
• Organizations must be able to take advantage of information ubiquity
  ▪ The faster user will be better off
  ▪ Must also understand how the other side will use the information

Command – there are problems with the fact that the US cannot always use the technological advantages that it has
• Commanders must be comfortable working with networks most of the time to avoid hierarchy relationships
• However, when networks fail, need to drop back to the hierarchical order to ensure things get done
• Example: internal communications networks may shut down when faced with a bomb scare
  ▪ Need an SOP or other arrangement to tell people what to do
• Commanders must understand that many elements they dealt with separately are now coming together

The JOE Summary Slide
• Challenges are blurring
• Challengers are blurring
• Expect a high rate of change and surprise
• Surprises will be a certainty

QUESTION AND ANSWER SESSION

Deep Futures Conferences
• Focus on specific regions – example: Post-Iraq war game
  ▪ Brings together experts from DoD, rest of government, commercial international enterprises, academia
  ▪ Discussing questions about the MidEast if 1) it becomes stable or 2) it breaks down into chaos
  ▪ Looked at regional and world-wide impacts and influences – example: How would Russia see this?
• Such conferences have not been done for all regions
  ▪ Other organizations may be working on other regions
• More such conferences are planned – within the limits of a flat budget
• DoD’s budget is flat but it does still have funding for exercises, etc.
  ▪ Other parts of the government even more constrained by budget problems
  ▪ Representatives from the rest of government have come for major events and have been very helpful
    ▪ Often can get help from retired experts who maintain good connections with their former departments
  ▪ Rest of government acknowledges that they have a role to play
    ▪ DoD says they will do something then other elements of the government will jump in to claim that it is their job to carry out a given task
• The JOE is being read by others in the government
  ▪ It sets scenarios for all elements to come together
  ▪ Making inroads with others but not enough
The JOE will never be a signed document – constantly evolving through conferences, etc.
- Designed to be the best possible document with new ideas being added all the time
- So will be published every few years as a final draft
- Problems occur when a document for signature must go both up and down a chain of command
  - Someone always wants to take out something
- The 2008 version will have a signed letter of transmission to extend the impact of the JOE

DoD is called in when things go wrong
- If things are going well, then you don’t need a soldier
  - Need bankers, merchants, etc.
- Need to determine what forces are needed ahead of a crisis so that such arrangements become regularized
- Seizing opportunities is more offensive than defensive but is better way to stay ahead of challenges
- There may be a need to push more to get more agencies involved

The New Maritime Strategy
- JOE is well connected since its current director came from OPNAV N-8 where the new Maritime Strategy was written
- Maritime strategy is discussed in the JOE – but only as part of any solution
- Tried to avoid taking service positions in the JOE

Fourth Generation Warfare
- Really only a model for how to look at levels of conflict
- Have involved the Transformation Advisory Group (high level members including Newt Gingrich and Hillary Clinton)
  - Already discussing what is next in Fifth Generation warfare
  - Discussing what is possible
- Not universally understood so hard to talk about it
  - What would 5th Generation warfare do with a biological weapon?
- Really talking about the nature of the threat