DEFENSE BUSINESS BOARD

Audit/Performance Data Use & Analytics in the Private Industry, and applicability to the DoD

November 10, 2020

21-S-0304

Approved by the Defense Business Board on 10 November 2020

Table of contents

Assignment

The Deputy Secretary of Defense directed the DBB to examine the following areas:

- Assess the use of audit and performance data in the DoD
- Examine how audit and performance-related data and analytics are used by leading companies in private industry to gain insights and drive successful outcomes
- Provide recommendations to assist Department executives in optimizing decision-making to ensure their business outcomes are efficient and effective, now and in the future

The Specific Terms are outlined in the Appendix, while specific responses to the TOR's tasks are laid out in the accompanying document

For the purposes of this overall presentation, however, we decided to combine these into the logical and actionable segments described above

Context

1. Although the DoD's annual audit plays an important role, this study is not about the audit process. It's about the ***data*** collected from the audit and its potential use through analytics

2. DoD recognizes the fact that as a result of the audit, it has begun to collect vast amounts of financial transaction data, which if properly analyzed, could reveal significant opportunities for internal improvements

3. DoD's existing practices of data management and analytics has started comparatively recently, taken on increased urgency, and is behind the private sector for many reasons

4. DoD needs validation and insights from leading practices in analogous private sector companies in order to design, manage and implement a powerful data management and analytics capability

5. DoD leadership needs specific recommendations, given current DoD initiatives and based on private sector leading practices, in order to achieve NDS and Cost goals

The Task Group & Methodology

DBB Task Group Members
Dr. Chris Gopal (TG Chair)
Mr. John O'Connor
Hon David Walker

Staff Support
Col Chuck Brewer, USMC
Mr. Web Bridges, DBB Staff
Mrs. Leah Glaccum, DBB Staff

Process & Methodology

- The quick turnaround and wide scope required a focused approach at an executive level
- Conducted 50 **interviews** (senior executives & thought leaders) in the DoD, private industry, think tanks, & academia, using a structured set of interview questionnaires
- **Researched** the current state of private industry leading practices using wide variety of secondary research sources & white papers
- **Described 4 case studies** on audit/big data management and analytics leading practices.
- **Examined a number of strategies,** studies & reports from the DoD and GAO
- Studied germane statutory requirements

All interviews were conducted under Chatham House rules so that interviewees could feel free to provide honest and frank feedback without fear of retribution or consequence. In addition, 2 of the companies featured in the caselets asked that their names not be mentioned

“The Bottom Line”

- While DoD is much larger and varied than private sector companies, the current urgency of increasing threats, technology development and expected additional resource constraints mean that data must be treated as a “strategic asset” and data management and analytics needs to be a top priority
- DoD has launched initiatives consistent with the leading practices in private industry, is making progress on its data challenges but lags leading private sector practices by a wide margin. Leaders know what strategies are required.. the key is execution
- The CDO and Data Council must be empowered, formalized and made accountable for the data strategy, its operationalization and data quality. Data ownership must lie with the data originators and both analytics and data processes must start at the “front-line”
- Both civilian and military leadership need to be held responsible and accountable for implementing the overall data strategy. It needs to be part of the ongoing performance management and related processes
- The data strategy at the CDO and agency levels must be funded and budgeted
- A Change Management Program must be initiated from the very top to demonstrate the value proposition and linkage of data, collaboration and analytics to achieving NDS and cost goals, as well as unit and individual objectives

“The Bottom Line”

- All key data needs to be automated using tablets, where appropriate, and manual record keeping needs to be discontinued by a specific date
- Sophisticated data analytics and AI capabilities will not be possible until the DoD can generate timely, complete, comparable and accurate data. In addition, an unmodified opinion of the DoD financial statements will not be possible until this criteria is met
- Dashboards should be based on the most vital data for key decision making, and should be a collaborative effort with the users
- DoD needs to upgrade its data management and analytical personnel using expedited hiring, appropriate requirements and enhanced training
- Enterprise Data lakes/pools (e.g., ADVANA) should be mandated for use in key decision making
- Existing financial/ERP systems need to be significantly rationalized and reduced with End-of-Life Dates established and funding adjusted

The Imperative

The urgency to treat data as a "strategic asset," to improve and innovate DoD data management and analytics is driven by three main factors:

- *The China threat* and, in particular, their adoption of the "whole of society" approach to national datasets, including all foreign people and firms. This is collected and utilized under their "Civil-Military Fusion" doctrine and supporting Cyber Security laws. This approach was articulated by Xi Jinping saying that China needs to "promote the deepened integration of internet, big data, and artificial intelligence with the real economy." The threat includes the Chinese control of the supply and manufacturing of many critical supply chains and the data that drives them. DoD must understand that they are in a unique position as the only department which can lead a drive for whole of Government data aggregation and utilization
- *The accelerated and exponential development and implementation* of new data, "intelligence," and analytics technologies
- A lack of urgency in adoption and use could place DoD behind its peer competition
- *Cost pressures* on budgets and defense spending that drive the need for data and analytics to drive efficiencies

https://www.ft.com/content/e33a6994-447e-11e8-93cf-67ac3a6482fd
https://www.forbes.com/sites/cognitiveworld/2020/01/14/china-artificial-intelligence-superpower/?sh=e15f65b2f053
https://www.cnas.org/publications/reports/rising-to-the-china-challenge
https://www.rand.org/pubs/research_reports/RRA176-1.html

DoD: Current State

- DoD has begun a journey to manage its data more strategically, with several initiatives that are consistent with generally-accepted leading practices in the private sector
- DoD's senior leaders responsible for data management and analytics know what must be done, however, there are some obstacles and challenges

DoD: Current State
The Journey has begun

DoD is undertaking, and has launched, several initiatives that are consistent with generally accepted leading practices in the private sector

- The necessary skillsets are in place at the top, and the data and analytics leaders recognize most of the issues and challenges raised in this report
- The 2019 Digital Modernization Strategy and the 2020 Data Strategy both establish a good framework
- The initial establishment of a CDO Council responsible for data governance.
- The implementation of a data lake strategy (e.g., ADVANA), where data is populated based on executive information needs
- The force function from the top of using real-time data from the approved data lake (ADVANA) as the basis for status and management decisions
- Analytics and dashboard development based on the top leadership needs (which is necessary but not sufficient)
- A nascent data sharing culture is developing in the DoD (but not all data & it is not pervasive) across agencies
- The proposal of a senior executive to oversee the hiring and retention of scarce “data warrior” talents (a new innovative concept)

https://www.fedscoop.com/usda-assistant-chief-data-officers/

DoD: Current State
But….Some Challenges

The DoD faces several challenges and some key management imperatives in achieving a goal of a "data-driven" warfighting machine - lack of urgency and the Empowerment and Funding of the CDO and the CDO Council

The Urgency:

- The pace of implementation and change is slow and relies on voluntary collaboration
- Our interviews have reveled that there is a lack of urgency in developing and executing data management and analytics to a world-class status

The CDO and the CDO Council - Empowerment, Funding and Organization:

- The CDO Council does not formally include all the CDOs and data owners from the different agencies and organizations, however, the CDO communicates with all executives and maintains excellent relations with them
- The CDO and the CDO Council does not have the appropriate authorities to implement collaborative strategies. This is compounded by title 10
- There is insufficient budget committed to realistically design, drive & implement the data strategies, technologies and initiatives - in data, analytics, legacy systems & business systems rationalization. Strategic planning for data is not consistent with budget allocations to support it
- Additionally, the funding of software and systems follows the same pattern as other DoD funding, even though the dynamics and time frames of design-development-implementation are very different

DoD: Current State
But….Some Challenges

The DoD challenges include a lack of vision and appreciation of data and analytics in achieving NDS and cost goals, a slow hiring process and lack of necessary skillsets

Culture:

- The different organizations (at all levels) do not have a consistent vision of the end state, or the value that across-the-board data sharing (instead of “hoarding”), collaboration, data management and analytics provide directly to the NDS and cost goals
- Senior level leaders in the Services and DAFAs have a strong appreciation for the use of financial data to identify operational efficiencies and improvements, however, there are inconsistencies on the degree to which this appreciation cascades down their organizations. The focus on analytics and dashboards seems to be mainly at the senior management level, with little on the front-line operator level
- The focus of DoD leadership appears to be on the excitement of advanced technologies, not on the basics of data accuracy and completeness

People/Skills

- There is a lack of internal resources that we can define as ”data warriors” to implement the data modernization and data strategy (e.g. translators, scientists, domain expertise and process design)
- The hiring process is too long for DoD to be competitive in the recruitment and retention of data warriors. DoD has no value proposition to attract and engage them

DoD: Current State
But … Some Challenges

Some additional challenges include far too many redundant and outdated systems and a lack of complete and standardized data

Complexity, Redundancy:

- There are **far too many** business information systems through the DoD, many redundant or using outdated technologies, and many protected by their "host" organizations (our interviews surfaced over 326 different and separate financial management systems, over 10,000 different and disconnected data management systems, and 4,700 data warehouses)

- The plan to decrease those systems (Investment Management Guide for Defense Business Systems) is not aggressive nor does it hold DoD entities accountable for reducing the number of those systems

Data:

- Data is not always accurate, complete or standardized throughout the DoD, and this makes it difficult to effectively use the data. The use of data can be characterized as fragmented and siloed, but progress is being made as DoD entities move through the data maturity process

Private Sector:
Leading Practices: Data

A strong, centralized data strategy, including standardization, completeness, ownership, developed and owned by an Empowered CDO and Data Council

- Development of a strong, centralized data strategy that includes governance, ownership and accountability, metrics, accuracy and completeness, standardization and Master Data Management, and technologies
- The Data Strategy is developed by the CDO or the Data Council, depending on the scope and complexity of the organization
- The entire data and analytics journey begins with data - accuracy, completion processes, “cleansing” and standardization across the organization
- Some leading companies adopt a data maturity model to guide themselves and set milestones on their data journey. Some of these models are standard commercially available models (e.g., from CMMI or DCAM), while others are tailored to the specific company’s situation

(For example: One of the world’s largest professional services firm uses a tailored [from an “off the shelf” available model] data maturity model to guide and measure its own progress)

Private Sector:
Leading Practices: Data

Data completeness and accuracy processes, along with analytics to run the business must start at the operational "front-line' level

- Digitalization and analytics starts in "front-line" where operations are conducted and data is generated. This is the basis on which the business runs and is executed. It then moves to the executive leadership where the business is run, course changes are made, and strategies are developed

(For example: A major global multi-BU corporation began the effort to start collecting, digitizing and cleaning data at the lowest level.- the "front line." Project teams visited the front line workers on manufacturing plants, warehouses, testing facilities, loading docks, etc.)

Private Sector
Leading Practices: People and Culture

A Data Culture which includes understanding of the criticality, involvement, and the right skillsets are critical in the organization

- A Data Culture: where people at all levels recognize the importance of data and analytics to achieving their individual goals, BU goals and the competitive goals of the company
- People at all levels and Business Units are involved in the development of analytics that they use and are needed for the effective functions of their job
- All the companies are faced with the issues of a lack of talent and devote time and effort to addressing this
- Key people that private companies are looking to hire include data translators, scientists, domain experts and process engineering

(For example: In a global multi-BU organization, the CDO recognized that the organization did not have the right skill-sets to either design or execute a digital transformation. As a result, 76% of the core project team was populated from people brought in from the outside of the company. 80% of these people had thought leadership, functional and domain expertise, with hands-on responsibilities and the remainder were analytical experts with less technical background. Internal hires to the core project team were high-performers with a strong familiarity for how the enterprise worked. As the initiative progressed, the data and analytics expertise was distributed between the BUs and the Corporate team (which essentially worked as a Center of Excellence). One of the responsibilities of the Corporate "CoE" was to provide training and support to the BUs)

Private Sector
Leading Practices: People and Culture

Hiring processes and requirements must be developed "out of the box" and decisions based on fast a part of the culture

- Fast hiring processes and value propositions are necessary to compete against other companies; Some leading companies use a fast track process for this

  (For example: a major global consumer products company, realizing that they would have to contend with years of embedded practices and attitudes to hiring, implemented an "Express Lane" hiring process for both the Corporate CoE and BUs)

- Unintentionally utilizing low quality data to perform data analytics can harm the organization and affect overall trust in the data

- People make decisions based on data - "fact-based decisions," and measure decisions and progress based on facts and hard data

  (For example: in one of the largest professional services/audit forms in the world, the CEO met with all the global senior leadership in one set of sessions, jointly set key goals in terms of their competitive imperatives. While the cultures were different, the objectives were the same. They then took these all the way to the BU and individual performance measurement across the globe. The metrics were built it into the regional/BU leader's' performance metrics and driven lower down in the organization to the junior levels. This removed much of the pointless reporting and focused on what mattered. It was only after this step, where acceptable decisions were made on accurate data, they they started evaluating their analytics – what problems were they wanting to solve, and what it was they wanted to analyze)

Private Sector
Leading Practices: Governance

An empowered CDO, CDO Council, with the necessary authority, budget and centralization/decentralization ownership is critical to success

- Leading companies appoint a CDO to develop and own the data strategy, standards and analytics, usually in a Federalist model
- The CDO, if in a conglomerate or multi-national organization, runs a CDO Council composed of executives (sometimes other CDOs) from across the organization, or functional heads, who are tasked with owning the data and analytics in their organizations
- The CDO office, CoE, Data Strategy and implementation, and technologies are all budgeted with resources and people - both centrally and funded through the different BUs and functions
- A combination of centralization/decentralization is used, where data standards and strategies are centralized, corporate-level analytics development is centralized, and BU/functional-level analytics are decentralized

Private Sector
Leading Practices: Governance

Centers of Excellence are vital enablers

- Centers of Excellence (CoE) - usually under the CDO - are set up to provide several functions - a place for scarce talent, a place to train internal people through a rotation method, a place to collect and disseminate leading practices, a place to conduct collaborative design, development and implementation sessions with people from across the units, and a non-threatening place to raise the entire level of the organization

(For example: The world's largest company established a CoE called its 'Data Café.' This CoE is a state-of-the-art analytics hub located within its headquarters. This hub works to reinforce the data driven culture by not only providing centralized analysis but pushing out governance models for standard analytics)

Private Sector
Leading Practices: Analytics, Dashboards and Technology Management

A Vision and Analytics Design are Critical Elements

- Many leading companies are adopting the practices and strategies for Industry 4.0 - an overarching set of strategies and a vison for the digitalization future. We believe that our major competitor has adopted this:

  "Enable autonomous decision-making processes, monitor assets and processes in real-time, and enable equally real-time connected value creation networks through early involvement of stakeholders, and vertical and horizontal integration"

- Leading companies view and address (design, implement) dashboards and analytics by **Category** - Strategic, Operational and Tactical, depending on the nature of the information, decisions and organizational level, and **Type** - Descriptive, Predictive and Prescriptive (Intelligent algorithms) - they start with Descriptive, then move up to Predictive and Prescriptive
- KPIs - are kept to the critical few (and these are determined carefully)
- Equally important, they view the real value of advanced analytics as coming from the "intelligent" analysis of multi-BU, multi-functional "Big Data"

  (For example: A major entertainment company, whose success , or failure, depends on the pinpoint assessment of consumer needs, has developed a system to analyze such data. They are among the most successful companies of their class, and they have shown that "intelligent" analytics outperforms executive non fact-based decision making consistently)

Private Sector
Leading Practices: Analytics, Dashboards and Technology Management

Advanced Dashboard Design geared to rapid and accurate decision-making is necessary

- Dashboards are designed by the people using them in collaboration with analytics, visualization and data experts, and the design of dashboards, regardless of level, is done to maximize decision-making potential (visually and type of information presented) and to prevent information overload. Dashboard/Visualization is designed to be interactive, remote and usable from a variety of media, determined, naturally, by cyber-security and reaction-time standards
- Several companies have developed interactive “cockpits” for their executives to keep track of operations, trends and to help run the business

(For example: One of the biggest global CPG companies, for example, developed software that allows their executives at any level in the company to customize dashboards for themselves. This customizable dashboard app is called their ‘cockpit’ and users can put it on their smartphones, tablets or laptops. The users are given the ability to customize which performance metrics, lines of business, etc. that interests them)

Private Sector
Leading Practices: Analytics, Dashboards and Technology Management

Reporting must be at a granular level, while the assessment and acquisition of technologies must be done in a measured fashion. Rationalization and reduction of existing business systems is a necessary component

- Reporting is done at the lowest granularity possible - it is felt that this can always be raised to higher levels of aggregation if needed - and at as near real-time as necessary depending on the information needed

  (For example: A major global conglomerate started the process by designing analytics to help front line workers measure success and goal progress. The project mantra was to focus first on the trenches and then work their way up the organization as they built a strong and reliable foundation of clean data)

- Technologies are never invested in for production until rigorous requirements are defined in collaboration with users, ROI (including strategic, non-quantifiable factors) and time to value/implementation are estimated. Most of these technologies/concepts are first evaluated with "Proofs of Concept" to determine their viability, economics and scalability

- Leading companies rationalize and harmonize their existing business information systems to eliminate redundancy, costs, confusion and take them down to a few

  (For example: A major global diversified company took over 6 years to reduce its number of ERP systems from over 600 down to 32. They too adopted a "data lake" strategy to gather raw data into a single source of truth)

Private Sector

Leading practices: Using Financial Data for internal improvement

As a result of the Audit, DoD has a considerable body of financial transaction data. Leading private sector companies use this data to analyze and drive significant operational benefits. Some of the major areas include:

- **Receivables:** Receivables analysis can increase payment velocity, decrease probability of default, & recoup owed money
- **Payables:** An analysis of payables and spend analysis can reveal the spectrum of terms, adherence to terms, spend by vendor, source and category -to drive improved terms, multiple sourcing and risk management, and, in some cases, surface potential collusion or supplier favoritism by procurement managers
- **Inventory:** Analysis of inventory data predict spending, reduce over-ordering, avoid shortages, examine consumption and service levels, reduce excess and obsolete inventory, re-distribute and rebalance inventory by location as needed, optimize working capital and, in general, highlight poor inventory management for action
- **Logistics:** Analysis of logistics (transportation and warehousing) can reveal directional trends in use of modes as well as their related costs, expediting and effectiveness of planning. Additionally, analysis of warehouse volumes and costs can highlight inefficiencies, usage and storage requirements
- **Vendors & Acquisitions:** Analyzing procurement financial data can uncover insights for negotiations, vendor segmentation, vendor performance management, annual purchasing strategy, drive improved sourcing, better pricing & terms

Private Sector
A Vision of the Future of data, analytics and "intelligence"

One leading expert, familiar with both the history of technology in the DoD and the private sector, described and painted a vision of the future of data and analytics:

"Everything companies are doing today can be described as linear improvement along the same flight path.

What if there is a way to tackle the data accuracy, completeness and "intelligent" analytical issues to develop and implement standards, ensure data accuracy and completeness, and develop complex analytics and algorithms quickly?

For example, like the COBOL initiative in the DoD?"

This got us thinking - can today's DoD envision and do something similar?

Private Sector
Applicable case studies for lessons, practices, validation

We identified, interviewed and researched leading companies to provide case studies with strong relevance to current DoD challenges

Case Study 1
- Global professional services firm, 300k employees & $37B annual rev
- Multiple autonomous business units around the globe with different metrics to measure performance & service output
- Poor data collection, quality & infrastructure were all issues preventing internal improvements & marketplace dominance
- Lack of modern data infrastructure limited analytical capabilities that were critical to improving organizational health

Case Study 2
- World's largest retail company, 2.2 million employees & $500B in rev
- Data infrastructure not sufficient to collect, organize & analyze massive quantities of daily transactional data
- Lack of analytical & data management skillsets were limiting growth of company analytics
- Market competition & need to recapture expenses drove need to use real-time data collection to drive decision making and resource allocation

- Multiple autonomous entities
- 2 million employees
- Data infrastructure & quality issues
- Data access issues
- 100's of legacy systems
- Unenforced data governance model
- No incentive/disincentive for compliance with OSD directives
- Nascent data analytics capability
- Org lacks analytics talent & skillsets
- Need for predictive analytics to aid decision making
- Needs appropriate dashboards at each level
- Peer competition creating pressure to drive internal improvement quickly

Case Study 3
- World's largest consumer pkgd goods co. with $65B in annual revenue
- Operational focus on procurement, manufacturing & logistics
- Increasing market competition created the need for internal analytics to drive internal efficiencies
- Multiple manufacturing facilities with analog data collection needed to digitize and drive real-time data
- Enterprise needed dashboards to aid decision making at every level, especially the front line

Case Study 4
- Multinational industrial conglomerate, 200k employees & $100B in annual revenue
- Enterprise grew through mergers & acquisitions
- High tech manufacturing operations with multiple autonomous BU's around globe with legacy IT systems
- Data sharing, data quality & accountability were issues across the enterprise
- Ineffective data governance model
- Buy-in & increased support needed by senior executive team

These lessons are built into the Leading Practices

DBB Recommendations

DoD is moving in the right direction

- The DoD CDO and Data/Analytics leaders know what needs to be done.
- However, the key lies in operationalization of the The Digital Modernization and Data Strategies, empowerment of the function to implement, adequate budgeting and funding, and a strong change management and communication program to institutionalize the necessary changes

Our Recommendations center around 4 areas:

- Governance, the Chief Data Officer, People and Culture
- Data, Analytics, & Implementation
- Technologies and Systems
- Suggested Future Initiatives to Consider

DBB Recommendations

Governance, the Chief Data Officer, People and Culture:

- Require the CDO Council to develop roles and responsibilities for CDOs across the entire enterprise and implement the data strategy and standardization for the DoD. This CDO Council should be held accountable for the data
- Expand the CDO Council to include CDOs/data owners from across the DoD. They already have all the CDOs. Consider creating subgroups within the CDO council that focus on DAFAs and or other key tenants of the data strategy
- Have the CDO and CDO council members operationalize the DoD Data Strategy with the necessary resources, budgets and authority to execute
- Ensure the ownership and accountability of data with the originating owner
- Provide enterprise level funding to the CDO to implement the 2020 Data Strategy. The CDO is identified as the responsible executive, but the budget to fund the strategy rests with the Services. To remedy this incongruence, senior Department leadership must ensure that the Military Services and DAFAs, matrixed through their own CDOs to the Department level CDO, allocate the budget required to implement the modernization and data strategies across the Department
- Develop a “express lane” hiring process for “data warriors” (outside of the regular hiring process) with appropriate requirements suitable for the skillsets and people involved
- Consider having a separate executive responsible for the hiring and retention of these “data warriors”, perhaps reporting into the CDO or Central HR. A recent DIB study suggested the establishment of a “Digital Peoples’ Officer” - a concept whose time may have arrived given the increasing role of data as a “weapons system”
- Establish a Center of Excellence for Data Analytics under the CDO
- Put teeth into the CDO mandate and data management via PPBE process and performance measurement

DBB Recommendations

Data, Analytics, & Implementation:

- Design and Implement a Change Management Program under the direction of the CDO and transformation experts, to include:
  - Value Propositions linking data and analytics to the individual, Agency, NSD goals and costs
  - The End State that can be communicated
  - Communication program emphasizing data and analytics as “key weapons systems”, along with the processes, metrics and approaches
  - Use of data and analytics in fact-driven decision making
  - Use of dashboards
  - Data entry and accuracy processes
  - And make it public with the gravitas attached to the various secretaries and the DSD
- Formalize the use of the selected analytics platform (e.g. ADVANA) and the “data lake” strategy to provide the “single source of truth” for the DoD Critical Data, and to be used as the basis for management decisions and status
- Set in place Task Forces run by the CDOs/Data owners of different services to fan out to the field, start developing data accuracy and completeness entry, maintenance and ownership processes
- Cross-functional teams (including data translators, visualization, functional and users) to design “ideal” dashboards and functionality- including cockpits for rapid information and trend assessment
- Cross-organizational, cross-functional workshop to develop Analytics design, metrics (real KPIs and metrics) and high-level requirements

DBB Recommendations

Technologies and Systems:

- Halt and re-set all data and analytics systems acquisition and development until detailed user-driven requirements, return on investment (ROI) and time to value estimates are made
- Systems to be reviewed and assessed include Robotics Process Automation, extract transform & load (ETL), artificial intelligence (AI), etc. - starting with the data and then moving upwards
- Start on a process to rationalize and harmonize the mass of business information systems within the DoD, putting "teeth" into this with budgeting for new technologies and removing funding for old and redundant systems
- Consider changing the funding pattern of data and analytics technologies to follow the life cycle pattern of design-development-testing-implementation-maintenance-replacement

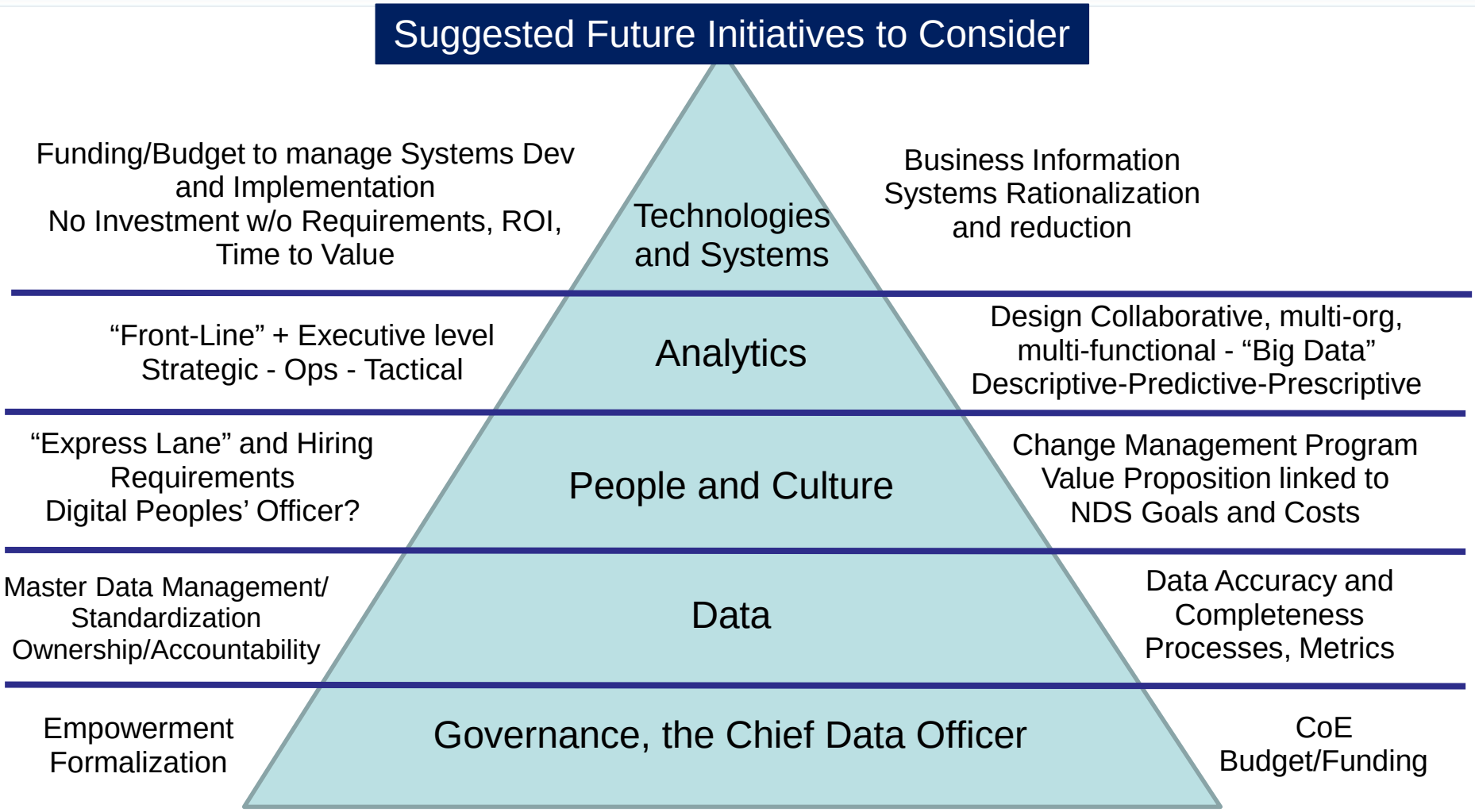
A Future Initiative?

To quote from a leading and innovative thinker we interviewed (and one with knowledge of technology in the DoD and the private sector):

> *"Everything companies are doing today can be described as linear improvement along the same flight path. What if there is a way to tackle the data accuracy, completeness and "intelligent" analytical issues to develop and implement standards, ensure data accuracy and completeness, and develop complex analytics and algorithms quickly? For example, like the COBOL initiative in the DoD?"*

This is a visionary initiative that could be funded on a research basis (somewhat like what is done in DARPA), **and is one that, with American ingenuity and innovation, will put the US and the DoD far ahead of its adversaries**

DBB Recommendations Summary



“The Bottom Line” - Revisited

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- DoD has launched some initiatives **consistent with the leading practices in private industry** and it is making progress on its data challenges, however in terms of analytical capability, the DoD lags leading private sector practices by a wide margin. DoD leaders know what strategies are required, but the key is execution
- The CDO and Data Council must be empowered, formalized and made accountable for the data strategy, its operationalization and data quality. Data ownership must lie with the data originators and both analytics and data processes must start at the “front-line”
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- The data strategy at the CDO and agency levels must be funded and budgeted
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- Sophisticated data analytics and AI capabilities will not be possible until the DoD can generate timely, complete, comparable and accurate data. In addition, an unmodified opinion of the DoD financial statements will not be possible until this criteria is met
- Dashboards should be based on the most vital data for key decision making, and should be a collaborative effort with the users
- DoD needs to upgrade its data management and analytical personnel using expedited hiring, appropriate requirements and enhanced training
- Enterprise Data lakes/pools (e.g., ADVANA) should be mandated for use in key decision making
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Appendix

Terms of Reference

List of interviewees and Organizations

Task

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Task Specifics

The Task Group was specifically asked to address the following within the DoD:

- Review how DoD uses data, describe any major challenges in using it for decision making, and identify any clear opportunities for improvement based on private industry best practices
- As we improve the quality of the financial statement and the underlying transaction level data, recommend how DoD can change its business practices to be more efficient
- As we improve the quality of the financial statement and the underlying transaction level data, recommend how DoD decision-makers can best take advantage of this data

Task Specifics

The Task Group was specifically asked to address the following from Private Industry:

- Examine how financial statement data and transaction level operational data is used in the private sector and how it could be applied to government (both for senior level decision making and for operational improvement
- Share/explain analogous, world class private sector examples
- Explain unique characteristics of the public sector that may limit or hinder application of private sector best practices and provide mitigation strategies, as appropriate
- Identify the leading private industry best practices of data management, analytics, dashboards, and decision processes
- Provide specific recommendations and options for the presentation, periodicity, and organizational level of reporting financial statement and transaction level data to inform decisions
- Provide specific recommendations and options for additional reform, to include tools and/or modifications to existing decision processes
- Any other related matters the Board determines relevant

Interviews

Mr. Taka Ariga, Chief Data Scientist & Director, Innovation Lab, Government Accounting Office (GAO)

Mr. Corey Bean, Senior Manager, PricewaterhouseCoopers (PwC)

Mr. Jonathan Breul, former Executive Director of the IBM Center for The Business of Government; former Senior Advisor to the Deputy Director for Management, OMB

Mr. Michael Condro, Partner, Leader of US Audit Industrial Products & Construction (IP&C), Deloitte Touche Tohmatsu Limited (Deloitte)

Mr. Michael Conlin, Chief Business Analytics Officer, OCMO

Mr. Bob Dacey, Chief Accountant, GAO

Dr. Das Dasgupta, PhD, Chief Data Officer, Saatchi & Saatchi

Mr. Tom Davenport, President's Distinguished Professor of Information Technology and Management, Babson College; co-founder, International Institute for Analytics; Fellow, MIT Initiative for the Digital Economy; Senior Advisor, Deloitte

Mr. Dante D'Egidio, Assurance Managing Partner, US-East Region, Ernst & Young (EY)

Mr. Mark DiMaggio, Global Head of Basel Capital Measurement & Analytics, JP Morgan Chase & Co.

Mr. Mark Easton, Deputy Chief Financial Officer (DCFO), Office of the Under Secretary of Defense (Comptroller) (OUSD(C))

Mr. Carl Gerber, Chief Data Officer, Deloitte

Mr. Doug Glenn, Assistant Deputy Chief Financial Officer (ADCFO), OUSD(C)

Mr. Diwakar Goel, Vice President and Global Chief Data Officer, General Electric; Board Member, MIT Center for Information Systems Research (CISR) Advisory and Research, MIT Sloan School of Management

Mr. Thomas Harker, Performing the Duties of the Under Secretary of Defense (Comptroller)/CFO (PTDO USD(C)/CFO)

Ms. Sara Hay, Assistant Director for Advanced Analytics, Innovation Lab, GAO

HON Lisa Hershman, Chief Management Officer of the Department of Defense

Ms. Alaleh Jenkins, Performing the Duties of Assistant Secretary of the Navy (Financial Management and Comptroller); Principal Deputy Assistant Secretary of the Navy (Financial Management and Comptroller)(ASN(FM&C), Department of the Navy

Ms. Mobola Kadiri, Deputy Assistant Secretary of the Navy (Financial Operations), (DASN (FO)); former Director for Financial Improvement and Audit Remediation (FIAR) directorate, OUSD(C)

Mr. Asif Khan, Director, Financial Management & Assurance, GAO

Mr. Mark Kristall, Partner, Internal Audit, Compliance and Risk Management Solutions, PwC

Mr. Kristof Ladny, Senior Advisor for Financial Data Modernization, Assistant Secretary of the Army (Financial Management and Comptroller) (ASA (FM&C)), Department of the Army

Mr. Mitchell Lawrie, Director of Transformation & Reform, OCMO

Ms. Suzanne Leopldi-Nichols, President, Global Business Services, United Parcel Service

Mr. Greg Little, Senior Staff Accountant, Director, ADVANA Program, OUSD(C)

Mr. Richard Lombardi, Deputy Under Secretary of the Air Force, Management (SAF/MG), & Deputy Chief Management Officer, Office of the Under Secretary of the Air Force (SAF/US), Department of the Air Force

Mr. Larry Malenich, Managing Director, Financial Management and Assurance, GAO

Ms. Angela Mangiapane, President, Mars Global Services (MGS), Mars, Inc.

Dr. David Markowitz, Assistant Deputy Chief of Staff, G-8, Headquarters, Department of the Army

Mr. Arthur Marshall, Assurance Partner, US-East Audit Innovation and Digital Leader, EY

Mr. Christopher Mihm, Managing Director, Strategic Issues Team, GAO

Mr. Jonathan Moak, Principal Deputy Assistant Secretary of the Army (Financial Management and Comptroller), Department of the Army

Dr. Donald Moynihan, McCourt Chair at the McCourt School of Public Policy, Georgetown University

Mr. Denis O'Leary, Associate, JP Morgan Chase & Co.

Dr. Tim Persons, Chief Scientist & Managing Director Analytics team

Mr. Azra Rebronja, JP Morgan Chase & Co.

Dr. Silvan Rubino-Hallman, PhD, Director, Transformation & Reform, OCMO

Mr. John Short, Partner, Federal and DC Area, EY

Mr. Lorenzo Smith III, CFA, Private Banker, JP Morgan Chase & Co

Mr. Dave Spirk, Chief Data Officer (CDO), Office of the DoD Chief Information Officer

Ms. Jacqueline Tame, Chief Performance Officer, DoD Joint Artificial Intelligence Center (JAIC), OUSD(C); GAMECHANGER, ADVANA NLP

Ms. Lorin Venable, CPA, Assistant Inspector General (AIG-FMR), Office of the DoD Inspector General

Dr. Casey Wardynski, Army Assistant Secretary of Manpower and Reserve Affairs (ASA (M&RA)), Department of the Army

Mr. Mark Weinberger, Former EY Global Chairman and CEO

Prof. Barb Wixom, Principal Research Scientist, MIT CISR

Deliberations and Vote
Audit Performance Data Usage in Private Industry Study